Blue Sky Matter

Toward an (In-flight) Understanding of the Sensuousness of Mobilities Design

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Abstract

In this paper we present a theoretical framework for an understanding of the relationship between the material design of mobilities technologies and the multisensorial human body. Situating our work in the emerging field of "mobilities design" within the broader so-called mobilities turn, we focus on two very different aircraft types and their design (the large passenger jet Boeing 737 and the small propeller aircraft DHC-2) in order to explore the sensuousness of in-flight experience and atmosphere. We focus on the interior design of the aircraft as well as on their technical capacities, and end with a conclusion that offers a flat ontological view of mobilities design. We argue that according the material design of mobilities technologies must be inscribed on equal terms with the sensing human subject if we are to claim that we have reached a better understanding of how mobility feels.

Keywords

aeromobility, affect, atmosphere, design, float planes, jets, senses, technology

Few social constructions are taken at greater face value than the prototypically Western notion that the human body possesses five senses.[1] Were indeed more people aware of the existence of other senses such as proprioception, thermoception, nociception, and—more pertinently to our current subject matter—the kinesthetic sense (our body's perception of its movement in space), calls for the investigation of the sensory underpinnings of mobility would by now be fully unnecessary. And yet, kinesthesia, despite its history as a research field in the life sciences, remains a badly underexamined topic even within the growingly diverse realm of mobility studies.[2]

All mobility practices—with the partial exception of imagined mobilities, or the mobilities of ideas and representations—are kinesthetic in nature. From walking to cycling, from driving a car to riding a train, and from skiing down a slope to sitting on a chairlift en route back up a mountain, kinesthesia is involved in how we balance ourselves, the direction we maintain, how we manage our pace and speed, how we regulate our bodily efforts, how we perceive scale and perspective, and how we execute our movements in style (and sometimes less so), and in myriad other ways. Students of mobility, and especially those with a particular interest in nonrepresentational, embodied, and phenomenological approaches, should therefore be keenly interested in passengers' (and drivers') bodies and their relations with the tools they employ in order to move, as well as with the experience of the physical features of the places where they travel.

The purpose of this article is to offer reflections on a kinesthetic experience and practice—namely, airplane flying—in relation to the assemblages that make it possible. Simply put, in what follows we ask how material design and sensations of airplane flight are entangled. Like other mundane technologies, such as boots,[3] airplanes play a crucial role in shaping space through the heterogeneous relations they mediate between travel routes and bodies. The intention of the essay is thus to raise awareness about the importance of connecting the material and physical dimensions of mobility analysis to the multisensorial experiences of mobile subjects. We aim to illustrate that the study of two very different flying experiences can be a useful lens for enhancing our understanding of how bodies and materials mutually affect each other. Broadly, we couch our work within three multidisciplinary bodies of literature: mobility, material culture, and sensory studies. More precisely, the first body of literature we will engage pertains to the field of mobilities and the senses, and aeromobilities[4] and in particular.[5] The second subject with which our arguments intersect is the materiality and design of transport modes.[6] Cars and trains have notably taken the lion's share of interest in this case, so by focusing on airplane design we hope to generate somewhat novel ideas. Finally, we draw inspiration from the cross-disciplinary study of the senses and sensations[7] and more precisely from the work of Ingold[8] on movement and the growing body of knowledge on affective atmospheres.[9]

With this article we aim to contribute to the development of a research agenda within mobility studies where materiality and design are explicitly put in the conceptual foreground, especially in relation to the sensations they shape. Rather than looking at discursive or cognitive material as the basis for our reflections we are interested in more-than-representational situated practices and sensuous experiences within their naturalistic material context. More precisely, we will be focusing on things, units, and materials in an attempt to contribute to the ongoing material turn in mobility research. To illustrate the usefulness of our theoretical ideas we draw illustrative material from two examples.

The first example details the first author's experiences while traveling on board the Boeing 737—a worldwide-known carrier used for both domestic and international travel. The 737 is Boeing's most successful aircraft and has been flying all over the world since 1967. The 737 has undergone various metamorphoses and has existed in nine different versions—all under the heading of "a family of airplanes,"[10] and has been standard-setting since the 1960s.[11] Here we will mainly refer to the "737 classic" versions (the 300/400/500 models). The second instance draws on the second author's experiences of flying aboard the DeHavilland Beaver, or DHC-2—a small, single-engine "bush plane" often used with floats to allow for water takeoffs and landings. The Canadian-made DHC-2 was only manufactured between 1947 and 1967, but even though no new models have been built since 1967, most of the 1,657 planes originally produced are still in service and are continuously revered as feats of inexpensive, practical, and ingenious design.[12]

We begin by couching our research in a small but growing field of studies focusing on the embodied perception of mobility. Subsequently, we outline our theoretical perspective on mobilities design. Next, we reflect on mobility design and flying sensations in relation to the different speed, travel durations, and routes of the two aircraft mentioned above.[13] By focusing in particular on the sensory dimensions afforded by the dramatically different designs of the Boeing 737 and the DHC-2 we reflect on the different atmospheres of our flight experiences. Finally, we conclude with a brief reflection on the ontology of mobilities design. By introducing ideas drawn from alien phenomenology and flat ontology,[14] we speculate on how designed units themselves might "sense" movement through the "medium" of air,[15] and therefore we introduce a new element in the mobility staging model.[16]

Before we start, a word on the approach and method is needed. The flying experiences are the experiences of two male, Caucasian academics age forty-plus. For all practical purposes we should describe our bodily capacities as "able." We are, in other words, telling two travel stories, based on reflexive participant observation, from a particular point of view that could be rightly criticized for being "ableist." On the other hand, we need to explore the flying practice with the "tools" at our disposal, and in this case for us that means flying as able mobile subjects. The experiences would have been radically different had the narrators been facing hearing, seeing, or walking challenges. Also we should note that the empirical "evidence" to which we refer consists of the many trips taken over the past decade by the two authors. This is to say that we have not made a targeted, research project-specific set of field trips dedicated to this particular article. Rather, we draw on thousands of kilometers of flying hours within the two aircraft types presented.

Sensing Mobilities

Even though very limited literature on the embodied experience and practice of flight exists, students of mobilities can now access a growing body of knowledge in order to deepen their understanding of how bodies are part and parcel of mobile assemblages. One of the very first such studies, following the so-called mobility turn of the early 2000s, was Mimi Sheller's research on the car–driver assemblage.[17] In a pair of articles drawn from textual data analysis as well as personal reflections, Sheller argued that car driving should not be considered purely as a rational economic choice or as a status-aggrandizing symbolic gesture. Choosing to buy and drive a car, instead, should be understood as an aesthetic, emotional, and sensory act unfolding in relation to drivers' embodied sensibilities toward car use. Car driving, Sheller argued, enabled kinship, work, habitation, sociability, and sheer pleasure—all largely outcomes of the changing material design of the car, evolving driver predispositions toward comfort and control, and ongoing transformations in urban and rural geographies. key parallel, Sheller found a key parallel "between motion and emotion, movement and feeling, autos and motives,"[18] and it is through a closer look at the "embodied dispositions of car-users and the visceral and other feelings associated with car-use" that we can achieve a better understanding of the wider social and cultural geographies of automobility.[19]

Since Sheller's intervention, mobility scholars have started to pay attention to the sensations taking place in the context of train travel,[20] cycling,[21] walking,[22] car driving and passengering,[23] motorcycle riding,[24] and sea travel,[25] among other experiences. Throughout this body of research, kinesthesia is treated as an active interface between the lifeworld and the human body. Sensing movement, in other words, is viewed less as a passive register of external stimuli on the perceiving body and mind, and more as an open disposition through which individuals are immersed in the currents of their movement. And absolutely crucial to the particulars of these currents are the material affordances available. Following Sheller's incitation to treat moving subjects as hybrid human-machine assemblages,[26] mobility researchers have made great strides toward understanding mobility technologies as extensions of the body or prostheses.

In the context of the (very limited) research on airplane passengering, a focus on the sensory perception of flight has yielded especially revealing information about dynamics related to comfort (and lack thereof), sensations of speed, and gazing from the cabin's windows.[27] Lucy Budd's historical research has revealed that sensory experiences of passengers and pilots have evolved in unison with aircraft design and the political and economic organization of the worldwide airline network to produce an experience of flight that is increasingly smooth, painless, quick, and predictable. This connects well with Liz Millward's argument about "idealized passengers" within the emerging discourse of aereomobility.[28] In fact it would not be a far stretch to argue that jet flight nowadays is as "McDonaldized" as many other consumer institutions of our global capitalist society, with its growing emphasis on efficiency, calculability, predictability, and control.[29] Being in the air at 36,000 feet, Budd reminds us, was a much different affair a few decades ago, when arguably more so than now:

> pilots and airline passengers were living, breathing, human bodies who variously experienced feelings of excitement, anticipation, and fear, and encountered (often unnerving) three-dimensional kin-aesthetic sensations during the course of a flight, including pitching (nose moving up and down), rolling (wings moving up and down), yawing (aircraft sliding from side to side), acceleration, climb and descent.[30]

Now, of course we are being simply provocative in adumbrating the possibility that today's occasional and frequent jetsetters might be slightly less "alive" than their counterparts of the 1930s, yet the point remains: in order to reduce fear, anxiety, discomfort, inconvenience, and the objective threat of injury and death, air flight has progressively become focused on decreasing the potential for passengers to sense the unique characteristics of airplane travel and the qualities of weather at high altitude. While we still believe, with Budd,[31] that to this day "airline passengers are living, breathing, human subjects whose individual embodied and affective experiences of flying are worthy of investigation," we also maintain that embodied experiences of airplane flight are quite different across different types of aircraft, route, and situation—with some being far less affectively intense than others. In order to reflect on this from a more sophisticated theoretical and conceptual angle we turn to the next section on mobility and design.

Mobility and Design

Mobile situations are acted out by human bodies in social interaction within a material environment. More precisely, mobilities are staged and designed from "above" through engineering, architectural, and institutional practices, but also through bodily tactics from "below"—as loosely scripted situated interactions staged by end users such as passengers.[32] Here take our point of departure primarily from this staging model in order to argue that the study of aeromobility must take embodiment and sensuousness seriously. The notions of "staging mobilities" and "mobilities in situ" and the analytical distinction between the material environment, the social interactions, and the *embodied* performance are in fact the pivotal points of this model (Figure 1).

- Insert Figure 1 about here -

Figure 1: Staging Mobilities[33]

The coming together of such elements (as portrayed in Figure 1) is an ensemble of acts of “staging from above” (e.g., policies, regulations, and design manuals) as well as acts of “staging from below” (e.g., mobile subjects and their particular decisions to move, act, and interact in certain ways). Looking, for instance, at in-flight mobilities we may notice that many elements have been “staged from above” (from the global air system to the engineers’ interior design of the cabin). But the way human bodies “inhabit” aircraft cabins and interact are expressions of a “staging from below” in which passengers’ subjectivities and embodiments become intertwined with systems, technologies, regulatory frameworks, policies, and even other nonpresent but idealized human subjectivities and bodies (for instance, the idealized version of a human body size influencing the design of aircraft).[34]

The spread, scale, and dynamic nature of contemporary flying practices require scholars to start looking more closely at the field of design and the way our mobile everyday life is enabled, constrained, and shaped by design decisions and interventions. Though one might argue that a new field of “mobilities design” is already emerging,[35] such a research agenda in relation to the design of aircraft and the air passenger experiences is yet to be developed. Such an agenda would put high emphasis on the sensorial, the embodied, and lived experiences of airplane passengers. So, for example, if we turn explicitly toward the issue of interior aircraft design we may observe that interior aircraft design is subject to complex processes of division of labor, as in any other field of industrial production.[36] The atmospheres and experiences afforded by interior aircraft design are (as many other mobilities designs) an expression of a compromise between the technically feasible and the economically viable. The aircraft design “stages” a particular experience and atmosphere at the same time that the passengers “stage” themselves within this complex nexus of space, technologies, and objects. Issues such as orientation of seats, number of rows, aisle width, presence of smaller “public spaces” (in larger aircraft typically in front of strategic sites such as the lavatories) all contribute to a "spatial setting" that is given in advance or "staged from above." [37]

However, multiple ways of inhabiting interior aircraft spaces bear witness to the fact that mobile subjects equally "stage" themselves within these artificial environments (as a matter of fact we found out during our conversation about this essay that one of us is an "aisle person" whereas the other is definitely a "window person"—two distinctly different ways of staging one's aircraft experience). Also we see the increasing usage of mobile electronic devices by many passengers as particular ways of "staging" and thus creating or co-creating the aircraft experience. "With an increasing mobile world population, the interiors of vehicles will be subjected to ever greater levels of public and professional scrutiny, technical innovation, governmental or international regulation, and aesthetic enhancement to protect, seduce and entertain us in our peripatic lives," as Gregory Votolato has acutely observed.[38] Thus, the function of "mobilities design" could arguably be said to be to "protect, seduce, and entertain"—all themes and issues that work on embodied mobile practices in more or less conscious and visible as well as in more subtle and subconscious ways. In other words, as we inhabit different aircraft we are inevitably afforded the ability to sense flight differently. Let us now take a closer look at how aircraft mobilities design and sensations intersect.

Sensing Flight

The sense through which humans apprehend movement in space is known as kinesthesia or the kinesthetic sense. Kinesthesia is part and parcel of the broader vestibular system, through which humans are also capable of sensing their body's balance, direction, and acceleration.[39] Kinesthesia, however, is not the only sense responsible for apprehending the experience of movement. Even when stilled—such as when seated inside an airplane cabin—a body apprehends its movement through a variety of multisensory stimuli (e.g., visual, aural, haptic, etc.). Dissecting which sense is responsible for which kinesthetic sensation, therefore, is not our concern. Rather, how sensory stimuli are affected by the technological means that mediate the bodily experience of flight "from above"—such as the design specifications of an airplane cabin—and how they are phenomenologically sensed and at times even rearranged "from below" by passengers like us is what will concern us here. Our intention in this section is to exemplify how the distinctly different designs of the Boeing 737 and the DeHavilland Beaver bring forth different occasions that give rise to sharply different atmospheres aboard the two airplanes.

An atmosphere is a transpersonal affective intensity associated with a particular place.[40] Loosely synonymous in everyday speech with the mood, character, or feeling of a place, atmospheres "emanate from the ensemble of elements" that make up a place and are constantly subject to being transformed and "taken up and reworked in lived experience."[41] Key among these ensembles of elements are two things. First are the embodied practices of those who dwell within a place, for we can understand atmospheres to "arise within the current of their [dwellers'] involved activity, in the specific relational contexts of their practical engagement with their surroundings."[42] And second are the material objects swirling in an environment, thus becoming entangled in complex more-than-human meshworks.[43] As a result, atmospheres are emergent, nuanced, indeterminate, and somewhat ineffable more-than-human assemblages—always exceeding clear apprehension.[44] Nonetheless atmospheres are at times unmistakeably palpable.[45] This is because, like all places, an atmosphere "owes its character to the experiences it affords to those who spend time there—to the sights, sounds, and indeed smells that constitute its specific ambience."[46]

Even though there is no such thing as a "typical" affective atmosphere of a passenger airplane—for such atmospheres will always vary according to the particulars of the situation, the origin and destination of the flight, the composition of crew and passengers, the time of day and year, and so forth—researchers have noted that affective experiences of commercial airline flight have some relatively stable characteristics over time.[47] To name a few, feelings of boredom, anxiety, quiescence, dread, excitement, hunger, anticipation, awe and wonder, and bodily discomfort circulate in different measures around the aircraft cabin, affecting passengers and being affected, in turn, by their changing moods, sensations, and states of mind. However, on unremarkable flights, under ordinary circumstances, for most people flying experiences generally turn out to be a bit, shall we say, "underwhelming" and purely a means to an end.[48] A far from uninteresting "finding," this "unexceptional" atmospheric texture might very well have been the designers' intent: to render flight habitual by softening the sharp edges of aircraft design (e.g., noisy engines, cold cabins, turbulence-prone aircraft, etc.) that in a not-so-distant past made passengers uncomfortable, and scared would-be fliers away,[49] thus ultimately contributing to downplay the fact that being airborne has an element of essential risk to it.

To state the above in other words, we might suggest that affective atmospheres of flight are heavily dependent on the design of an aircraft "from above."[50] An airplane that is designed to recede into passengers' consciousness and minimize their discomfort and anxiety in the air is an airplane that effectively insulates passengers. It shields them, for example, from the weather and air pressure outside. It allows for a moderate amount of sociality during the flight, but not overly intimate or invasive conditions. And perhaps it allows them to become distracted and entertained—thus taking their minds away from being strapped and stuck inside a flying piece of metal suspended in the clouds 35,000 feet above the safety of the ground. As David Bissell observes, it is thus not surprising that:

> easy passage is one of the promises granted to passengers through a suite of infrastructures that give rise to an entubulated experience of mobility. Seamless point-to-point passage where different modes of being-driven snap-to-grid are afforded by

> traffic reports, itineraries, timetables, real-time journey information and travel agents, which enrol the passenger into an economy of ease, speed and comfort that aspires to make travel quicker, more comfortable, and above all, *effortless*. Within this economy, resistances and encumbrances that impede smooth passage are unwelcome. Infrastructures that alleviate the encumbrances of travel through speed demonstrate how the passenger is enrolled within a particular capitalist ethic that privileges particular ways of moving over others.[51]

This atmosphere of *insulation* is arguably the norm, but there are noteworthy exceptions in the world of flying. Aircraft design that more deeply involves passengers in the experience of flight "from below"—for example by making it difficult or even impossible to ignore sensations of being in the air—might be said instead to be characterized by an atmosphere of *suspension.* Such suspension might be engendered by the kind of design that makes people feel suspended—indeed literally a feeling of "hanging" in the air—while simultaneously perceiving a sentiment of suspense, which some people could experience as exhilarating or, in contrast, frightening.

Speed, travel duration, and route are important elements affecting aircraft design and the resulting atmosphere on board. For example, take the way design and sensations of *speed* intersect. The Boeing 737 ("classic model") has a top speed of 876 km/h and a cruising speed of 780 km/h. In contrast, the DHC-2 has a top speed of 255 km/h and a cruising speed of 230 km/h. An aircraft's speed is determined by many design variables, such as the power of the engine(s) and the weight and shape of the aircraft. The "Classic" Boeing 737 has a length ranging between 31 and 37 meters and a wingspan of 28.88 meters, a height of 11.07 meters, and a passenger seating capacity between 108 and 180 depending on the model (see fig. 2). The "classic" model is powered by two CFM International CFM56 engines. In contrast, the

DHC-2 can accommodate six passengers, has a length of only 9.22 meters, a wingspan of 14.63 meters, a height of 2.74 meters, and a maximum gross weight of 2,313 kilos. Its power plant is a Pratt & Whitney R-985 Wasp Jr. Radial Engine.

- Insert Fig. 2 about here -

Figure 2: Boeing 737 (Photo by Ole B. Jensen).

The different sizes of the two airplanes afford dramatically different conditions for experiences of flight, such as differing forms of sociality on the move. A full cabin capable of accommodating 150+ people normally makes for a very anonymous atmosphere. And in fact for some passengers nothing could be worse than spoiling that comforting anonymity—a troublesome circumstance caused by overly chatty seat companions, loud or unruly passengers who manage to draw unwanted attention, or large-shaped passenger bodies that end up touching against neighboring elbows, legs, and worst of all heads and shoulders.[52] Mobile atmospheres "are rarely experienced alone or in isolation from other people" and "being with" others is at the very center of our embodied experiences of flight.[53] Yet our affective dispositions toward fellow passengers are highly variable not only from occasion to occasion and from mood to mood, but also in light of the expectations that passengers develop with respect to aircraft design. Before boarding and takeoff, and after landing, DHC-2 passengers, for example, would find it almost impossible to avoid communicating with fellow passengers and the pilot. They also know that doing so may be necessary to secure free rides or share taxis upon arrival at a destination, or simply to maintain good rapport with neighbors and acquaintances in the small communities where Beavers operate.

Dramatically different design specifications also make for very different sensations of flight speed. On the Boeing 737 the key times when speed is felt are during takeoff (acceleration) and during landing (deceleration) where the kinesthetic sense is stimulated far above any other everyday life experience. In particular the takeoff acceleration appeals to many, triggering an almost adrenalin-like rush that is hard to experience elsewhere. As the 737 reaches cruising speed the vehicle speed itself is then hardly felt. Turbulence and directional shifts are felt, but while cruising, the 737 feels as "steady as a rock." Flying the DHC-2 is instead like traveling on a speeding one-ton truck. The Wasp Jr. engine is extremely loud. At cruising speed the propeller is deafening enough to prevent passengers from being able to listen to mobile devices with their earphones and even from speaking to one another. During takeoff and landing the propeller's roar is even rowdier—so rambunctious that most DHC-2-operating airlines offer passengers ear plugs for the flight. So, while visually the sensation of speed is not particularly acute, the loudness of the Pratt & Whitney engine amplifies the relative velocity of flight.

Speed sensations are deeply entangled with sensibilities such as comfort and anxiety. Even though passengers sit still inside a 737 or a Beaver, their bodies do not cease to be moved affectually. For instance, flying at high altitudes means flying without proximate points of visual reference, which lessens the intensity of the sensation of flight speed. On the other hand even though the cruising speed of the DHC-2 is at least four to five times slower than that of the 737, it is not uncommon for first-time flyers to sense discomfort and anxiety at flying "so fast" (as the second author has heard numerous times) while being "so close" to trees, mountain faces, buildings, and other features of the landscape. "Both speed and slowness emerge as transversal qualities of body-object assemblages," observes Bissell in this regard, and "these apprehensions of im/mobility and affective intensity assist opening up possible ways of thinking through how comfort as a corporeal sensibility is experienced by sedentary bodies."[54]

Aircraft engineers also design a cabin well-cognizant of how long passengers will be on board. *Duration* of travel is something that we may not promptly identify as affecting the sensation of flight, but its consequences are clear upon close examination. For example, the Boeing 737 mainly operates on short- and mid-distance routes and does not always carry the inflight entertainment systems carried by aircraft operating on intercontinental routes. With a reach between 4,000 and 5,000 km, the 737 operates efficiently on flights between one and four hours. This means that it covers, for instance, most of central Europe in its reach. This is not really long enough for passengers to get a great deal of sleep, as in intercontinental flights, but it is long enough for anyone interested to catch a quick nap. "Tiredness and sleep, Bissell argues, have "significant implications for how we understand experiences of mobility" such as atmospheres. [55] When virtually everyone goes to sleep following the incitation of long-range airplane pilots, a certain harmony prevails among quiescent passengers in the darkened and quiet cabin. But when only a few people nap, while others chat, and others try to work, tensions may arise between passengers over space occupation, noise level, the up or down position of window blinds, and so on. In other words, the 737 is not a place designed for or "dedicated to sleep, such as the motel [or perhaps the aptly named hypercomfortable 787 "dreamliner"], but rather offer[s] the possibility of sleep as one of a number of practices that the mobile body can potentially experience."[56]

And speaking of window blinds, due to its 2x3 seat row design as the standard setting for the 737, we find there is a certain awkwardness related to window-gazing (which is one of the most obvious attractions of flying besides the fact that one is transported fast). Only two people have direct window access and often we see curious fellow passengers leaning over and twisting their necks to get a glance of the "outside world" without transgressing the boundaries of intimacy too much.

DHC-2 passengers have even fewer ways to spend their travel time. The maximum range of a DHC-2 is 732 kilometers, but most airlines fly their Beavers much shorter distances, typically anywhere from twenty- to forty-minute flights and therefore less than 100 km. In light of that, sleep is normally not an option and in this sense passengers are mandated to be somewhat animated and lively. Because there is no in-flight entertainment available on Beavers, and because the extremely limited hip and elbow space between passengers seated on a common bench makes it difficult to operate a mobile device or even read a newspaper, most passengers will spend their flight looking out the window or directly in front of them. The option of looking outside is rendered even more appealing by the unique configuration of the cabin (both passengers seated in the backbench have a window view, two out of three seated in the middle bench do, and the passenger seated in the cockpit next to the pilot even has a side and a front view identical to the pilot's). The windows—two of which can even be partially opened—are single sheets of clear Plexiglas that permit one not only to see outside but also to feel the air, yielding sensations of outside temperature and smells (most notably the scent of kerosene, particularly pungent at takeoff and landing).

Lastly, an airplane's *route* can strongly affect its design—and vice versa. A Boeing 737, thanks to its pressure cabin design, is capable of reaching a cruising altitude up to 11,300 meters, which not only takes the aircraft "above the weather" but also allows operation on relatively longer routes. One of the most striking design features felt by the passengers is precisely the pressure cabin technology. Apart from the fact that this technology enables flying at much higher altitudes it also affects the embodied sensations in the cabin. For one thing, windows are not to be opened. At these cruising altitudes an immediate lack of cabin pressure may lead to loss of consciousness within a very few minutes. Moreover, the outside temperature at these altitudes would make a sudden open window very dangerous. The pressure cabin design then leans on a closed system of air conditioning and air circulation that most passengers recognize in the form of very "dry air" (hence the continuous serving of water from the flight attendants on long distance hauls).

The "pressure cabin" will not, however, disallow the passenger's sensation of pressure change. The pressure changes are mostly felt during altitude changes such as takeoff and landing, but can also be experienced midair if the plane changes altitude. This is predominantly felt in the ears, and anything from chewing gum to various depressurizing techniques like blowing one's nose while keeping it covered with the fingers, can often be observed during flight. That said, small "sensory strategies" such as these are simply not enough for some passengers who are highly susceptible to ear pain, and indeed many would-be passengers simply avoid airplane travel because of such pain. [57] Pain often accompanies kinesthesia. Justin Spinney's research on cyclists attempting to climb Mt. Ventoux has, for example, revealed how pain functions as a barometer of effort and skill,[58] and in that case as the by-product of slow cycling ascent. In airplane pressurized cabins, on the other hand, pain is curiously endured as the by-product of rapid ascents and descents by still and virtually sedentary bodies. All-in-all the pressure cabin design contributes to the sensation and atmosphere of an insulated and "truly artificial environment." By this we mean that the human body senses that this environment is very different from what is usually experienced on the surface level of the Earth, meaning that the aircraft will "interface" our sensation of the world, or in the words of Votolato: "beyond moving us from A to B, every vehicle in which people travel provides an interface with the natural, physical world."[59]

Video: https://vimeo.com/156476739

The reality is much different on a DHC-2 because of the absence of a pressurized cabin capable of flying above weather. The highest a DHC-2 can fly is 5,486 meters, but this service ceiling is purely theoretical. Most Beavers operate at low altitude from lakes and seas because of the plane's effective STOL (short takeoff and landing) design (see video). This means that Beavers are ideal for travel to/from small islands and lakeshore destinations to mainland towns and cities (it is no accident that most DHC-2s can be found along the North American Pacific Coast and along the Australian and New Zealand coastline)—typically all areas where flight occurs at very low altitude. Flying at an altitude of 60–100 meters means it is impossible to have a Godlike landscape view as one does on pressure cabin aircraft.[60] However, the low altitude makes it especially rewarding to gaze out of the window. "As passengers engage with the world," as they "gaze through the window, they weave their temporality, landscape, and experience of . . . travel."[61] Float plane passengers, as opposed to 737 flyers, for example, get the chance to glance at neighbors washing their cars and weeding their gardens, or perhaps attempt to spot pods of seals frolicking in the water. Of course, this may be entertaining and even romantic at times, but it also makes the body feel vertiginously "hung" in midair—much like the sensation of peeking down the balcony of a ten-story building. It is an atmosphere of suspension that—at best—feels like weightlessly gliding or—at worst—precipitating uncontrollably with every "bump" (a feeling commonly experienced during bad weather, especially windy, days).

The ways that mobile subjects sense the atmospheres of flight within the two very different mobilities design of the DHC-2 and the 737 are obviously very different. In concluding this section it might be useful to compare the difference between the two types of aircraft to the differences between a modern automobile and a motorbike. Like today's cars, the 737 provides a cocoon-like environment in which affordances for insulations and desensitizations form the exterior abound. On the other hand, similar to a motorcycle the DHC-2 affords different intensities of involvement with the environment traveled through, as well as with the actual transport vessel. Air currents and winds are directly felt, save for the mediation of a thin layer of metal or plastic, and just as on a motorcycle, on a Beaver there is a distinct sensation that you are in the airspace through—better yet *alongside*—which you are moving. As on a motorcycle you are less dependent on abstract control over trajectory, much closer to the ground, more intimate with its textures and contours, and more conscious of its presences, absences, and variations.[62]

So, in a sense, vehicles such as the 737 and the Beaver are the same only in terms of broad categories. Mobility designs always afford particular embodied and sensorial experiences depending on their material characteristics, which are then always experienced in distinct ways in situ "from below." Different mobility designs, in other words, actively "reshape the affordances of nature by expanding the range of possible actions available to the body."[63] Different affordances and different actions then give rise to sharply different sensations and "sensory strategies" on the part of actors.[64] As Paul Ashmore brilliantly puts it:

> Different configurations of objects, technologies, energies, non-human life forms, spaces, forms of knowledge and information combine to form "affective fields" that are distributed across particular geographical settings. Here, then, thinking through affective atmospheres allows for the emergent and processual nature of experiencing travel, and the human and non-human elements that cohere and disperse in the experience of passengering. Furthermore, consideration of broader affective fields moved through and generated in the course of travel help to avoid uncritically assuming the passenger as an already given subject.[65]

Or the airplane, as an already given subject, we might add. To summarize, what we have done in this section is to bring some tangible stories to bear on the fact that we are not just flying from A to B, but in complex ways we are inhabiting aircraft with the multiplicity of our sensorial capacities. Such multiplicity craves a more acute vocabulary to be analytically explored than what has been developed so far within the mobilities turn. To become more sensitive to the importance of design we may then argue for the importance of a "flat ontology" of mobilities design.

The Next Leg: Toward a Flat Ontology of Mobility Design

Hitherto we have paid attention to how *passengers* experience flight. But our research objective—to shed light on the sensation of airplane flight in relation to the assemblages that make such mobile practice possible—does not necessarily imply that we should limit ourselves to examining *human sensations* alone. Alas, an exclusively anthropocentric focus is what characterizes much of mobility studies, a focus that much too often unduly treats materials as inert, "lumpen" entities awaiting meaning attachment and discursive reification.[66] If we wish to comprehend sensuous mobilities writ large, rather than solely human mobilities, a broader, more-than-human, approach is required. In this brief final section we then speculate on how the Boeing 737 and the DHC-2 might "sense" flight—heeding the call for a rematerialized social scientific epistemology and ontology.[67]

A starting point for a more-than-human approach might be to add an element to the staging mobilities model. Rather than just a staging from "above" and from "below" we might also introduce a level of staging from "the side." This "lateral" staging process should account for the nonhuman-mediated forces with which material objects, things, or "units" enter into the relations comprising the assemblages they comprise.[68] Thus, rather than a dialectical ontology composed of sociostructural and individual forces, we need to deal with a "flat" ontology,[69] in which all units (human and nonhuman) are perceived to be the same, or better yet, one in which "all things equally exist, yet they do not exist equally."[70] From a flat ontological perspective airplane flight can be understood as a mobile experience and practice in which “humans are no longer monarchs of being, but are instead amongst beings, entangled in beings, and implicated in other beings,”[71] such as an aircraft itself.

It might seem silly to suggest that an airplane can sense flight. But the speculative realist attitude typical of flat ontology demands that we humans “abandon the belief that human access sits at the center of being, organizing and regulating it like an ontological watchmaker.”[72] While we might never truly know how airplanes “feel” when they fly (arguably we might be as unaware of it as we are of how their human passengers feel), an intelligent speculation might work as a phenomenology that transcends human consciousness—thus functioning as an “alien phenomenology.”[73] So, along these lines, we might “speculate” that airplanes might not quite “feel” as humans do but still “feel” in consequential ways. They might not acknowledge a feeling of fear following a sudden drop in altitude, or a sense of discomfort and dizziness during a moment of turbulence, or even annoyance at noise or disgust at the smell of kerosene. Not every being senses the same things, in the same ways after all (that is also why we have aisle people and window people). Yet airplanes might prehend, by way of “confrontation,”[74] certain perturbations in their environment differently from the way that humans do. They might, for example, be highly sensitive to certain changing levels of stimuli and to the consequences of changing stimuli for the relations characteristic of the assemblages of which they are part.[75]

Take the example of flying at high altitudes. As planes climb higher the air gets thinner. Jets like the 737 are designed to draw in air through the operation of compressors, but propeller engines are not designed the same way. As a Beaver climbs higher it “senses” the lower temperature and higher altitude by “confronting” the relative lack of oxygen and by slowing down. The internal combustion engine of a DHC-2 needs air to operate and without it, its power is greatly reduced. Or take the example of turbulence. Clean-air turbulence is caused by a jet stream interacting and mixing with slower-moving air. The human eye cannot see turbulence, or detect it on a radar, but it can sense it through its vestibular system. An airplane has no vestibular system proper but it can still "confront" turbulence in a kinesthetic sense by changing altitude, bank, and pitch. Even more interestingly, jets like the Boeing 737 are designed with a trait known as "positive stability," which allows the aircraft to return automatically—without pilot intervention—to its original position in space after being shifted around by turbulence.

Many other examples could be cited of how differently designed aircraft differently sense changing environmental relations and act accordingly, but the point remains and we must bring this exploration of the multisensorial aerial experiences to a close: a flat ontology invites us to understand objects as present and at hand for us as they are for each other.[76] We do want to emphasize the underexplored dimension of multisensorial mobility practices—as a good deal of research on the subject is beginning to emerge. However, en route to explaining these with the twin examples of the 737 and the DHC-2, we have felt the necessity to inscribe the materiality and design realities much more explicitly than has been done before. The "staging mobilities" model clearly illustrate that we should pay attention to "in situ" practices and how they entangle sites, technologies, and artifacts as well as other mobile subjects and their bodily capacities. The "in situ" experiences of either 737 or DHC-2 aeromobility inscribe different sensorial dimensions, but they also invite us to think in terms of a flat ontology bringing the materiality of the two different aircraft much more forcefully into the story as we develop an inflight understanding of the sensuousness of mobilities design.

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Notes

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[16] Ole B. Jensen, *Staging Mobilities* (London: Routledge).

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