

## Chapter 1 Toward an aesthetics of outdoors experience and walking (Draft)

### Defining the problem

Consider for a second your understanding of "outdoors", its typical meanings, its connotations and the personal resonances it triggers for you. For many, the outdoors is a word that connotes the *pleasures and/or fears* of recreational (or accidental) activities that take place in areas without the shelter of our built environments. Yet it could also index an number of quotidian activities such as walking between various buildings on a university campus, or hurrying down the street to catch a bus. There is certainly a range of understandings relating to the "outdoors" that we are more likely the share (certain sports, social events or other cultural activities like parades happen there), and others that are deeply individual, such as the thrill I take in walking in the back country, versus others who might suffer terribly from various phobias in such spaces. Not only is outdoors a word, but it also connotes worlds in which space is experienced under different cultural conventions and navigational cues (compare what you know about finding your way around city streets to that of following a hiking trail), and different personal circumstances. I for one easily become lost in cities, which gives me some sense of trepidation about them, but I almost never feel that way in the remote desert terrains in which I do much of my research. Sometimes, I have known exactly where I was in the desert and on the map, which frightened me for other reasons more related to my level of preparation and bad decision making. For many the exact opposite scenario would apply: comfort with the city and trepidation in the natural landscape. The worlds in which we navigate may be urban, suburban, rural, wilderness, and increasingly virtual worlds, and the experiences we have had in those worlds may be very different due to our individual peculiarities. Yet on the other hand, there are some aspects of our spatial experience that we more universally share, such as how we build cognitive maps of the spaces we occupy and how we communicate spatial relations.

Barbara Tversky has noted that our remarkable linguistic abilities include an equally remarkable facility for conveying categorical spatial relationships. [Tversky, Barbara, Levels and Structure of Spatial Knowledge, Cognitive Mapping Past Present and Furture, Kitchen and Freunds Schuh, eds, Routledge, 2000, pg 31] As anyone who has ever studied a second language would agree, among the most essential words and phrases to master are those that describe spatial relationships, such as: over, under, behind, in front, back, on top, beside, inside; spacial descriptors including the word "outdoors" under consideration here. The powerful linguistic flexibility of these spatial orientation words can be seen in their broad grammatical range, in that they often play many roles as parts of speech; adjectives (a front man), adverbs (to oversell an idea), and most perhaps essentially as prepositions (the cat is under the bed.) The latter prepositional use of "outdoors" is its most denotative: the antonym of indoors when describing a spatial relationship to architecture. Spatial words become object and place nouns very easily as well, when for example we are "given a syringe in the behind," or we "go on top to hoist the sail." The the noun and verb modifying uses of spacial orientation words are highly metaphorical and flexible, allowing many expressive connotations, such as "under the gun" to describe a coercive situation or the very broad meanings that stick for the term selected here, the outdoors.

Our ability to express and understand spacial relationships utilizing language is powerful. Although not quite objective or universal, our complex use of spatial language is nevertheless behaviorally efficacious most of the time. As Tversky points out, when we utilize space words the prepositional sense, literally performing a grammatical pre-positioning of objects within in our speech acts, we use linguistic distinctions almost unconsciously (as in, with incredible ease) to encode complex combinations of spatial *scale* and relationship within which we communicate spatial relationships to other people. Importantly, other people usually understand our spacial representations very well.

Tversky and her colleagues report three scales of spacial relation, at least for English and Dutch speakers. The first is description of small spaces from a single point of view, such a single room from its doorway. Simple prepositions are applied to objects described, such as "the desk is on the left and the computer is on the desk." This suffices to encode and efficiently communicate the relationships of a space that can be viewed in its entirety from a single perspective or view.

Larger spaces require encoding through more complex conceptual frames, such as a "route" perspective depending on a sequential representation, and "survey" views depending on extrinsic frames such as the cardinal directions North, East, South and West. (Route and survey knowledge will be examined in more detail in chapter 2.) Various creatures whose wayfinding skills have been intensively studied certainly exhibit some amazing wayfinding abilities, perhaps the most often mentioned being *Cataglyphis*, a desert ant with exceptional path integration and dead reckoning ability. *Cataglyphis* can walk directly back to their nests, in a constantly shifting terrain of Saharan sands with no stable landmarks, no matter how convoluted their daily meanderings. [ref] But humans too, even if we are in many respects limited by our generally inferior sensory organs, do nevertheless have a number of amazing navigational abilities. Perhaps the most impressive among them being the use and propagation of very diverse, yet normally highly effective, representations of spacial relationships conveying different scales of reference as mentioned above. Newer digital representations are rapidly altering our navigational experience. In just a few short years, we have gone from using paper maps of cities, through printing maps with directions on websites like MapQuest, to the consolidation of turn-by-turn GPS navigation first in dedicated devices and now into our mobile phones. If our experience of navigation in the city is changing so rapidly, how should we, for the purposes of developing a notion of what an aesthetics of the outdoors and walking in it might be, frame the "outdoors" such that we can illuminate the kinds of experiences we share? This is not an easy problem. For example consider a natural landscape that thrills one person, inspiring a sense wonder and exploration, yet triggers in another person agoraphobic terror. How do we define what we expect to be a common experience from qualitatively different (though as we will see, perhaps not contrary) experiences such as these?

Immanuel Kant's philosophy of experience laid out in his *Critique of Judgment* (1790), like much of his philosophy, is very much interested in resolving differences between individual cognitive experience and notions universal experience. In his 1781 *Critique of Pure Reason*, he famously formulated what is now probably the most commonly held notion of the *a priori* as knowledge or truth that does not depend on direct experience for verification (further defined via concepts of synthetic and analytic judgment), thus firmly specifying a category of transcendental and universal truth. In his 1785 *Groundwork of the Metaphysic of Morals* he theorized the "categorical imperative" as objective and absolute moral requirements justified only by their ends, as universal imperatives, once again not dependent on anyone's subjective experience. Kant was a little softer on aesthetic judgment, some would say producing a muddled oxymoron that is yet no less committed to the universal, His notion of the universality of aesthetic judgment distinguished between mere sense as a lower form of judgment based in *the agreeable* (which recognizes that we each have our own individual and often different likings, as in "agreeable to our senses") and a higher form of disinterested, impartial judgment he termed *taste* which is based not in agreeableness but instead *the good*. For Kant, *the good* is somewhat the opposite of *the agreeable*, as the good is objectively founded in ethics and objective reason instead of mere pleasurable sensation. In between these poles he situated two important concepts describing aesthetic experience: *the beautiful*, which he thought corresponded with understanding, and *the sublime*, thought to correspond with reason. From this he drew a notion of a *subjective universality* (which many take as an oxymoron) that lies in between *the agreeable* (subjective) and *the good* (objective.) Subjective universality of judgment is the judgment we *ought* to agree on. Its universality is based in transcendental truths that can be demonstrated as superior to any mere liking. In Kant's

words:

"Roses in general are beautiful," is no longer pronounced as a purely aesthetic judgement, but as a logical judgement founded on one that is aesthetic. Now the judgement, "The rose is agreeable" (to smell) is also, no doubt, an aesthetic and singular judgement, but then it is not one of taste but of sense. For it has this point of difference from a judgement of taste, that the latter imports an aesthetic quantity of universality, i.e., of validity for everyone which is not to be met with in a judgement upon the agreeable. It is only judgements upon the good which, while also determining the delight in an object, possess logical and not mere aesthetic universality; for it is as involving a cognition of the object that "they are valid of it, and on that account valid for everyone."

Consider Kant's model below:

Subjective	Universal Subjective	Universal Subjective	Objective
Agreeableness	Beauty	Sublime	Good
Merely empirical sense data	Ought to be judged via a priori transcendental, not mere empirical sensation	Ought to be judged via a priori transcendental, not mere empirical sensation	A priori, transcendental

A modification of Kant's concept of subjective universality, I will argue, serves well to frame the problem of theorizing an aesthetics of the outdoors and to situate walking within it, such that on one hand my framework is at least *applicable* (even if not in stronger "universal" terms) to all human experience, and on the other hand in a way that accounts for the very reasonable suspicion that an aesthetics of the outdoors might dead on arrival because, for example, the same landscape that can trigger an aesthetic experience of tranquil beauty in one person can also produce extreme anxiety and discomfort in another. Critically, I understand that subjective universality is one of Kant's more turgid and often questioned assertions. The justification I will make for subjective universality in this circumstance untwists Kant's tortured reasoning through recourse to the empirical and repeatable observations drawn from neuroscience. This would certainly be over Kant's own objections, but I think his theory can be logically re-scripted to support mine. This maneuver at the same time serves to recuperate (or at least leave functional) the very useful Kantian conceptions of the beautiful and the sublime, which I will argue apply better to the outdoors than another 18<sup>th</sup> century philosopher, Edmund Burke's, notions of the same categories. The big takeaway here? Whereas Kant justified an aesthetics of subjective universality through logical contemplation of the good over the agreeable, in turn dealing firmly with those who, due to a presumable moral and social disability, can not separate the hedonism of the agreeable from an approach to the objective good, I take the situation relative to sensual experience and reason to be purely neurological, such that Kant's notion that agreeableness (sense) is somehow lowly in comparison to the good can be relaxed. After rewriting his notion of the agreeable while not necessarily rejecting Kant's good (a battle I have no need to fight here), I will show how the beautiful and the sublime are congruent with neural experience and function.

Cognitive science, neuroscience, and psychology use the terms distal and proximal stimulus to separate stimulus into its external source and its interface with the nervous system. For example the distal stimulus might be a piece of music that is being played, and how that stimulus is encoded by our sense organs (in this case the auditory system) would be the proximal stimulus that in turn propagates through the nervous system and brain as a cascade of synaptic activity. While in a later chapter on autopoiesis I will give more detailed framing for the distal stimulus as radically external to the biological subject, or a phenomenon merely triggering internal phenomenon without any necessity to consider more than an arbitrary translation of relations between external and internal that yields an

emergent fitness, it is an easier step here to show that neurological evidence indicates that it is quite justifiable give equal privilege not only sense experience and higher reasoning, but indeed to a holistic view of brain and nervous system function.

To show this, we can start by replacing Kant's notion of the object of appreciation, which he proposes aesthetic judgment acts on, such as a piece of music being performed, with the physical manifestation of musical stimuli, in other words, the distal stimulus. The signal that is experienced by our bodies becomes the proximal stimulus, the word "becomes" being very important here. Our auditory system is a membrane, small bones and cilia performing an analog to analog conversion, from sound energy to neural signals. The distal stimulus triggers in our neurobiology a proximal stimulus, in other words the sound is transduced into a sensation as performed by our internal neurobiology. There really are two different performances taking place, one by the musicians and another by our nervous system. The proximal stimuli in turn can be cast in the role of Kant's notion of the agreeable, which he certainly believed was in the realm of the senses. I think that we and Kant would quite likely agree on this much, at least, but for the rest of the argument involving the beautiful, the sublime and the good, we are going to have to dig a little deeper into some neuroscience.

At the University College of London exists the Wellcome Laboratory for Neurobiology in the Wellcome Department of imaging neuroscience. In the recent two decades there has been a revolution in neuroscience research enabled by various brain scanning technologies, but none more important than Magnetic Resonance Imaging, or MRI, (also called Nuclear MRI or NMRI). Also a staple of high tech health care, MRI uses powerful magnetic field to unify the alignment of atoms in the body, which can then be systematically perturbed by radio frequencies allowing the atoms to be measured and reconstructed into a three dimensional, digital representation. The technology is very sensitive, not only allowing the imaging of fine gradients within the the soft tissue of the body such as the brain, but to detect very small changes in the tissue in real time. The revolution in neuroscience is a direct result of the ability to perform real time images of how the brain is responding neurologically to proximal stimulus.

Among the more interesting and popularly discussed discoveries enabled by MRI studies to come out of the University College of London, in research led by Royota Kanai, is that liberal and conservative political orientation is linked with brain structure. Kanai and his colleagues found that liberals have a larger anterior cingulate cortex, and conservatives a larger right amygdala. The anterior cingulate cortex has been shown to deal with rational cognitive functions and decision making, while the amygdala has been shown to deal with emotional memory and fear response. [Political Orientations Are Correlated with Brain Structure in Young Adults, *Current Biology*, Volume 21, Issue 8, 677-680, 07 April 2011] Nobody should be surprised that this discovery generated a great deal of conversation and speculation, even though the study was absolutely clear that it did not address whether these parts of the brain grow to different sizes based a person's experiences in the world, or whether the size of these areas of the brain can predict that some of us are naturally better prepared to deal with complex ideas and contradiction, and others better at responding to threats. Among the limits of MRI is that, although it does allow temporal analysis of brain function, the durations are on the order of the time that a subject can spend laying inside of a MRI machine. Thus to answer the "chicken or egg" problem of whether the size of these areas of the brain are a cause or effect of political orientation would obviously require a much different type of study.

What is interesting for us however is that brain function and anatomy can now be robustly observed relative to questions that are not exactly those questions most people might imagine neuroscientists would be raising. For example, neuroscience has made marvelous progress in the study of diseases like

depression, schizophrenia, and autism. We all might expect this or at least be unsurprised, given that these are diseases of the brain. What is surprising to some is that studies can also be formulated to answer questions in other fields such as the social sciences, arts and humanities, just as in the Kanai study with has obvious applications in political science. Given this, should it be surprising to learn that neuroscience has taken on the neurobiology of aesthetics? Indeed, this is exactly what Tomohiro Ishizu and Semir Zeki, also with the Wellcome Laboratory for Neurobiology, have done in a study titled *Toward A Brain-Based Theory of Beauty*, [Ishizu T, Zeki S (2011) *Toward A Brain-Based Theory of Beauty*. PLoS ONE 6(7): e21852. doi:10.1371/journal.pone.0021852] producing what should be some equally "conversation generating" results for those of us in the arts and humanities. Ishizu and Zeki, as careful scientists, begin with what they take to be a "well formulated... in a neurobiologically accessible way" definition of beauty that was specified by Edmund Burke in 1757:

"In his Philosophical Enquiry into the *Origin of Our Ideas of the Sublime and Beautiful*, Burke wrote that 'Beauty is, for the greater part, some quality in bodies acting mechanically upon the human mind by the intervention of the senses' [1]. That definition suggests that there is a unique faculty of beauty that can be stimulated by any and all the senses. It thus raises an important question: would the experience of beauty derived from different senses, say the visual and auditory, correlate with activity in the same or different brain areas?"

Their goal was to find out if our brains experience beauty in the same way regardless of modality. Essentially, the experiment was as follows. First a group of thirty subjects were asked to rate a number of images and musical works as either ugly, indifferent, or beautiful, but these subjects were not scanned by MRI. Rather, this phase of the experiment served to develop a set of input stimuli distributed in roughly equal proportions between the three categories. Then, a second group was similarly screened, categorizing a different set of images and music into beautiful, indifferent, and ugly. But this exercise was not to select inputs, but rather to select subjects whose *categorization* of similarly beautiful, indifferent and ugly inputs were roughly distributed evenly between the categories. For example, one subject who categorized the input into only two of the categories, indifferent and ugly, was excluded from the study. So on the one hand the researchers had a set of input stimuli that was roughly evenly distributed – by survey – between the categories, and a set of subjects with a tendency to categorize inputs into a fairly even distribution across those same categories. Finally, the second set of subjects had their brains scanned with MRI as they actively categorized the earlier set of inputs (seen by them for the first time) into the three categories.

The design of the experiment was thus not at all about the evaluations involved in the specific categorization of any specific work into the different aesthetic categories, although it is important to point out that there was, as we might expect, variation in how the subjects evaluated the works. Thus on this level, the study was not addressing aesthetics in the Kantian sense of an "ought to be found beautiful", but rather on an empirical "tend to be found beautiful" that is statistical in nature. The study on one hand was controlled to ensure a set of input stimuli that is roughly equivalent in broad cultural terms to an equal distribution of beauty, indifference and ugliness, and on the other hand for a set of subjects who themselves tend to select those categories in roughly equal distributions. Their plan worked extremely well in the experiment, as the responses during scanning were in fact fairly evenly distributed between the three categories. The key to understanding the experiment is, that when exposed to a never before seen stimuli, the subjects were able to convey to the researchers (through the push of one of three buttons) that they were experiencing beauty (or one of the others) under conditions of reasonably high certainty that they were indeed experiencing that category of experience. Further, they had been trained on this very categorization exercise with a different set of stimuli, so they both knew how to perform during testing, and had previous experience applying the categories to new stimuli. Thus, the MRI apparatus could, with high certainty, show which areas of their brains were

activating when experiencing the beautiful, the indifferent and the ugly. The authors of the study point out a number of things that are important to mention here. They deserve a great deal of credit for their sophisticated emphasis that their study does not conflate art with beauty, mentioning artists such as Marcel Duchamp, Francis Bacon, and Lucian Freud as examples of other kinds of artistic merit that have historically surpassed any primary concern with beauty. Also, they point out that their study does not intend to, or in any way address, the notion of the sublime as laid out by philosophers such as Burke or Kant, a disclaimer that I as you will see soon, I speculatively reclaim.

So, what were the results? The study demonstrated a clear correlation between the beautiful stimuli and activation in a single part of the brain, the orbito-frontal cortex (mOFC), which the authors point out from other studies is associated with pleasure and reward processing. Another area they identified only became active only during visual stimuli: the caudate nucleus. This area of the brain is involved in various memory related abilities, and interestingly has also been found to play a role in romantic love. [Arthur Aron, Helen Fisher, Debra J. Mashek, Greg Strong, Haifang Li, and Lucy L. Brown (May 2005). "Reward, Motivation, and Emotion Systems Associated With Early-Stage Intense Romantic Love". *J. Neurophysiol.* 94: 327–337. doi:10.1152/jn.00838.2004] But it was the consistent, regular activation of the mOFC during both the experience of visual and auditory beauty led the authors ultimately to their conclusion: "We therefore modify Burke's 1757 definition given above and say that 'Beauty is, for the greater part, some quality in bodies that correlates with activity in the mOFC by the intervention of the senses.'" Now, how should we parse these results?

Thus, Ishizu and Zeki express at least some agreement with both Burke and Kant that there are external properties of objects that generate experience, and they were cleverly strategic in their advancing of Burke's definition over Kant's (whom they only mention in passing), because although a reading of Burke's *Origin of Our Ideas of the Sublime and Beautiful* reveals a rigorous, granular and carefully organized deductive case, ultimately it is the empirical core evidence based on Burke's observations of, and assertions about, his and other's psychology that provide the raw material for his study. In the *Critique of Judgment*, Kant rejected this empirical basis in Burke's theory in terms that could also be taken today as an equal repudiation of the Ishizu and Zeki study:

"Hence if the import of the judgement of taste, where we appraise it as a judgement entitled to require the concurrence of every one, cannot be egoistic, but must necessarily, from its inner nature, be allowed a pluralistic validity, i.e., on account of what taste itself is, and not on account of the examples which others give of their taste, then it must found upon some a priori principle (be it subjective or objective), and no amount of prying into the empirical laws of the changes that go on within the mind can succeed in establishing such a principle. For these laws only yield a knowledge of how we do judge, but they do not give us a command as to how we ought to judge, and, what is more, such a command as is unconditioned-and commands of this kind are presupposed by judgements of taste, inasmuch as they require delight to be taken as immediately connected with a representation. Accordingly, though the empirical exposition of aesthetic judgements may be a first step towards accumulating the material for a higher investigation, yet a transcendental examination of this faculty is possible, and forms an essential part of the Critique of Taste. For, were not taste in possession of a priori principles, it could not possibly sit in judgement upon the judgements of others and pass sentence of commendation or condemnation upon them, with even the least semblance of authority." [From the General Remark upon the Exposition of Aesthetic Reflective Judgements.]

Recall that my horse in this race is the claim that there is modification to Kant's universal subjectivity that might ground an aesthetics of the outdoors and walking. Kant's argument is that experience (going toward beauty and the sublime) has access to a priori, transcendental truths that logically yield "oughts." Examined in the terms of cognitive and neuroscience, Kant's case is that the *distal stimuli* possess the properties that through a universal subjectivity should lead to a correct judgment, as opposed to an individual judgment based in sense. By this theory, human experience of the outdoors

and walking *ought* to be the same. In his theory we should be able to identify qualities of the outdoors that are transcendental, also existing above any independent sensations of our bodies and brains. But what brain scans based on the more singular question of beauty now clearly demonstrate, beauty and by implication all aesthetic experience is specific brain activity within predictable and limited areas of the brain. (It is well known that in cases of brain damage or sensory deprivation such as blindness that parts of the brain can adapt to different functions, but this is not an issue because presumably if any such function, including aesthetic experience if such is possible, were "relocated" to a different part of the brain that it too would fire with similar consistency to produce the experience.) We can say now that aesthetic experience is a relation between proximal stimuli and specific things happening in the brain, and these are what we can consider universal but separate from distal stimuli. If some individuals are demonstrated to use different areas (say, as the result of an injury to the mOFC), it would nevertheless remain *consistent* for that experience they call beauty, and if not it would remain reasonable left to disclude that experience based on the individual health issue.

It is important to be clear about what I am not saying. It might be taken from the argument so far that I hold that neural experience is arbitrary with regards to distal stimuli. In later chapters I will ultimately make a fuller case for recourse to understanding social factors as explaining differing experiences, yet in a way that does not devolve into relativism. What I am saying is that distal stimuli triggers a system – an individual human – that has learned to respond to stimuli within its own history of interaction with the world. For example, let's say for any given painting that your mOFC fires "beauty," but mine does not. This presents no problem. Indeed the subjects in their study did not universally agree about which individual stimuli (which art works and musical pieces) were beautiful or otherwise. While there was a measurable degree of agreement, there was also some variance in distribution of taste. The data about what is considered beautiful by individuals could be analyzed to come up with a statistical evaluation, as in a poll, of which works are on average beautiful, but the definition of beauty taken from a neural perspective is one that only requires that the mOFC (and to some degree the caudate nucleus) fires.

Further, although Kant would have violently rejected any statistical evaluation of what is beautiful, his theory makes the exact same kind of mistake although for different reasons. This is the mistake of *granting the qualities that produce the experience to the distal stimulus*, which I seek to remove because it is a mere trigger. What matters is that the proximal stimulus occurs, is propagated through the nervous system to the brain, and that there is a specific firing pattern that produces aesthetic experience. From there, it is a small step to claim by extension that not only beauty, but all of aesthetic experience is a subjective universal experience produced by the brain. Once established, I am quite willing agree that the causes of the statistical variance in individual taste might be due either due to culture through learning, or even through Kantian *a priori* transcendentals, because either cultural or transcendental influences may mediate the triggering fireworks in the mOFC, which should be considered necessary and sufficient as the deeper cause of beauty. To emphasize, beauty has been shown to be a measurable, material phenomenon, starting as it does from the perspective of *proximal stimuli at the border of the nervous system and cascading inside and through to specific parts of the brain*. In as sense then, I replace Ishizu and Zeki's properties granted to objects and replace them with social or cultural mediation.

The reason for this exercise? It affords a corrective that recuperates the possibility of a Kantian analysis from a neurological perspective, because Kant's keen reflection on experience can be read as actually predicting in the 18<sup>th</sup> century some of what Ishizu and Zeki would discover in the 21st, and further for which Burke's theory is found lacking. Beyond his "well formulated... in a neurobiologically accessible way"[*ibid*] definition of beauty, the remainder of Burke's account is brittle, particularly in failing to account for the possibility of robust learning. He infers a data set of psychological responses which he

finely parses, for example as Joy and Grief [Part 1, section 5], examining them a potential causes that might be carried forward toward an ultimately deductive conclusion that the beautiful is based in a pleasure related to the passions of love, and the sublime based in a terror related to the fear of death. In one example, he argues that that beauty is not bound to proportion because of the diversity of proportions found in flowers, animals and humans, any combination of which might be found beautiful or indifferent, thus eliminating proportion as a cause of beauty. [Part 2 sections 1-5] Later, he specifies qualities such as smallness [Part 2 section 13], smoothness [section 14], gradual variation [section 15], delicacy [section 16], and color [section 17] as causes of the pleasure stimulated by beauty. As we have seen, Kant was severely critical of this psychological/empirical approach. Kant agreed that these "psychological observations, these analysis of our mental phenomena are extremely fine, and supply a wealth of material for the favorite investigations of empirical anthropology," but complained that "these laws only yield a knowledge of how we do judge, but they do not give us a command as to how we ought to judge." As stated above I don't find these causes mutually exclusive, but what I do find is that Kant's account of the "ought" at least implicitly accepts that minds can be changed, whereas Burke adheres to a strict categorical system.

Here we can look at the problem through a more contemporary lens. There are striking the similarities between Burke's critical system, and what is called an Experts System in the computer science sub-discipline of artificial intelligence. Experts Systems are so called because they carefully capture, in decision trees ready to be logically traversed, the many rules utilized by highly experienced people to deduce specific outcomes. Take for example medicine. A medical diagnosis system would reason from the general (my belly hurts) to the more specific (it is lower than my stomach, etc) eventually arriving at a specific diagnosis (you have Diverticulosis.) This is very similar to Burke's catalog of aesthetic experience and his syllogistic approach of carrying reasons forward. Pain and pleasure and carried forward through joy and grief, and then then to specifics like delicacy and darkness, all so as to explain the beautiful and the sublime. Experts Systems can be very useful diagnostic tools, but they are also notoriously deep and narrow, with well know brittleness when facing the kind of contradictory input that is common in a complex world of changing context. (Perhaps the patient also reports eating some mild mushrooms, which might be poisonous.) But even more so, just as you can only discuss disease with a medical diagnosis system in a way that arrives at a narrow conclusion, Burke's theory only carries us through a structured set of propositions cataloged from psychological responses of his own or others toward aesthetic stimuli that produce a brittle and easily broken definition. Kant's theory, for all his transcendentalism, remains open to working out, even through concepts of the *a priori* and the objective, new experience which over time updates the response of the nervous system. Unlike Burke, there is no reason in principle that Kant's system could not judge something beautiful even if it was rough, striated, indelicate and comparatively lacking in color, such as many beautiful paintings by Piet Mondrian. Kant seems to hold out some significant advantages in this regard.



Piet Mondrian, Gray Tree, 1912

Thus while Burke's *definition* of beauty might be well formulated from a neurological perspective, his notions of the beautiful and the sublime are poorly formed because they can not account for a subject in whom the neurological response of beauty is triggered by the distal stimuli of the above painting. In other words, the experience produced starting with the proximal stimuli, which are the outer layers of our brain that we normally refer to as our senses that cascade inward is the universal, there is no other. This in turn requires us to look for cultural explanations, again which I will ground in autopoiesis and notions of distributed cognition in a later chapter) to explain variance in outcomes given distal stimuli. By contrast to Burke, and even though Kant held a similarly mistaken view of distal stimuli as possessing aesthetic qualities, nevertheless his notions of the beautiful and sublime are not contradicted under a neurological view as they clearly are for Burke. Because in Kant, even if taste turns out not to have any foundation in transcendentals (again, I am willing to allow them), he still held that taste could be modulated in individuals. Further and of much more interest is that a case can be made that in examination of his proposals for the beautiful and sublime, that here we do indeed find a some congruence with a neurobiological basis that should today be considered interestingly prescient. Kant defined the beautiful and the sublime comparatively as:

"The beautiful in nature is a question of the form of object, and this consists in limitation, whereas the sublime is to be found in an object even devoid of form, so far as it immediately involves, or else by its presence provokes a representation of limitlessness, yet with a superadded thought of its totality. Accordingly, the beautiful seems to be regarded as a presentation of an indeterminate concept of understanding, the sublime as a presentation of an indeterminate concept of reason. Hence the delight is in the former case coupled with the representation of quality, but in this case with that of quantity."

As stated earlier, Ishizu and Zeki are explicit that their study does not test for the sublime, instead opting for the easier opposition, the ugly, with indifference as a neutral separator. There are probably many good reasons for this, but one that stands out in particular is the 19<sup>th</sup> century association of the sublime with the natural landscape. MRI machines are not portable, and there are lingering questions about whether mere representations of the landscape can substitute for "being there" to experience it directly. If we were to insist that in order to scan the brain for the sublime as precisely as Ishizu and Zeki did for beauty, then we would need to image the subjects under conditions that could produce the effect of the sublime, perhaps a virtual reality or data visualization systems of such high resolution that it could produce something like landscape's effects while the subject lies still inside the MRI. But I have suspicions about this that are not only based on technological capacity (as we are still far from the holodeck imaginary of the the Star Trek: Next Generation series) but even more so that if we attend to

Kant's definition such as test should be very difficult to perform in any case without a portable MRI. (Due to the powerful electromagnetic fields needed and high power requirements, a portable MRI is highly unlikely.) For Kant, the sublime was a kind of overburdening of the intellect with too much stimulus, an overwhelming sensory experience in which there is no recourse to understanding (the beautiful); instead the sublime stimulates our capacity for reasoning. In this sense, beauty can be read as deductive, with general principles (*a priori* goods) guiding our specific understandings of judgment, if not sensory input which Kant regarded as lowly. The sublime, on the other hand involves moving from a quantity too large to parse, forcing on us a vigorous activity of struggling to generalize; in other words to apply reason to too many facts too quickly, inducing a general sense of, or neural approximation of, the sublime experience. (I will return to this issue in the chapter on Artificial Intelligence, because Kant can also be seen as having much to say about artificial intellect.)

Nevertheless, I will present two paths though which we might logically induce, at a high level of abstraction, something about the actual relations of the sublime experience and patterns of neural activity in the brain. The first is through the "ugly." Even though the category of the ugly is certainly different from the romantic sense of the sublime, we can nevertheless take from Kant that the ugly is a poorly constructed form, about which transcendentals can inform us negatively instead of positively as in the case of beauty. And this is where things become yet more interesting in terms of Ishizu and Zeki's brain scanning experiment. While the experience of beauty caused rather focused firing in the mOFC (and caudate nucleus for visual stimuli only), the experience of ugliness from a brain function based perspective is much broader, with firing of the amygdala in both spheres (recall that it processes fear), in the visual cortex, in the right fusiform gyrus (responsible for many recognitions tasks ranging from colors to faces), in the left inferior occipital gyrus (also related to vision) and left superior medial frontal gyrus (implicated in decision making), left somato-motor cortex (planning physical movement), and left postcentral gyrus (processing of fine touch and proprioception.) As with the caudate nucleus, these firings were stimulated by visual input, with the brain doing very little during ugly musical stimuli. While it may be interesting to speculate about the experience of the ugly based on the suspected functions of the areas of the brain that it lights up (a range of perception processing and decision making related to vision), it is best left to future neuroscience to theorize and test for finer conclusions. But what we can say, empirically and with logical induction, is that the brain is a busy organ during this experience, and that may lead us to logically conclude that both more energy is being expended and that the energy is being used to resolve or work out what we might describe as the aesthetic dilemma of the ugly. In Kant's term, the brain struggles for an understanding of the ugly, whereas the beautiful is met with least energetic states of reward.

Secondly, many more studies have been done on the neurology of fear and/or panic. Burke becomes interesting here because he so narrowly focused on terror as the cause of the sublime, but Kant's notion of the sublime as the senses being overwhelmed by input is probably more congruent with the mental state of the sublime that Kant tried so hard to explain via external causes (distal stimuli.) My thoughts about whether it is terror or over stimulation that better explain 18<sup>th</sup> century notions of the sublime, or how fear and the cognition of large quantities may relate, of course falls into pure speculation on my part, again about which future neuroscience may show us something interesting. But to take just one example, in a research report titled *Unconditioned responses and functional fear networks in human classical conditioning*, Clas Linnmana, Ansgar Rougemont-Bückingb, Jan Carl Beuckea, Thomas A. Zeffiroc, and Mohammed R. Milad (2011) showed via a fear conditioning experiment that involved both expected and unexpected electric shocks, that brain activity was stimulated in regions somewhat overlapping with that of ugliness. When a shock was expected but not delivered, firing happened in the red nucleus (implicated in motor control and perhaps walking), the anterior insular (aspects of body awareness and internal sensation) and dorsal anterior cingulate cortices (cognitive and emotional

functions.) When the shock was also delivered, additional firing took place in the dorsal striatum, the whole insula (including areas that process self-awareness, motor control, social emotions, homeostasis) and as in the case of experiencing the ugly firing took place in the the amygdala and somatosensory corticies (the region of the left somato-motor cortex.) But what is shown is again that a large number of brain areas are at work, and that there is at least some overlap between areas between fear responses and responses to ugly stimuli.

An artists reading of neuroscience literature is, of course, not neuroscience but rather a way of framing these aesthetic concerns toward my end of providing some ground for an aesthetics of the outdoors and walking to stand upon. What neuroscience can tell us with great clarity is that the beautiful (shown conclusively by Ishizu and Zeki) and the sublime (for which I make the case that there is other evidence that allows of to logically induce a relationship) seem to correspond with patterns of qualitative and quantitative processing activity in the brain. The case for the quantitative in the case of the sublime is no doubt on much less stable ground than that for the beautiful for a variety of reasons, but in the cases of brain responses to ugly stimuli and fear, we do see a comparatively large number of brain areas working, which tends to support ideas of both Burke (terror) and Kant (quantity.) Ultimately, I prefer Kant's thoughts about quantity, and think that there is good reason to speculate that the human experience of the sublime probably includes many areas of the brain firing simultaneously, as if struggling with or working out a relationship between the body and complex and multiple modalities of input stimuli. The beautiful, which Kant associated with understanding, produces activity in fewer areas (as few as one), indicating that very much what Kant inferred through his intense and detailed philosophical ruminations was on target with actual brain function to an impressive degree.

So then what of this notion of an aesthetics of the outdoors and place? Recall that the essential problem is that of a subjective experience of the outdoors versus that which is universal to all of us. My proposal is that the brain as the ultimate production site of experience (because distal stimuli are reasonably factored out, or at least put in proper perspective), that we can begin, however provisionally, to separate out those neurological operations that universal and those that are subjective. After some time with Immanuel Kant's impressive mental gymnastics that produced his well reasoned, or at least hard fought concept of subjective universality, this answer may seem astoundingly simple. But what I believe that I have shown is his recourse to subjective universality becomes unnecessary when brain science in many senses demonstrates – by pointing to areas of the brain as they fire – that the brain is in a way radically subjective in terms of how it deals with stimuli, but the structure of the firings of our neuronal networks is strikingly universal. Further, that neuroscience seems to reflect key experiences described in the philosophy we call aesthetics is good news toward an aesthetics of the outdoors and walking, because we can now point to a mixture of some strong proof and some reasonable logical induction as a basis or grounding.

The final question to pry open a bit in this chapter is this: what are the universal activities (or firings) of the within our nervous systems that constitute an aesthetic experience of the outdoors? This is the topic of the next chapter, in which the hippocampus is shown to produce some universals about how the brain encodes and processes wayfinding experience – in fact that the brain does seem to enable both route and survey knowledge using predictable areas. And once this is shown, then we can think about what the implications of how we navigate are, in my interests toward the design of data and information systems that increasingly mediate our day to day movement and speculative, experimental art practices in the wild. In particular, the computer science of artificial intelligence as applied to wayfinding robotic systems. How we understand how we do these things should allow us to discover new ways to mediate those experiences, and that should open a lot of space for new experimentation.

