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Atmosphere and intersubjectivity: lessons from photography

Maya Gratier

And what does this have to do
with love, except
everything? Now the fire rises
and offers a dozen, singing, deep-red
roses of flame. Then it settles
to quietude, or maybe gratitude, as it feeds
as we all do, as we must, upon the invisible gift: our purest, sweet necessity: the air.

Mary Oliver, 2005, excerpt from the poem *Oxygen*

Introduction

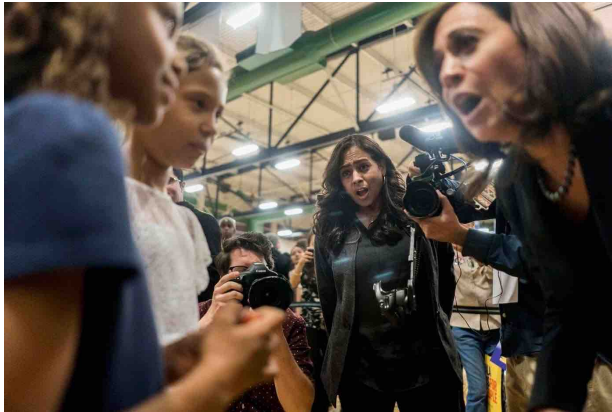
From birth, human beings partake in the vast circulations of air that compose atmosphere. Air cycles across life forms. It rhythmically enters and exits the bodies of animals with every breath. Every living being is connected to other living beings through air. Humans must indeed recognize their vital debt to plant life which is the source of all breathable air (Coccia, 2016). The rhythms of breathing are connected to terrain, effort, emotion and sociality.

Air, mind and atmosphere appear to be etymologically intertwined. In Sanskrit *Atman* means 'vital breath' as well as 'soul'. In Greek *Atmos* means 'vapour' and *Psyche* means 'breath' and 'soul'. *Spiritus* in Latin means 'wind' and *Anima* designates both 'breath' and 'soul'. Could atmospheres be involved in the very constitution of the human mind?

In this paper I wish to explore the connection between intersubjectivity, atmosphere and human development. I take as point of departure a few photographs that portray people intensively involved in a moment of sharing within real-world happenings.

PHOTOS HERE





Captions: 1. Colwyn Trevarthen's 80th birthday celebration at St Cecilia's Hall in Edinburgh, Dave Lee and Tom Pitcairn share Colwyn's expression of pride and gratitude while he unwraps presents from around the world. 2. Aroun and Ava, my children, stand next to each other on Venice Beach, Los Angeles, expressing the same quality of excitement and awe in their body posture. 3. Sisters Kamala and Maya Harris express the same emotion while talking to school girls. 4. 4-year-old best friends imitate each other's way of walking and dressing and express a similar kind of enjoyment of silliness.

What these photographs reveal is a remarkable correspondence of mood that can be read off the faces, body postures and muscle tone of the individuals. This is not exactly imitation because none of the people in the photographs are looking at each other directly. They appear rather to be immersed together in a shared and continuous atmosphere, each responding to a broader surround than to each other *per se*.

Do people, including infants, enact each other's moods based on forms of peripheral and diffuse perception? Do they attune to each other not so much directly but rather indirectly, because each attunes to the affect-laden space they inhabit together in that moment?

Photography and film are extraordinary tools for learning about the behavior of people in real-life relational contexts. And their potential for yielding scientific knowledge has been underestimated, yet acknowledged in the field of infant development.

In the following pages, I will explore the possibility that intersubjectivity and attunement depend on the indirect perception of atmosphere. People's moods or inner feeling states may be available not only to the attentive partner involved with them but to a host of other participants, including non-human ones. I will argue that people's moods have auras, that is that they radiate into the outer world, beyond skin and body, and thus become palpable to other breathing, feeling beings in their vicinity.

Perhaps infants' sensory aliveness and presence makes them attune to the spaces between people where relational meaning and emotion form and unfold. Complex relationality, I will suggest, is what brings together the intersubjective and the atmospheric, reminding us that individuals, and dyads or groups, always exist within a broader nexus of connections, a living fabric that weaves together the material, the sentient and the aesthetic. Atmosphere may then be a fundamental condition for any human intersubjective experience to exist. I will end this paper with examples from empirical research that explore a possible *science of atmospherics*.

Photography beyond the image

A photograph is always more than what it shows. It opens a moment frozen in time. Many people will look at a photograph and see what it does not portray. It will evoke for them a place, a time and a host of memories built out of stories told and re-told. What a photograph is, if looked at for itself, is a moment not so much *frozen* but taken out of the *flow* of time and carrying within it the movements that produced it. When photographed, the movements of a person are stilled within a frame, movements that are both external and visible (the shifts of posture, the folds of the face) and internal yet indirectly graspable by the attentive viewer (a moment within the flow of feeling of the person photographed).

Photos have the potential to unfold time, though they offer no more than a flattened view of a world without smell, touch, temperature or air. But by looking closely at those movements, external and internal, caught on film as in a spider's web, we learn to appreciate the extraordinary expressiveness of all fellow humans, and perhaps to some extent of other animals too. Photographs of persons involved in real-world experiences, in relation with their surroundings, are tangible proof that a body is not only the stage of subjective experience but also the locus of its genesis. They show how subjective experience is related to another's experience. Photography thus reveals the profoundly intersubjective nature of feeling and thinking by enabling the outsider viewer to hone in on the minute movements, both visible and sensed, of those who are photographed. Grasping these minute movements and thus sensing the internal flow of feelings of the person photographed, is a process that engages the viewer's imagination of how they came about within a situation, whether it is visible or not on the photograph.

The photographer, the one who catches the potentially unfolding moment of a person's experience, engages with the subject through a sort of intersubjective dance. The art of the photographer is to sense a moment dense enough to unfold and reveal the durable movements of a person's expression. That process of sensing requires an openness to the world of others, to its happenings and affordances. The renowned photographer Henri Cartier-Bresson described the experience of catching the moment, with its dramatic sense of happening, as "l'instant décisif". His photographs are so powerful and so beautiful because they make visible those points of equilibrium, harmony and synchrony within the *ongoingness* of everyday life. Atmospheres perhaps bear such rich moments that a photographer decides to capture them. Awareness of an atmosphere, which requires sensory presence to its affordances, goes hand in hand with an awareness of acute moments, ones where experience becomes meaningful and memorable. Is the art of photography then also an art of atmospherics?

Photographing babies engaged with the world has provided invaluable insights for developmental psychology. Photography and film are research tools that enabled the pioneering discoveries of innate intersubjectivity and of developing relational processes throughout infancy. I will suggest that infants are immediately aware of the atmospheres that hold and shape people's interactions and that their ability to tune into those atmospheres connects them to an intangible world beyond the present and situates them in both a historical frame and a cultural space.



Caption. This photograph of my daughter Ava, taken about 30 minutes after her birth, caught Colwyn's eye. He noticed the subtle wrinkle of her brow, the intensity of her gaze, the balanced tone of her muscles, turning this photograph into another piece of evidence revealing all newborns' immediate relationality, their sensory aliveness and bodily awareness of self and other.

Microanalysis and the moving image

Film, which re-creates an experience of real time, is a succession of fixed images. When the images are taken in very close succession, movements appear as fluid as in everyday life. But when images are separated by longer gaps, the images take on life, become animated. Invisible movement seems to magically emerge from the sequence of static images. The images themselves recede and what catches the viewer's attention in essence are the movements that connect the depicted moments. The art of animated film is the ability to recruit the viewers' own creative perception, involving them in the process of emergent expression.

The sequences of photographs that make up film have taught us a great deal about infants' unexpected sociality and expressiveness. By slowing film down to its image-by-image granularity, researchers found a way of accessing and reconstructing the intuited movements captured by the single image. Microanalysis represented a momentous turn for developmental psychology. It had already proved useful in ethology and anthropology where a new science of movement centered on understanding body motion patterns in communication had emerged. The work of Ray Birdwhistell, Albert Schefflen, Bill Condon, Elliot Chapple and many others built common ground across various disciplines. These researchers, in the sixties, discovered that unnoticed actions could appear by replaying film repeatedly in slow motion. Interest in using film as a means to explore subtle manifestations of culture in embodied habits like dance or social encounters grew out of the ground-breaking anthropology of Franz Boas. It also influenced Margaret Mead's pioneering studies of early child development, based on detailed description of the films and photographs made with Gregory Bateson in many countries around the world.

The first detailed microanalytic observations of parent-infant interactions were published in the seventies (Brazelton, Koslowski & Main, 1974; Condon & Sander, 1974; Stern, 1971; Trevarthen, 1974). By involving parents in their research and letting infants express themselves while in relation with their parents, researchers began to appreciate how capable very young infants were at engaging in reciprocal social interaction, and how much they appeared to enjoy it (Papoušek & Papoušek, 1979; Stern, 1974; Trevarthen, 1977). These studies pursued and transposed the objective of earlier studies of adult social interaction, seeking to make visible the unseen choreographies of everyday encounters between infants and adults. Microanalysis

of filmed interactions thus became the solution for making latent behavior visible, and formed the basis of a new understanding of the workings and makings of first relationships.

Colwyn Trevarthen, and a few contemporaries like Daniel Stern, sought to explain how the curious and imaginative minds of infants develop through engagement with a world of others. Their detailed and painstaking microanalyses of body movement, facial expression and vocal expression aimed at uncovering much more than observable patterns of recurrence and change in the coordination of interpersonal behaviour. Their aim was rather to explain how human infants share experience through timing and rhythm with a sensitive awareness of another's feelings, appetites and abilities. Intersubjectivity, and its transformations over the first year (Trevarthen, 1993) and affect attunement (Stern, 1985) both depend on a sense of timing and rhythm and on the ability to grasp correspondences across sense modalities. Microanalysis, in the hands of these researchers, became a means for entering the inner lives of babies.

Finding the right level of granularity for entering the inner lives of babies is no easy task. Methods of microanalysis are based on a real-time discretization of movement and expression. Yet a few decades of such research have not dissipated such key questions as : Can the onset of an emotional expression be identified with millisecond precision? Does a movement begin the moment it is visible or in the invisible moments that precede it ? It seems that analysis of body movement contingencies, visible and measurable in the successive images of a film, can only yield a mechanistic view of the behavioural coordination between individuals. Taking into account the invisible, or not yet visible, aspects of human expression (Manning, 2009), seems crucial, albeit challenging, if researchers wish to continue exploring infants' inner lives, or infant cognition in the wild, through microanalysis of film.

Sensing within fields of experience

Infants' ability to initiate and respond to adults in contexts of intimate and affectionate exchange hinge on the possibility that they perceive others coherently as whole persons with their complex, multimodal components. Yet the nature of this kind of perception is not fully understood today, though some pieces of the puzzle are being put together. Much is known about sensory development and attention, starting before birth. We are beginning to understand how the senses function together. Decades of careful microanalysis of such encounters, showing the extraordinary interactional synchrony between infants and adults, indeed suggests that individuals, including small babies, begin to grasp another's intention as it takes shape and throughout its indeterminate unfolding. When an infant sees and hears her mother speaking to her, and experiences herself as the object of her mother's attention (Reddy, 2008), does she not 'sense', with all her senses working together, the feeling her mother conveys even before it is there for all to see?

A number of cross-sensory mappings appear to be in place at birth, such as between sight and sound, touch and sight or proprioception and sight (Meltzoff & Moore, 1977; Bahrick, Hernandez-Reif, & Flom, 2005; Slater, Quinn, Brown, & Hayes, 1999). Much experimental research has been conducted on young infants' abilities to perceive patterns or structure in multimodal phenomena (Legerstee, 1990; Walker-Andrews, 1986, 1988) and to transpose their characteristics and qualities from one sense modality to another (Meltzoff & Borton, 1979; Streri, 1987). Recent studies have shown that newborns are sensitive to cross-sensory correspondences between for instance auditory pitch and visuo-spatial elevation (Walker et al., 2018), suggesting a readiness to deal with the multimodal complexity of phenomena right from birth. A few months later, infants associate higher pitch with pointed as opposed to blunt objects (Walker et al., 2010), with small as opposed to large objects (Peña, Mehler, & Nespor, 2011) and thin as opposed to thick forms (Dolscheid et al., 2014), much the way adults do. Guellai et al. (2016) have also shown that newborns make accurate audio-visual associations

based on the non-synchronous presentation of stimuli. Infants presented with two dynamic facial displays uttering two different sentences but where only one of them corresponded to one of the two displays, used cues other than temporal synchrony to match utterances to the corresponding facial movements. Evidence has been converging lately to suggest that such non arbitrary correspondences across the senses provide foundational experiences for sound symbolism and for arbitrary mappings of meaning in language use (Guellaï et al., 2019).

Temporal synchrony and rhythm have been identified as crucial conditions for the kinds of cross-sensory mappings and correspondences infants are capable of (Bahrick, 1987; Lewkowicz, 1996; Bahrick and Lickliter, 2012). Lewkowicz and Turkewitz (1980) were the first to demonstrate that 3-week-old infants can match sound and light intensities. Contiguous timing, synchrony and rhythmic patterns appear to hold and connect all the senses, forming fields of experience where sensing is a process born from interwoven strands of perception. Studies conducted on individual infants in laboratory settings help understand some of the seemingly mysterious characteristics of their real-life encounters with speaking, moving and feeling adults who behave towards them with a spontaneous multimodal redundancy of expression (Bahrick & Lickliter, 2012). Careful observation of temporally organised behaviour between adults and infants, involved in meaningful encounters with each other and with the specific worlds they inhabit, has enabled developmental scientists to lift some of the mystery and magic of the ongoing intermodal flow and fine choreography of infants' social interactions.

It is well recognized today that smell plays a crucial role in early infant development. The sense of taste is well developed *in utero* and foetuses acquire preferences for specific tastes from their experience of swallowing amniotic fluid permeated by the chemosensory properties of the foods their mothers eat (Schaal, Marlier & Soussignan, 2000). Amniotic fluid conveys a mother's chemical ecology (Schaal et al., 2020) and is responsible for constituting the foetuses first gut microbiota. After birth, newborns orient to their mothers guided by the smells of lactation, and within hours they recognise the specific smell signature of their mother's skin (Soussignan, Schaal & Marlier, 1999). Later on, infants categorize faces faster when they are associated with their mother's smell (Leleu et al., 2020) suggesting multisensory experience drives perceptual processes. Smell has been identified as an important dimension of atmosphere, it is inherent to air and breathing (Tellenbach, 1981). If indeed infants' sense of smell orients them in the world, then it is likely that infants also sense an atmosphere, that is a quality that lies beyond smell but that cannot exist without it (Tellenbach, 1981).

Social touch, as smell, is a vital need and a powerful force in human development. It plays a crucial part in the rapid learning of the first months of life through association with face recognition and auditory patterns (Della Longa, Gliga & Farroni, 2019; Lew-Williams et al., 2019). Especially before they can walk, infants are carried. Their bodies are moved and manipulated in the various contexts of care, play and affectionate communication. The way a mother touches her infant, its rhythm, intensity and dynamic, enabling anticipation through fine prospective postural adjustments (Reddy, Markova & Wallot, 2013), is central to establishing the kind of dependable relationships infants need. Social touch must be an important conduit for sensing the moods and emotions of other people. Touch is also a means for gaining knowledge of the world through haptic perception. By 5-months infants discriminate object shapes based on manual exploration even when it is not associated with vision (Streri & Pêcheux, 1986). Toddlers learn about plants by exploring them through smell and touch in the company of their parents (Fantasia et al., 2021).

Theories of perception based on a conventional 5-sense model need to be revised. Their assumptions that the senses are clearly distinct and that perception proceeds from unimodal 'simpler' forms to multimodal 'more complex' ones are probably flawed. It is likely that infants access unified fields of sensory experience more readily than adults do, perhaps because they are not yet lumbered with memory-making and future-orienting language. Perhaps so-called

multisensory complexity, because it affords forms that are intrinsically meaningful, is to the infant the simplest way to inhabit a world. Merleau-Ponty's ideas, that continue to inspire many developmental psychologists, identify experience as fundamentally synaesthetic, starting with primordial preconceptual forms of experiencing built on the overlap of the senses. He saw perception as a participatory relationship between bodies - sensing with alive senses - and an environment which includes non-human materiality. This relationship, according to Merleau-Ponty is one of reciprocity or "reversibility", entailing an interweaving of experience and the spaces and materials that make it possible.

More research is needed on infants' sensing within complex social worlds, involving multiple ongoing interactions and different time-scales as well as spatial, material or olfactory components that they can anticipate and recognise.

Emotions, moods and auras

If infants can sense, in anticipation, the shifts of gaze, lip movements and body sways of their close others, they also grasp the larger frames within which these expressive coordinations occur. Research has shown that they not only grasp the affective states, moods and purposes, of other people's behaviour, but also become a part of it themselves, through their own attentive engagement (Reddy, 2019). Infants, perhaps more so than adults, attune with immediacy to others' affects. An understanding of the permeability, or porosity, of the infant mind, and of healthy adults' readiness to engage with it, has emerged from decades of insightful clinical work with parents and infants.

Furthermore, the ways in which infants and parents behave towards each other appear to be shaped and oriented by past relationships (Fraiberg, Adelson & Shapiro, 1975). Thus, an infants' current feelings and moods are not disconnected from past times and non-present others. The 'ghosts in the nursery' linger in the air that surrounds the newly forming relationships infants are so eager to build with family members, through ongoing and reiterated patterns of meeting. In France, Serge Lebovici (1988) pioneered an understanding of the visible and invisible threads that connect infants and parents intergenerationally through everyday social interactions. Clinical insight and careful observation enabled him to identify how the behavioral, affective and symbolic, imaginative or phantasmal dimensions of parent-infant interaction continually respond to and influence each other. The study of how infants are affected by the emotional moods and styles of their parents has provided strong evidence that they experience forms of continuity between the emotions of others and their own. Research on the effects of a mother's postnatal depression has even shown that infants will take on the emotional moods of their parents in such a way that they become integral to their own style of interacting with others (Field et al., 1985).

Such continuities of affective state and condition between adults and infants can be understood as resulting from a process of 'attunement'. Attunement has been described as a way of relating to and of being responsive to the world and as a fundamental constituent of care (Heidegger, 1962). Daniel Stern's careful science of infant social behavior, and his experience-driven theorizing about its genesis, has shed light on the prevalence of affect attunement in everyday parent-infant interactions. Parents tune into their infant's states and moods from the first moments of their sense-based sociality. Even a premature baby's shift in facial expression elicits an instantaneous change in the affective quality of the parents' speech prosody (Filippa et al., 2018). A few decades of research on affect attunement, based on microanalysis of parent-infant interaction (e.g. Legerstee, Markova & Fischer, 2007), has made it clear that infants also tune into their parents' moods and affects, enabling them to experience together the *vitality dynamics* (Stern, 2010) that are shaped by their encounters. Vitality dynamics describe the processes by which feelings and emotions form, develop and dissolve

between people and through time. Recognizing them as central forces of human relatedness, and even of connectedness to places and times, brings about the realization of the inseparability of form and content, or of outward expression and inner emotional state. Yet most research in early human development has assumed that emotions and thoughts reside inside the private minds of people, requiring infants to be able to access and analyze the contents of people's minds.

A number of researchers have however made efforts to show that emotional communication does not require understanding of mental states, or rational evaluation of people's behavior. Working with infants in relation with others makes it quite apparent that emotions belong to neither person involved and that, as Merleau-Ponty would have it, they are reversible. Emotions do not generally hide inside bodies or minds, only to be expressed at the will of their beholders. It is certainly the case that infants do not contain their emotions within themselves. Emotions and bodies are continuous, even among deceitful adults. People can read them off each other, and can sense them with alive senses and caring attention, not as static well-defined categories but as happenings, contours and forms. The fundamental reciprocity of the emotional life of infants has been wonderfully demonstrated in studies of playful interactions involving coyness, teasing and joking (Reddy, 2000; 2008). Infants are well equipped to sense the dynamics of emotional experience, to pick up on moods and tune in to them by finding reciprocities and resonances because, lacking any coded speech ability, they are grounded in a present time that is rich with sensory aliveness. The attentional frame of a rich present creates a sense of duration, generating what Stern (2004) has called 'present moments' which are rooted in the multiplicity of interconnected perceptions we know infants to be capable of.

Not only do infants make good sense of their surrounds or milieux, through active and organized perception, but others in their orbit, those who care for them and are careful towards them, in turn fabricate material surrounds that are well-suited to their needs and abilities. Intuitive parenting skills (Papoušek and Papoušek, 1987) foster adapted holding and handling and give rise to the gentle musical tones of infant-directed speech. Adults know how to create the right kinds of envelopes for infants, through sound, touch, smell, holding. The enveloping sensorium they provide for infants becomes an intermediary space for dreamlike states and diffused peripheral awareness, for building trust out of care, and for projecting durable ways of being (Anzieu, 1985; Winnicott, 1991). Individuals may then acquire their own aura, felt as a singular presence in relation to others. The moods they express are then always *intermediary experiences* (Throop, 2009) because they afford attunements to the atmospheres they generate with others and within situations that can refer to the past and involve processes of emergence.

Ben Anderson has described atmospheres involving human experience as both determinate and indeterminate and infused with collective affective qualities (Anderson, 2009). They can be seen as affording anticipation and offering opportunity for change and novelty. Anderson suggests that "affective atmospheres are a class of experience that occur before and alongside the formation of subjectivity, across human and non-human materialities, and in-between subject/object distinctions" (Anderson, 2009, p. 78).

Atmosphere, aesthetic value and intersubjectivity

What is an atmosphere? Do we know whether it is even a *thing* or a *process*? Can it be identified and examined? How important is atmosphere for infant development, and to what extent do infants contribute to generating atmospheres?

Clinical observation and a science of intersubjective infant development suggest that infants are indeed sensitive to the atmospheres close others create in their presence. Tense relations between parents are often associated with perinatal psychopathology, such as sleep or eating disturbance. Infants also clearly thrive in the presence of relaxed affectionate partners.

They are attuned to their parents' physiological rhythms of breathing. Martine Van Puyvelde and her colleagues (Van Puyvelde et al., 2015) found that infants adjust their own rhythmic respiratory rate to their mothers' rates between birth and the age of 2 months. Human infants are immediately connected through their bodies and their biological functions to other people's affective states and moods. Such physiological rhythmic synchrony is known to be crucial for enabling the kinds of dialogues and mutualities that define intersubjective experience in infancy (Feldman, 2006; Porges, 2001). Does breathing together generate an atmosphere?

Atmospheres are perhaps **intermediary** spaces that exist between human states of consciousness and biological processes. When a parent breathes faster and faster, an infant, experiencing rising stress (cortisol) may begin to fuss or cry and a third party, picking up on the infant's emerging mood, may in turn contribute to an atmosphere of tension and discomfort. Atmospheres may arise through processes of resonance that are rooted in biophysiological functions. Developing my example further, we can imagine that if the disquieted parent and infant are in a particular environment where the light is soft, the sounds are coherent and predictable enough, the smell is pleasant and familiar, the third party might arrive and take in the atmosphere of the space and reflect it back to the parent whose breathing may then become more regular, and slower. Thus, the infant's physiological state may be affected not just directly by the parent but also and crucially indirectly by another person and by the broader surround, made up of objects and qualities.

An atmosphere can be considered **pre-reflective** space and time, that is not as much perceived or understood as sensed or intuited. It is not mediated by a reasoning mind but by a feeling body (Griffero, 2014). Atmospheres constitute impressions rather than contexts that can be analyzed. We sense an atmosphere because it has an effect on our bodies, causes a tension in the muscles or a quickening of breath. It is after we've attuned to an atmosphere that we may recognize it, reflect on it and attempt to name it. It is through the felt-body with its myriad forms of perception (sense perception, proprioception, alteroception, interoception, etc.), that we come into contact with an atmosphere which becomes both an external and an internal space.

Atmospheres are **attentive** spaces and sequences that foster forms of attending in those involved in it, but that also exists because people attend to it with an openness to its effects. Infants, taken as particular kinds of subjects, must thus play an important part in shaping atmosphere because of their particular forms of attentiveness and responsiveness to the world of people, to life forms and to objects. They have the potential to draw less attentive adults into an atmosphere and thus to foster new fields of experience that may enrich not only their own lives but also those of others. Do infants attend to the world in ways that are no longer readily accessible to adults? Are they then particularly aware of atmospheres and more open to experiencing them? Do adults approach those modes of attention when they make efforts to bring awareness back to their bodies and their senses, as in the practice of meditation, or when they are situated in aesthetic spaces, whether humanly-shaped or organically formed?

Atmospheres are **aesthetic** spaces. They generate moods, memories and images through a sense-based corporeal communication with their objects. The objects that compose a person's surround afford not only actions in a Gibsonian sense, but also meaningful and often metaphorical perceptual connotations. The science of infant development has shown that objects, even static physical objects, have connotations for infants before they can directly manipulate them and well before they can name them (Baillargeon, 1994). When they look at an object, infants know that it cannot stop being solid, that if it falls, it falls along linear trajectories, that it can sit on top of another object or temporarily disappear.

Yet, the everyday objects an infant encounters are much more than the cubes and spheres experimental psychologists use to test their cognition. They are intentionally made by people with purpose and they resonate with the histories that brought them into existence. Crafted

objects and valued objects, used by people with purpose and pride, are surely more meaningful to infants than manufactured good. And they surely contribute to making the kinds of atmospheres that, I suggest, play a vital part in early human development. Some objects then, perhaps ones that carry the attention of their makers and users, generate atmospheres because they co-mingle with the feelings they induce. These are aesthetic objects, objects that speak to us because they are shaped, textured, colored or positioned in a way that puts them in relation with people, present or absent, and with each other. Infants, I should think, are not indifferent to the types of objects that surround them.

We have little scientific knowledge of the aesthetic experiences of infants but our science of aesthetics is itself limited and subject to criticism. But if we approach aesthetic experience from the Greek sense of *aistēsis* or ‘sense experience’ it is perfectly plausible that infants are intimately acquainted with aesthetics. How do infants, or humans in general, experience beauty? What touches us and moves us and why? We do know that infants display some preferences that coincide with adults’ aesthetic preferences. Young infants’, and even newborns’, preference for attractive faces is a well-known example of this (Langlois et al., 1987; Slater et al., 1998). It is interesting that infants, even at birth, are drawn to biological motion compared with more predictably moving entities (Simion, Regolin & Bulf, 2008). It has likewise been known for a long time that young infants are more attracted to complex patterns with irregular arrangements than to highly predictable ones (Fantz & Fagan, 1975). A large body of research has provided evidence that infants not only appreciate music but also have musical tastes that align with the musical cultures they are familiar with by the end of the first year (Soley & Hannon, 2010). Young infants’ preferences for consonance over dissonance and for pleasing melodies (Schellenberg & Trehub, 1996) suggest they are endowed with a form of musical aesthetic which may enable more specific tastes to develop later on. One study with 6–10-month-olds showed that infants can discriminate and categorize paintings by well-known artists such as Monet and Picasso (Cacchione, Möhring & Bertin, 2011). Another study found that similar aged infants show a preference for original artworks (Krentz & Earl, 2013). Overall, very little research has focused on infants’ preferences for aesthetic objects, such as paintings, photographs, sculpture and ceramics, dance performance or musical compositions. The field of infant aesthetics is yet to emerge!

Atmosphere is always **intersubjective** because it affords a co-mingling of experience creating a field of experience beyond the subject. People come into contact with each other’s’ private minds not so much by gaining factual knowledge of what goes on inside them but rather by entering a field of knowing through a sensing, an inkling, an intuitive feel, that is made possible through a form of musical dance, through rhythm and minute adaptations to each other made in the moment. And human sociality is inseparable from historically-laden objects and structures, from a material world that organizes it. Subjectivity, perhaps in the form of aesthetic value, infuses all the objects that make up a cultural world. As Alfred Schütz (1951) explains, when we listen to a piece of music or read a novel, we encounter the minds of their creators. Listening and reading are intersubjective experiences.

Atmospheres support intersubjective experiences because they create continuities by dissolving boundaries. Their own boundaries are diffuse. Where does a smell begin and where does it end – or rather when does a smell begin and end? At what point does light turn to darkness, and dawn turn into day? Atmospheres are composed of continua and spectra and they are first and foremost realities in process offering fields of experience. Natural places, out in the open where air is connected to sky, always have atmospheres because they are teeming with life. Every insect, leaf and bird participates in the atmospheres of natural places. Humans have always had good intuitions about these atmospheres in the natural world. That is why sacred places have been founded close to sources or at the confluence of rivers, why villages and then cities were built over spectacular geographies. There are practical reasons too

(irrigation, protection) but throughout history, territorial battles have been fought also to secure access to sacred spaces. Sacred spaces are directly related to a harmony of the senses, to proportion and balance. All human cultures bring with them attitudes of care and attention through ritualization and through artistry.

Atmospheres hold time and contain moods, auras and feeling states. Although their boundaries are not clear-cut and are shifting, they do have boundaries because they build tensile relations across them, thus defining what is and is not an atmosphere (Böhme, 1993). Experience 'within' an atmosphere is generative and protective whereas 'outside' an atmosphere a person may feel confused, disconnected and afraid. Infants need to be contained and they achieve this through 'good-enough' holding (Winnicott, 1991), through the enveloping sound their parents provide by speaking and singing, or rhythmically tapping or rocking them. Within an atmosphere, a person's experience is intertwined with that of others and with the connotations of objects, with the qualities and happenings that generate the atmosphere itself, creating expectation, resonance, recollection and lingering. Outside or beyond an atmosphere, experience is fleeting and dissolving, it does not attach to anything, it does not generate stories, desires or hope. Atmosphere is thus also a **semiotic** space, it affords meaning-making and recollection and it generates history. Finally, atmosphere is not only a space, it is best described as a space-time configuration, that is, a space that opens up at a moment in time and closes, describing a contour in time. It is a space with no location and it is a time that does not last.

Infants participate in creating atmosphere. Within an atmosphere their actions acquire 'prospective control' (Trevarthen, 2007; Lee et al., 1999), they become more fluid, graceful and harmonious because they are shaped and oriented relationally. Infants relate to qualities of objects, of light, of smell and sound. They not only have marked preferences and memory for certain familiar and important smells (Schaal, Marlier & Soussignan, 2000) and sounds (De Casper & Fifer, 1980; Trainor, Wu & Tsang, 2004), they also generate movement and expression when they encounter them. Already at birth they turn with effort and control to smell or hear what they wish to experience. Every action of theirs, every strand of attention, is woven into the fabric of an atmosphere.

Complex relationality

Thus, the infant's physiological state may be affected not just directly by the parent, within an intense dyadic relationality, but also and crucially by other persons and by broader surroundings, made up of objects and qualities, within a complex form of relationality. Complexity is integral to any natural living world, to any ecosystem in which generative growth occurs with every beat and every breath. Organic life is based on recurrence, repetition propelled by variation, circularity, redundancy and interdependency. It is characterized by abundance because it is inherently productive and reproductive.

Complexity is from the Latin *complexus* which means 'that which is woven together'. It is worth considering whether infants first sense and perceive an atmosphere, with its moods, auras, affective tones and feels, and only secondarily identify people as well-bounded identities within them. Perhaps they react principally to fields of presence and to the histories that dwell in material forms. Could their own subjectivity be formed and acquire aura and presence, in other words an identity, because they live within atmospheres that organize their experiences? Are "atmospheres are the shared ground from which subjective states and their attendant feelings and emotions emerge" (Anderson, 2009, p. 78)?

Many researchers have begun to consider such ideas by exploring for instance joint action and intentionality (Sebanz, Bekkering & Knoblich, 2006), processes of shared intentionality (Tomasello & Carpenter, 2007) or collective improvisation in music or dance

(Himberg et al., 2018), leading to a major paradigm shift in the cognitive sciences (Schilbach et al., 2013). There has been a shift and a search for methods to study dynamic social processes rather than individuals as separable parts of an interaction (De Jaegher, Di Paolo & Gallagher, 2010). Such a shift has led to a search for explanation not so much within individual brains but between brains involved in public situations that themselves afford their actions and reactions. Indeed, relational systems have come to be studied as the loci of meaning-making and creative praxis. Social relatedness, and thus also perhaps the relational complexity that is characteristic of an atmosphere, involving sociable others as well as the material and chemosensory surround, is as natural a 'milieu' as air or water is to animals living on land or in the sea. Kaiser & Butler (2021) describe this inseparability of persons from the relational system within which they necessarily live as 'social breathing'. And they suggest that for some individuals social breathing becomes challenging, such as when infants do not experience adequate affectionate social contact or when they present socio-emotional disorders such as autism (Kaiser & Butler, 2021).

Relating to an atmosphere necessarily makes one a member of a group as opposed to a disconnected singularity. And being involved in complex relational systems implies forms of participation both as intent observer and valued creator of a shareable content, of what we may call culture or semiosis. Atmosphere can thus support a sense of belonging (Gratier, 1999, 2003), weaving lasting bonds that persists between and across successive atmospheres. Dwelling in time and space and opening the senses to complex relationality gives rise to atmospheres that go on to take shape, to open up processes of growth and transformation. It is in this sense that atmosphere, with the intersubjective processes it enables, is perhaps the main locus of developmental change. Encountering other minds, made possible because they are immersed in a continuous enveloping atmosphere, has been described as the main transformational force of human development (Reddy, 2019).

Because an atmosphere is a space-time in which something takes roots, grows and flourishes, reproduces and yields something else, and then dies, it also connects narrative process with developmental change. Within the affective atmospheres that human beings thrive on, meaning is shaped in the course of narrative unfoldings, building shared histories and cultures. Indeed, the narrative and intersubjective nature of development has been a focus of Jerome Bruner's cultural psychology approach (Bruner, 1990). Pulse and narrative have been identified as key aspects of the communicative musicality that holds adults and infants in intimate exchange in the first months (Trevvarthen, 1999; Malloch & Trevvarthen, 2009). And it is likely that pulse is also a key ingredient of atmosphere.

Atmosphere then is a tapestry, composed of multiple interwoven relations creating resonance, echo and attunement. Infants are capable of dwelling in them and by doing so develop multiple relations to the fields of experience attached to persons, to the aesthetic qualities and projections attached to objects. It is through the complex relationality an atmosphere affords and organizes that infants participate, learn and change.

A science that teases apart, one by one, the components of a complex whole, such as an atmosphere, is incomplete for it is impossible to fully understand the parts without understanding the whole, nor to understand the whole without knowing its parts (Morin, 1988).

Towards a science of atmospheric: photography, film, soundscape

I have suggested that atmospheres are important for human development because they offer opportunities for transformation, organizing an infant's sensorium within a nexus of recurrent multiple and reconfiguring relations. How can we study atmosphere as an entity as well as the processes, interactions and transformations it contains?

Experimental science, which has largely been applied to the study of human minds already from infancy, aims to tease apart components of events or processes and to examine lines of causality leading from one to another. Attempts have been made to assess causal links between persons, objects and environments, each taken as a separable unit of analysis, or ontological type. Clearly such an experimental approach must fail when it comes to the study of atmospherics. A naturalistic science based on observation is better suited but tends to become caught up in a particular granularity in such a way that the analyst is drawn in to the minutiae of smallest units composing a phenomenon. Yet, simultaneous and coordinated observation at both micro and macro scales can yield precious insights.

The endeavor of science, and the progress it promises, is itself intertwined with a vision of beings as separable from their ecologies. The science of Psychology seeks to define the basic processes of human thinking and behavior, with infancy naturally seen as a time when humans are closest to their essence, unperturbed by the influences of their ecologies. This surely stems from a fundamental misunderstanding about human nature as separable from the rest of nature, from plants and other animals, including other humans, and all of the habitats that keep them (us!) alive. We have thus created an airtight science that ignores the very stuff that makes us move and think and feel. A number of thinkers and researchers today question the scientific project that has thus far dominated the study of the human mind. Lately, a constructive resistance has begun to offer new pathways to realms of knowledge that no less seek truth and change than those of the positivist era. Science need not be confined to sanitized laboratories. Specialists are now acknowledging the value of an indigenous science or a citizen science. Artists are proving that making art is also a process of discovery and insight. Psychologists have begun to shift their focus from individuals to dyads and to phenomena.

Research on atmosphere calls for new methods but also for reflecting on the positionality of researchers. Where should they be? Are they part of an atmosphere? Research laboratories, while trying to be neutral and non-interpretive spaces, in fact have powerful atmospheres of their own – and infants of course sense them and behave accordingly! If researchers and their tools are necessarily part of an atmosphere, they must have a dual position. The move to a second-person science indeed makes space for the researcher-participant.

Photography and film are both useful tools for the study of atmospherics. And perhaps photography in particular, because of the presence of the photographer in the “instant décisif” where moods, auras and atmospheres are ripe for capture. I have suggested that photography is an intersubjective dance between the photographer and that which is photographed. Atmospheres may then leave traces in the stilled moment a photograph can hold.

Conclusion

This paper has explored the concept of atmosphere and its relevance to infant development. Attempts have been made to define the concept and to identify possible ways of making it an object of research. My interest in atmosphere as a researchable entity stems from my deep commitment to the idea that intersubjective processes are intrinsic to human development throughout life. I suggest here and in line with a whole history of thinking on the subject, Colwyn Trevarthen’s thought being at its forefront, that world-making intersubjective processes are rooted in infants’ complex relationality to a sensory-based social fabric beyond the dyad, and perhaps even beyond the human. I even suggest that our culture-generating human sociality is intimately tied to times and spaces inhabited by a variety of past and present living organisms. That human semiospheres cannot be separated from their atmospheres, and that therefore human culture is a natural process that grows out of a world that is at once material, organic and spiritual.

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