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Perceptual and sensitive aspects of the urban ground: sound, thermal and somatic.

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Abstract:

Sensory dimensions of urban ground have been little studied by architectural and urban research, forgotten behind their functional and ecological dimensions. It is nevertheless an essential element of the human scale of cities and contributes to the background of urban ambiances. In the perspective of drawing a new episteme of the urban ground, an element particularly linked to the whole bodily experience, we will evoke in this contribution mainly three sensory dimensions.

A NEW EPISTEME OF THE URBAN GROUND

The urban ground as an architectural and urban object contributes to the quality of public spaces as well as to the process of aestheticizing cities. The revival of urban planning initiated in the 1980s in several European cities (Barcelona, Bologna, Lyon, etc.) put an end to the all-circulatory thinking that had prevailed until then and places in the foreground the walkability of cities (Walk 21, International Walking Charter, etc.). In the millennium turn with the Sustainable Development Goals and then the growing global warming concern, we have witnessed a renewal for urban ground attention in its biological and climatic capacity, only pointing its leading role in the transitions models towards climate-neutral cities (World Soil Day, World Soil Year in 2015). However, the sensory dimensions of urban ground have been little studied by architectural and urban research. In its pedestrian uses, it is nevertheless an essential element of the human scale of cities and contributes to the background of urban ambiances. The foot treads on it, the eye brings it into the perceptual horizon without us dwelling on it. It is part of our first experience of movement, it is caught up in our sensory-motor scheme.

While sight is a common tool in architectural field, masking other ways of ambiance experience, we decided to focus on thermal, sound, and somatic sensitivities related to urban grounds and how they intertwine in urban mobilities, as we assume they offer new understandings about the planning, design of cities. What is urban ground in terms of sensory and somatic experience when you set aside the sense of sight? For this, we will start from updated fieldworks, resulting from a thesis and a team research, then present some of our methodological experimentations realized on site to grasp the multisensory relationship to the ground in contemporary urban mobilities. We will finally expose some archetypal urban grounds through examples of our fieldwork.

Body on the ground: a sensory-motor loop on an emotional background

Our body has several informative senses concerning the proper self, and concerning the outside-self. The senses allowing the capture of external information leading movement, are carried by the head (hearing, sight, smell, taste). The skin, the largest organ of the body, is a surface of exchange between the inside and the outside of the body. Thermoceptive, proprioceptive or kinesthetic sensors (including vestibular system, tactile pressure sensors under the feet, articular and musculoskeletal sensors, sight, etc.), which concern self-awareness in relation to a gravitational, oriented, climatic environment, help regulate the sense of balance and organize movement. We come into contact with the ground in a multi-sensory way, even if our relationship to the ground as adults is largely unreflective. Nevertheless, if we pay attention to the games played by very young children, we realize that this relationship is varied and rich. The ground, as a stable reference in the material world, as a support for the antigravity thrust, is a surface of contact inherent to the development of movement and walking. The young child gradually acquires the skills to reduce the surface of his support on the ground and to free his upper body. By progressively straightening up, by countering gravity, he builds his own body schema in relation to this first support to find his balance and walk.

The eye, like the foot, maintains an active relationship with the surface to determine its texture. This correspondence between visual and podotactile information is explored and enriched throughout life: through experience, we put in place what can be called the "haptic" aspect of visual perception, which informs us about the surface state of the material, its possible flexibility, allowing us to anticipate the proprioceptive adjustment for walking. This acquired skill is associated with sound information obtained by rubbing, rolling or tapping the foot on the ground in order to make a holistic picture of each ground. The ear is an organ of proximity (I hear myself walking) and distance (I hear others walking). As the ground is a "producing" and "propagating" façade by solidian way and by reverberation, the auditory and vibratory sensitivities

are especially linked in the ground experience. It allows us to hear ourselves in our own movement, linking feet and head.

The ground is also a heat exchange zone between air and matter. According to the type of material it is made of, with different thermal effusivity characteristics, it leads to different feelings of warmth over time. It therefore plays a thermal role in two ways: as an exchange surface with the body, by conduction through direct contact, and as an exchange surface with the air, mainly through reflection and radiation from its surface, absorption and evaporation through heat exchanges in its depth, and through larger thermal convection movement with the air above it. Skin thermoreceptors inform us on the air stratifications and movements at play over and through the ground. While moving on urban ground, the urban space user is, when possible, adjusting its route to thermal comfort spaces and seeking different grounds, depending on the meteorological conditions of the moment: warm ground in the sunshine on cold days, cool ground under dense shadow on hot days, fresh full soil and filtered heat under a canopy...

Taking part in the body schema almost as a body extension, the ground participates in our tonus and thus in our affective posture. The "pre-movement" (Godard, 1998) which anticipates the gesture to come, takes shape according to the intentional framework of the action, a tonic-emotive state. Sometimes accidents reveal this emotional background linked to the ground: feeling an empty space under our foot or losing our balance because of a slope or a swaying of the foot, will contract us and take away our sense of body security. In short, our perception supposes a complex intricacy between several sensory and motor systems, on an emotional background. The ground is caught in a sensory-motor loop while we're moving, standing or walking. It unites the senses of contact and distance, of feet and head.

An exploratory and instrumented *in situ* approach

Our analysis is based on the exploration of several fields and corpus collected during team work and our respective theses (Germon, 2017; Thiollière, 2016). Our participation in the ANR MUSE (Chelkoff & al., 2014) research program, which questioned the sensitive enigmas of contemporary urban mobility, was an opportunity to test various methodological approaches to *in situ* investigation. With different issues at the center of our PhD work, we came together on this project for an empirical investigation on threshold practices and devices in the vicinity of cemeteries on two sites in the Paris region (La Défense) and in Barcelona (the Poble Nou district). We first carried out simultaneous measurements on different significant sensory thresholds, regarding spatial and material configurations (including the materiality of the ground), ambient temperature, brightness, sound levels, as well as postures, gestures and mobilities, observable in a given time on either side of these thresholds.

La Défense was the subject of further analysis in the context of research on sound and somatic dimensions of the urban ground (Germon, 2017). About ten walks were thus carried out on different pedestrian strata from the top of the La Défense's forecourt, down to the level of the promenade designed by Gilles Clément at the back of the Arch, passing by a wood suspended walkway. To highlight what is not observable, what is not even conscious most of the time in ordinary daily experience, we have set up for these walks an experimental protocol based on the Commented City Walks method (Thibaud, 2013), introducing a constraint: eyes closed. Often used in dance or somatic practices (Germon, 2016), closing our eyes makes us more attentive to ourselves, decreasing the stimuli coming from the outside to concentrate on finer, more internal sensations. Comments on the sensations, perceptions and feelings of the walkers, as well as their gestures, were recorded by the researcher-guide, using an audio or audio-video recording device. The gait and the postural tone made sensitive in the permanent contact between the walker and the guide (hand-arm, hand-shoulder) were also observed and noted afterwards. These field materials were then cross-analyzed, based on archetypal urban ground zones, walkers' modes of apprehension of the experience, as well as lexical registers and gestures used. We will only discuss a few aspects here, allowing us to update certain forms of interrelation in the field.

A few outcomes through the examples of archetypal urban grounds

La Défense symbolizes a slab architecture far removed from the sustainable city, but the site has grown over the decades, following successive models of urban ground design, and continues to transform. The result is a variety of ground types. Their materiality, their implementation, their texture, the changes of levels, the slopes, the stairs offered, on a restricted area, a great possibility of exploration. At the time of our field studies, we have identified 3 zones in this part of La Défense, corresponding to 3 main experience frames: le "Parvis", la "Jetée", la "Promenade" (today the access to Jetty is closed and the Promenade replaced by a new project). Without being representative of multiplicity of ground design models, they can be taken as archetypal examples: modular large slabs, suspended walkways and vivid soils.

Slabs with modular pattern: le "Parvis" (the Forecourt)

The pedestrian slab is composed of large (2,32x1m) prestressed concrete deck slabs on plots, with gravel texture and hollow joints. A 40cm empty space between the slabs and the structure allows the drainage of rainwater and the passage of technical grids. The forecourt is similar to a large space, a promontory, where the sky is very present, and steps can go in all directions. Despite the roughness of the ground, the podotactile dimension disappears in favor of the sensations coming from the upper body and in particular from the ears, the eyes and the skin: in addition to the strong

luminosity which forces us to bend head down when the weather is very nice (even with the eyes closed), it is the thermal and sound experience which is predominant. The above-ground architecture installed on a mille-feuille of slabs gives rise to an extreme climate, with the shadows of the towers being very pronounced, generating significant differences in temperature, luminosity and air speed. At certain points on the slab, wind corridors reinforced by the venturi effect lead to postural rebalancing when walking. The most efficient walk is convened by workers in a hurry. Certain steps rhythm, at first sight surprising, are the result of wearing heels and hollow-jointed floor, which explain a jerky gait giving rise to curious ballets.

Behind the La Defense Arch, a zone surrounded by high glass office towers is composed of paving stones. The hard ground and its homogeneous texture does not absorb the shock of the step and sends the force of the impact directly back to the skeleton, without offering the required elasticity for it to pass from feet to head. The place is very reverberating and the steps impacts are reinforced by the lags and echoes coming back from glass fronts, creating a sonic metabolic effect. It gives the place a strangeness character whereas at morning rush hour, vocal sounds are almost absent.

Vibrating walkways: la “Jetée” (the Jetty)

The “Jetty” consists of a four hundred meters long and eight meters wide metal structure, supported by central piles. Tied to the slab on one side, it floats above the void at the other end, twelve meters high above the soil. It is covered on its central aisle with a five-meter wide wooden decking, curved across its width, which gives a slightly cambered effect to the floor. It is bordered along its length by benches and counter-alleys of metal grating, becoming a balcony facing the landscape, the trees of the cemetery and the Arch garden. The Jetty is a suspended walkway between natural soil and the slab levels, submitted to weather and wind changes. As we walk the length of the path, the rumors of the slabs activity become distant, replaced with vocal presence of birdlife, more intimate discussions and the impacts and vibrations on and of the jetty itself, similar to large scale percussion and wind instrument to play with. The bawl shape of the built front, around the cemetery sites encircled by expressways, generates slightly distorted and swirling sounds, and offers a very contrasting soundscape from the slab’s one. Its vibrant ground (in the literal sense of the word), warm and luminous in dry weather, becomes dark and slippery when it rains.

Through its wind and step-responsive vibrations, the jetty is a "connector" element allowing to live a singular proprioceptive and aesthetic experience. It is often practiced for digestive or meditative walk on breaks from work. It puts passers-by in contact with each other, who "vibrate" together and modulate its waviness with their movements. Vibration invites you to reactivate your internal movement capacities in

order to absorb the slight variations of a moving ground. It appears extremely monotonous and safe in its surface (except for the high heels wearers that have to mind the 2cm gap), allowing one to concentrate on other sensations, as a “free hip joints” feeling a walker evoked, the pleasure of oscillating movement of the steps responding to movement of the ground.

Vivid soils and gardens: the “Promenade”

From the "Jetty", a metal staircase leads to a "Promenade" designed by landscape architects Clément and Dechaume, a linear space under the Jetty, receiving filtered light and a permanent shadow line in its middle. It combines pedestrian paths to the south, an earthen floor with plant beds under the Jetty, a calade, large flat irregularly shaped stones and a sandy area where the workers come to play petanque at lunchtime. Humidity emanates from the low plantations and trees on the side borders, as well as from the ground, which Clément wanted to be as close as possible to an "idea of nature" (Clément, 1997). It plays the role of a garden for workers and visitors of La Défense who can rest on a linear bench along the cemetery.

Gardens are generally related to an imaginary world linked to a slowing down of walk and pace, evoked through sounds, postures, and kinesthetic sensations. The ground of the gardens is often soft and permeable: lawn, stabilized sand, earth soil. The thermal and hydraulic regulation effect of vegetation and porous soil invites on sunny days to rest and enjoy the coolness, requiring however specific equipment in rainy weather to protect the foot from moisture or cold.

Through the progressive erasure of urban sound events, the garden invites a feeling of connection to one's own sound, linked to auditory pleasures: the unfolding of the step on the stabilized ground is said to be "crunchy", evoking a foot that is sometimes unstable but making one's own step audible and present. For our closed-eyed walkers, the experience provided by walking on various grounds puts the body on alert, the frequent changes in ground surface and relief require some attention to podotactile dimension of the experience. On the calade, one walker describes a sensation of "awakening" in walking. Not only the sole of the foot is "massaged" by the uneven texture, but it is the whole skeleton that moves because the ground plays with a heterogeneity of relief, flexibility and density. She specifies: "The body, it oscillates to remain a little in balance". In spite of its "playful" aspect, this unstable and mobile support also causes a feeling of insecurity in balancing, particularly noticed by older walkers.

Conclusion

The urban ground is not only a technical and functional element, taking an important part in the ecological management of the cities, it's not only a good design playground, taking part in cities' branding, it covers an “soma-aesthetic”

(Shusterman, 2010) dimension in the sense that it participates in our embodied experience. Even when it disappears in our awareness, we are made of kinetic and perceptive habits that allow for dispersion, a projection into the outside world, into the global environment. We rely on it, that's how we organize ourselves in urban walking or other activities. A certain proprioceptive routine is necessary for this attentional dispersion. But sometimes, vibration response, or small texture differences of ground is needed for being conscious about our lively internal perception, far away from soft and cosy environment which can correspond to a normalization of cities' design. Pay attention to these sensory and somatic effects could help us bring cities back to a human scale.

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