On Walking

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

A B S T R A C T

Imagine the anatomy of architecture as a complex system, where the form is the result of generative processes, the material properties of the components, and their patterns of assembly.

Within this paradigm, surface is that part of the system which exchanges energy, information, and materials with the local environment. How does human occupation of a space offer energy, information, or material to the system-building, and how can the surface best vector these exchanges?

Walking could represent human occupation in this context. I choose my walker's lineage and declare my interest, as an architect, in empathetic space. I explore the history of bipedalism, of the path as an architectural object, and of the sciences, philosophies and poetries of walkers. And I browse through contemporary architectural discourse pertaining to emergent design methodologies. Along the way, I test my proposal in two experiments: one complete, and one in progress...

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And to my family: I am sorry I've been away for so long. Thanks for not forgetting me during the times I disappeared into this work, and for bringing me back when I got lost in it.

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THE PATH AS ARCHITECTURAL OBJECT

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PREFACE

IMAGINE A BUILDING which behaves as an organism in an ecosystem. The form of that building is the result of generative processes—the way complex systems and patterns arise out of a multiplicity of relatively simple interactions—the material properties of the components, and their patterns of assembly. As the form of the building shifts from one *rationalized for superimposed functions* to one *derived from the capacities of materials and constructs*, the role of the architect shifts from the tradtional architect-as-shape-maker to that of architect-as-rule-maker. This architect-as-rule-maker, rather than designing the shape of a building, designs *how* the building sends, receives, and organizes the energy/information/material which is exchanged between the building-as-organism and the ecosystem it inhabits.

Now, imagine that the occupants of the building are, collectively, another organism constituting part of the building-as-organism's ecosystem. What energy, information, or material does the crowd-organism offer to the building-organism (and vice-versa)? Consider the act of walking as representative of occupation in this context for two reasons: first, the act of walking through a building exerts measurable forces on the surfaces of that building which can be considered as variables in the derivation of the forms of the building; second, walking has a long history as an act through which human beings understand and relate to place, making it a logical source for a "language of occupation" permitting meaningful communication between a building and its occupants by way of the shape of the place.

THIS BOOK IS MORE RHYTHM THAN LOGIC. It digresses, but the territory it covers is presented repeatedly, from multiple perspectives

and in multiple forms. To construct my argument, I've written three "movements" around three themes: what it means to be a walker, how walking and architecture relate to one another, and how I imagine *acting* as a walker/architect. Interrupting these movements are two "interludes" which offer context to my wanders: the first is a selection of the early (1860s to 1950s) discourse on the relationship between walking and architecture; the second is a sort of a glossary of the ways of walking which I've come across in my research into the history of walking. I conclude with an alternative history of architecture rooted in a nomadic, rather than sedentary, perception of place, originally proposed by Francesco Careri in *Walkscapes*.

The first movement, HOMO LUDENS, is a personal introduction and declaration of interests within architectural discourse. As a walker studying architecture, I am interested in applying the Situationists' concept of affective space (and some of their methods of working in this affective space) to research responsive architecture. I am a walker, I am a psychogeographer, and I want to build architecture which behaves as if it were an organism in an ecosystem.

BOTANIZING ON THE ASPHALT is an interlude of commonplace book entries regarding the Dadaist, Lettrist, Surrealist, and Situationist movements which initiate the contemporary discourse on walking and architecture. This concludes with the Situationist speculations on the architecture of tomorrow: "The architecture of tomorrow will be a means of modifying present conceptions of time and space. It will be a means of knowledge and a means of action. The architectural complex will be modifiable. Its aspect will change totally or partially in accordance with the will of its inhabitants." (Ivan Chtcheglov [alias Gilles Ivain], "Formularly for a New Urbanism," 1953, reprinted in *Internationale Situationniste 1*, 1958.)

The second movement, WALKERS, weaves together both historical and contemporary cultural and architectural discourses which, at least tangentially, pertain to walking. “The Building as Organism” is a small story describing how I imagine architecture relates to the movement of people through a place. This story leads to a speculation on the role of architecture in the “wisdom of crowds” world of Web 2.0: architects would create a building-organism capable of collecting and organizing spatial information, and re-presenting it (letting it shape our places in the way the internet has shaped thought).

“A Glossary” is a commonplace book entry on some of the key concepts useful for understanding the computational advances which have precipitated the contemporary architectural interest in emergence, self-organization and architecture.

“Emergence, Self-organization and Architecture” is a short introduction to D’Arcy Thompson’s *On Growth and Form* and the legacy of Frei Otto’s research into self-forming processes as sources for this discourse, followed by three examples of architectural researchers and experimental designers working within this discourse.

“Another Glossary” is a commonplace book entry on some of the key concepts used by authors of the contemporary architectural discourse regarding emergence, self-organization and architecture.

“Mountains and Rivers Without End” is a history of the literature of walkers, rooted in my own experience of walking, spanning from Frances Yates’ *Art of Memory* to Gary Snyder’s lumberjack poetry. I play with ideas which relate place to collective memory and argue that walker-thinkers have, over time, developed the study of complexity and the “narrative” sciences which are at the root of my own interests in architectural design. I finish this wander with a brief introduction to Jaron Lanier’s speculations on the subject of the origin of language and its relation to new computational theories regarding pattern recognition. I imagine that, if shape and meaning are connected in certain

metaphors, then architecture, by way of the computational methods that permit a computer to recognize a face, could be programmed to learn to engage in meaningful communication with its occupants by way of a poetic, shape- and metaphor-based language.

WAYS OF WALKING is an interlude of commonplace book entries "defining" fourteen ways of walking by way of selected combinations of images and quotes.

The third movement, EXPERIMENTS, chronicles three experiments (two of them my own), their failures, successes and implications for future projects. "A Secret Theatre" is a more thorough explanation of the ideas of D'Arcy Thompson and Alfred North Whitehead; a meditative excursion on the forces which have shaped the bodies and minds of human beings as we evolved from quadrupedal primates to bipedal members of the Homo *genus*. I conclude this walk with a discussion about Jaron Lanier's hopes for an artificially amplified neoteny within Virtual Reality and my own desire to create a Real Reality with some of the properties of Lanier's VR, by way of responsive architecture: creating places where our thoughts and the shape of our world are connected, perhaps not at the speed of thought, but at a faster pace than the current rate of change of architectural form.

"Mapping the Campus" is an experiment in collaborative mapping using geo-located social media. This pedestrian survey is an attempt to use the path (as act, object, and narrative) to represent occupation in my efforts to generate the form of occupied space.

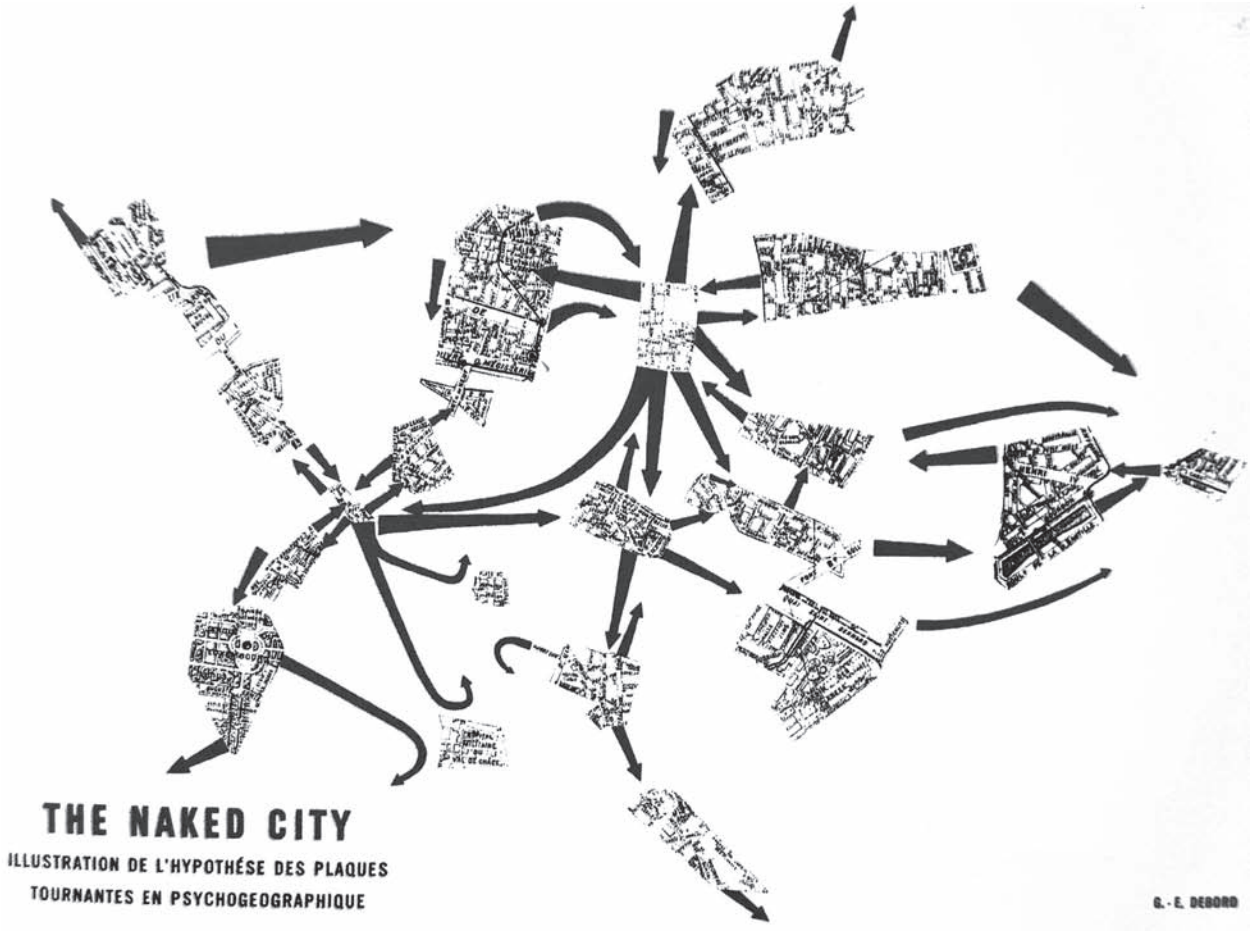
"The Fleeting and the Infinite" is an (unfinished) experiment in revealing the shapes generated by the crowd-organism as its members walk through a rudimentary building-as-organism installation. A sort of a prosthetic for an architect-cum-*flâneur*, a thing and a way which occupies some territory between instrument and intervention.

The last essay, THE PATH AS ARCHITECTURAL OBJECT, is a nomad's history of architecture, from the wanderings of the Paleolithic period to the Ancient Egyptians' transformation of the space of the path (the space along) into interior space (the space of eternal wandering). I imagine a space which takes shape over time in response to occupation; in response to walkers. The path has evolved into the spatial order of occupants-as-walkers (complete with the ability to walk order out of chaos); a spatial order which I imagine will suit the new changed-based architectural paradigm within which I find myself immersed.

MOVEMENT 1: HOMO LUDENS

As a walker studying architecture, I am interested in applying the Situationists' concept of affective space *(and some of their methods of working in this affective space) to research responsive architecture. I am a walker, I am a psychogeographer, and I want to build architecture which behaves as if it were an organism in an ecosystem.*

> According to the etymological roots of the names of the two brothers, Cain can be identified with *Homo Faber*, the man who works and tames nature to materially construct a new artificial universe, while Abel, whose job was, all told, less tiring and more amusing, can be seen as the *Homo Ludens* so dear to the Situationists, the man who plays and constructs an ephemeral system of relations between nature and life. Their different use of space also implies a different use of time derived from the original division of labour. The work of Abel, which consists of going to fields to feed his animals, is one of privilege with respect to the labours of Cain, who has to stay in the fields to plough, sow and reap the fruits of his labours.
>
> Francesco Careri, *Walkscapes*, 2002, 31.[1]



"The Naked City," Guy Debord, 1957.

I AM A WALKER. I declare myself to be a student of architecture. If I could claim a lineage, however, I would choose the impossible: the impotent Abel - the brother who went (to the fields with his flocks); the brother who walked. I *must* be a descendant of the playful, wondering, wandering *Homo Ludens*; I am, as Thoreau defined, a born walker; I have received direct dispensation from heaven.

I walk compulsively. Measurelessly. Monotonously. I once earnestly paced the maze of halls that form the psychology building on main campus which is shaped like a brain complete with dead-end corridors which turn back on themselves and windows which only ever offer partially obscured views of the outside world. As of late, I find myself tracing new fragments of paths between my desk and my bed: via the river, the Portuguese market, and/or one of three coffee shops. Through the halls of the school, and along the streets of "downtown." And, when it rains, I pace back and forth on the concrete floor of the studio. Or over the creaking floorboards of my second floor apartment, followed closely by the tap-tap-tap of dog nails on the hardwood, to the well-concealed annoyance of my downstairs neighbour ("It's always quieter on the second floor").

It is easier to compose my thoughts when I'm walking. I notice that I unconsciously place fragments of thoughts into the whole of my physical experience with the landscape, temporarily freeing my conscious brain to find and present another fragment which might be reunited with one of the bits I hung on a tree as I passed. I then re-order my thoughts with a tilt of my head or a change of pace, or a momentary focus on some shape or sensation that brings back into focus the drifting idea.

I can only meditate when I am walking. When I stop, I cease to think, my mind only works with my legs.

Jean-Jacques Rousseau, *Confessions*, 1782.[2]

WALKING, MAKING, WORKING

Walking shares with making and working that crucial element of engagement of the body and the mind with the world, of knowing the world through the body and the body through the world.

Rebecca Solnit, *Wanderlust*, 2000, 29.[3]

A METHODICAL INTERVENTION

Our central idea is that of the construction of situations, that is to say, the concrete construction of momentary ambiences of life and their transformation into a superior passional quality. We must develop a methodical intervention based on the complex factors of two components in perpetual interaction, the material environment of life and the comportments which it gives rise to and which radically transform it.

Guy Debord, "Report on the Construction of Situations," 1957.[5]

A CALL

However intricate it may be, the call is one emanation, a sound ensemble, specific in pitches, duration, pattern and intensity typical first of that bird's species but further modulated within that typically to be uniquely characteristic of that individual bird. The bird call does not contain, but is intimately shaped by, both the history of the species and the history of the individual bird. In the bird's chicks, the call feels like mother, in another member of its species, the call feels erotic or maddening, depending on the other's sex; to a nearby hawk the same call feels like an urge to hunt, in a vole panic, in a poet walking in

I AM A PSYCHOGEOGRAPHER! PERHAPS ... I am, at least, enamoured with The Naked City. "Illustration de l'hypothése des plaques tournantes en psychogeographique." I wonder at the affect of place; the emotional and behavioural aftermath of people mingling in un-space: filled space, dense space, sensed and sensing space. I'm interested in the sensual connections within matter, and, as if I was, or when I will be an architect, I think (I feel?) I ought to be conscious of the sensuous exchanges taking place, for example, between the call of a bird and photons, between a tree and a pond. And within that consciousness, I will make a call of my own: sending some message into some place for it to sense and be sensed. I wait to hear back ... and work to create new "techniques of sending," depending on what mangled echo returns, I suppose.

I'm weaving my tale, to facilitate—or justify—my yearning to build my own monster out of dismembered experience secreted from its resting place in the night, to jolt it to sending/receiving/organizing (life) and to set it loose on some unsuspecting audience to see if it consumes them. I imagine an architecture which records traces of occupation like a forest; absorbing into its own constant re-organization patterns of spatial occupation discovered through senses stitched into the idea-corpse of my monster. I imagine architecture as an organism in an ecosystem: sending/receiving/organizing.[4] I imagine, too, that the crowd of people occupying a building are an organism. And I think that in order to figure out how to design an architectural organism which is adaptive, which absorbs change and responds, I'll start by taking a close look at that primal architectural act: walking.

THIS IS MY DEFENCE: my nature, my instinct, my weakness and weariness. It is why you will find in these pages not a construction,* as might be expected of an architecture student,* but a construct: a story, a path, and an ephemeral system of relations between nature and life. Which is to say, a walk.

* Neither of these statements is entirely true. Which brings me to one last confession: Walking is not an analytical act; it breeds improvisation, association, digression, and the half-truths that bind them together. In the interest of sharing the progression of my thoughts, including the occasional blurring of the line between truth and fiction, without offending my adjudicators, I will do my best to declare as such those "facts" I relay which I know to be less than true.

the woods a feeling that cascades
into a lyrical turn of language, in a
composer into a musical imagination,
in a camper background noise.
To a heavy snowbank, the call does
not feel like much, but had it been 10
hertz higher in pitch or 10 decibels
louder in volume, the snow bank
might have felt the call enough to
avalanche. A blush of protons, rushing
from a tree to reflect off a pond
nearby feels virtually nothing of
the call at all, nor does the call feel
much of them. But the air between
the tree and the pond feels some of
the photons, heats up and changes
density, an effect the call feels.

Jeffrey Kipnis, "On the Wild Side"
from *Phylogenesis*, 2004.[6]

INTERLUDE: BOTANIZING ON THE ASPHALT

Commonplace book entries regarding the Dadaist, Lettrist, Surrealist, and Situationist movements ending with the Situationist speculations on the architecture of tomorrow: "The architecture of tomorrow will be a means of modifying present conceptions of time and space. It will be a means of knowledge and a means of action. The architectural complex will be modifiable. Its aspect will change totally or partially in accordance with the will of its inhabitants." (Ivan Chtcheglov [alias Gilles Ivain], "Formularly for a New Urbanism," 1953, reprinted in Internationale Situationniste 1*, 1958.*[7]*)*

"Tristan Tzara reading to the crowd at St Julien le Pauvre church," Paris, 1921.

The crowd is his domain, just as the air is the bird's, and water that of the fish. His passion and his profession is to merge with the crowd. For the perfect idler, for the passionate observer it becomes an immense source of enjoyment to establish his dwelling in the throng, in the ebb and flow, the bustle, the fleeting and the infinite. To be away from home and yet to feel at home anywhere; to see the world, to be at the very centre of the world, and yet to be unseen of the world, such are some of the minor pleasures of those independent, intense and impartial spirits, who do not lend themselves easily to linguistic definitions. The observer is a prince enjoying his incognito wherever he goes. The lover of life makes the whole world into his family, just as the lover of the fair sex creates his from all the lovely women he has found, just as the picture-lover lives in an enchanted world of dreams painted on canvas. Thus the lover of universal life moves into the crowd as though into an enormous reservoir of electricity. He, the lover of life, may also be compared to a mirror as vast as this crowd: to a kaleidoscope endowed with consciousness, which with every one of its movements presents a pattern of life, in all its multiplicity, and the flowing grace of all the elements that go to compose life. It is an ego athirst for the non-ego, and reflecting it at every moment in energies more vivid than life itself, always inconstant and fleeting.

Charles Baudelaire, "The Painter in Modern Life," 1859-60.[8]

THE TERRITORY

Streets are the spaces left over between buildings. A house alone is an island surrounded by a sea of open space, and the villages that preceded cities were no more than archipelagos in that same sea. But as more and more buildings arose, they became a continent, the remaining open space no longer like the sea but like rivers, canals, and streams running between the land masses. People no longer moved anyhow in the open sea of rural space but travelled up and down the streets, and just as narrowing a waterway increases flow and speed, so turning open space into the spillways of streets directs and intensifies the flood of walkers. In great cities, spaces as well as places are designed and built: walking, witnessing, being in public, are as much part of the design and purpose as is being inside to eat, sleep, make shoes or love or music. The word citizen has to do with cities, and the ideal city is organized around citizenship—around participation in public life. ...

Walking is only the beginning of citizenship, but through it the citizen knows his or her city and fellow citizens and truly inhabits the city rather than a small privatized part thereof. Walking the streets is what links up reading the map with living one's life, the personal microcosm with the public macrocosm; it makes sense of the maze all around.

Rebecca Solnit, *Wanderlust*, 2000, 175-6.[9]

Not finding one's way in a city may well be uninteresting and banal. It requires ignorance—nothing more. But to lose oneself in a city—as one loses oneself in a forest—that calls for quite a different schooling. Then signboards and street names, passers-by, roofs, kiosks, or bars must speak to the wanderer like a crackling twig under his feet, like the startling call of a bittern in the distance, like the sudden stillness of a clearing with a lily standing erect at its centre. Paris taught me this art of straying; it fulfilled a dream that had shown its first traces in the labyrinths on the blotting pages of my school exercise books.

Walter Benjamin, "Berlin Chronicle," 1932.[10]

FLÂNEURIE

What exactly a flâneur is has never been satisfactorily defined, but among all the versions of the flâneur as everything from a primeval slacker to a silent poet, one thing remains constant: the image of an observant and solitary man strolling about Paris. It says something about the fascination public life exerted over Parisians that they developed a term to describe one of its types, and something about French culture that it theorized even strolling.

Rebecca Solnit, *Wanderlust*, 2000, 198.[11]

The Dadists passing through Paris, as a remedy for the incompetence of guides and dubious pedants, have decided to undertake a series of visits to selected places, in particular to those places that do not have any reason to exist. It is incorrect to insist upon the picturesque, historical interest and sentimental value. The game has not yet been lost, but we must act quickly. Participation in this first visit means answering for human progress, for possible destructions and responding to the need to pursue our action, which you will attempt to encourage by any means possible.

"Flyer distributed to passers-by,"
reprinted in Francesco Careri, *Walkscapes*, 2002, 75.[12]

DADAISM

Dada progressed from introducing a banal object into the space of art to introducing art—the persons and bodies of the Dada artists—into a banal place of the city. That "new interpretation of nature applied this time not to art but to life," announced in the press release explaining the Saint-Julien-le-Pauvre operation, is a revolutionary appeal to life versus art and the quotidian versus the aesthetic, openly challenging the traditional modes of urban intervention, a field of action usually reserved for architects and town planners. ...

Dada did not intervene in the place by inserting an object or by removing others. It brought the artist, or the group of artists, directly to the site in question, without effecting any material operation, without leaving physical traces other than the documentation of the operation—flyers, photographs, articles, stories—and without any kind of subsequent elaboration.

Francesco Careri, *Walkscapes*, 2002, 76.[13]

The secrets of each of you, like those of language and love, are revealed to me each night, and there are nights in broad daylight. You pass close to me, your clothes fly away, your account books open at the page where the dissimulations and the frauds are to be found, the intimacies of your bedroom are revealed, and your heart! Your heart like a hawk-mouth in the sun, your heart like a ship on an atoll, your heart like a compass needle driven mad by a little piece of lead, like washing drying in the wind, like a whinnying of horses, like seed thrown to the birds, like an evening paper one has finished reading! Your heart is a charade that the whole world has guessed. Fear nothing, then, either for myself or for your reputation, and let me enter the handkerchief shop.

Louis Aragon, *Paris Peasant*, 1926, 99.[14]

SURREALISM

The Surrealists abandoned the nihilism of Dada and moved toward a positive project. Using the groundwork laid by nascent psychoanalytical theory, they plunged beyond Dadaist negation in the conviction that "something is hidden behind there." Beyond the territories of the banal exist the territories of the unconscious, beyond negation the discovery of a new world that must be investigated before being rejected or greeted with mere derision. The Surrealist research is a sort of psychological investigation of one's relationship with urban reality, an operation already applied with success through automatic writing and hypnotic dreams, and which can also be directly applied in walking through the city. The Surrealist city is an organism that produces and conceals territories to be explored, landscapes in which to get lost and to endlessly experience the sensation of *everyday wonder*. Dada had glimpsed the fact that the city could be an aesthetic space in which to operate through quotidian/symbolic actions, and had urged artists to abandon the usual forms of representation, pointing the way toward direct intervention in public space. Surrealism, perhaps without yet fully understanding its importance as an aesthetic form, utilized walking—the most natural end everyday act of man—as a means by which to investigate and unveil the unconscious zones of the city, those parts that elude planned control and constitute the unexpressed, untranslatable component in traditional representations.

Francesco Careri, *Walkscapes*, 2002, 87-8.[15]

Poetry has consumed its ultimate formalisms. Beyond aesthetics, poetry lies entirely in the power men will have in their adventures. Poetry is read on faces. Therefore it is urgent to create new faces. Poetry is in the form of cities. We construct subversion. The new beauty will be that of the situation, temporary and experienced. ... Poetry simply means the development of absolutely new forms of behaviour and the means with which to be impassioned.

from Issues 1 and 5 of
Potlatch, the International Lettrist Review, 1954.[16]

LETTRISM

The Lettrists rejected the idea of a separation between alienating, boring real life and a marvellous imaginary life: reality itself had to become marvellous. It was no longer the time to celebrate the unconscious of the city, it was time to experiment with superior ways of living through the construction of situations in everyday reality: it was time to act, not to dream.

Francesco Careri, *Walkscapes*, 2002, 92.[17]

We need to work toward flooding the market—even if for the moment merely the intellectual market—with a mass of desires whose realization is not beyond the capacity of man's present means of action on the material world, but only beyond the capacity of the old social organization. It is thus not without political interest to publicly counterpose such desires to the elementary desires that are endlessly rehashed by the film industry and in psychological novels like those of that old hack Mauriac. ("In a society based on poverty, the poorest products are inevitably used by the greatest number," Marx explained to poor Proudhon.)

The revolutionary transformation of the world, of all aspects of the world, will confirm all the dreams of abundance. The sudden change of ambiance in a street within the space of a few meters; the evident division of a city into zones of distinct psychic atmospheres; the path of least resistance which is automatically followed in aimless strolls (and which has no relation to the physical contour of the ground); the appealing or repelling character of certain places—all this seems to be neglected. In any case it is never envisaged as depending on causes that can be uncovered by careful analysis turned to account. People are quite aware that some neighbourhoods are sad and others pleasant. But they generally simply assume elegant streets cause a feeling of satisfaction and that poor streets are depressing, and let it go at that. In fact, the variety of possible combinations of ambiances, analogous to the blending of pure chemicals in an infinite number of mixtures, gives rise to feelings as differentiated and complex as any other form of spectacle can evoke. The slightest demystified investigation reveals that the qualitatively or quantitatively different influences of diverse urban decors cannot be determined solely on the basis of the era or architectural style, much less on the basis of housing conditions.

The research that we are thus led to undertake on the arrangement of the elements of the urban setting, in close relation with the sensations they provoke, entails bold hypotheses that must be constantly corrected in the light of experience, by critique and self-critique.

Guy Debord, "Introduction to a Critique of Urban Geography," 1955.[18]

SITUATIONISM

While conserving the tendency to look for the repressed memories of the city, the Situationists replaced the randomness of Surrealist roaming with the construction of *rules of the game*. To play means deliberately breaking the rules and *inventing* your own, to free creative activity from socio-cultural restrictions, to design aesthetic and revolutionary actions that undermine or elude social control. The theory of the Situationists was based on an aversion for work and the premise of an imminent transformation of the *use of time* in society: with the changes in production systems and the progress of automation, work time would be reduced in favour of *free time*. Therefore it is important to protect the use of this non-productive time from the powers that be. Otherwise it would be sucked into the system of capitalist consumption through the creation of induced needs. ... If recreational time was increasingly being transformed into a time of passive consumption, free time would have to become a time devoted to *play*, not utilitarian, but ludic.

Francesco Careri, *Walkscapes*, 2002, 106.[19]

Certain of Chirico's paintings, which are clearly provoked by architecturally originated sensations, exert in turn an effect on their objective base to the point of transforming it: they tend themselves to become blueprints or models. Disquieting neighbourhoods of arcades could one day carry on and fulfill the allure of these works.

I scarcely know of anything but those two harbours at dusk painted by Claude Lorrain—which are at the Louvre and which juxtapose extremely dissimilar urban ambiances—that can rival in beauty the Paris metro maps. It will be understood that in speaking here of beauty I don't have in mind plastic beauty—the new beauty can only be beauty of situation—but simply the particularly moving presentation, in both cases, of a sum of possibilities.

Among various more difficult means of intervention, a renovated cartography seems appropriate for immediate utilization.

The production of psychogeographic maps, or even the introduction of alterations such as more or less arbitrarily transposing maps of two different regions, can contribute to clarifying certain wanderings that express not subordination to randomness but complete insubordination to habitual influences (influences generally categorized as tourism that popular drug as repugnant as sports or buying on credit). A friend recently told me that he had just wandered through the Harz region of Germany while blindly following the directions of a map of London. This sort of game is obviously only a mediocre beginning in comparison to the complete construction of architecture and urbanism that will someday be within the power of everyone. Meanwhile we can distinguish several stages of partial, less difficult realizations, beginning with the mere displacement of elements of decoration from the locations where we are used to seeing them.

Guy Debord, "Introduction to a Critique of Urban Geography," 1955.[20]

PSYCHOGEOGRAPHY

The Situationists saw the psychogeographical *dérive* as the means with which to strip the city naked, but also with which to construct a playful way of reclaiming its territory: the city is a toy to be utilized at one's pleasure, a space for collective living, for the experience of alternate behaviours, a place in which to waste useful time so as to transform it into playful-constructive time. It was necessary to challenge that affluence peddled as happiness by bourgeois propaganda. ... It was necessary to "go from the concept of circulation as a supplement of work and distribution in the various functional zones of the city to one of circulation as pleasure and adventure," to experience the city as a playful territory to be utilized for the circulation of men toward an authentic life. What was needed was the construction of adventures.

Francesco Careri, *Walkscapes*, 2002, 108.[21]

Into each of these lives one could penetrate a little way, far enough to give oneself the illusion that one is not tethered to a single mind, but can put on briefly for a few minutes the bodies and minds of others. One could become a washerwoman, a publican, a street singer. And what greater delight and wonder can there be than to leave the straight lines of personality and deviate into those footpaths that lead beneath brambles and thick tree trunks into the heart of the forest where live those wild beasts, our fellow men?

Virginia Woolf, "Street Haunting: A London Adventure," 1927.[22]

ARCHITECTURE

The simplest means of articulating time and space, of modulating reality, of engendering dreams. It is a matter not only of plastic articulation and modulation expressing an ephemeral beauty, but of a modulation producing influences in accordance with the eternal spectrum of human desires and the progress in realizing them.

The architecture of tomorrow will be a means of modifying present conceptions of time and space. It will be a means of knowledge and a means of action.

The architectural complex will be modifiable. Its aspect will change totally or partially in accordance with the will of its inhabitants.

Ivan Chtcheglov (alias Gilles Ivain),
"Formularly for a New Urbanism," 1953,
reprinted in *Internationale Situationniste 1*, 1958.[23]

M O V E M E N T 2 : W A L K E R S

"The Building as Organism" A small story describing how I imagine architecture relates to the movement of people through a place leading to a speculation on the role of architecture in the "wisdom of crowds" world of Web 2.0: architects would create a building-organism capable of collecting and organizing spatial information, and re-presenting it (letting it shape our places in the way the internet has shaped thought).

"Emergence, Self-Organization and Architecture" A short introduction to D'Arcy Thompson's On Growth and Form *and the legacy of Frei Otto's research into self-forming processes as sources for this discourse,followed by three examples of architectural researchers and experimental designers working within this discourse.*

"Mountains and Rivers Without End" A history of the literature of walkers, rooted in my own experience of walking, spanning from Frances Yates' Art of Memory *to Gary Snyder's lumberjack poetry. I play with ideas which relate place to collective memory and argue that walker-thinkers have, over time, developed the study of complexity and the "narrative" sciences which are at the root of my own interests in architectural design. I finish this wander with a brief introduction to Jaron's Lanier's speculations on the subject of of the origin of language and its relation to new computational theories regarding pattern recognition. I imagine that, if shape and meaning are connected in certain metaphors, then architecture, by way of the computational methods that permit a computer to recognize a face, could be programmed to learn to engage in meaningful communication with its occupants by way of a poetic, shape- and metaphor-based language.*

(W)hat Engels observed are patterns in the urban landscape, visible because they have a repeated structure that distinguishes them from the pure noise you might naturally associate with an unplanned city. They are patterns of human movement and decision-making that have been etched into the texture of city blocks, patterns that are then fed back to the Manchester residents themselves, altering their subsequent decisions. (In that sense, they are the very opposite of the traditional sense of urban complexity - they are signals emerging where you would otherwise only expect noise.) A city is a kind of pattern amplifying machine: its neighbourhoods are a way of measuring and expressing the repeated behaviour of larger collectivities—capturing information about group behaviour, and sharing that information with the group. Because those patterns are fed back to the community, small shifts in behaviour can quickly escalate into larger movements: upscale shops dominate the main boulevards, while the working class remains clustered invisibly in the alleys and side streets; the artists live on the Left Bank, the investment bankers in the Eighth Arrondissement. You don't need regulations and city planners deliberately creating these structures. All you need are thousands of individuals and a few simple rules of interaction.

Steven Johnson, *Emergence*, 2002, 40.[24]

THE BUILDING AS ORGANISM

THE STORY OF *THIS* BOOK BEGINS HERE: I noticed a six-foot-high wood fence extending perpendicularly from the back of an old, mangled building into what-used-to-be-a-lane-but-is-now-a-parking-lot. A fence next to a door which recedes into a building opening onto stairs leading to a hallway that smells like stale cigarette smoke and run-down apartments known to the police. People spill out of the door through the recess into the field of the fence ... a group slows and bulges—its inertia momentarily depleted—then, replenished by the distance, it elongates again, peeling itself away from the building and into the places—the dense, filled, sensing and sensed spaces—of the city.

A few meters past the recess and up three steps is the back entrance to a quiet, elegant restaurant serving local lawyers, bankers and business-people working in the remains of the historic downtown core of this mid-size Ontario city. As the tenants from upstairs linger, caught in the fence's field, the restaurant's patrons march through the billowing cloud of their presence, into the echoing emptiness of the dining room.

THE ARCHITECTURAL COMPONENTS OF THIS TINY SCENE—the fence, the recess, the doors, the stoop and the what-used-to-be-a-lane-but-is-now-a-parking-lot—were pulled this way and that on sketch paper and in construction drawings: organizing circulation, offering or obscuring views and access, permitting or preventing the development of fields of attraction and fields of dispersion. They existed as abstractions in the mind of a designer or builder, differentiated into a building, deformed or reorganized to resolve material and temporal issues of

construction, establishing, modifying, or resetting the material organization of this place; the matter of this place. This new organism—this building—does not so much transcend the individual properties of its components as absorb them into a new whole with new properties existing within and forming part of an ecosystem; forming the place where the billowing clouds of presence mingle, propelled by the sensual connections within matter and contained within fields of organization or decay.

SIR FRANCIS GALTON (1822 – 1911) was an English Victorian polymath, anthropologist, eugenicist, tropical explorer, geographer, inventor, meteorologist, proto-geneticist, psychometrician, and statistician.[26]

I LIED. THAT'S NOT WHERE IT STARTED. It started with a story from *The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations* by James Suroweicki: Francis Galton recounts a visit to a country fair where fair-goers were invited to guess the butchered weight of an ox and record their guess on a slip of paper. After the winner was announced, Galton collected all of the guesses and found that the crowd accurately guessed the weight of an ox when their individual guesses were averaged. This average was closer to the ox's true butchered weight than the individual guesses, including the separate estimates made by experts.[25]

I like this story for two reasons: First, it presents a philosophical paradigm whereby collectively human beings can be considered an organism which has the property (in certain circumstances) of superior problem-solving capabilities when measured against the problem-solving capabilities of the individual members of the group. This paradigm inherently rewards diversity, respect for independence and cooperation within the group (the neutral aggregation of independent perspectives produces hyper-accurate results); values which I celebrate.

There is something remarkable, too, about the possibility that either reality is the average of our collective understandings of it (the ox

weighs x lbs. because x lbs. is the average imagined mass of the beast) or (more likely?) the composition of the collective is balanced in such a way that we perceive some truths more accurately together than alone (i.e., we each have a place in the whole, its balance of perspectives is somehow maintained).

Aside from believing that this paradigm promotes behaviours/social organizations which I think are nice and fair, and right, I suspect that making use of the problem solving properties of the crowd-organism, already a tactic being pursued in other fields, could potentially be profitable for architects.

Before I wander too far, let me tell you the second reason I like the Francis Galton tale: it is spatial. As a student of architecture, I enjoy the spatiality of the intelligence demonstrated by the crowd; I imagine the fair-going people tilting their heads ... circling the ox ... cradling a remembered roast (six lbs., purchased at the market last Wednesday and consumed heartily with wine and Yorkshire pudding and roast potatoes later that evening) and mentally stacking those roasts in three dimensions within the form of the ox while their bellies remember the sensation of roast consumed and repurposed ... or calculating the number of husbands it would take to make up an ox, then mentally deconstructing the husband's anatomy, separating meat from bone and estimating the percentage of man-meat per husband then multiplying that by the number of husbands per ox (calculated above) ...

If I (a fair-goer, now) estimate the weight of the ox with math and memory—a fuzzy combination, at best—I get to an approximate number, probably a range: 200-300 roasts stacked inside his hide multiplied by six pounds per roast minus 20-30% for bone and organs equals 840-1440 pounds. Something other than math helps me pick my guess: maybe I hear in the ox's breath a tone which informs me of the size of his lungs (closer to 30%, now), or the turbulence generated by the ox's

bulk shifting as he lumbers by suggests that he is denser than I first guessed. The point is that my physical, material, kinetic experiences in the world inform the spatial intelligence I use to make my guess. And someone else has another set of experiences which may be similar or radically different from mine and with someone else and someone else...

COLLECTIVELY OUR EXPERIENCES EQUAL the dressed weight of an ox. The internet is very good for aggregating diverse opinions on problems suited to the crowd-organism; it's great for collecting the slips of paper, and maybe for advertising the ox-weighing contest and explaining the rules, but it's not very good at getting the people around the ox, so to speak. This is how I imagine that there is a profit to be made: by using architecture to gain access to the spatial intelligence of the individuals occupying it, a specific intelligence not currently accessible via the internet, architects would create the building capable of collecting the spatial equivalent of clicks on Google results. This building would collect and organize spatial information, and could even represent it, letting it shape our places in the way the internet has shaped thought. Profitability aside, dare I say that it is the responsibility of architects, as caretakers of a body of knowledge (pertaining to spatial intelligence) for society, to update the way we collect, organize and use that information? Maybe, maybe not.

I'D LIKE TO THINK YOU'RE WITH ME, that you are roused by the call to find a way to tap the spatial smarts of the crowd and that you willingly inhabit the paradigm of the crowd-organism and building organism. I hope the glitter in your mind's eye is bright enough that you believe in the gold. And that you believe in it enough that we swing the average and manifest a few ounces, at least.

But just in case, I'll stop conjuring gold and let you in on the dirt: advances in computer science emerging from, and developing in parallel with, research into the phenomenon of emergence in biological organisms, and crowds, and the form of cities, are being adapted by some architects to generate or influence the form and composition of buildings. Within this paradigm, I propose to consider two questions: What aspects of human occupation become useful inputs for the building-organism? and, How does the crowd-organism respond to the building-organism outputs? (I might sidestep the implied question: What are the outputs?).

"Historical Ordnance Survey map," Manchester, England, 1890-1905.

ANIMATE FORM

Animation is a term that differs from, but is often confused with, motion. While motion implies movement and action, animation implies the evolution of a form and its shaping forces; it suggests animalism, animism, growth, actuation, vitality and virtuality.[27]

ATTRACTION-DIFFUSION

A hypothesis of the generation of a pattern from a smooth sheet of cells during development in the formation of buds, skin markings and limbs. Chemicals accumulate until sufficient density is reached, then act as morphogens to generate organs.[28]

BOOLEAN NETWORK

A set of boolean variables (a primitive data type having one of two values: true or false) whose state is determined by other variables in the network (through comparison operators: >, ≠, AND, &, *, OR, |, +, EQV, =, ==, XOR, NEQV, ^, NOT, ~, !). Elementary cellular automata are particular cases of boolean networks, where the state of a variable is determined by its spatial neighbours.[29]

COMPLEXITY THEORY

Complexity theory focuses on effects produced by the collective behavior of many simple units that interact with each other, such as atoms, molecules and cells. [30]

CYBERNETICS

The field of cybernetics organizes the mathematics of responsive behavior into a general theory of how machines, organisms and phenomena maintain themselves over time. It uses digital and numerical processes in which pieces of information interact and the transmission of information is optimized. Feedback is understood as a kind of "steering" device that regulates behavior, using information from the environment to measure the actual performance against a desired or optimal performance.[31]

GENETIC ALGORITHM

Genetic algorithms initiate and maintain a population of computational individuals, each of which has a genotype and a phenotype. Sexual reproduction is simulated by random selection of two individuals to provide "parents" from which "offspring" are produced. By using ... random allocation of genes from the parents' genotype and mutation, the process is iterated for as many generations as are required to produce a population that has among it a range of suitable individuals to satisfy the fitness criteria.[32]

A G L O S S A R Y

GEOMETRICAL PHYLLOTAXIS

The development of form in plants, which offered a general theory of the morphogenesis of cylindrical latices. These are formed locally rather than globally, node by node, and are further modified by growth. To mathematically model this process, it is necessary to have a global informing geometry, the cylinder, and a set of local rules for lattice nodes.[33]

MORPHOGENESIS

The biological process that causes an organism to develop its shape.[34]

PARAMETRIC MODELING

Using the computer to design objects by modeling their components with real-world behaviours and attributes. A parametric modeler is aware of the characteristics of components and the interactions between them. A parametric model maintains consistent relationships between elements as the model is manipulated.[35]

SYSTEM

The system is the part of the universe that is being studied, while the environment is the remainder of the universe that lies outside the boundaries of the system. Depending on the type of system, it may interact with the environment by exchanging mass, energy (including heat and work), linear momentum, angular momentum, electric charge, or other conserved properties. In some disciplines, such as information theory, information may also be exchanged. The environment is ignored in analysis of the system, except in regards to these interactions.[36]

SYSTEMS THEORY

The concepts and principles of organization in natural systems are independent of the domain of any one particular system.[37]

TOPOLOGY

A major area of mathematics concerned with spatial properties that are preserved under continuous deformations of objects (deformations that involve stretching, but no tearing or gluing).[38]

SELF-FORMING PROCESSES

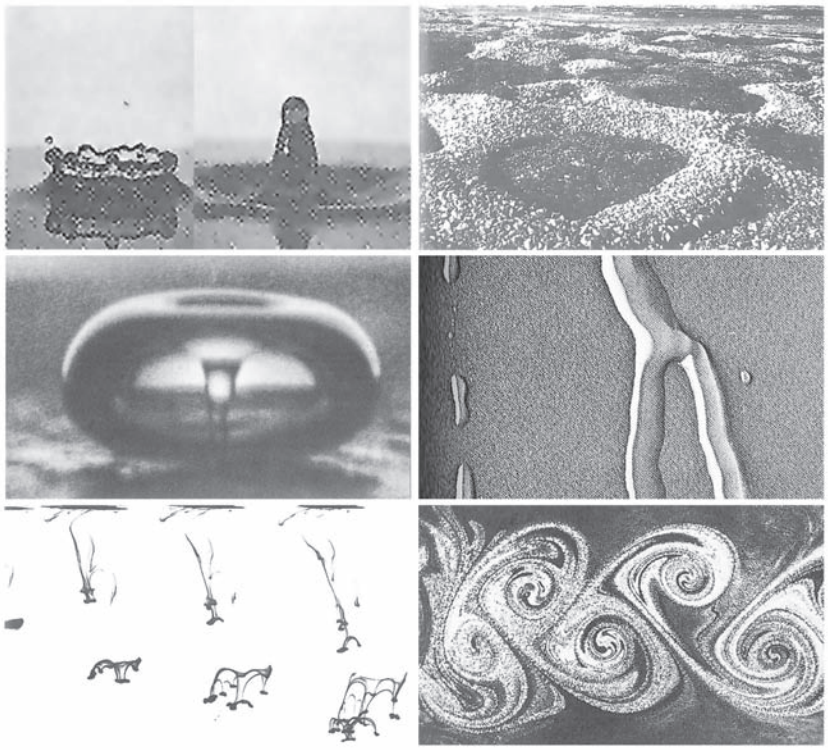
The structures in space and time have typical phenotypes, depending on whether energy or matter is transported in space by the local motion of the particles.

Waves produce periodically recurring motions which transport energy as a function of time (left, from top to bottom, images 1 and 2).

If material particles are transported in space, motions of rotation are produced in an enclosed space which form vortexes.

Further characteristic families of forms are ring vortexes (image 3), Bénard cells (right, top, image 4), helical vortexes (image 5), and vortex streets (image 6).

Siegfried Gaß, *IL Form Force Mass 5: Experiments*, 1990, 2.97.[39]



"Structures in Space and Time," Siegfried Gaß, 1990.

EMERGENCE, SELF-ORGANIZATION, AND ARCHITECTURE

SELF-ORGANIZATION: THE BIOLOGICAL MODEL The advances in computer science which I mentioned a moment ago—more specifically, the development of computational models for complex systems—find their roots in the work of zoologist and mathematician D'Arcy Thompson. In his 1917 text, *On Growth and Form*,[40] he speculates that the form of biological organisms is influenced by physical laws and mechanics as much as (or more than) than by Darwin's "survival of the fittest" theory. Thompson identified similarity in the form of jellyfish and that of drops of liquid falling into a viscous fluid, for example, and in the form of the hollow bones of birds and engineering truss designs.

(Around the same time as Thompson's writings, early 20th century architect Antoni Gaudi was experimenting with catenary chain models to define the form of his Church of the Sagrada Familia.)

Today, at least in part because of Thompson's observations, biological organisms are understood as self-organizing systems: natural systems which organize material in space, over time, and under the load of gravity through the interactions of many simple components (such as sand grains, water molecules, and living cells)—a process known as morphogenesis. It is the differences in the patterns of assembly of these simple components which result in differences in the form and performance of the organism (or system).[41]

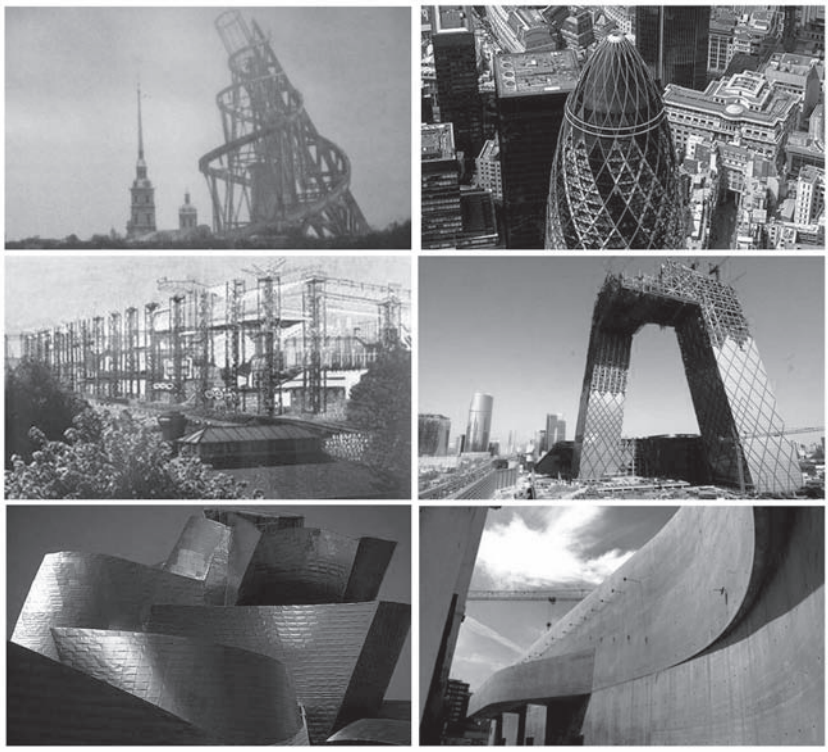
(Siegfried Gaß, a student of Frei Otto, published an extensive analysis of typical forms resulting from self-forming processes in *Form Force Mass 5: Experiments*. Of particular relevance to these wanders is the section on structures in space and time.)[42]

ANIMATE FORM

If there is a single concept that must be engaged due to the proliferation of topological shapes and computer-aided tools, it is that in their structure as abstract machines, these technologies are animate.

(A keyboard is an actual machine, it is technological therefore it is a concrete assemblage. The distribution of letters on keys in space is an abstract machine, it is a virtual diagram designed to limit the speed of typing; no particular test word or sentence exists, and it applies to an indefinite series of existing and future words.)

Greg Lynn, *Animate Form*, 1999, 40-41.[43]



Motion in Architecture (clockwise from top left):
"Monument to the Third International," Vladimir Tatlin, 1920.
"Swiss Re tower," Norman Foster, 2003.
"CCTV building," OMA, 2008.
"MAXXI," Zaha Hadid, 2009.
"Guggenheim Museum in Bilbao," Frank Gehry, 1997.
"Fun Palace", Cedric Price, 1964.

According to Achim Menges, architect and studio master for the Emergent Technologies program at the Architectural Association in London, extending this model to the design of buildings shifts the Modernist paradigm of form "rationalized for realization and superimposed functions" to a new paradigm where form is derived from the capacities of materials and constructs.[44] To derive form in this model, a (mathematical) process of differentiation is necessary: the process of solving the (biological or architectural) system for multiple variables, broadly defined by Menges as ecology, topography, and structure.[45]

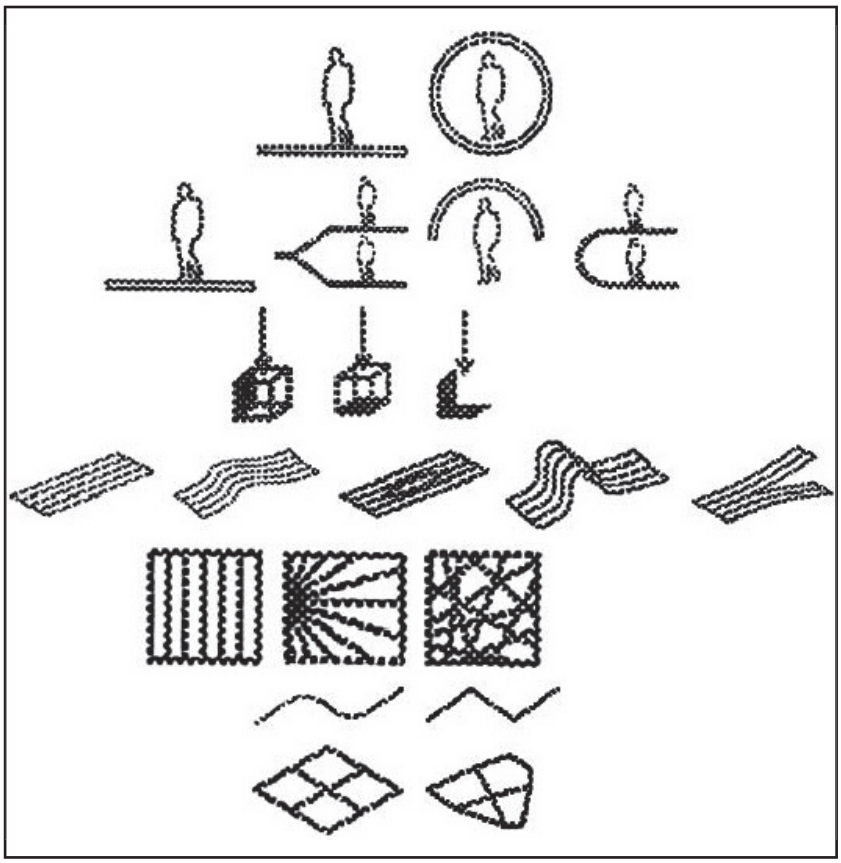
D'Arcy Thompson first applied mathematics to biological form to quantify his theory of morphogenesis. This conceptual leap paralleled mathematician and philosopher Alfred North Whitehead's theory that "organisms are bundles of relationships that maintain themselves by adjusting their own behaviour in anticipation of changes to the patterns of activity all around them."[46] These two theories (collectively arguing that form and behaviour emerge from process)[47] bring us back to that rich discourse in mathematical and computational models for complex systems—including cybernetics (Norman Weiner), geometrical phyllotaxis and the attraction-diffusion model (Alan Turing), systems theory, complexity theory, genetic algorithms (John H. Holland), and most recently, mathematical simulations of genes acting in Boolean networks[48]—which provides the conceptual model and the computational foundation for building-organism design.

... AS APPLIED TO ARCHITECTURE. These mathematical and computational models (all based on calculus, the mathematical study of change) have, so far, found their way into built architecture through topological surfaces functions in CAD software (which are so prolific they appear as the sandbox tools in the free and popular Google SketchUp software), time-and-force modelling attributes in animation software and parameter-based modelling.[49] But architectural researchers and experimental designers are attempting to make instruments of

PHYLOGENESIS

The phylogram operates to identify consistency across the different design processes, projects, and the overall body of the architects' work.

Alejandro Zaera Polo, "Types, Styles and Phylogenesis," 2004.[50]



"Phylogenetic Diagrams," FOA, 2004.
From top to bottom: Function: ground, envelope; Faciality: single face, multiple face; Balance: constant, shifting; Discontinuity: planar, rippled, pinched, perforated, bifurcated; Orientation: oriented, non-oriented; Geometry: continuous, discontinuous; Diversification: patterned , contingent.

the most recent mathematical advances (those computational models of complex systems) and their corollary conceptual models.

For example: "phylogenesis" is used to generate diagrams for architectural design. Foreign Office Architects analyzed ten years of their own work, classifying it in the manner of a phylogenetic tree in the hopes that they could "address general questions about the identity and the consistency and the operativity of an architectural practice today."[51] Why inhabit the building-organism paradigm?

> By constructing our identity from a populational analysis of the projects, we are trying to avoid constructing it on the basis of idealistic or critical claims. We are constructing the consistency of our practice out of its own material, understanding our production as a non-arbitrary group of individuals that may or may not share features and therefore belong to a species. From this perspective, our practice may be seen as a phylogenetic process in which seeds proliferate in time across different environments, generating differentiated yet consistent organisms that evolve through time and across different environments.
>
> Alejandro Zaera-Polo and Farshid Moussavi, *Phylogenesis*, 2004.[52]

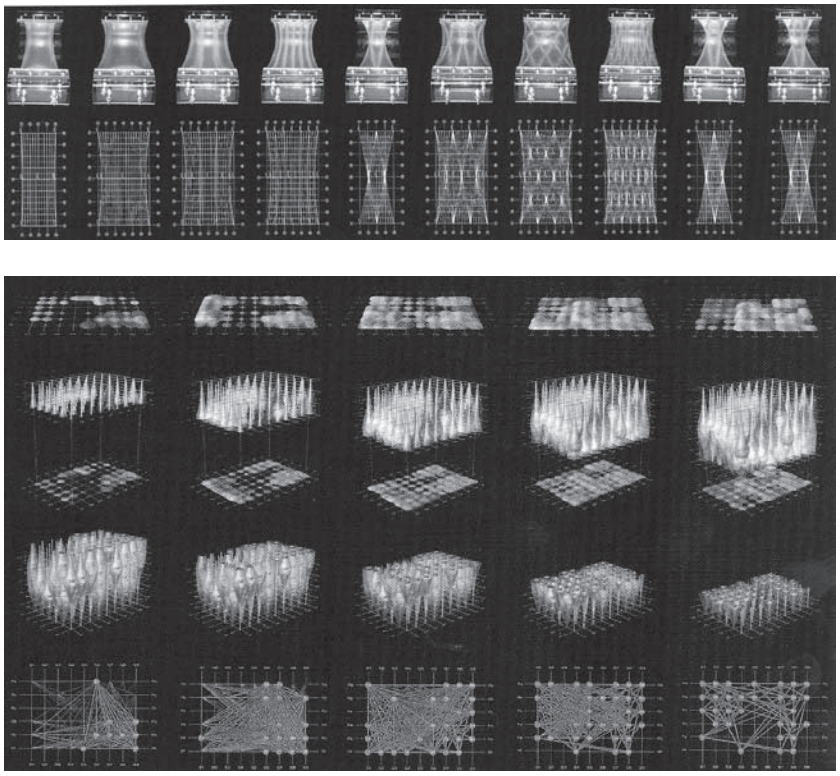
"Morpho-ecologies" are formal, structural and programmatic solutions to architectural problems. One of the keys to understanding this approach is an acute awareness of the shift from geometric to differential mathematics in architectural design: that is to say the shift from static to dynamic forms in architecture.[53] Parametric modeling is one of the tools architects can use to design using differential mathematics. "Parametric Model: It maintains consistent relationships between elements as the model is manipulated. For example, in a parametric building modeller, if the pitch of the roof is changed, the walls automatically follow the revised roof line."[54]

"Postagriculture," one of Achim Menges' designs using a morpho-ecological approach, is designed through multiple acts of

MORPHOECOLOGICAL DESIGN

The Postagriculture project begins with the recognition of the importance of environmentally and socially sustainable food production. ...The aim is to articulate an inclusive and responsive strategy, one that enables a mode of agricultural production that is a highly integrated, mutable and vital urban programme. The project promotes a local hybridization of intensified agroproduction with public recreation. This in turn demands an architecture that is capable of negotiating and adapting to different system requirements.

Achim Menges, "Morphoecologies," 2006.[55]



"Postagriculture," Achim Menges, 2002.
Top: Component evolution based on parametric variations of the boundary definition points, the seam layout, the pressure of the compressed air volume and the consequent geometry and prestressing of the membranes;
Bottom: Organizational model of differential intersystemic relations derived by a digital-mapping technique of system-specific light and climatic conditions.

differentiation. For example, the light level within the structure is a function of available light and transparency of material, the transparency of the material is a function of its density, the structural capacity of the material is also a function of its density and so on. If particular light levels are required within a building, a differential equation will be necessary to solve the relationship between light, material thickness, and structural capacity. "A differential equation is a mathematical equation for an unknown function of one or several variables that relates the values of the function itself and its derivatives of various orders. Differential equations play a prominent role in engineering, physics, economics and other disciplines."[56]

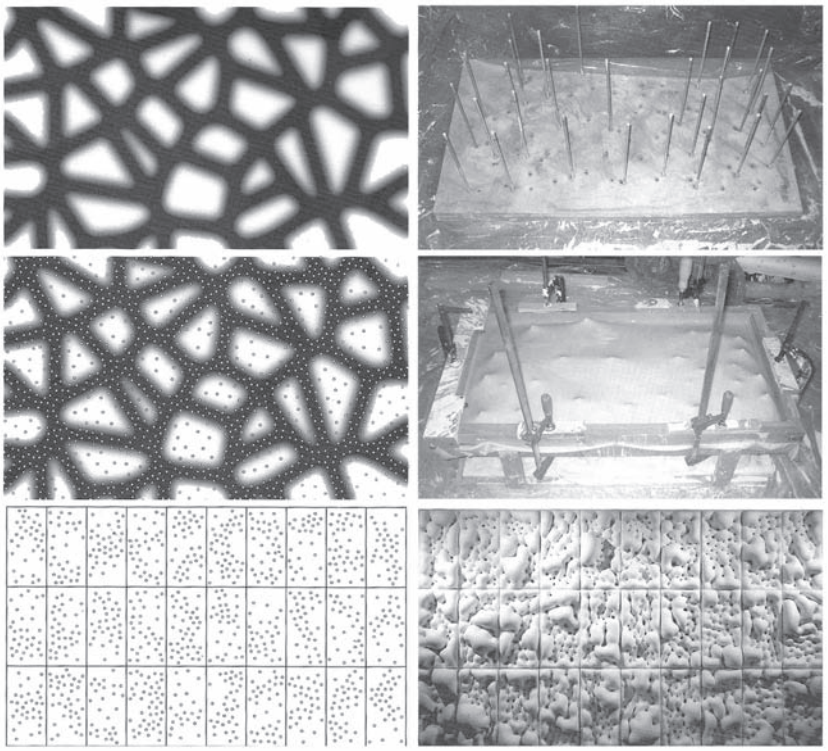
"Material emergence" develops the architect's intuition for animate forms. Andrew Kudless, a prominent figure within this particular area of research, is one of the architects who have begun experimenting with self-forming processes paired with evolutionary design methods.[57] The physical form-finding processes Kudless uses, which involve the application of a set of rules that restrict or influence the organization of, and thus the shape of, a set of material components, "are consistent with some of the characteristics of natural self-organizing systems ... offering the possibilities of experimental morphogenesis from which forms emerge that have an 'inbuilt' potential for self-organization in material production."[58]

Kudless' experiments are particularly concerned with the forms of surfaces, which, in the building-organism paradigm, are the part of the system through which energy, materials, and information are exchanged with the surrounding environment. "This new potential for architectural surfaces is predicated on a parallel interest in territory— territory on which spaces flow into one another, and on which connectivity and integration are enhanced. The experience of these surface territories and spaces is at once private and public, interior and exterior—a manifestation of the contemporary cultural condition."[59]

EMERGENT MATERIAL METHODOLOGIES

Kudless has established himself as a prominent figure in a new generation of architectural researchers whose investigations traverse physical "self-organized" production and computational processes; their material systems use pattern and surface differentiation to produce gradients of performance that transcend the atelier tradition of experimentation with arrangements of materials stressed to produce stable organizations.

Michael Weinstock, "Surfaces of Self-organization," 2006.[60]



"p_wall," Andrew Kudless, 2006.
From top to bottom, left: initial pattern, array of points (density correlated to grayscale value), panel distribution; right: dowels to restrain fabric located at points from step 2, plaster poured into elasticated fabric mould, final form.

AS I CONSIDER THESE EXPERIMENTS ... These examples offer a toolkit of potential methods through which to investigate how a building can gather and release information, material or energy (the possible inputs/outputs of the building-organism), but I find myself wondering how human occupation of a space offers energy, information, or material to the building-organism, and thus how the surface can best vector these exchanges.

I think walking is a good place to start looking for occupant offerings of energy, information, and maybe even material. Walking is already our tool (we, the members of crowd-organism) for bringing spatial order to a shifting territory—we used it once, long, long ago as we walked the spatial order of the path into existence, and it must remain embedded within us. The message is not new but we are developing new ways of sending and receiving and organizing our architecture, ways of destabilizing it. And so, to bring occupants back into this unstable place, I imagine coordinating the place's instability with the innate ability of the occupant to construct a new order.

My point, for the purposes of this wander, is this: we (architects) should figure out how to design our buildings to sense walking, or speak walking, so that the occupant and the building can start to have a useful conversation (via matter and energy photons, turbulence, and the "tone" of vibrations emanating from ox-breathing?).

I WALLOW HAPPILY in the thinking part of design—as I imagine do other architects who work in the building-organism paradigm—the working-through and arguing-for, and I suspect that I (and they?) secretly want to preserve this muckiness past the point of diagrams and construction drawings, oozing uncertainty through actual construction and into the lives of the occupants, the people – into the real world!

ADAPTIVE EMERGENT ARCHITECTURE

"Emergence" is the scientific mode in which natural systems can be explored and explained in a contemporary context. It provides "models and processes for the creation of artificial systems that are designed to produce forms and complex behavior, and perhaps even real intelligence."[61]

ADAPTIVE EMERGENT BEHAVIOR

The system would use local rules between interacting agents to create higher-level behavior well suited to its environment.[62]

BIOMIMESIS

Bionics is the application of biological methods and systems found in nature to the study and design of engineering systems and modern technology.[63]

COMMONWEALTH

The place we have an interest in, which is made up of all of us.

COMPLEX BEHAVIOR

A system with multiple agents dynamically interacting in multiple ways, following local rule and oblivious to any higher level instructions.[64]

ECOLOGY

The interdisciplinary scientific study of the distribution and abundance of organisms and their interactions with their environment. The environment of an organism includes all external factors, including abiotic ones such as climate and geology, and biotic factors, including members of the same species (conspecifics) and other species that share a habitat. If the general life science of biology is viewed as a hierarchy of levels of organization, from molecular processes, to cells, tissues and organs, and finally to the individual, the population and the ecosystem, then the study of the latter three levels belongs within the purview of ecology.[65]

EMERGENCE

In its broadest definition, emergence is "a higher level pattern arising out of parallel complex actions between local agents."[65] In the urban form of Manchester (for example), the patterns that emerged were neighborhoods, or districts, with distinct characteristics which crystallized out of the actions and interactions of users of the commonwealth (the local agents), "capturing information about group behavior, and sharing that information with the group."[66]

A N O T H E R G L O S S A R Y

GENERATIVE MODELING

A shape is described by a sequence of processing steps, rather than just the end result of applying these operations. Shape design becomes rule design.[67]

MORPHOLOGY (BIOLOGY)

The form, structure and configuration of an organism. This includes aspects of the outward appearance (shape, structure, colour, pattern) as well as the form and structure of the internal parts like bones and organs. This is in contrast to physiology, which deals primarily with function.[68]

PERFORMATIVE STRUCTURE

A network of connected scenes that captures the relationships among scenes. A performative structure constrains the paths agents can traverse to move from one scene to another, depending on the roles they are playing.[69]

PHENOTYPE

Any observable characteristic or trait of an organism: such as its morphology, development, biochemical or physiological properties, or behaviour. Phenotypes result from the expression of an organism's genes as well as the influence of environmental factors and possible interactions between the two. The genotype of an organism is the inherited instructions it carries within its genetic code. Not all organisms with the same genotype look or act the same way, because appearance and behaviour are modified by environmental and developmental conditions. Similarly, not all organisms that look alike necessarily have the same genotype.[70]

PHYLOGRAM (OR PHYLOGENETIC TREE)

A device of classification in biology which is used for systematic study of evolutionary history and the relationships among organisms that have common ancestors.[71]

PROLIFERATION

The growth or production of cells by multiplication of parts or a rapid and often excessive spread or increase.[72]

"St Mary's Lake near Cranbrook," Gerald Neault, 1980.

MOUNTAINS AND RIVERS WITHOUT END

FROM JACK KEROUC'S *THE DHARMA BUMS*: So we unpacked our packs and laid things out and smoked and had a good time. Now the mountains were getting that pink tinge, I mean the rocks, they were just solid rock covered with the atoms of dust accumulated there since beginningless time. In fact I was afraid of those jagged monstrosities all around and over our heads.

"They're so silent!" I said.

"Yeah man, you know to me a mountain is a Buddha. Think of the patience, hundreds of thousands of years just sitting there bein perfectly perfectly silent and like praying for all living creatures in that silence and just waiting for us to stop all our frettin and foolin." Japhy got out the tea, Chinese tea, and sprinkled some in a tin pot, and had the fire going meanwhile, a small one to begin with, the sun was still on us, and stuck a long stick tight down under a few big rocks and made himself something to hang the teapot on and pretty soon the water was boiling and he poured it out steaming into the tin pot and we had cups of tea with our tin cups. I myself'd gotten the water from the stream, which was cold and pure like snow and the crystal-lidded eyes of heaven. Therefore, the tea was by far the most pure and thirstquenching tea I ever drank in all my life, it made you want to drink more and more, it actually quenched your thirst and of course it swam around hot in your belly.

"Now you understand the Oriental passion for tea," said Japhy. "Remember that book I told you about the first sip is joy the second is gladness, the third is serenity, the fourth is madness, the fifth is ecstasy."

"Just about old buddy."

"Either Okanagan or near Lillooet," Gerald Neault, 1985.

The rock we were camped against was a marvel. It was thirty feet high and thirty feet at base, a perfect square almost, and twisted trees arched over it and peeked down on us. From the base it went outward, forming a concave, so if rain came we'd be partially covered. "How did this immense sonumbitch ever get here?"

"It probably was left here by the retreating glacier. See over there that field of snow?"

"Yeah."

"That's the glacier what's left of it. Either that or this rock tumbled here from inconceivable prehistoric mountains we can't understand, or maybe it just landed here when the friggin mountain range itself burst out of the ground in the Jurassic upheaval. Ray when you're up here you're not sittin in a Berkeley tea room. This is the beginning and the end of the world right here. Look at all those patient Buddhas lookin at us saying nothing."

"And you come out here by yourself ..."

"For weeks on end, just like John Muir, climb around all by myself following quartzite veins or making posies of flowers for my camp, or just walking around naked singing, and cook my supper and laugh."

"Japhy I gotta hand it to you, you're the happiest little cat in the world and the greatest by God you are. I'm sure glad I'm learning all this. This place makes me feel devoted, too, I mean, you know I have a prayer, did you know the prayer I use?"

"What?"

"I sit down and say, and I run all my friends and relatives and enemies one by one in this, without entertaining any angers or gratitudes or anything, and I say, like 'Japhy Ryder, equally empty, equally to be loved, equally a coming Buddha,' then I run on, say to 'David O. Selznick, equally empty, equally to be loved, equally a coming Buddha' though I don't use names like David O. Selznick, just people I know because when I say the words 'equally a coming Buddha' I want to be thinking of their eyes, like you take Morley, his blue eyes behind those glasses, when you think 'equally a coming Buddha' you think of those eyes and you really do suddenly see the true secret serenity and the truth of his coming Buddhahood. Then you think of your enemy's eyes."

"Mount Revelstoke," Gerald Neault, 1981.

"That's great, Ray," and Japhy took out his notebook and wrote down the prayer, and shook his head in wonder. "That's really really great. I'm going to teach this prayer to the monks I meet in Japan. There's nothing wrong with you Ray, your only trouble is you never learned to get out to spots like this, you've let the world drown you in its horseshit and you've been vexed ... though as I say comparisons are odious, but what we're sayin now is true."

Jack Kerouac, *The Dharma Bums*, 1958, 329.[73]

THE STORY I TELL MYSELF ... begins in the shelter of the foothills of the Purcell Mountains, looking across the Kootenay river at the Mighty Rocky Mountains. And at the edge of the Columbia River, against the backdrop of the Monashee and the Selkirk Mountains. And on the frozen Interior Plateau suspended between the Rocky Mountains and the Pacific Coast Ranges. And on a cliff in the foothills of the Pacific Ranges along the west edge of the Coast Mountains. These are the settings of my earliest memories; they are the backdrops against which the experiences which have shaped me, body and mind, are acted out. Which is to say that, in the story I tell myself, I am as much a child of the mountains of the Pacific Northwest as I am of my own mother.

(Though both my mother and my mountains are wise, my mountains don't answer the phone when I call in homesick, or heartsick; they consider my dramas too humble to disturb their deep blue-green serenity. My mother, on the other hand, listens even when I can't speak.)

These mountains are the mountains which Japhy Ryder and Ray Smith wandered in *The Dharma Bums*: landscapes where glaciers discarded the remnants of their glacial wanders, where Gary Snyder, as lumberjack poet, was a heroic nomad, and where John Muir made posies and possibly danced naked (or started the Sierra Club. Would you prefer poetry or history?). Here it is sensible to say: "your only trouble is you never learned to get out to spots like this, you've let the world drown you in its horseshit and you've been vexed."

MEMORY AND TIME

Memory is, therefore, neither Perception nor Conception, but a state or affection of one of these, conditioned by lapse of time.

Aristotle, *On Memory and Reminiscence*, 350 BCE.[74]

ON CLIMBING THE SIERRA MATTERHORN AGAIN AFTER THIRTY-ONE YEARS

Range after range of mountains
Year after year after year.
I am still in love.

Gary Snyder, *No Nature*, 1992, 362.[75]

JAPHY RYDER. At least that's the name I knew him by when we first met, a dozen years ago. At the time I was bewitched by his good friend, Jack Kerouac (both as author and as Ray Smith, Japhy's eager student in *The Dharma Bums*). It was, predictably, Kerouac's wandering ways which drew me to him, and his cadenced, walker's-words which mesmerized me. We met while I was on my own version of the Grand Tour, madly consuming as many new geographies as I could, thirsty for new experiences in new places. Kerouac—in the guise of Ray Smith and Jack Duluoz and Sal Paradise—was my hero, my mentor and my guide on these journeys: a fellow Peripatetic, descendant of Buddha and Aristotle.

While I wandered far from home in search of the new and unfamiliar, Japhy and Ray conjured the surreal comfort of my native geography with a magic I knew with every fibre of my being, but knew as a personal, solitary experience, not one in the context of generations of walkers as I have come to know it now.

THAT WHICH I EXPERIENCE AS WALKING—the shape, the tale, and the action—is in no way a universal understanding of what is a universally human behaviour; and yet neither is it entirely my own. At *my* end of this wander—the beginning of this tale and (nearly) the end of my walkers' family tree—is Gary Snyder: poet lumberjack and nomadic hero *in the flesh!* (I remember, at seventeen, awakening to the understanding that most of the people, places and experiences I once thought the product of the infinite imaginations of the authors in whose books I found them were in fact the material experiences of those people in their places; words put down in the hopes that some reader will find solace in these shared worlds; that they will recognize home and fellow.) I found Snyder by way of Rebecca Solnit—the walker's historian—and I'm loath to admit that I didn't recognize him, at first, as my travelling companion from all those years ago. Granted, he had changed his name, but I should have known better than to mistake him for a stranger...

I was a tourist on my Grand Tour, despite my earnest desire to *be part of* the places I visited, and I am a tourist as I experience the worlds of William Wordsworth and Jane Austen and perhaps even John Muir. But not so when I read Snyder: I *recognize* his call, and to me it feels like *home*: the shape of the place which shaped me. Snyder's poetry, and Kerouac's barely-fictional account of Snyder himself, describe so precisely the way I experience and understand the world that I can't help but think that I am not alone; that my thoughts and experiences aren't quite mine, but rather that they are the mangled echoes of the calls of those who have walked and thought their way through these landscapes before me, seeking to understand this world in the context of their own private sequences of spatial experiences.

Kerouac quotes Snyder (via Japhy) acknowledging the echoes of Muir's call within his own, and within Muir's wanders I find echoes of Walt Whitman's *Song of the Open Road* and Henry David Thoreau's *Walking*. Whitman's poetry reverberates with traces of John Clare's *Journey Out of Essex*, which reflects Jane Austen and her chronicles of Victorian walking-life in *Pride and Prejudice* and the Wordworths' walk to the Lake District in 1798. And the walkings of Austen's characters, and the Wordsworths, contain echoes of the invention of the English Garden by Capability Brown at Stowe along with Rousseau's unfinished *The Reveries of a Solitary Walker*.

Heard together these echoes tell the tale of the places these walkers walked, away from the French Renaissance Gardens of Versailles—axial, symmetrical, centred on the facade of a building—through the naturalistic landscapes of the English Garden, out onto the open road, and beyond the road, up the mountains, into the wilderness.

IF A TREE FALLS IN THE FOREST ... Did my mountains make Japhy and me? The latest research into the neurobiology of memory suggests that an experience in the world is translated into electrical impulses which trigger the growth of neurons in our brains. Memory is matter.

COMPUTATIONAL NEUROSCIENCE

There aren't yet any instruments that can measure what a large, complicated neural net is doing in detail, especially while it is part of a living brain, so scientists have to find indirect ways of testing their ideas about what's going on in there.

One way is to build the idea into software and see if it works. If a hypothesis about what a part of the brain is doing turns out to inspire a working technology, the hypothesis certainly gets a boost. Computational neuroscience takes place on an imprecise edge of scientific method. For example, while facial expression tracking software might seem to reduce the degree of ambiguity present in the human adventure, it actually draws scientists and engineers into collaborations in which science gradually adopts methods that look a little like poetry and storytelling.

Jaron Lanier, *You Are Not a Gadget*, 2010, 160.[78]

The shape of that matter, that organism: my brain, as D'Arcy Thompson will attest, is the result of forces acting upon its components (neurons and synapses and such) as they are organized in space, over time. The forces acting upon my brain are quite literally the forces of experience: the electrical impulses generated in my skin, my eyes, my ears, my nose, and my tongue as they are assaulted by the electrical charge of electrons, or the energy and momentum of particles of light, or the mechanical vibrations of air particles, or volatile chemicals let loose from their objects. If Japhy and I have spent prolonged periods of time subjected to similar patterns of experiential assaults—similar because, while our times, contexts, actions are our own, our backdrops continue to emit the same pattern they have for millennia—then the shapes of our brains could in fact share morphological characteristics. My appreciation for Snyder's poetry might well be because the shape of his thoughts are ergonomic, so to speak: comfortable ... natural. In the context of the shape of my brain, that is.

The intuition that place and thought and memory are powerfully connected is as old as the Indigenous Australians' Songlines but I'll pick it up, as Frances Yates does, as it becomes part of Western philosophical (and scientific) tradition. Yates chronicles, in *The Art of Memory*,[76] the history of a particular mnemonic tradition: the *method of loci*. This is an explicitly spatial technique to improve what Aristotle called the artificial memory: the ability to fix knowledge, derived from sense experience, in images that heighten perception, with the goal of enhancing a rhetorician's eloquence. The practitioner begins with a place, deeply embedded in the mind: "often conceived of as a palace or a theatre, (this place) might be likened to a sacred space within which the mnemonist possessed intuitive familiarity."[77] Through this place the practitioner walks, depositing into its architecture "vivid pictorial imagery which inspired awe"[79] which are connected (neuron to neuron) to the ideas which the practitioner hopes to remember. This technique leverages skills which we all possess (in varying degrees, admittedly);

skills developed in order to allow us to orient ourselves in the world: to order our spaces.

ARISTOTLE'S STUDENTS—THE PERIPATETICS—those "given to walking about"[80] (what a perfectly fantastic name to adopt...)—applied these mnemonic techniques *instrumentally* (and sensually) in what would, during the Middle Ages, become the surviving, though still sweetly subversive, strain of this art of sauntering as a tool for communicating moral lessons and other sacred messages. Plato's edition of the method of *loci*—in which the value of a mimetic image was tied directly to the ideal reality that it was empowered to represent—was largely suppressed during the Middle Ages (when its pagan provenance miffed the monotheists), flourishing later, during the Italian Renaissance (16th century) as reinterpreted by the Neoplatonic philosophers. The Neoplatonists were not walkers; they didn't appreciate change. The mnemonic systems of the likes of Guiolio Camillo and Giordano Bruno were spatial (which makes me like them, despite their stillness) but they were based on Plato's unchanging reality, in which "journeys into the memory moved along fixed trajectories to be travelled again and again...The Neoplatonic mnemonists possessed no sense of development."[81]

As the Renaissance ended and the Early Modern period began, the Baconian Method (the precursor to the scientific method) "rejected the notion of magical correspondences between mnemic images and the powers governing the heavens (spurning) the prideful role of magus for the more modest one of scientific investigator."[82] And so the esoteric version of the mnemonic tradition was displaced by scientific empiricism, a paradigm in which knowledge and sense experience were intimately connected.

While his peers (Isaac Newton, René Descartes, Baruch Spinoza), despite their re-evaluation of the "honesty" of sense experience, struggled to shake off the stillness of the Neoplatonists largely confining

The "METHOD OF LOCI," as first described by Simonedes (cf. Yates, 1966), is explicitly spatial. In this technique, subjects improve memory by putting to-be-remembered items into some place or spatial context. Retrieval is effected simply by "going" to that place in thought ... Events occurring within separate contexts are efficiently recalled in those contexts and minimally confused between contexts, though the events themselves might be highly similar. The mental maps we have of our home town, our neighbourhood, and our house are all examples of the kinds of spatial contexts within which events occur, can be coded internally, and can subsequently be effectively retrieved or recalled: Studies by Smith, Glenberg, and Bjork (1978) and Bellezza and Reddy (1978) indicate that the power of the method of loci might lie in its ability to take advantage of this natural state of affairs.[83]

themselves to the study of simple systems, Gottfried Leibniz embraced the study of change, setting the proverbial stage for the introduction of the science of nature from which tumbles the study of complexity (and my own efforts to apply these ideas to the design of architecture).

THOUGH POSTHUMOUSLY EXONERATED, Leibniz was accused of having plagiarized Issac Newton's calculus, that all-important mathematics of change which, centuries later, is the darling of experimental, and sometimes subversive, architects. This accusation cast a shadow over Leibniz's reputation towards the end of his lifetime and for a century after he died permitting, in some small way, I think, the rampant rationalism of the Modernists (*another* century-and-a-half post-Leibniz) which produced the Modern architect's destructive, though inevitable (if you believe that order is simple), obsession with the *tabula rasa*.

Immanuel Kant was one of the first to revisit Leibniz's work, after the gossip faded from memory, keeping his ideas alive until Bertrand Russell brought them back into the light of day via a critical study of his metaphysics published in 1900. As the twentieth century progressed, Gottfried Leibniz was recognized as having anticipated some of that century's greatest scientific developments: special relativity, information theory, digital computers, cybernetic theory, quantum physics ...

WHILE LEIBNIZ TROD A PATH IN THE FIELD OF SCIENCE, a path which embraced motion, experience, change, and which at least anticipated, if not laid the ground for, the advances in computational methods which permit the architectural paradigm within which I work, Giambattista Vico blazed a new trail through the forests of history exposing the workings of collective memory in oral tradition, connecting human imagination with the shape of the universe. It is what Vico calls *topics*—"the poetic formulae though which primitive people identified the phenomena of the world...(providing) commonplaces or fixed points of reference amidst the flux of sensory experience"—which I

THE LANGUAGE OF MATHEMATICS

Philosophy (i.e., physics) is written in this grand book—I mean the universe—which stands continually open to our gaze, but it cannot be understood unless one first learns to comprehend the language and interpret the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometrical figures, without which it is humanly impossible to understand a single word of it; without these, one is wandering around in a dark labyrinth.

Galileo Galilei, *Il Saggiatore* (*The Assayer*), 1623.[84]

believe lay the ground for a "poetic code" through which human occupation can become a useful variable in the differentiation of morpho-ecological architecture.

A CODE BASED ON WALKING. Vico's genius lies in his mediation of Platonic and Aristotelian conceptions of order: he searches for the Platonists' fundamental shape of reality within the Aristotelians' experience-based reality, but at the scale of the collective (anticipating Francis Galton's discovery of the "wisdom of crowds"). Vico argues that the "truth" of history can only be evaluated in the context of the collective's poetic (metaphoric) relationship with their common experiences of place: their *collective memory*.

(I am not the first architect to recognize the potential of this paradigm of collective memory to inform the design of buildings; to have considered that understanding architecture—the shape of a place—requires an understanding of art and literature, poetry, culture, politics and history, and vice versa. I am, after all, a product of the cultural history pedagogy of this school...)

While Vico never explicitly addresses an investigation of a culture's ways of walking through places as a way of identifying its poetry, the Romantic poets and philosophers of the late eighteenth and nineteenth centuries who took up Vico's quest to "touch the original, imaginative powers that make us creative"[85] began what Rebecca Solnit calls "the literature of meditative excursions" which introduces the act of walking as an aesthetic practice. Jean-Jacques Rousseau, father of Romanticism, inaugurated this tradition in his last, unfinished collection of thoughts: *The Reveries of the Solitary Walker*.

THE CLASSIC FRENCH GARDENS OF VERSAILLES were designed by André Le Nôtre for Louis XIV, one of the last kings of France, starting in 1662, over one hundred years and (nearly) a revolution before Jean-Jacques Rousseau's *Reveries*. These gardens were champi-

THE LITERATURE OF MEDITATIVE EXCURSIONS

Just as twelfth-century cultural revolution ushered in romantic love as first a literary subject and then a way of experiencing the world, so the eighteenth century created a taste for nature without which William and Dorothy Wordsworth would not have chosen to walk long distances midwinter and to detour from their already arduous course to admire waterfalls. This is not to say that no one felt a tender passion or admired a body of water before these successive revolutions; it is instead to say that a cultural framework arose that would inculcate such tendencies in the wider public, give them certain conventional avenues of expression, attribute to them certain redemptive values, and alter the surrounding world to enhance those tendencies.

Rebecca Solnit, *Wanderlust*, 2000, 85.[86]

ons of man's mastery over nature: the plans were rational and geometric, designed to be consumed all at once from overlooking terraces and walls, all vegetation was constrained and directed, and the central axis of the garden led from the facade of the palace to the horizon, linking King and God.

As the seeds of revolution against the cultural narrative represented by the artifice of these French Gardens were germinating in France, the English aristocrats cultivated a taste for nature, "in a sense, politically positioning themselves and their social order as natural, in contrast to French artifice. Thus their pursuit of country pastimes, their penchant for portraits of themselves in the landscape, their creation of naturalistic gardens, their cultivation of a taste for landscape, all had a political subtext."[87] This shift in political and philosophic taste was expressed in Capability Brown's 1751 redesign of the Stowe landscape gardens which he made naturalistic and cinematic. These gardens were designed to be experienced in motion, inviting the occupant to wander through, revelling in the complexities of nature; escaping the order of man.

VIRTUOUS NATURE VERSUS THE VICES OF POLITICAL SOCIETY. The latter theme is Rousseau's in his (mostly) melancholic final collection of autobiographical, introspective essays, not to mention much of his life's work. The *Reveries* express the solace Rousseau finds in the solitary contemplation of nature at a time when the civilized world had become hostile for him. (Rousseau was banned from France and Geneva because of the religious indifferentism expressed in his novel *Julie, ou la nouvelle Héloïse*, published in 1761.) This search to rediscover his identity through the study of nature, to find meaning in individual experience and to feel the clarity of communication with the natural world became the quest of the Romantics: those who, like Rousseau, were haunted by a sense of regret, a dissatisfaction with everyday life once exposed to the "sweet liberty" of ...

ON BOTANIZING

It is the chain of accessory ideas that makes me love botany. It brings together and recalls to my imagination all the images which most charm it: meadows, waters, woods, solitude and above all peace and tranquility which one can find in those places—all of this it instantly conjures up before my memory. It makes me forget the persecutions of men, their hate, their scorn, their insults and all the vile deeds with which they have repaid my sincere and loving attachments to them. It carries me off to quiet places among good and simple people such as those I once knew. It reminds me of my youth and my innocent pleasures, it allows me to enjoy them anew, and very often it makes me happy even now, amidst the most miserable fate ever endured by mortal man.

Jean-Jacques Rousseau, *Reveries of the Solitary Walker*, 1778, 121.[89]

AN IMAGINATIVE ENGAGEMENT WITH NATURE. Dorothy and William Wordsworth (along with their friend and fellow poet-walker Samuel Taylor Coleridge) might have been the first to consciously engage in this new era of what I think Vico would call repetition (mimesis): an expression of empathy with the creativity of the past. The Wordsworths' walks to and in the Lake District, as chronicled in Dorothy's *Grasmere Journal*, begin a new evolution of the oral tradition which was based in the collective experience of place: directions were transmitted in text (via poem and journal and Reverie) but the story passed on was in the experience of walking through a landscape, in the act of tracing a common path in which is embedded a direct correspondence between knowing and doing and which is transformed, in some way, by the physical presence of each (and every) walker in that space. (The *Grasmere Journal* was written in 1798/99 but not published until 1897, after John Muir had founded the Sierra Club. More on that later.)

In the abstract, typographic culture of the late Eighteenth and Nineteenth centuries,[88] this act of repetition, this reconnection of experience and idea, rendered the art of walking as an aesthetic practice subversive; the domain of eccentric artists like the Wordsworths and Coleridge, of unconventional women like Elizabeth Bennet (Jane Austen's heroine in *Pride and Prejudice*), and madmen like the peasant-poet John Clare (and poet of the common man, Walt Whitman!). It was Henry David Thoreau who trod a new path which shifted this subtle subversiveness towards two powerful political movements: marches as civil disobedience (Mahatma Gandhi's *Salt March* in 1930 and Martin Luther King's *Selma to Montgomery March* in 1965) and environmentalism (by way of the botanical adventures of early Twentieth Century naturalists such as John Muir and D'Arcy Thmpson). It is the latter branch we will follow here, though I imagine the former as a benign ghost, haunting the rest of our journey. (Which is to say that that walking, by nature, has an aura of anarchy, even when its objective is order.)

Walter J. Ong, a late Twentieth Century cultural historian, argues that a modification of the human mind which is expressed in increasingly abstract, personalized, self-conscious cultural exchanges corresponds to the stages of cultural communication: oral, chirographic, TYPOGRAPHIC, and electronic.

It was because of the RAILWAYMEN of the nineteenth century that local time was superseded by standardized time in the form of Railway Time. Railways operated within a scale of time (and space) which required, for the sake of efficiency, a consistent definition of time across vast spaces. By the end of the nineteenth century, precise longitudinal navigation at sea (the result of the development of sufficiently accurate markers of time known as chronometers) had permitted not only British domination of foreign territories by virtue of its domination of the seas, but a global British standard of time: GMT.[91]

IN 1872, EADWEARD MUYBRIDGE STOPPED TIME. It was at the behest of railwayman Leland Stanford (one of those mid-nineteenth century lords of time)—who wanted to know if all four of a horse's hooves were off the ground at the same time during a gallop—that Muybridge developed a new technology (high-speed photography) and, not unwittingly, a new hyper-sense: the ability to evaluate the instantaneous shapes within motion (the derivative, as it is known in calculus: "Given a function and a point in the domain, the derivative at that point is a way of encoding the small-scale behaviour of the function near that point."[90]) This pseudo-scientific investigation—along with Muybridge's subsequent studies of human beings walking, running, climbing, leaping, twirling and dancing—is the first such study to engage in the poetry of nature, building a bridge, via technology, between science and narrative; in essence, bringing into being the scientific study of complexity which is at the root of my own architectural experiments.

By 1913, D'Arcy Thompson had merged Muybridge's studies of shape over time with Leibniz's mathematics of change (and, perhaps, John Muir's sense of narrative) to make his theory of growth and form. While Thompson considered changing shape on a vastly different time scale than Muybridge—over millennia rather than moments (or, more precisely, over millennia *and* moments)—the principle of scientific study of the poetics of change are common to these two men who both inhabit what Alfred North Whitehead will label the paradigm of "an ontology of becoming." D'Arcy Thompson's careful analyses of the shapes of liquids of various viscosities splashing, falling and otherwise being propelled through one another were only possible because of Muybridge's technological innovations permitting the perception of these instantaneous shapes. These studies were likely inspired by Muybridge's own copious photographic studies of water in motion. Thompson, however, applied the new perception offered by this method of investigation to a broader pool of subjects which, unlike Muybridge's primarily anthropic studies, included every living organism.

THE SIERRA CLUB. In the midst of Muybridge and Thompson's inaugural scientific studies of complexity, John Muir and his friends formed the Sierra Club, an "alpine club" for mountain-lovers which rapidly transformed into a political organization seeking the protection of the natural landscapes they wandered from what they argued was ill-considered destruction in the name of development. My mountains were so noble in the eyes of John Muir and his peers that they effected what is now a world-wide movement to protect them from the simple orders of modern men, preserving their complexity as a resource for the new poet-scientists, progeny of Eadweard Muybridge, D'Arcy Thompson, Gottfried Leibniz and all the poet-walkers. This moment marks a profound shift in Western culture's relationship with the natural world from one which imagined the wilderness as hostile, separate from the civilized world, to be defended against or tamed, towards one in which human beings are imagined as a part of a large, complex and delicately balanced ecology which must, at the very least to ensure our own long-term survival as a species, be understood and protected.

I find something unsatisfying about the latter rationalization for environmentalism: in order to continue to survive, we must protect the natural world. There is a hint of reluctance in it, and a good dose of fear. And in that cold rationalization, there is nothing of the magic and joy and wonder which exudes from Walt Whitman and John Muir and Gary Snyder's "un-rational poetries," those collections of words which so precisely embody the experience of our common landscapes that their authors, particularly Muir, ought to be called Mimics, not poets.

I call Muir a Mimic because his words, like those of the great epic poets of the last age of orality, mimic the forms of nature "as if in creating language he were imitating the creative act of God. Ultimately, it is these forms of nature that inspire imagination."[94] Muir, through wildly successful writing and popular politics, offered to the Western world an opportunity to reconnect to those natural forms, and the

DAM HETCH HETCHY?

Dam Hetch Hetchy! As well dam for water tanks the people's cathedrals and churches, for no holier temple has ever been consecrated by the heart of man.

John Muir, *The Yosemite*, 1912, 262.[92]

WALKING AND DEMOCRACY

The taste for walking and landscape became a kind of Trojan horse that would eventually democratize many arenas and in the twentieth century literally bring down the barriers around aristocratic estates.

Rebecca Solnit, *Wanderlust*, 2000, 86.[93]

imagination they inspire, through collective, repetitive experience of a designated common landscape: state and national parks.

In the same way as Thompson's research into morphology injected the poetry of experience into Darwin's theory of evolution, Muir's formation of the Sierra Club transformed a fledgling conservation movement focused on most effectively milking resources from the land (without killing the cow) into a powerful preservation campaign rooted in the shared, poetic experience of the natural world.

POPULAR SUPPORT FOR THE ENVIRONMENTAL MOVEMENT, and the corollary cultural shift from anthropocentrism to biocentrism, created the conditions for a renewed interest in, and acceptance of, early ideas about complexity on the part of the scientific community. A century later, science is narrative; no longer the domain of theories but rather of detailed stories.[95] This is particularly true of biology and computational studies based on and participating in biological inquiries, as Jaron Lanier points out in the latter chapters of *You Are Not a Gadget* where he discusses computationalism, the origins of semantics and neoteny, virtual reality and cephalopods. I find the early part of Lanier's book, a scathing criticism of Web 2.0, depressing in the context of my own efforts to use new interactive social media to generate architectural form, but I am inspired by his speculations on the relationship between shape, metaphor, and the origins of language. In the end, I am, in this book, meandering towards the development of a language through which architecture and occupants can communicate, and the structure of that language is derived from the same corner of poetic-scientific discourse which Lanier mines in towards the end of his book.

I find his association between shape, metaphor and language particularly compelling and relevant to my own speculations on a new architectural language suitable for work in the building-as-organism paradigm. This part of Lanier's argument is rooted in a wonderfully poetic experiment designed by neuroscientist V. S. Ramachandran

THE KIKI/BOUBA EXPERIMENT

Rama (neuroscientist V. S. Ramachandran) is interested in determining how the cross-modal areas of the brain may give rise to a core element of language and meaning: the metaphor.

Rama's canonical example is encapsulated in an experiment known as bouba/kiki. Rama presents test subjects with two words, both of which are pronounceable but meaningless in most languages: bouba and kiki.

Then he shows the subjects two images: one is a spiky, hystricine shape and the other a rounded cloud form. Match the words and the images! Of course, the spiky shape goes with kiki and the cloud matches bouba. This correlation is cross-cultural and appears to be a general truth for all of humankind.

The bouba/kiki experiment isolates one form of linguistic abstraction. "Boubaness" or "kikiness" arises from two stimuli that are otherwise utterly dissimilar: an image formed on the retina versus a sound activated in the cochlea of the ear. Such abstractions seem to be linked to the mental phenomenon of metaphor. For instance, Rama finds that patients who have lesions in a cross-modal brain region called the inferior parietal lobule have difficulty

known as kiki/bouba which points towards a physiological basis for metaphor and a metaphoric origin for language. I imagine that, if shape and meaning are connected in certain metaphors, then architecture, by way of the same computational methods that permit a computer to recognize a face, could be programmed to learn to engage in meaningful communication with its occupants by way of a poetic, shape- and metaphor-based language. The act in which I imagine I will find the patterns I seek (akin to facial expressions or synesthetic metaphors, for the purposes of this thought) is walking.

both with the bouba/kiki task and with interpreting proverbs or stories that have non-literal meanings.

Rama's experiments suggest that some metaphors can be understood as mild forms of synesthesia. In its most severe forms, synesthesia is an intriguing neurological anomaly in which a person's sensory systems are crossed—for example, a colour might be perceived as a sound.

What is the connection between the images and the sounds in Rama's experiment? Well, from a mathematical point of view, kiki and the spiky shape both have "sharp" components that are not so pronounced in bouba; similar sharp components are present in the tongue and hand motions needed to make the kiki sound or draw the kiki picture.

Jaron Lanier, *You Are Not a Gadget*, 2010, 171.[96]

INTERLUDE: WAYS OF WALKING

A commonplace book entry "defining," by way of selected combinations of images and quotes, fourteen ways of walking: Normal Gait Mechanics, Erratic Path, Nomadic Journey, Pilgrimage, Labyrinth and Maze, Political March, The Garden Path, Philosopher's Walk, Promenade, Sauntering, Mountaineering, Flâneurie, Visit/Deambulation/Drifting, and Walking Art.

> He used to come into my rooms at midnight, and for hours he would walk backwards and forwards like a caged tiger. On arrival, he would announce that when he left my rooms he would commit suicide. So, in spite of getting sleepy, I did not turn him out. One such evening after an hour or two of dead silence, I said to him, "Wittgenstein, are you thinking about your logic or about your sins?" "Both" he said, and then reverted to silence.
>
> Bertrand Russell
> via Rebecca Solnit, *Wanderlust*, 2000, 16.[97]

Normal Gait Mechanics

Normal Gait Patterns Have Two Major Periods:

1. Double Limb Support: a) weight loading
   b) weight unloading
2. Single Limb Support: a) stance phase of ipsilateral side
   b) swing phase of contralateral side

DOUBLE LIMB SUPPORT

WEIGHT UNLOADING: Trailing foot is rolling off floor

Phases: Terminal Stance: when heel rises
Pre-Swing: when 1st MTP rolls off floor

Joint Motions:	**Terminal Stance**	→	**Pre-Swing**
Ankle	Heel rise	→	Max. plantarflexion (20°)
Knee	Full extension	→	Flexes to approx. 40°
Hip	Max. extension (20°)	→	Flexes to approx. 0° (neutral)
Pelvis	Relative anterior rotation	→	Less anterior rotation
	Posterior depression	→	Begin anterior elevation
Trunk	Aligned between legs	→	Aligned towards wt. loading leg

WEIGHT LOADING: Weight is transferred to contralateral leg

Phases: Initial Contact: when heel contacts floor
Loading Response: when sole of foot contacts floor

Joint Motions	**Initial Contact**	→	**Loading Response**
Ankle	Neutral	→	Plantarflexes 10°
Knee	Knee extended	→	Knee flexes 15°
Hip	Flexed 25°	→	Stable 25° flexion Relative abduction
Pelvis	Level	→	Lateral drop to swing leg
Trunk	Aligned between legs	→	Aligned towards wt. bearing leg

"Normal Gait Mechanics Page 1," Joe Godges.

SINGLE LIMB SUPPORT — Body is aligned over the stationary foot
Contralateral leg is off the floor

STANCE PHASE: (Initial Mid-Stance, Mid-Stance, Late Mid-Stance)

Joint Motions	**Initial Mid-Stance**	→	**Late Mid-Stance**
Ankle	Slight plantarflexion	→	Max. dorsiflexion (10°)
Knee	Slight flexion	→	Extended
Hip	Flexed, Relative adduction	→ 10°	Extended, Relative adduction
Pelvis	Lateral drop to swing leg, externally rotated		
Trunk	Toward stance leg → Away from stance leg Trunk rises in an arc over the stationary foot		

SWING PHASE: Leg shortens via hip and knee bend to simplify floor clearance

Sub Phases:
- Initial Swing: big toe leaves ground
- Mid-Swing: contralateral leg is at high point – mid-stance
- Terminal Swing: leg reaching forward for next floor contact

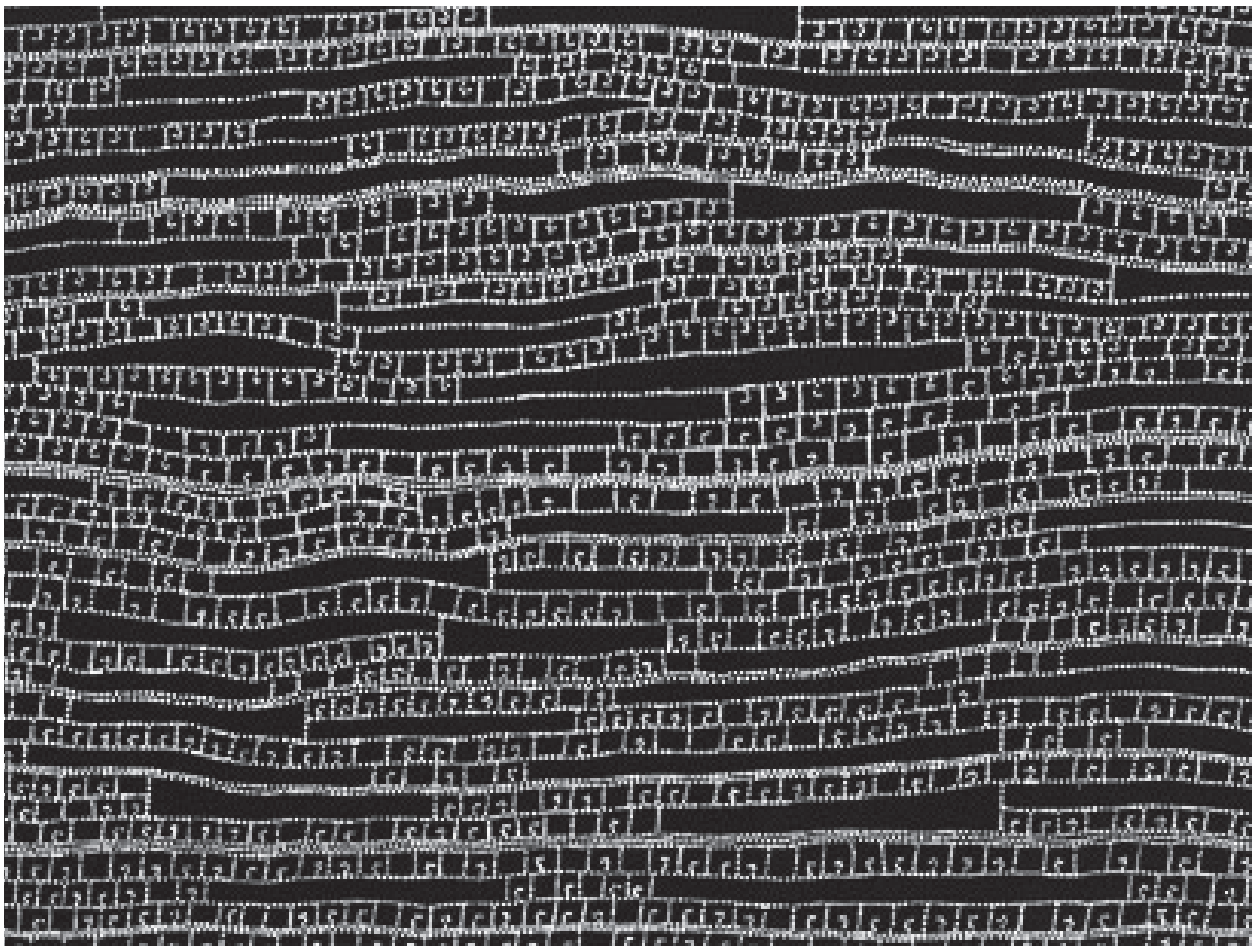
Joint Motions	**Initial Swing**	→	**Mid-Swing**	→	**Terminal Swing**
Ankle	Plantarflexed	→	Neutral	→	Neutral
Knee	Max. flexion (60°)	→	Flexion	→	Max. extension (0°)
Hip	Flexion, Relative abduction	→	Max, flexion (25°) Max. abduction (10°)	→	Flexion, Relative abducted
Pelvis	Lateral drop to swing leg, medial rotated				
Trunk	Aligned over stance leg				

Pathway of Center of Gravity

Sagittal Plane: Rhythmical up and down motion
- Highest point: Over extended single leg (MSt)
- Lowest point: Double limb support (PSw/LR)
- Vertical displacement of 4-5 cm. (sinusoidal wave)

Frontal Plane: Rhythmical side-to-side motion
- Most lateral point: Mid-Stance
- C. O. G. swings laterally in as arc over the stationary foot
- Lateral displacement of 4-5 cm. (sinusoidal wave)

"Normal Gait Mechanics Page 2," Joe Godges.



"Women's Dreaming," Dorothy Napangardi, Yuendumu, 2010.
Warlpiri artists at Yuendumu have been painting with acrylic paint for more than three decades. The artists produce work in a wide variety of styles ranging from the vibrant colours and heavily textured surfaces to fine and delicate dots and lines. Yet at all times, the Yuendumu artists remain true to their tradition by producing art works that map the journeys of their ancestors to the sacred Mina Mina site.

ERRATIC PATH

Regardless of the words, it seems the melodic contour of the song describes the nature of the land over which the song passes. So, if the Lizard Man were dragging his heels across the saltpans of Lake Eyre, you could expect a succession of long flats, like Chopin's "Funeral March". If he were skipping up and down the MacDonnell escarpments, you'd have a series of arpeggios and glissandos, like Liszt's "Hungarian Rhapsodies".

Certain phrases, certain combinations of musical notes, are thought to describe the action of the Ancestor's feet. Once phrase would say, "salt-pan"; another "creek-bed", "spinifex", "sandhill", "mulga scrub", "rockface" and so forth. An expert songman, by listening to their order of succession, would count how many times his hero crossed a river, or scaled a ridge—and be able to calculate where, and how far along a songline he was.

"He'd be able," said Arkady, "to hear a few bars and say, "This is Middle Bore" or "That is Oodnaddat—where the Ancestor did X or Y or Z."

"So a musical phrase," I said, "is a map reference?"

"Music," said Arkady, "is a memory bank for finding ones" way about the world."

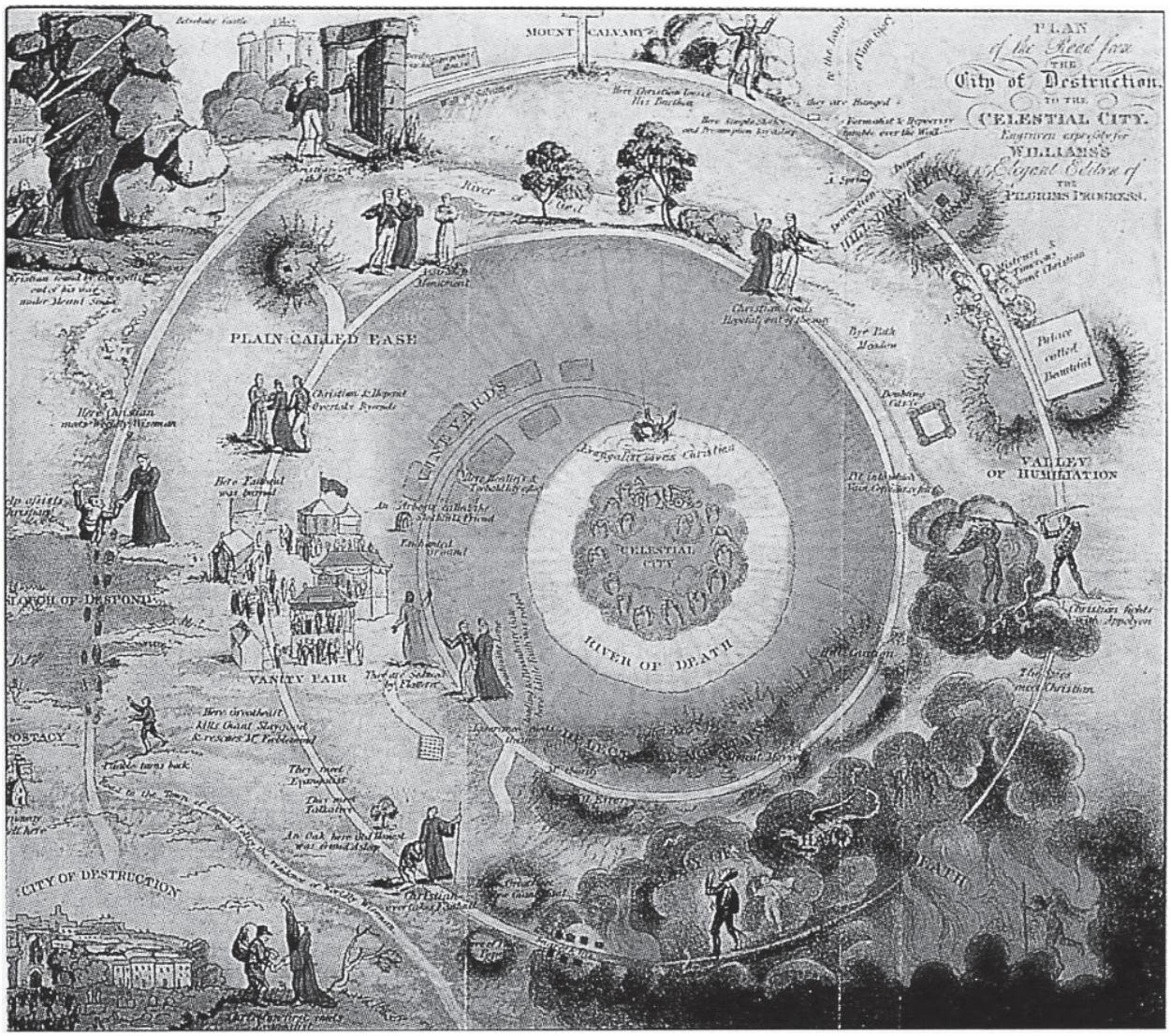
Bruce Chatwin, *The Songlines*, 1988.[98]

"Stone Row," Dartmoor, UK, 2,500 BCE.
Stone Rows are made up of upright stones of varying size set some distance apart in single, double or very occasionally triple lines. The shortest known row is 32m in length, and the longest is over 3.4km. Often burial mounds are found in or near stone rows.

NOMADIC JOURNEY

Much as the nomad trajectory follows habitual trails or paths, their function is not that of the sedentary path, which consists in spreading human beings out in an enclosed space, assigning each person his or her part and regulating communication between the parts. The nomad trajectory does the opposite, it spread human beings (or animals) out in an open, undefined, non-communicating space.

Gilles Deleuze and Félix Guattari,
A Thousand Plateaus: Capitalism and Schizophrenia, 1987.[99]



"The Pilgrim's Progress," John Bunyan, 1677.

PILGRIMAGE

He who would valiant be,
Let him come hither;
One here will constant be,
Come wind, come weather
There's no discouragement
Shall make him once relent
His first avow'd intent
To be a pilgrim.

Whoso beset him round
With dismal stories,
Do but themselves confound;
His strength the more is.
No lion can him fright,
He'll with a giant fight,
But he will have a right
To be a pilgrim.

Hobgoblin nor foul fiend
Can daunt his spirit;
He knows he at the end
Shall life inherit.
Then, fancies, fly away,
He'll not fear what men say;
He'll labour night and day
To be a pilgrim.

John Bunyan, *The Pilgrim's Progress*, 1678.[100]

"Pylos tablet," Pylos, Pelepoponnesos, Greece.
An inscribed clay tablet with a square seven-ring labyrinth. Backside of a clay tablet from Pylos bearing the motif of the Labyrinth, allusion to the mythological fight of Theseus and the Minotaurus.

LABYRINTH AND MAZE

When Minos reached Cretan soil he paid his dues to Jove, with the sacrifice of a hundred bulls, and hung up his war trophies to adorn the palace. The scandal concerning his family grew, and the queen's unnatural adultery was evident from the birth of a strange hybrid monster. Minos resolved to remove this shame, the Minotaur, from his house, and hide it away in a labyrinth with blind passageways. Daedalus, celebrated for his skill in architecture, laid out the design, and confused the clues to direction, and led the eye into a tortuous maze, by the windings of alternating paths. No differently from the way in which the watery Maeander deludes the sight, flowing backwards and forwards in its changeable course, through the meadows of Phrygia, facing the running waves advancing to meet it, now directing its uncertain waters towards its source, now towards the open sea: so Daedalus made the endless pathways of the maze, and was scarcely able to recover the entrance himself: the building was as deceptive as that.

Ovid, *Metamorphoses,* Book VIII, 8 CE.[101]

"Selma to Montgomery March," 1965.

POLITICAL MARCH

It was the first time that I had ever been in a town where the working class was in the saddle. Practically every building of any size had been seized by the workers and was draped with red flags and with the red and black flag of the Anarchists; every wall was scrawled with the hammer and sickle and with the initials of the revolutionary parties; almost every church had been gutted and its images burnt. Churches here and there were being systematically demolished by gangs of workmen. Every shop and cafe had an inscription saying that it had been collectivized; even the bootblacks had been collectivized and their boxes painted red and black. Waiters and shop-walkers looked you in the face and treated you as an equal. Servile and even ceremonial forms of speech had temporarily disappeared. Nobody said "Senor" or "Don" or even "Ústed"; everyone called everyone else "Comrade" or "Thou", and said "Salud!" instead of "Buenos días". Tipping had been forbidden by law since the time of Primo de Rivera; almost my first experience was receiving a lecture from a hotel manager for trying to tip a lift-boy. There were no private motor-cars, they had all been commandeered, and the trams and taxis and much of the other transport were painted red and black. The revolutionary posters were everywhere, flaming from the walls in clean reds and blues that made the few remaining advertisements look like daubs of mud. Down the Ramblas, the wide central artery of the town where crowds of people streamed constantly to and fro, the loud-speakers were bellowing revolutionary songs all day and far into the night. And it was the aspect of the crowds that was the queerest thing of all. In outward appearance it was a town in which the wealthy classes had practically ceased to exist. Except for a small number of women and foreigners there were no "well-dressed" people at all. Practically everyone wore rough working-class clothes, or blue overalls or some variant of militia uniform. All this was queer and moving.

George Orwell, *Homage to Catalonia*, 1938.[102]

"Stowe Gardens in Buckinghamshire," London, 1746.
Laid out by Charles Bridgeman, delineated in a large plan, and fifteen perspective views. Drawn on the spot by Mons. Rigaud.

At that moment they were met from another walk by Mrs. Hurst and Elizabeth herself.

"I did not know that you intended to walk," said Miss Bingley, in some confusion, lest they had been overheard.

"You used us abominably ill," answered Mrs. Hurst, "running away without telling us that you were coming out."

Then, taking the disengaged arm of Mr. Darcy, she left Elizabeth to walk by herself. The path just admitted three. Mr. Darcy felt their rudeness and immediately said, "This walk is not wide enough for our party. We had better go into the avenue."

But Elizabeth, who had not the least inclination to remain with them, laughingly answered, "No, no; stay where you are. You are charmingly grouped, and appear to uncommon advantage. The picturesque would be spoilt by admitting a fourth. Good-bye."

She then ran gaily off, rejoicing, as she rambled about, in the hope of being at home again in a day or two. Jane was already so much recovered as to intend leaving her room for a couple of hours that evening.

Jane Austen, *Pride and Prejudice*, 1797.[103]

"The School of Athens," Sanzio Raphael, 1510.

PHILOSOPHER'S WALK

Above all, do not lose your desire to walk; every day I walk myself into a state of well-being and walk away from every illness. I have walked myself into my best thoughts, and I know of no thought so burdensome that one cannot walk away from it... but by sitting still, and the more one sits still, the closer one comes to feeling ill... thus if one just keeps on walking, everything will be all right.

Søren Kierkegaard, 1847.[104]

"Piazza San Marco, Venice," Romolo Tessari, 1868.

PROMENADE

We were standing under the arcade at the door of the hotel. They were carrying tables out and setting them up under the arcade.

"Want to take a turn out to the park?" Brett asked. "I don't want to go up yet. I fancy he's sleeping."

We walked along past the theatre and out of the square and along through the barracks of the fair, moving with the crowd between the lines of booths. We came out on a cross-street that led to the Paseo de Sarasate. We could see the crowd walking there, all the fashionably dressed people. They were making the turn at the upper end of the park.

"Don't let's go there," Brett said. "I don't want staring at just now."

Ernest Hemmingway, *The Sun Also Rises*, 1926, 208.[105]

"The wanderer above the sea of fog," Casper David Friedrich, 1818.

SAUNTERING

I have met with but one or two persons in the course of my life who understood the art of Walking, that is, of taking walks—who had a genius, so to speak, for *sauntering*, which word is beautifully derived "from idle people who roved about the country, in the Middle Ages, and asked charity, under pretence of going à la Sainte Terre," to the Holy Land, till the children exclaimed, "There goes a *Sainte-Terrer*," a Saunterer, a Holy-Lander. They who never go to the Holy Land in their walks, as they pretend, are indeed mere idlers and vagabonds; but they who do go there are saunterers in the good sense, such as I mean. Some, however, would derive the word from *sans terre* without land or a home, which, therefore, in the good sense, will mean, having no particular home, but equally at home everywhere. For this is the secret of successful sauntering.

Henry David Thoreau, "Walking," 1861.[106]

"On the Way to Drawbridge Peak," Ansel Adams, 1928.
Taken on the Sierra Club "high trip" of 1928. That year, the Club's annual summer outing took members to the Canadian Rockies.

MOUNTAINEERING

If we knew all the laws of Nature, we should need only one fact, or the description of one actual phenomenon, to infer all the particular results at that point. Now we know only a few laws, and our result is vitiated not, of course, by any confusion or irregularity in Nature, but by our ignorance of essential elements in the calculation. Our notions of law and harmony are commonly confined to those instances which we detect; but the harmony which results from a far greater number of seemingly conflicting, but really concurring, laws, which we have not detected, is still more wonderful. The particular laws are as our points of view, as, to the traveller, a mountain outline varies with every step, and it has an infinite number of profiles, though absolutely but one form. Even when cleft or bored through it is not comprehended in its entireness.

Henry David Thoreau, "The Pond in Winter," in *Walden*, 1854.[107]

"The Library, Holland House, Kensington, London," Fox Photos, London, 1940.
An interior view of the bombed library at Holland House with readers apparently choosing books regardless of the damage. The House was heavily bombed during World War II and remained derelict until 1952 when parts of the remains were preserved.

FLÂNEURIE

It is not given to every man to take a bath of multitude; enjoying a crowd is an art; and only he can relish a debauch of vitality at the expense of the human species, on whom, in his cradle, a fairy has bestowed the love of masks and masquerading, the hate of home, and the passion for roaming.

Multitude, solitude: identical terms, and interchangeable by the active and fertile poet. The man who is unable to people his solitude is equally unable to be alone in a bustling crowd.

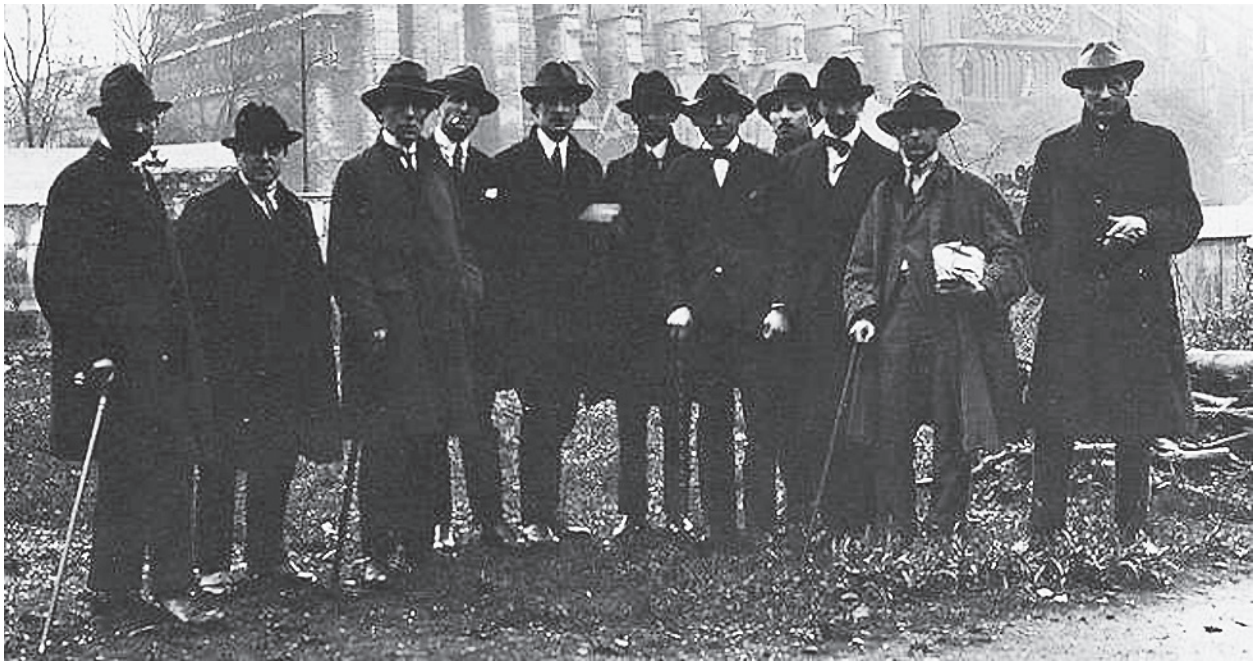
The poet enjoys the incomparable privilege of being able to be himself or someone else, as he chooses. Like those wandering souls who go looking for a body, he enters as he likes into each man's personality. For him alone everything is vacant; and if certain places seem closed to him, it is only because in his eyes they are not worth visiting.

The solitary and thoughtful stroller finds a singular intoxication in this universal communion. The man who loves to lose himself in a crowd enjoys feverish delights that the egoist locked up in himself as in a box, and the slothful man like a mollusk in his shell, will be eternally deprived of. He adopts as his own all the occupations, all the joys and all the sorrows that chance offers.

What men call love is a very small, restricted, feeble thing compared with this ineffable orgy, this divine prostitution of the soul giving itself entire, all its poetry and all its charity, to the unexpected as it comes along, to the stranger as he passes.

It is a good thing sometimes to teach the fortunate of this world, if only to humble for an instant their foolish pride, that there are higher joys than theirs, finer and more uncircumscribed. The founders of colonies, shepherds of peoples, missionary priests exiled to the ends of the earth, doubtlessly know something of this mysterious drunkenness; and in the midst of the vast family created by their genius, they must often laugh at those who pity them because of their troubled fortunes and chaste lives.

Charles Baudelaire, "Crowds," *Le Spleen de Paris*, XII, 1869.[108]



"Dada group at Saint Julien Le Pauvre, April 14, 1921." Giovanni Lista, Paris.
Left to right: Jean Crotti, Asté D'Esparbès, André Breton, Jacques Rigaud, Paul Eluard, Georges Ribemont-Dessaignes, Bejamin Péret, Théodore Fraenkel, Louis Aragon, Tristan Tzara, Philippe Soupault.

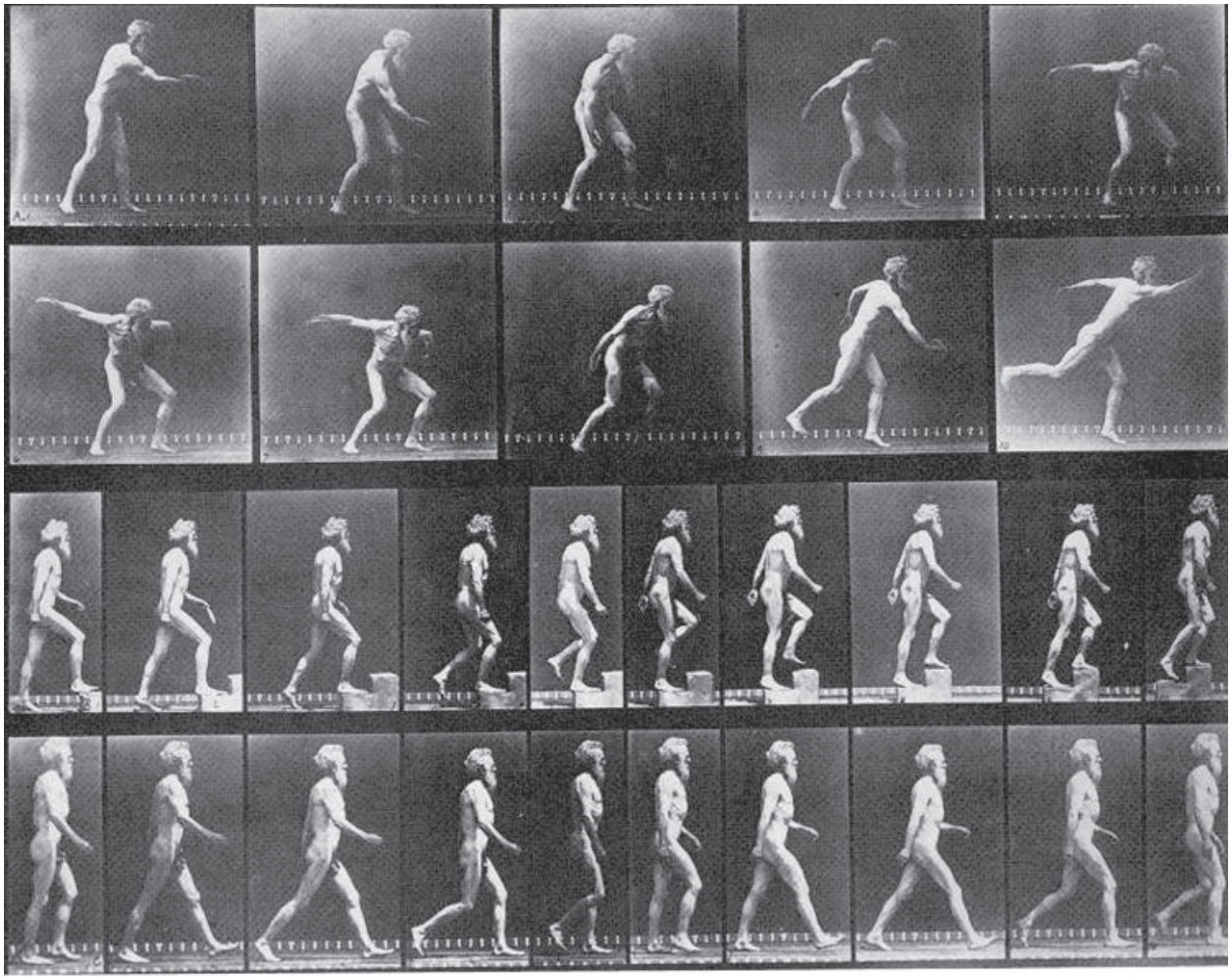
VISIT, DEAMBULATION, DRIFTING

Constructed situation: A moment of life concretely and deliberately constructed by the collective organization of a unitary ambiance and a game of events.

Psychogeography: The study of the specific effects of the geographical environment, consciously organized or not, on the emotions and behaviours of individuals.

Dérive: A mode of experimental behaviour linked to the conditions of urban society: a technique of transient passage through varied ambiances. Also used to designate a specific period of "dériving".

"Definitions," in *Internationale Situationniste, 1*, 1958.[109]



"Sequences Of Muybridge Throwing A Disk, Using A Step, And Walking," Eadweard Muybridge, C.1884.

Pollock's near destruction of this tradition (of painting as aesthetic object) may well be a return to the point where art was more actively involved in ritual, magic, and life than we have known in our recent past. ... Pollock, as I see him, left us at the point where we must become preoccupied with and even dazzled by the space and the object of our everyday life, either our bodies, our clothes, our rooms, or, if need be, the vastness of Forty-second Street. Not satisfied with the suggestion through paint of our other senses, we shall utilize the specific substances of sight, sound, movements, people, odours, touch.

Allan Kaprow, *The Legacy of Jackson Pollock*, 1958.[110]

M O V E M E N T 3 : E X P E R I M E N T S

"A Secret Theatre" A more thorough explanation of the ideas of D'Arcy Thompson and Alfred North Whitehead; a meditative excursion on the forces which have shaped the bodies and minds of human beings as we evolved from quadrupedal primates to bipedal members of the Homo genus*. I conclude this walk with a discussion about Jaron Lanier's hopes for an artificially amplified* neoteny *within Virtual Reality and my own desire to create a Real Reality with some of the properties of Lanier's VR, by way of responsive architecture: creating places where our thoughts and the shape of our world are connected, perhaps not at the speed of thought, but at a faster pace than the current rate of change of architectural form.*

"Mapping the Campus (Using Locative Media)" An experiment in collaborative mapping using geo-located social media. An attempt to use the path (as act, object, and narrative) to represent occupation in my efforts to generate the form of occupied space.

*"The Fleeting and the Infinite" An unfinished experiment attempting to reveal the shapes generated by the crowd-organism as its members walk through a rudimentary building-as-organism installation. A sort of a prosthetic for an architect-cum-*flâneur*, a thing and a way which occupies some territory between instrument and intervention.*

Usually the uniqueness of human beings is portrayed as a matter of consciousness. Yet the human body is also unlike anything else on earth, and in some ways this has shaped consciousness. The animal kingdom has nothing else like this column of flesh and bone always in danger of toppling, this proud unsteady tower.

Rebecca Solnit, *Wanderlust*, 2000, 32.[111]

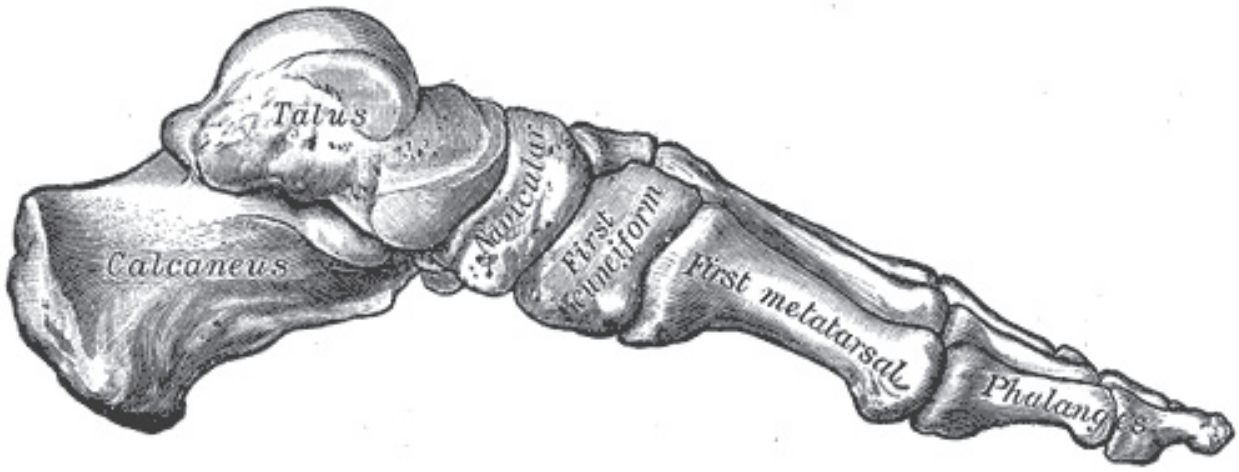
A SECRET THEATRE

MY HEEL STRIKES THE GROUND, ARRESTING MY FALL ... There is an irresistible attraction between my mass and the earth's. Every time I take a step, I risk a fall. I teeter precariously on one foot; my heel, my hero, saving me from falling flat on my face. The force of the ground against my heel bone, my calcaneus, has made it large compared to that of my quadrupedal ancestors' (ask D'Arcy Thompson, if you want to know how)*; large enough to accept that force and transfer it up, up, up.[112]

Up through my ankle, my talus, a bone shaped like a wedge so that the joint is most stable when my foot is dorsiflexed—which is to say that the top of my forefoot is moved towards my body as it is now, when my heel strikes the ground; stable enough to transfer the force of the ground from my calcaneus to my tibia.[113]

* D'Arcy Tompson's theory from *On Growth and Form* (1917), or Alfred North Whitehead's from *Process and Reality* (1929)—which I will introduce later in this *dérive*—are neither the most true, nor even the most popular, of the theories of human evolution which have been proposed. I choose these two arguments because they posit that the form and behaviour of an organism emerge from process; from its response to the forces acting upon it over time. I find this way of thinking useful in my more explicitly architectural research—it has inspired the mechanisms I have experimented with in generating architectural form. As such, it seems appropriate when considering the act of walking in relationship to the form and behaviour of a building's surfaces, to do so within the same ontological paradigm.

"HEELS DOWN" I REMIND MY PUPILS, six little girls trotting around on fat lazy lesson ponies, unwittingly asking them to take advantage of the formidable form of the talus in their efforts to adapt their bipedal bodies to the motion of their quadrupedal mounts. The ball of the foot is balanced on the stirrup, the heel pressed down to stabilize the ankle joint and free the hip and knee joints to absorb the energy of the horse—those joints being much better-suited to that purpose than the ankle.



"FIG. 290— Skeleton of foot. Medial aspect," *Gray's Anatomy*, 1973.

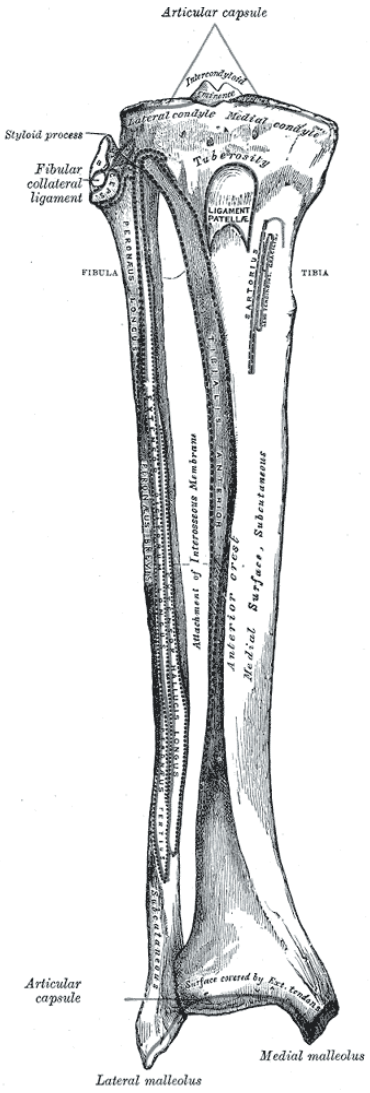
MY LONG, STRONG, STRAIGHT, AND SLENDER TIBIA, the weight bearing bone of my lower leg, accepts the force of the ground via my talus by widening at its base, and transfers it to the largest and longest of all the bones in my body, my femur, with another enlargement at its head.[114] According to Maurice H. Herzmark, author of "The Evolution of the Knee Joint," this joint between tibia and femur, my knee, is the largest and most vulnerable joint in my body.[115] Despite being uniquely adapted to be weight-bearing at full extension, shaped for stability and protected by the patella, my knee is inherently prone to injury.[116] It accepts a force four times the weight of my body at every

step[117], transferring that force from my vertical tibia to my angled femur, angled such that it brings my knee under my centre of gravity—a crucial structural development in my ancestors' ascent to bipedalism.[118]

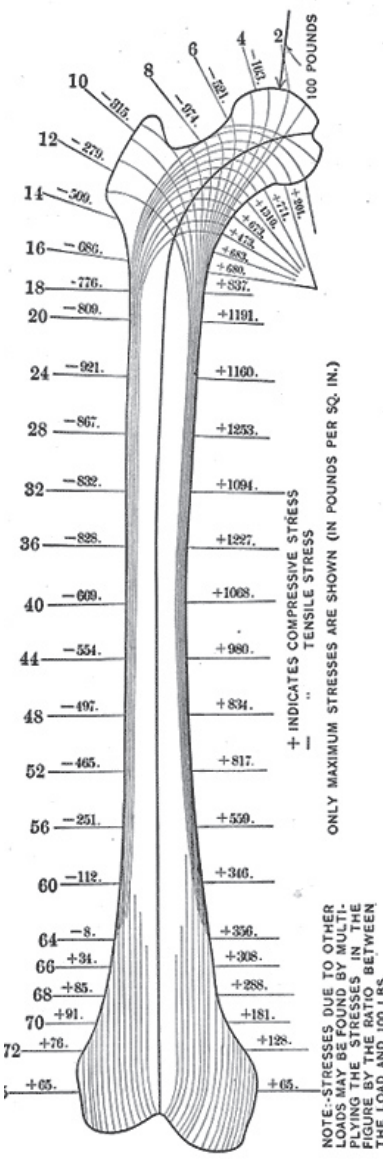
The declaration of Owen Lovejoy, functional anatomist and expert on human locomotion, that *Lucy*'s knee "is like a modern knee joint. This little midget was fully bipedal,"[119] became the accepted verdict[120] confirming the little *Australopithecus afarensis* as the great-great grandmother of my impotent ancestor Abel the Wanderer, and unofficially ordaining *Lucy* as the Mother of all walkers.

Lucy is a 3.2-million-year-old *Australopithecus afarensis* skeleton found in Ethiopia in 1974 who, it has been theorized, retained her primate ancestors' ability to climb trees—a talent long since selected away in favour of the copious advantages of walking—but had the wide, shallow pelvis and the adducted knees of a Walker.[121] I wonder about the shape of these adducted knees; about the contradiction between a shape which is so powerful as to permit a characteristic which defines the hominid *genus*, bipedalism, while being so vulnerable as to expose an individual member of that genus to the risk of being unable to participate in the basic human act of walking. Is the shape unfinished? Still being moulded by the forces acting upon it? And I wonder at the marvellous side effect of bipedalism, human consciousness[122], which permits that disabled individual to compensate for the vulnerability resulting from the adduction of the knee—which Mother *Lucy* accepted in exchange for the Walk—through knowledge, wisdom, and imagination. I will return to *Lucy*, and the unintended side consequences of selection in favour of bipedalism in due time; for now let us rejoin our wander along the path of the force of the ground against my heel as it continues to travel upwards, from knee to pelvis.

The valgus angle—the angle of my femur out from knee to hip which brings my knee under my centre of gravity—has changed the shape of the head of my femur compared to that of my quadrupedal ancestors, making mine shorter, broader, and more obliquely angled than theirs.

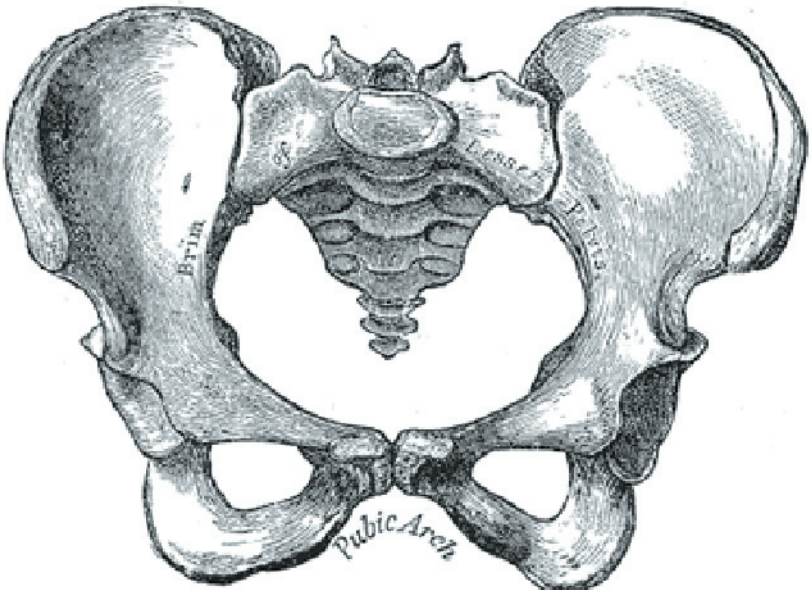


"FIG. 258— Bones of the right leg. Anterior surface," *Gray's Anatomy*, 1973.



This shape is stronger and allows my femur to transfer the force of the ground from my leg to my pelvis[123], my magnificent, mysterious pelvis. My very own "secret theatre where thinking and walking meet," according to Rebecca Solnit.[124]

MY SHORT, BROAD PELVIS IS BOWL-SHAPED; a basin containing innards and intimacy, in equal measure. It is the connection between the manipulative and locomotive halves of me; between my thoughts and my world; between my feelings and my sensings. My ilium—the larger, upper bone of my pelvis—supported by my ischium, its smaller partner—accepts the force of the ground from my femur and transfers it through to my sacred sacrum, five fused vertebrae wedged between my hips from which hangs my coccyx and on which balance my cervical, thoracic and lumbar vertebrae topped by that champion of consciousness, my skull.[125] Attached to my ilium is my gluteus maximus, another distinct, and delicious, feature of the hominid genus which isn't skeletal and shouldn't have been mentioned quite yet. My sacred sacrum and my coccyx form the concave pelvic curve at the base of my spine[126]; sacred because this curve cradles the organs of procreation, once offered in sacrifice[127], I imagine, to Mother *Lucy* for her determination to beget us Walkers. Out of my sacrum emerges my lumbar curve; the convex, compensatory curve which took shape only when I learned to walk[128] and developed so that it absorbs the unique forces generated by my own personal evolution from quadruped to biped. The elongation of my lumbar spine, and the compression of my pelvis make the shape of my waist—one more widely appreciated side-effect of bipedalism—and allow me to twist my torso, effectively increasing the range of my reach[129] and eventually leading to the development of the Hula, the Belly Dance, and, my personal favourite, the Twist. My concave thoracic curve is a primary curve, like my pelvic curve—a shape with which I am born—which supports my ribs and my shoulders, from which hang my arms and my hands.[130]

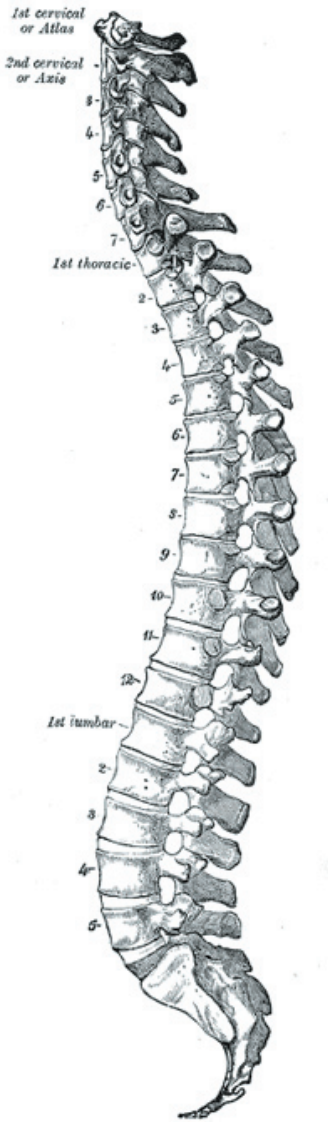


"FIG. 242— Female pelvis." Henry Gray, *Gray's Anatomy*, 1973.

My neck—the convex, compensatory, cervical curve which connects my torso to my head—was shaped as I developed the capacity to hold my head up, balanced precariously on top of my spine.[131] My foramen magnum—the large hole through which my spinal cord enters my cranium—is located towards the centre of my skull, making this balancing act possible. My quadrupedal ancestors' heads hung from their cervical spines which were oriented roughly parallel to the ground plane—in contrast to my unsteady tower of bones piled perpendicular to the earth—requiring a connection between their skulls and their spines which was located further back than my own.[132]

THE EVOLUTION OF THE FORM OF MY SKULL, my cranium—in contrast to the rest of the bones along this path—has been caused both directly by the forces of bipedal locomotion and by the side-effects of my ancestors' increasingly erect posture.[133] My skull is not one bone, but twenty-two—down from four-hundred-and-four at my birth—eight of which protect my brain and fourteen of which shape my face.[134]

Opposite: "FIG. 250— Diagram of the computed lines of maximum stress in the normal femur. The amounts of the maximum tensile and compressive stress at the various sections are given for a load of 100 pounds on the femur head. For the standing position ("at attention") these stresses are multiplied by 0.6, for walking by 1.6 and for running by 3.2. (After Koch.)," *Gray's Anatomy*, 1973.



"FIG. 111— Lateral view of the vertebral column," *Gray's Anatomy*, 1973.

To balance on my spine, my face (or more properly, my snout) has become shorter than *Lucy*'s was; my maxilla and my mandible—my lower face and jaw—are compact, reducing the bulk of my cranium and making my head round and bulbous. In fact, the bulbousness of my cranium, and the corollary increase in cranial capacity is not so much a result of the physical forces acting upon my skull as a side-effect of the new relationship between body and environment resulting from an upright posture. My round head is certainly easier to balance atop my spine, but my big skull and brain grew out of opportunity, not necessity.[135]

MY TOE PUSHES OFF, PROPELLING ME FORWARD ... Before the tale of those fabulous unintended side consequences of selection which permit these thoughts to take form in my mind, I'd like to discuss a more pressing question: Why did my ancestors walk? We've contemplated the forms along D'Arcy Thompson's trail of force; forms resulting from the arrangements of an organism's components over time and against the force of gravity; new forms resulting from new forces acting on my ancestors' bones. The next question is: Why were there new forces at all? What drove my ancestors to leave the trees and walk on two feet thus shifting their bones' relationship with gravity? Alfred North Whitehead, an early 20th century mathematician and philosopher, like Thompson, explains the mechanisms of this evolution of behaviour—which precedes the evolution of form—through what is known as process philosophy, an ontology of becoming.[136]

Whitehead argues that an organism's reaction to an experience—which is to say its behaviour—is related to both that particular occasion of experience and the organism's understanding of its previous experiences. According to this philosophy, changes in an environment over time result in changes to an organism's experience of that environment and thus changes in that organism's behaviour. Following this logic, Whitehead proposes that these occasions of experience are the

fundamental elements of the universe and that concrete objects are actually successions of occasions of experience; that the concrete form of my body is the succession of the occasions of experience of my ancestors. The beginning of this new path between my walking/climbing ancestors and my walking/endurance-running self—by way of Whitehead's process philosophy—begins around 2.5 million years ago, during the Pliocene Epoch, when our planet's climate changed significantly, becoming cooler and drier, resulting in a change in the morphology of my ancestors' environment: the abatement of their wooded habitats into desert islands between which were open stretches of land.[137]

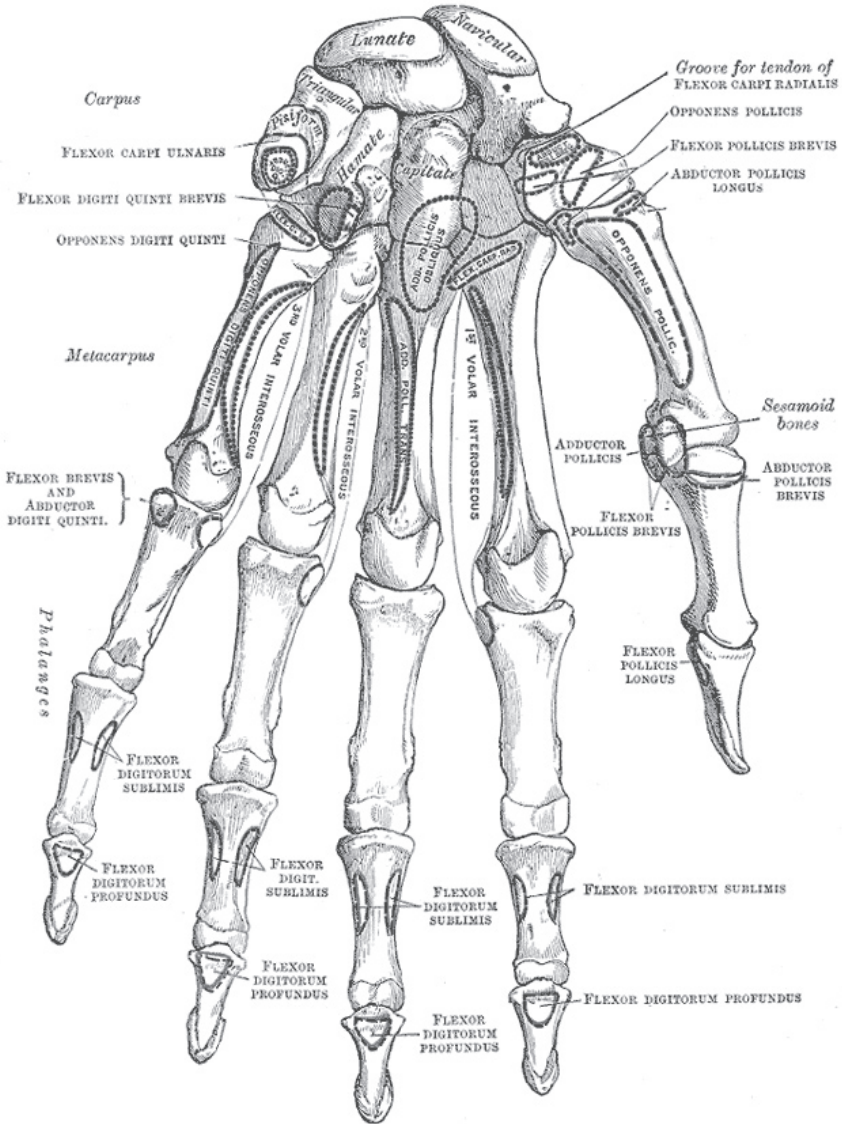
WHILE *LUCY* WAS BIPEDAL WHEN IT SUITED HER, known as a "facultative biped"[138]—and it likely suited her when it gave her an advantage in collecting food—*Johnny's child*, the first Homo *habilis*, or "handy man", discovered by archeologists was an "obligate biped"[139] which meant that his forelimbs were no longer locomotor limbs but rather manipulator limbs—a fortuitous accident from which, according to archeologist Mary Leakey, stems all modern technology and which bestows such significance on the behaviour *obligate bipedalism* in the development of Homo *sapiens*.[140] *Johnny's child*, also known as Olduvai Homonid No. 7 or OH 7, lived around 1.75 million years ago; his remains were discovered by Jonathan and Mary Leakey in 1960 in the Olduvai Gorge, Tanzania.[141] The members of the homonid *genus* who lived between *Lucy* and *Johnny's child* lived through that period of climate change during the Pliocene Epoch, experiencing increased exposure to the sun as they travelled between the remaining islands of wooded habitat they favoured. Their bodies already permitted bipedalism—the morphology of my tree climbing ancestors was inherently suited to intermittent walking and had become more so as the gastronomical benefits of walking became apparent—but adopting a bipedal posture as they travelled across the open desert offered such significant advantages in keeping them cool that my ancestors walked more often

and for longer periods than ever before, forcing (quite literally, if you believe Thompson) their bodies to adapt in favour of this increasingly habitual behaviour.

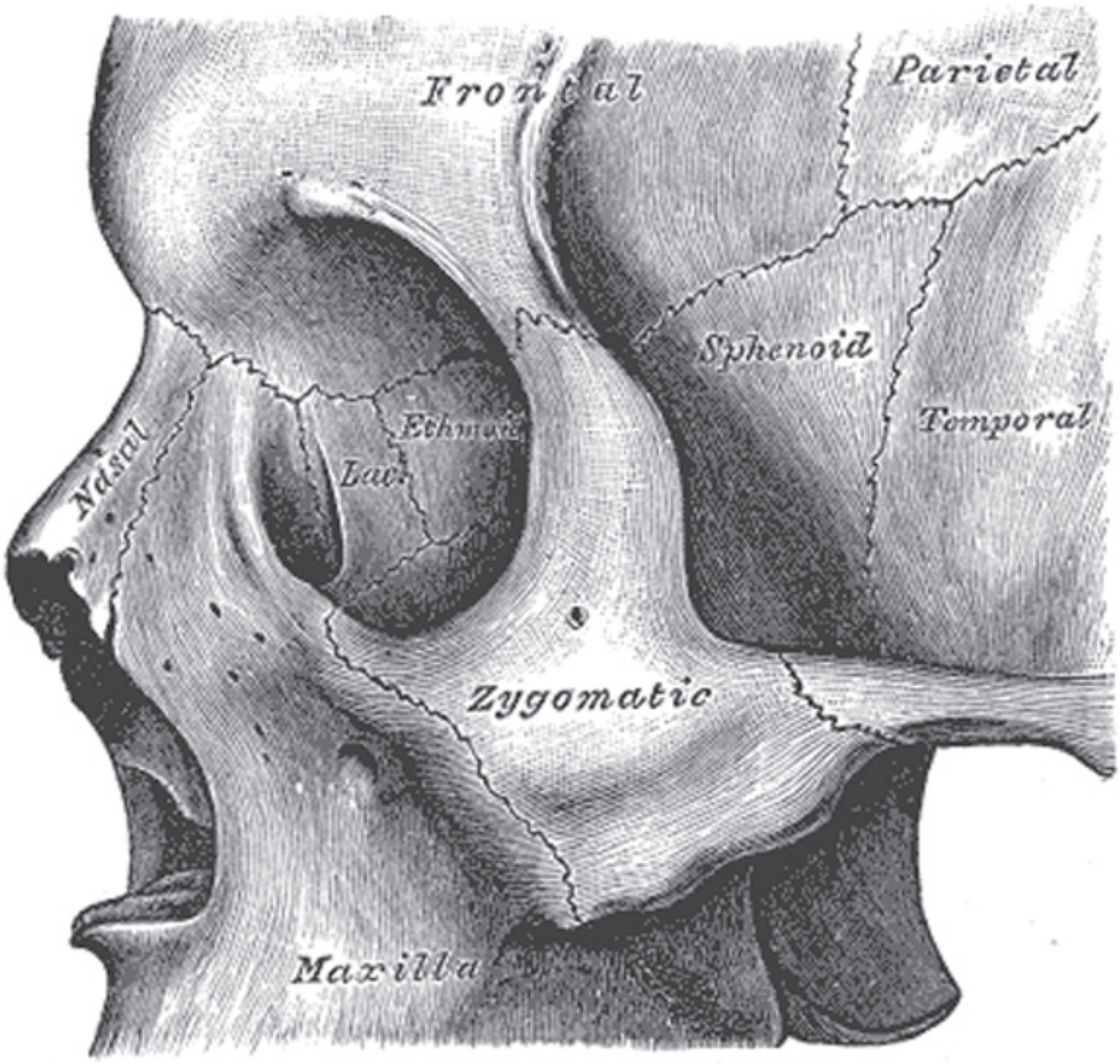
A bipedal posture has three distinct advantages when it comes to keeping cool in an open, sun-drenched landscape: the body's exposure to solar radiation at midday is significantly less than a quadruped's, its exposure to wind blowing across the earth is increased, and the upper body occupies a strata of air which is measurably cooler than the air at ground level. These advantages conserve energy which quadrupeds expend in cooling themselves—a direct advantage—but they also precipitated a change in the circulatory system which had unexpected additional advantages. Since the biped's head occupies the coolest strata of air its body has access to, its body took advantage of that micro-environment by pumping more blood to the head, where it would be most efficiently cooled. Of course, more blood in the head meant more blood in the brain, and the brain began to grow.[142]

AS MY ANCESTORS' BRAINS GREW, and the selective pressure of weight was removed from their forelimbs, something happened, akin to the development of the unconstrained songs of the domestic Bengalese finch in comparison to its wild cousin, the white-rumped munia. The male white-rumped munia sings a stereotyped song, the accuracy of which represents its quality to a potential mate. Bengalese finches, in contrast have been bred domestically, selected for the aesthetic quality of their plumage; the selection pressure of accuracy has been removed from their songs. When that pressure was removed, an innate propensity to experiment was released.[143] When my ancestors' forelimbs no longer needed to be locomotors, they became experimenters, manipulators, hands: a perfectly serendipitous outlet for their new big brains.

At some point the size of my ancestors' brains encountered a new selective pressure: the size of a bipedal woman's pelvis. A child's cranium could only be so big and still fit through a pelvis shaped primarily



"FIG. 219— Bones of the hand. Volar surface," *Gray's Anatomy*, 1973.



"Fig. 164—Left zygomatic bone *in situ*," *Gray's Anatomy*, 1973.

by the forces of gravity. But by that time, my ancestors' brains and hands were so valuable to them that their behaviours changed again to adapt to this new experience—the experience of insufficient brain capacity for the possibilities offered by hands and their experiments. This compromise is known in biology as *neoteny*—the delayed physiological development of an organism. In my ancestors' case this is manifested in an extension of the period of increasing cranial capacity post-birth, a feat which permits the extension of what was once a juvenile period of learning into a life-long condition.[144]

Neoteny is an interest of Jaron Lanier, a computer scientist who was among the first to develop implementations of Virtual Reality in the 1980s. Lanier writes, at the end of his recent book *You Are Not a Gadget*, about the relationship between neoteny and imagination in human beings; imagination being human kind's most precious ability and arguably humanity's defining characteristic. He contemplates the possibilities of experiencing artificially amplified neoteny within Virtual Reality via the ability to change the apparent form of your body and your environment at the speed of thought. Lanier believes this will engender new, unbounded variety, creativity, imaginings—magical experiences now only ours when we are very young and new.[145]

WE HAVE WANDERED PAST THE END of the track between the advent of hominid bipedalism and the current state of humanity. I have brought you this extra distance along Lanier's barely discernible path because it leads in the direction of an argument for responsive architectures—the Real Reality version of Lanier's Virtual Reality; places where our thoughts and the shape of our world are connected, perhaps not at the speed of thought, but at a faster pace than the current rate of change of architectural form.

Google Earth image showing representation of the density of occupation of paths over the entire mapping exercise.

MAPPING THE CAMPUS (USING LOCATIVE MEDIA)

WHAT FOLLOWS IS AN ACCOUNT OF MY FIRST EXPERIMENT (or thirteenth, or 276th) accompanied by some of the artifacts it generated. These records are preceded by a brief introduction to three artists whose work connecting the act of walking, the path as an architectural object, and the tale of the space crossed—bridging between the gap between the Dadaist anti-walk and my own efforts to find architectural form in the occupation of space—inspired this excursion.

I had just written the essay which inspired the first two parts of "Movement 2: Walkers"—and I had determined to use the path (as act, object, and narrative) to represent occupation in my efforts to generate the form of occupied space—when I was offered a research position within "Emerging Responsibilities, a signage and wayfinding strategy for the University of Waterloo" (also known as "the Wayfinding Project") directed by Donald McKay, Associate Professor at the University of Waterloo School of Architecture. I was asked to develop a pedestrian survey which would "provide base information with which (the team) can begin to create a plan for an integrated way-finding matrix."[146]

I saw this as an opportunity to collect a set of data pertaining to the occupation of space which I could use to generate form using Grasshopper (a scripting plug-in for Rhinoceros3D, a 3D modelling application). Having completed a set of experiments (numbers 3 to 42, or 0, or...) which failed to generate sufficiently precise and objective data, I was hungry for a substantial collection of measurable data (GPS tracks, photos, videos, audio recordings and short texts).

While the project was successful as a proof of concept offering a framework for using locative media as a tool for wayfinding, I again

THE DIGITAL CAMPUS MAP

The Digital Campus Map is the component of the study that we are the least familiar with making, but it is a component with a number of very current models.

Its ultimate goal: guide everyone easily and confidently through the campus, using a digital matrix, found on the Internet or uploaded to a hand-held device.

Its immediate goal: provide base information with which we can begin to create a plan for an integrated way-finding matrix – the Pedestrian Map. The development of an interactive map, imbedded in an application that might be readily used by our community, is much farther off.

Donald McKay, "Project Charter," 2010.[147]

A PEDESTRIAN COMMUNITY

Way-Finding, in its form and organization, anticipates the university community; it is the institutionalization of our hospitality. At night in December, on a rainy day in November, on the first day of term in September, waiting for the bus in February, or passing time outdoors in June, our community can sense the absence of that hospitality. By degrees, the campus becomes an unwelcoming place.

Right now, with a transit and parking plan that makes the pedestrian network the prime address for most buildings, everyone is a pedestrian by the time they step off the ring road into campus, if not hundreds of yards farther out.

And right now, a person on foot—a student, a visitor or guest, a faculty member, an administrator, a member of the university's substantial force of support workers—can only make his or her way through campus either by traversing the parkland to the west of Main Campus (an attractive environment of diminishing significance), or by walking an informal, linked network of building corridors and tunnels (closed at night and relatively incoherent) or by walking a network of service lanes, marked with service doors and bays, and dumpsters (inhospitable with service traffic by day, dark and apparently insecure at night.)

The Campus is a terrain that is transparent only to the experienced, who tend to follow only their own particularly worn paths in this terrain; in an almost exclusively pedestrian community, it is a terrain of special knowledge.

Donald McKay, "Project Charter," (2010).[148]

over-estimated my own abilities to manage the generation of data which was sufficiently precise for my purposes. I worked with the GPS tracks on their own and developed a Grasshopper definition to import and format the points and paths, and to generate representations of the space occupied by the walkers over time, but I was frustrated by the breadth and (relative) sparseness of the data set as a whole. To be meaningful the data would need substantial processing (for which I am untrained) or it would need to be exponentially larger (which demanded resources I did not have).

The conclusion I drew from this experiment was that I needed to take a big step back and design something much simpler—an experiment which requires the processing of only one or two types of basic data—and something which directly connects occupation and form rather than relying on interpretations of interpretations. I resolved to develop an installation of some sort which would be physically shaped by the occupants while collecting basic information about occupation (such as time and location of footfalls) and the shape of the installation.

THE EXPERIENCE OF THIS EXPERIMENT: While this experiment represents a series of important failures in the context of my own research, as a pedestrian survey and in terms of its duties to the Wayfinding Project it was rather successful in generating a rich body of digital, multi-media, first-person accounts of the experience of being a pedestrian on the main campus of the University of Waterloo. This archive served as a resource for the development and presentation of the less esoteric elements of the Wayfinding Project and will exist in the infinite memory of the internet for some time to come to serve as a resource for other interested parties such as incoming students.

DATA GENERATED:

#	Type/Host
17	geolocated videos on YouTube
42	geolocated videos on Flickr
1251	geolocated photos on Flickr
1527	geolocated photos on Picasa
27	geolocated photosynths on Bing Maps
23	photosynth locations on Posterous
63	geolocated audio recordings on Posterous
262	maps on Google Maps
113	GPS tracks on Posterous
1399	geolocated tweets on Twitter
1747	Unique posts
4724	Total posts

BRUCE NAUMAN

In homage to Arena Quad I+II of Samuel Beckett and the character Molloy, Bruce Nauman walked for about an hour on a space defined by starting with a line drawn on the ground. With his hands clasped behind his back, placing one leg at a time on the ground, walking—instead of an ordinary gesture—becomes a dance of the weights and continuous rebalancings of the body while giving rise, through the sound of the cadenced steps, to a rhythmical, sonorous space.

Francesco Careri, *Walkscapes*, 2002, 129.[149]

"Slow Angle Walk (Beckett Walk)," Bruce Nauman, 1968.

RICHARD LONG

Long's intervention is free of any technological aid, it doesn't cut into the Earth's crust, but merely transforms the surface in a reversible way. The only means utilized is his own body, his possibilities of movement, the strength of his arms and legs: the largest stone utilized is one that can be moved by a single person, and the longest path is the one the body can follow in a certain period of time. The body is a tool for measuring space and time. Through the body Long measures his own perceptions and the variations in atmospheric agents, he uses walking to capture the changes in the direction of the winds, in temperature and sounds. To measure means identifying points, indicating them, aligning them, circumscribing spaces, alternating them in keeping with a rhythm and a direction, and here again Long's work has primordial roots: geometry as the *measure of the world*.

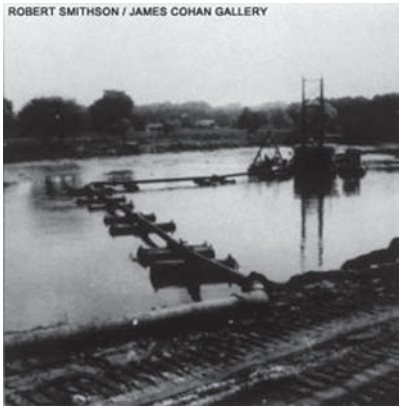
Francesco Careri, *Walkscapes*, 2002, 147.[150]

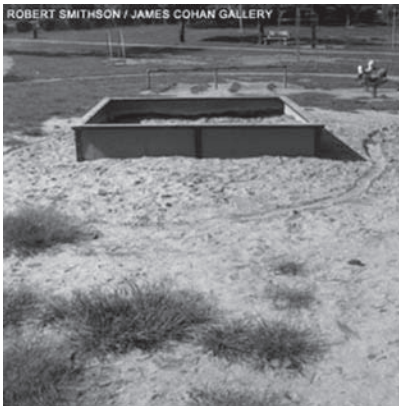
"A Line Made by Walking,"
Richard Long, 1967.

ROBERT SMITHSON

The deeper sense of the outing in Passaic is the pursuit of a "land that time forgot," in which the past, present and future do not dwell, but instead different, suspended timeframes, outside of history, between science fiction and the dawn of man, fragments of time positioned in the actuality of suburbia. Unlike (Richard) Long, who calls himself an "urban cowboy", and unlike (Hamish) Fulton, who admits he doesn't know how to walk in urban space, (Robert) Smithson delves into the refuse of the world's suburbia in pursuit of a new nature, a territory free of representation, spaces and times in continuous transformation. The urban periphery is the metaphor for the periphery of the mind, the rejects of thought and culture. It is in these places, rather than the false archaic nature of the deserts, that it is possible to formulate new questions and hypothesize new answers. Smithson doesn't avoid the contradictions of the contemporary city, he walks straight into their midst, in an existential condition halfway between the Palaeolithic hunter and the archaeologist of abandoned futures.

Francesco Careri, *Walkscapes*, 2002, 162.[151]





"A Tour of the Monuments of Passaic, New Jersey," Robert Smithson, 1967.

SAMPLES OF AUDIO CLIPS INCLUDED IN THE "MAPPING THE CAMPUS" PODCAST:

EMERGENCE
"What happens when there is no leader? Starlings, bees, and ants manage just fine. In fact, they form staggeringly complicated societies, all without a Toscanini to conduct them into harmony. How? That's our question this hour. We gaze down at the bottom-up logic of cities, Google, even our very own brains."

"sneault.posterous.com/mapping-the-campus-podcast-radiolab"
Excerpts from WNYC's *RadioLab* "Emergence" (18-02-05).[152]

ASSIGNMENT I
MAPPING THE SPACE OF THE CAMPUS COMMUNITY

Use your assigned class schedule to roughly plan your day. You should be present in the public spaces adjacent to the appropriate classroom before and after scheduled classes to record your experience in that place and to meet potential participants ("typical students").

Approach people entering, leaving and using the place you are in. Introduce yourself as a graduate student from the School of Architecture working on a pedestrian survey of main campus and give them an *info card*. Ask them if they would mind telling you a little bit about the place you are in and how it relates to other places they go to on campus. If they are willing to engage in conversation, start with these questions:

Tell me about the place you are in now. What is it called?
Where were you before here? How do I get there?
Where are you going next? How do I get there?

If appropriate, ask the participant if you can make an audio recording of the conversation. If the participant is willing, record your conversation, or a portion thereof, using Hindenburg Mobile. Do not collect any personal identifying data (i.e., the participant's name or image). Do not use video to record interviews.

Share the local knowledge discovered during the conversation and try to represent the place from the perspective of the participant using the media at your disposal.

Go to the places mentioned by participants and repeat the process of approaching people in that place and asking if they would like to participate in the survey. Identify thresholds, entrances, places of social congregation, and existing methods of wayfinding wherever possible. Report on organized/spontaneous activities occurring in the places you visit and, if possible, determine how and where the event information was disseminated.

** These QR codes can be scanned by most smartphones using a free application which will direct you to the relevant file hosted on my Posterous blogs.

ASSIGNMENT II
"MAPPERS" INTERPRETATION OF CAMPUS

Use the MotionX GPS iPhone app to save a GPS track of the paths you travel throughout the day. Include waypoints to identify places of interest along the way.

Using what you learned about campus during the first mapping session, speculate on the design of a wayfinding system - what's your best guess at how to tackle the problem?

Play with the media at your disposal! Use it to comment on the themes of this project: experience of place, recognition of patterns, walking, web 2.0, technology and culture, memory, spatial intelligence...

Take elevation shots of assigned buildings on campus (which will be used by our team as texture maps in SketchUp) and capture a set of photos for a Photosynth of an assigned space.

LET'S GET LOST AND
WAYS OF SEEING
"Rebecca Solnit ... tells Steve Paulson that getting lost has many meanings and that sometimes it's a good thing if it allows you to go beyond your own constraints and comfort zones."

"sneault.posterous.com/mapping-the-campus-podcast-ttbook-lets-get-lo" Excerpts from WPR's *To the Best of Our Knowledge* "Let's Get Lost 10-02-07-B" (07-02-10)[153] and "Ways of Seeing 06-04-09-A" (09-04-06).[154]

GEOTAGGING is the process of adding geographical identification metadata to various media such as photographs, video, websites, or RSS feeds and is a form of geospatial metadata. These data usually consist of latitude and longitude coordinates, though they can also include altitude, bearing, accuracy data, and place names.[155]

PROPOSAL: People are always working out ways of walking through campus, skirting around new buildings, towards a faculty not yet visited. So, rather than a map of the asphalt and paver paths already installed on campus, and rather than (or in addition to) adding names to these paths to orient users, or providing addresses or branding with fonts or colours or what have you, what I envision is a map of the paths people use, persistently updated and tagged with text, photos, audio, and video (all searchable, of course).

The goal is to shift from a top-down map to a bottom-up map: in lieu of (or in addition to) a map measured and drawn and organized with layers of names and map icons, the Pedestrian Survey will generate a map which traces/tracks the space that is occupied, and collects some record of the things that happen in that space. With a good interface, this cloud of user-generated data will revolutionize wayfinding in a persistently changing place.

TYPE OF DATA AND SELECTED IPHONE APP:
Short texts – Echofon (Twitter),
Photos/Videos – FlickitPro (Flickr),
Sketches – Sketches2 (Flickr),
Audio recordings – Hindenburg Mobile (Posterous), and
GPS - MotionX GPS (Posterous, GoogleMaps).

I proposed using iPhones to collect GPS and accelerometer data in order to trace in 4d (x, y, z, and t) the paths of people exploring main campus while taking photos, sketching, and writing about what they sense and what "senses" them (imagining the campus as an organism: sending/receiving/organizing). The paths followed were then collected into an online Google-Earth-based database and annotated with geotagged information (tweets, photos, sketches and video and audio recordings).

AMBITION: In the future, I imagine that an application for smartphones which permits anonymous collection of GPS and accelerometer data could become popular enough that a good sample of students are being tracked. Their movements would then be expressed on a 4d digital model of the paths walked on campus, annotated, like Google Earth, with images, videos, audio recordings and blog/twitter postings. News or information which has a spatial relationship (the location of a lecture, for example) would also be included.

Eventually, a field of beacons of some sort—pylons with a multicoloured/dimming light might do, maybe with a screen, or a touchscreen, or maybe an iPad—could re-present some/all of the data, disseminating collected info and advertising the available resource.

The Pedestrian Survey is both a stand-alone project as research for the wayfinding system design (collecting narrative and spatial data, and producing a 4d model of the "paths-travelled"), and could be incorporated into the final signage design to become a self-renewing wayfinding resource. Incorporation of this system into the final product would also potentially provide a platform for spatial research for the School of Architecture and other faculties: students could write their own applications for the smartphone and advertise approved projects through the wayfinding system and/or draw data from the wayfinding application.

METHODS: I hired twelve graduate students from the Waterloo School of Architecture, selected for their expertise in spatial narrative, photography, place analysis and/or social media, to explore the UW main campus and record their experiences using iPhones.

The students were paid for 29 hours of participation in and preparation for two 12-hour on-campus mapping sessions, funded through the Wayfinding Project's budget. Both I and the Wayfinding Project group have free access to and full publication rights for all material produced by the students during the mapping sessions.

I assigned each "mapper" the class schedule for a selected department/program/year at UW. Using the course schedule as a guide, the "mapper" was asked to find "typical students" and map their environment. To inform the mapping exercise, three basic questions were asked of the "typical students" encountered: Tell me about this place (the place you are in now). What is it called?; Where are you coming from? (Where were you before here?) How do I get there?; Where are you going next? How do I get there?

WHERE THE DATA IS NOW:

TWITTER

All the Mappers (list)
twitter.com/#/list/uwmap/all-the-mappers

FLICKR

UWmap's Photostream
www.flickr.com/48736060@N02/

PHOTOSYNTH

UWmap's Photosynths
photosynth.net/search.aspx?q=uwmap

YOUTUBE

UWmap's Videos
www.youtube.com/user/uwmap

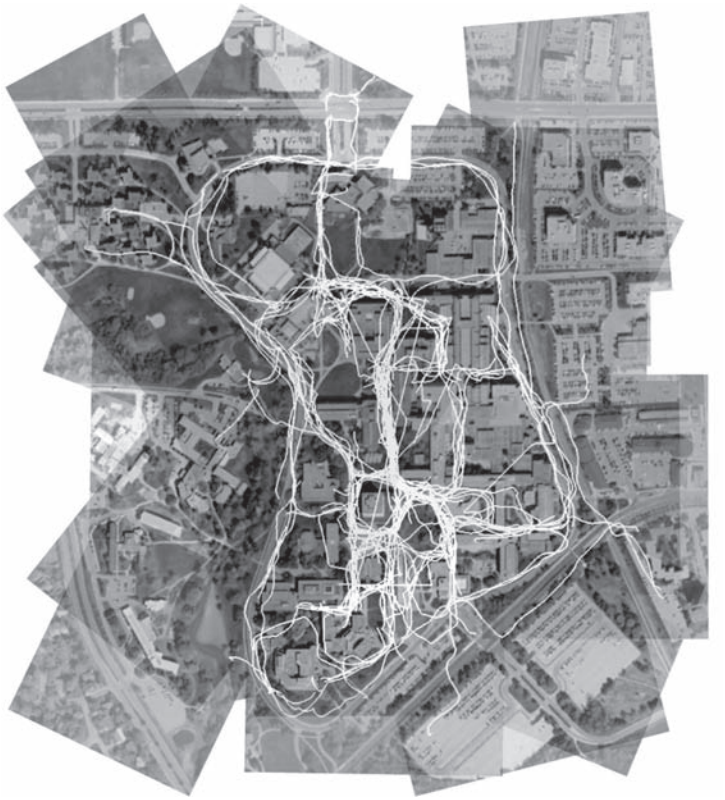
THE GOOGLE EARTH FILE

Here is a link to the Google Earth file containing all of the links to the media generated during the "Mapping the Campus Using Locative Media" pedestrian survey.

"uwmaphowto.posterous.com/uwmapped-the-google-earth-file-0"
uwmapped.kmz (22-05-10)

Instructions: Download and install Google Earth and open the "uwmapped.kmz" file. This file contains hard copies of all of the GPS files as well as links to photos, audio files, videos, Photosynths and more (an internet connection is required to view all but the GPS tracks).

RESULTS: The pedestrian survey produced a new kind of map. The University of Waterloo now has a prolific (1747 unique, 4724 total posts) geo-located web presence on popular social networking and image/video sharing websites, exploiting this popular new feature available on the increasingly ubiquitous smartphone. This map is immediately accessible to the public and can be actively promoted by the University as a method of wayfinding. This digital presence has been produced by carefully selected graduate students in architecture, who have produced high-quality work likely to generate some popular interest and hopefully initiate further participation by the university community.



Google Earth image showing all GPS tracks collected during Mapping the Campus (Using Locative Media).

PICASA WEB ALBUMS

UWmap's Web Album
picasaweb.google.com/uwmapphoto

POSTEROUS

UWmap's GPS Tracks
uwmapgps.posterous.com/

UWmap's Audio
uwmapaudio.posterous.com/

UWmap's Photosynths
uwmapsynth.posterous.com/

How to Add To UWmap
uwmaphowto.posterous.com/

AN EMPATHETIC TERRITORY

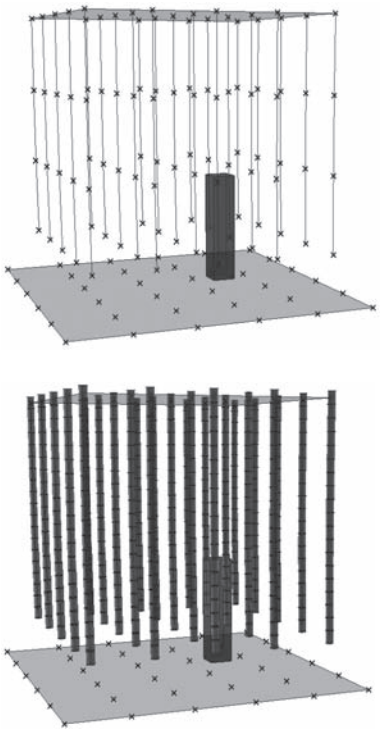
The Surrealist path was positioned out of time, crossing the childhood of the world, taking on the archetypal forms of wandering in the empathetic territories of the primitive universe. Space appears as an active, pulsating subject, an autonomous producer of affections and relations. It is a living organism with its own character, a counterpart to shifting moods, with which it is possible to establish a relationship of mutual exchange. The path unwinds amidst snares and dangers, provoking a strong state of apprehension in the person walking, in both senses of "feeling fear" and "grasping" or "learning". This empathetic territory penetrates down to the deepest strata of the mind, evoking images of other worlds in which reality and nightmare live side by side, transporting the being into a state of unconsciousness where the ego is no longer definite.

Francesco Careri, *Walkscapes*, 2002, 82.[156]

THE FLEETING AND THE INFINITE

THE TALE OF "THE FLEETING AND THE INFINITE" IS BOTH POSTSCRIPT AND PREFACE. It is not a Conclusion (nor even a conclusion). And it isn't yet done. In the tradition of Rousseau, who died before he could complete the two walks intended to finish his *Reveries of a Solitary Walker*, I am moving on before I fully realize the experiment chronicled here. This is a postscript in the sense that "the fleeting and the infinite"—a sort of a prosthetic for an architect-cum-*flâneur*, a thing and a way which occupies some territory between instrument and intervention (I will get more specific, I promise)—doesn't fit tidily into the rest of this collection of wanders through history and literature, philosophy and math and whatever else has found its way into these pages (I might have lost track). It is a sketch of a speculative act and a step from page to place. And it contains my longing to finally morph from participant-observer, student-of-the-past, and author-of-text to actor, maker, architect.

For now it will suffice to describe the thing I am making as a field of tentacles: twenty-five flexible columns hanging from the ceiling which can each describe their instantaneous shape to a computer. The computer records patterns of occupation, which are represented by patterns in the forces exerted by the wandering footfalls of the occupant-organism on sensors embedded in the floor along with the shape of the tentacles as they are displaced by the moving bodies of the occupants. The computer sorts through and correlates this data, sending back out to the tentacles the instructions for a responding form—perhaps a repetition from its past experiences, perhaps some new experiment of its own. And so on, over time expressing in the path-shapes carved into the field



Images from Rhino model generated using "the fleeting and the infinite" Grasshopper definition. (All tentacles at neutral positions).
Top: Showing the locations of the force sensors embedded in the floor and the position sensors located at the control points of the three curves composing each tentacle; Bottom: Showing the material components of the tentacles (sections of pool noodle in the current incarnation of this experiment).

some primitive form of communication between occupants through time, between occupant and space/shape, and between occupant and architect-as-rule-maker (as opposed to the more traditional architect-as-shape-maker).

THE CONCLUSION I DREW from my last experiment was that I needed to take a big step back and design an experiment which requires the processing of only one or two types of basic data, and which directly connects occupation and form rather than relying on interpretations of interpretations. I resolved to develop an installation which would be physically shaped by the occupants while collecting basic information about occupation along with a record of the shape of the installation.

For "the fleeting and the infinite" I borrow the Surrealists' "empathetic territory" and the Situationists' "citizen-walker": this field of flexible columns is a *tool* for unveiling the "unconscious" of the place, for visualizing the form of the crowd-organism, and it is an *experiential post-symbolic text* containing messages passed both consciously and unconsciously between walkers, uniting occupants across time in place as local agents of an emergent organism. While the meaning of most of this escapes the modest intelligence of the field, I can imagine "educating" the field by taking it out to "experience" different ways of walking in different places. I hope that from its digital memories of those walks in those places might spring some sort of digital wit—"a message whose ingenuity or verbal skill or incongruity has the power to evoke laughter."[157]

Of course the field itself will never be clever, but it might be enough for it to appear so, from time to time. A positive reaction from the occupant-organism might embed the crowd's own cleverness at noticing the best of these spontaneous incongruities into the patterns that make the shape of the thing. Which is to say that, in the absence of occupant-participants, this thing is banal. I have abdicated the responsibility of architect-as-shape-maker in favor of the position of speculative

spectator in the new paradigm of architect-as-rule-maker, and in doing so I have shifted the burden of poetry-in-place onto the shoulders of an unpredictable crowd. I am asking you to abandon your traditional interpretations of poetry in architecture for the sake of the wonder of "the complete construction of architecture and urbanism that will someday be within the power of everyone."[158]

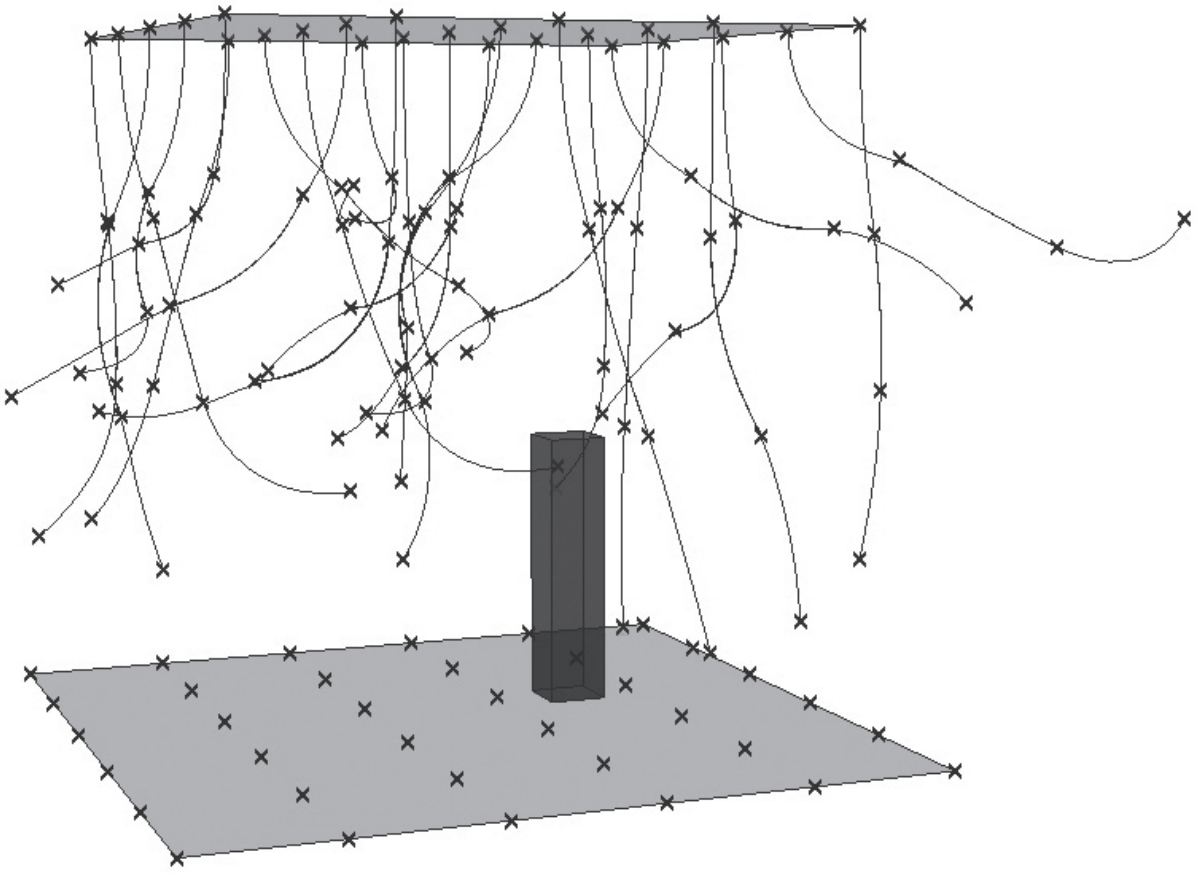
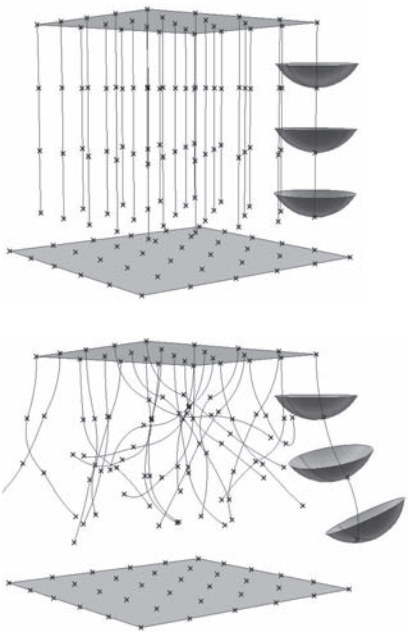


Image from Rhino model generated using "the fleeting and the infinite" Grasshopper definition showing the locations of the force sensors embedded in the floor and the position sensors located at the control points of the three curves composing each tentacle. (All tentacles at random positions).



Images from Rhino model generated using "the fleeting and the infinite" Grasshopper definition showing a surface representing the possible locations of the tip of each curve of one tentacle given the material properties of the components of the tentacle and the base plan of the curve. Top: Tentacle at neutral position; Bottom: Tentacle at random position.

POSTSYMBOLIC COMMUNICATION

Suppose we had the ability to morph at will, as fast as we can think. What sort of language might that make possible? Would it be the same old conversation, or would we be able to "say" new things to one another?

For instance, instead of saying, "I'm hungry; let's go crab hunting," you might simulate your own transparency so your friends could see your empty stomach, or you might turn into a video game about crab hunting so you and your compatriots could get in a little practice before the actual hunt.

I call this possibility "postsymbolic communication." ... It would not suggest an annihilation of language as we know it—symbolic communication would continue to exist—but it would give rise to a vivid expansion of meaning.

This is an extraordinary transformation that people might someday experience. We'd then have the option of cutting out the "middleman" of symbols and directly creating shared experience. A fluid kind of concreteness might turn out to be more expressive than abstraction.

In the domain of symbols, you might be able to express a quality like "redness." In postsymbolic communication you might come across a red bucket. Pull it over your head, and you discover that it is cavernous on the inside. Floating in there is every red thing: there are umbrellas, apples, rubies, and droplets of blood. The red within the bucket is not Plato's eternal red. It is concrete. You can see for yourself what the objects have in common. It's a new kind of concreteness that is as expressive as an abstract category.

Jaron Lanier, *You Are Not A Gadget*, 2010, 190-1.[159]

A GRASSHOPPER FILE IS KNOWN AS A *DEFINITION* in the same way that an autoCAD file is known as a drawing, a Sketchup file as a 3d model, and a Word file as a document. A Grasshopper definition replaces the mouse clicks and keyboard shortcuts of a traditional Rhino (3d) model with a computational description of the shape to be generated. RhinoScript is the language of that description; the Grasshopper plug-in is not strictly necessary for the production of the effects I seek, except for the fact that I am not a computer programmer. Grasshopper, like almost all of the technologies I use in this experiment, is designed for the curious generalist: it makes accessible, via a "user-friendly" interface, some of the more interesting capabilities of a 3d modelling program while bypassing some of its more complex inner workings. Eventually, I imagine, I will need to properly learn VBScript or some other programming language and I will require in my network a least one computer programming specialist in order to realize my architectural ambitions, but for the time being these technologies for generalists, developed by computer scientists/artists, offer the equivalent of those basic phrases any tourist needs when exploring a foreign land.

In the context of "the fleeting and the infinite," I use Grasshopper to describe the material properties of the components of the "tentacles," the relationships between those components and their *potential* patterns of assembly, in space, over time and against the forces of occupation as represented by the act of walking. I explain to Grasshopper how to interpret the information it receives, via the Arduino (more about that in a moment), from the sensors embedded in the tentacles and the floor. I then ask Grasshopper to reply to the tentacles with instructions on how to position themselves in response to the input from the occupants. I have also given Grasshopper the ability to form memories—time-stamped data accumulated in a spreadsheet—and to search for patterns in those memories to use as fragments of postsymbolic text in its ongoing conversation with the occupants.

RHINO can create, edit, analyze, document, render, animate, and translate NURBS curves, surfaces, and solids with no limits on complexity, degree, or size. Non-Uniform Rational B-Splines (NURBS), are mathematical representations of 3-D geometry that can accurately describe any shape from a simple 2-D line, circle, arc, or curve to the most complex 3-D organic free-form surface or solid. Because of their flexibility and accuracy, NURBS models can be used in any process from illustration and animation to manufacturing.

RHINOSCRIPT is a scripting tool based on Microsoft's VBScript language. With RhinoScript, you can quickly add functionality to Rhino, or automate repetitive tasks.[160]

For designers who are exploring new shapes using generative algorithms, GRASSHOPPER is a graphical algorithm editor tightly integrated with Rhino's 3-D modelling tools. Unlike RhinoScript, Grasshopper requires no knowledge of programming or scripting, but still allows designers to build form generators from the simple to the awe-inspiring.[161]

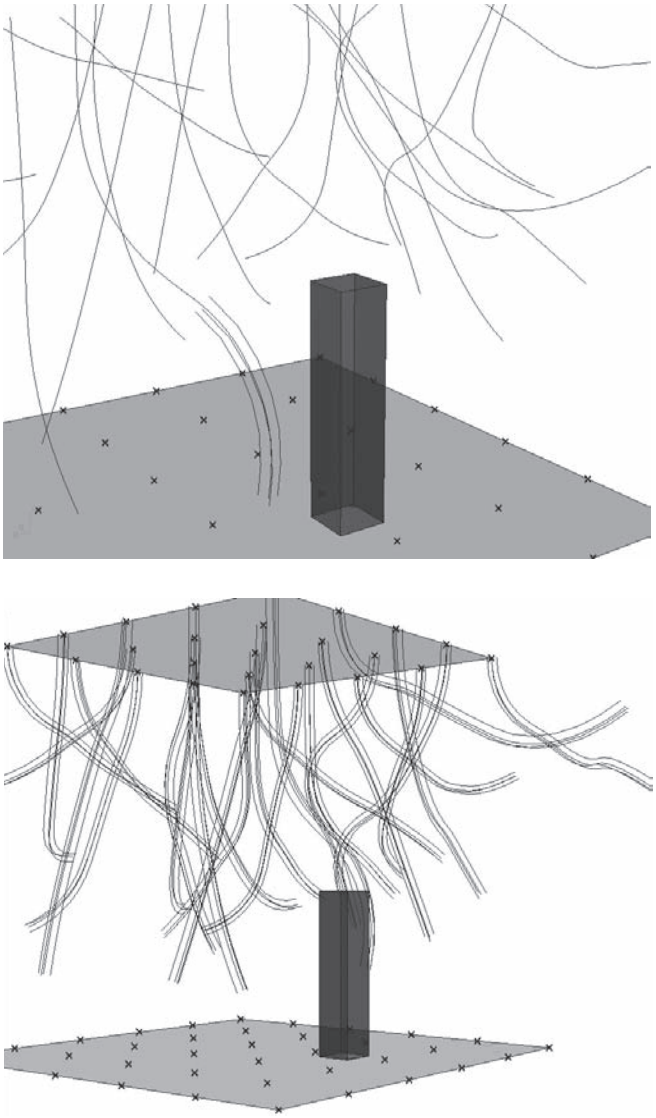
ARDUINO is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). Arduino projects can be stand-alone or they can communicate with software on running on a computer (e.g. Flash, Processing, MaxMSP).[162]

PROCESSING is an open source programming language and environment for people who want to program images, animation, and interactions. It is used by students, artists, designers, researchers, and hobbyists for learning, prototyping, and production. It is created to teach fundamentals of computer programming within a visual context and to serve as a software sketchbook and professional production tool.[163]

AN ARDUINO IS A RUDIMENTARY COMPUTER that can be loaded with simple programs which permit it to receive data from sensors (e.g., a button, a knob, a light sensor, temperature sensor, force sensor) and control actuators (e.g., a buzzer, an LED, a motor, servo, "muscle" wire). An Arduino can act on its own, or as a part of a distributed intelligence for a central computer, expanding that computer's potential inputs and outputs beyond screen, speakers, keyboard, and mouse, to include virtually anything which can translate experience into electrical energy.

To program an Arduino to function on its own, the designer works within the Arduino "environment" where the language is *Arduino*, a dialect of *Wiring*. Thankfully, there is a substantial and generous online community of both professional and amateur Arduino programmers who openly share their codes, often accompanied by multimedia tutorials (translations) and discussion boards where "newbies" can ask for help. I've used this online community to find existing code which I've copied and modified to suit my own ambitions, learning just enough along the way to understand which segment of code controls the part of the program I want to change along with a few basic phrases with which to communicate my intentions.

Each tentacle of "the fleeting and the infinite" requires its "own" Arduino to which are connected the tentacle's sensors and actuators along with lines of communication between this network of autonomous Arduinos and the Arduino which connects to the central computer running Grasshopper. Recently, Andy Payne of LIFT Architects and Jason K Johnson of Future-Cities-Lab have developed Firefly: a set of "components" (packets of code describing a particular function) for Grasshopper which allow me to both read from and write to the Arduino plugged into my computer so that, while the autonomous Arduinos directly control their individual tentacles, the Arduino connected to my computer acts as a central nervous system, relaying data between the the "body" (the field of tentacles) and the "brain" (Grasshopper).



Images from Rhino model generated using "the fleeting and the infinite" Grasshopper definition showing the Nitinol "muscle" wires running along each tentacle, the lengths of which are transmitted via the Arduino to each tentacle, thus physically manifesting the computed form.

FIREFLY is a set of comprehensive software tools dedicated to bridging the gap between Grasshopper, the Arduino micro-controller, the internet and beyond. It allows near real-time data flow between the digital and physical worlds, and will read/write data to/from internet feeds, remote sensors and more.[164]

NITINOL ("MUSCLE") WIRE will amazingly shorten in length (with significant force) when electrically powered. It is easy to use, and the thin strands of wire can lift thousands of times their own weight. Nitinol wire returns to its original length when it cools. The direct linear motion of Muscle Wires offers experimenters a source of motion that is very similar to that of a human muscle, providing possibilities not available with motors or solenoids. Nitinol wire may be heated by any means, most commonly by running electric current through it. The contraction movement it produces may be applied to any task requiring physical movement, allowing it to replace small motors or solenoids.[165]

The LPR530AL is a low-power dual-axis GYROSCOPE capable of measuring angular rate along pitch and roll axes. The gyroscope is the combination of one actuator and

one accelerometer integrated in a single micromachined structure. It includes a sensing element composed by single driving mass, kept in continuous oscillating movement and able to react when an angular rate is applied based on the Coriolis principle. A CMOS IC provides the measured angular rate to the external world through an analog output voltage.[166]

FORCE SENSING RESISTORS (FSR) are a polymer thick film (PTF) device which exhibits a decrease in resistance with an increase in the force applied to the active surface. Its force sensitivity is optimized for use in human touch control of electronic devices. FSRs are not a load cell or strain gauge, though they have similar properties.[167]

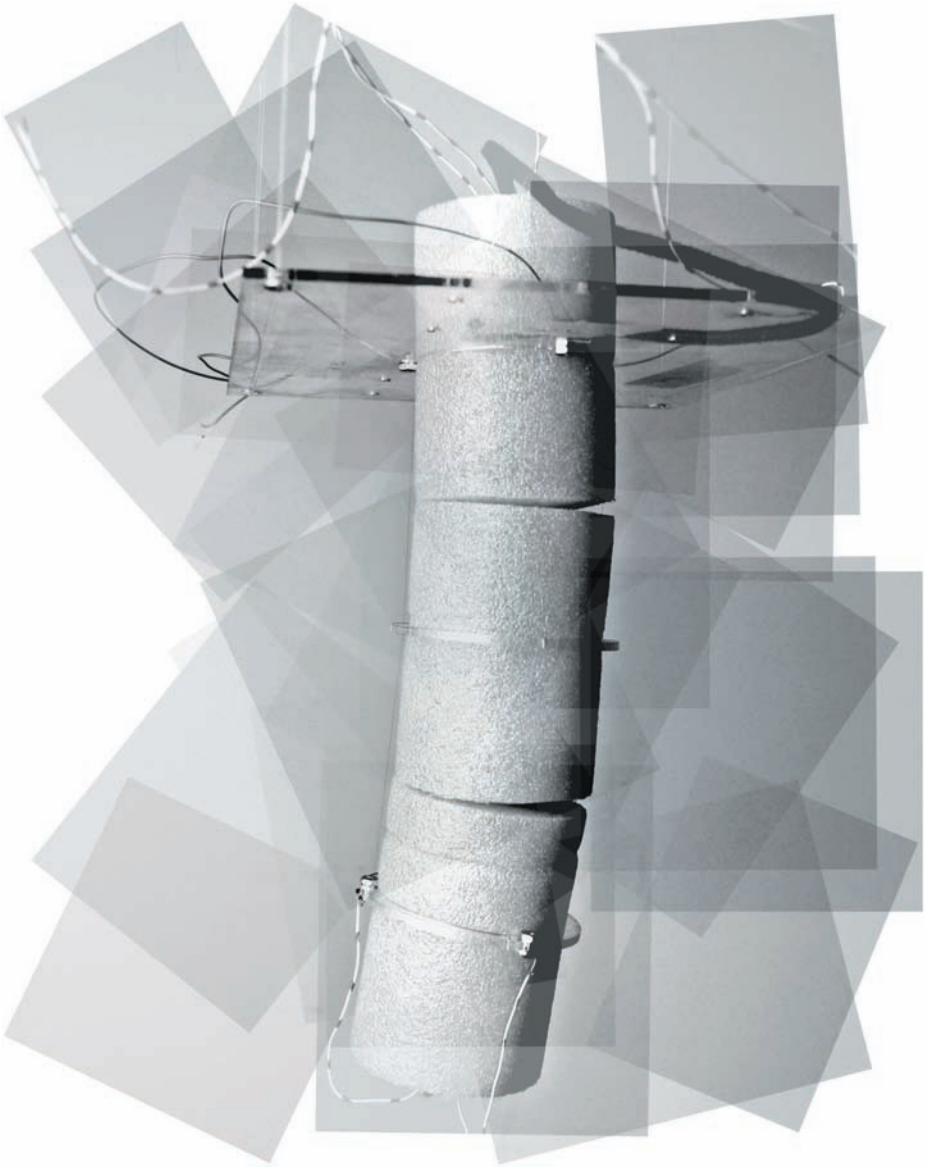
KINEMATICS is the branch of classical mechanics or mechanical engineering that ... can be used to find the possible range of motion for a given mechanism, or, working in reverse, can be used to design a mechanism that has a desired range of motion.[168]

A CONTINUUM ROBOT is a continuously curving manipulator, much like the arm of an octopus.[169]

THE DESIGN OF THE TENTACLES involved a (somewhat) systematic exploration of the material properties of readily available (i.e., at the local hardware/dollar/surplus store) and affordable components which I imagined—I was regularly proven wrong—would assemble into flexible hanging columns capable of both occupying a minimal amount of space and inscribing a relatively large architectural volume. As I experimented I tried to understand the principles of kinematics pertaining to continuum robots in order to both choose appropriate prototype components and describe the material properties of those components mathematically in Grasshopper.

Though not yet tested, the latest incarnation of the tentacle is based on a prototype constructed of small bevelled rubber washers originally manufactured for plumbing applications. Of all of the prototype materials I tested (poker chips strung on bungee cords, flexible dryer ducts and detachable swivelling faucet heads, to name a few) these washers offered the best combination of a simple form, easily replicable at full scale using the resources available in the school's traditional and digital workshops, which, when assembled into a tentacle, inscribed relatively predictable (and rather pleasing) shapes in space. I fabricated a scaled-up version of the rubber-washer-tentacle using cylindrical polyethylene foam pool noodles (which are lightweight, suitably dimensioned, and easy to cut and shape). The form of the components has since been refined, described to Grasshopper and fabricated, now awaiting yet another round of—increasingly rewarding—testing, checking, and revising.

SENDING/RECEIVING/ORGANIZING (LIFE?) For a moment or two twenty-five tentacles will hang lifelessly from the ceiling, inscribing a cube in the centre of a gallery (the setting, I expect, for a modern *promenade*). There will be, provisionally, a half a meter between them —making them far enough apart to invite occupation of the field and close enough together to incite physical interaction with it—and the



Above: "Tentacle Prototype 7." Constructed using bevelled rubber washers (originally manufactured for plumbing applications) strung on brass ball chain with eye screws and fishing line "tendons." Approximate dimensions of washers: 7.5mm high x 14mm diameter, 37° bevel, total length of tentacle: 265mm. Approximately 1:6 scale model.

Left: "Tentacle Prototype 7.6." Constructed using components formed from polyethylene foam "pool noodles" strung on bungee cord with Nitinol "muscle" wire "tendons." Dimension of components: 107mm high x 65mm diameter, 15° bevel, total length of tentacle: 1924mm. Full scale model.

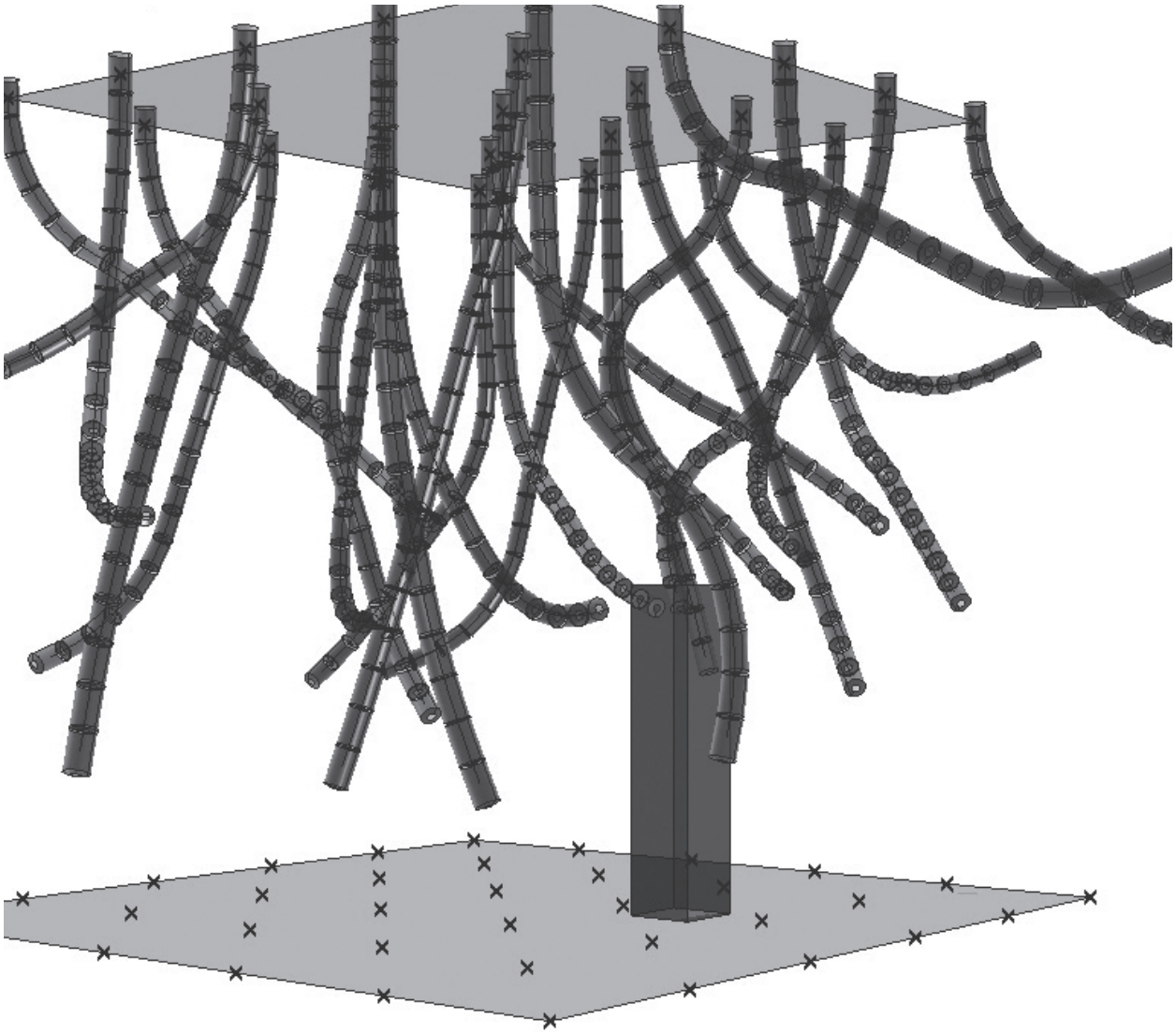


Image from Rhino model generated using "the fleeting and the infinite" Grasshopper definition showing the digital representation of the field of tentacles in a random state. In theory, the physical field looks just like this (only pink). The rectangular column represents some small "spectacle" enticing walkers into participating in the formation of the field.

FOURIER TRANSFORM

For the first time, we can at least tell the outlines of a reasonable story about how your brain is recognizing things out in the world—such as smiles—even if we aren't sure of how to tell if the story is true. ...

I'll start with a childhood memory. When I was a boy growing up in the desert of southern New Mexico, I began to notice patterns on the dirt roads created by the tires of passing cars. The roads had wavy corduroy-like rows that were a little like a naturally emerging, endless sequence of speed bumps. Their spacing was determined by the average speed of the drivers on the road.

When your speed matched that average, the ride would feel less bumpy. You couldn't see the bumps with your eyes except right at sunset, when the horizontal red light rays highlighted every irregularity in the ground. At midday you had to drive carefully to avoid the hidden information in the road.

Digital algorithms must approach pattern recognition in a similarly indirect way, and they often have to make use of a common procedure that's a little like running virtual tires over virtual bumps. It's called the Fourier transform. A Fourier transform detects how much action there is at particular "speeds" (frequencies) in a block of digital information. ...

Unfortunately, the Fourier transform isn't powerful enough to recognize a face, but there is a related but more sophisticated transform, the Gabor wavelet transform, that can get us halfway there. This mathematical process identifies individual blips of action at particular frequencies in particular places, while the Fourier transform just tells you what frequencies are present overall.

There are striking parallels between what works in engineering and what is observed in human brains, including a Platonic/Darwinian duality: a newborn infant can track a simple diagrammatic face, but a child needs to see people in order to learn how to recognize individuals.

Jaron Lanier, *You Are Not a Gadget*, 2010, 160-1.[170]

tentacles will extend from just above the reach of the average occupant to about a half a meter above the floor. These dimensions are flexible—they exist as *variables* entered into the Grasshopper definition, deliberately temporary and tuneable, able to be adjusted in the face of experience.

When the first occupant enters the field, I will finally be faced with this one, last, fabulous question. A question which, for now, hangs tantalizingly amidst these tentacles, waiting (im)patiently for their first experiences: what do I do with the data? The first step is to receive: I need to compile a record of the sensations the field is experiencing while occupied. The second step is to organize: I hope that within the shapes described by this data is some pattern equal to an expression as universal and as concrete as a smile. I think that, by modifying the pattern recognition algorithms used for facial recognition, scripts (or maybe software) could be designed which would be capable of finding such patterns, *if* they do exist. The third step is to send: I think that in order to learn the language of walking the field will need to speak, which is to say, to send.

I would like the field to learn the language of walking so that I can take lessons. Together, I hope we can tune into the spatial murmurings of the occupant-organism and reveal some order in that noise. At first, like a baby *or* our paleolithic ancestors, the field should make shapes which mimic (though not precisely replicate) the shapes it has learned from its occupants, who are themselves somewhat new to this new/old language (they know how to walk, but have never been asked to consciously construct a sentence in "walking"). As the field burps and burbles and squeals, once in a while it will make a sort of a word in shape which the occupant-organism will recognize and, like a patient mom, repeat back to the field enthusiastically, reinforcing that particular pattern.

I imagine that, over time, the field and the crowd will develop a rudimentary vocabulary with which they can communicate, and with which

I can compose new spatial poetries (as an architect-as-rule-maker in the new building-as-organism paradigm). These new poetries will be a combination of my own cadence and rhythm accompanied and adjusted by the sensuous exchanges taking place between occupant and building.

ONE LAST THOUGHT: What happens when there is no occupant? Will the tentacles dream? Processing information gathered in novel ways (a private enterprise). Perhaps I could be privy to those dreams if I tiptoe quietly into the space so as not to disturb its sleep.

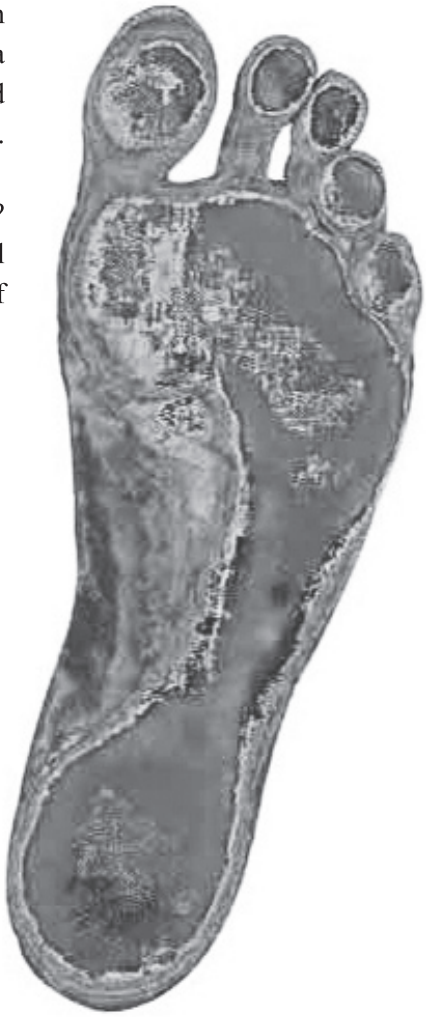


Image showing force generated between foot and floor while walking.

THE PATH AS ARCHITECTURAL OBJECT

A nomad's history of architecture, from the wanderings of the Paleolithic period to the Ancient Egyptians' transformation of the space of the path (the space along) into interior space (the space of eternal wandering). I imagine a space which takes shape over time in response to occupation; in response to walkers. The path has evolved into the spatial order of occupants-as-walkers (complete with the ability to walk order out of chaos); a spatial order which I imagine will suit the new changed-based architectural paradigm within which I find myself immersed.

> While in the world of the villages and the cultivated fields the erratic path had been transformed into a trail and then a road, giving rise to the architecture of the city, in the empty spaces of the nomadic universe the path conserves its symbolic elements of Paleolithic roamings and transfers them into the sacred spaces of the Egyptian temples. From this moment on it would be increasingly difficult to separate architecture from the path.
>
> Francesco Careri, *Walkscapes*, 2002, 57.[171]

THE ACT OF CROSSING SPACE

The act of crossing space stems from the natural necessity to move to find food and information required for survival. But once these basic needs have been satisfied, walking takes on a symbolic form that has enabled man to dwell in the world. By modifying the sense of the space crossed, walking becomes man's first aesthetic act, penetrating the territories of chaos, constructing an order on which to develop the architecture of *situated objects*. Walking is an art from whose loins spring the menhir, sculpture, architecture, landscape. This simple action has give rise to the most important relationship man has with the land, the territory.

Francesco Careri, *Walkscapes*, 2002, 20.[175]

A LONG, LONG TIME AGO ... Or maybe not so very long ago at all. We stood on two feet, tipped forward, put one foot in front of the other, and walked. Our first walks were more properly called wanders: instinctive and erratic. We wandered through an empathetic world animated with magical presences. A surreal world where our thoughts and our environment were seamlessly connected. We were immersed in pure experience.

As we adapted to our teetering vertical view of the world—as our bodies steadied, our minds grew, and our hands became sly and agile—we began to grow out of our magical wanderings and into the determined order of the path. The moment we understood "this is the way to grandma's house" or "this is the way to where the buffalo roam," we became architects, constructing an order on which we still build. That path—the beginning, the end, and the way in between—was the first spatial order we constructed.[172] That path was also an act (of crossing space), a tale (of the space crossed), and an architectural object (the line that crosses the space).[173] And best of all, that path—and the space along it—led to the *menhir*—and the space around it—to *benben*—the volume—and to the *Ka*: the space of eternal wandering; the space inside.[174] The space for a walker in this world, our world, as an architect.

NOMADIC SPACE IS SMOOTH

The sedentary space is *striated* by walls, enclosures and roads between the enclosures, while the nomadic space is smooth, marked only by "traits" that are effaced and displaced with the trajectory.

Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, 1980, 420.[176]

I HAVE BROUGHT YOU BACK HERE: not to the beginning, the beginning of walking, nor to that other beginning, the beginning of my story, but to the beginning of architecture, sometime around 2.6 million years ago, during the early millennia of the Paleolithic Era—because I think that understanding what happened then may be useful to an architect today. There is a change afoot in architecture (pun intended), and we will wander here, through the footfalls of our forefathers from Homo *habilis* to Heliopolitan Egyptians, in the hopes that we find a foundation for a new relationship between building and occupant that suits this emerging way of thinking about form.

THIS DEVELOPING INTEREST ... The efforts, by some architects, to adapt new research into the phenomenon of emergence to generate or influence the form and composition of buildings requires a fundamental destabilization of our current understanding of architectural form as "rationalized for realization and superimposed functions."[177] This new way of thinking about architecture asks us to imagine built form derived from the capacities of materials; an architecture that has been "solved" for the variables ecology, topography, and structure,[178] and an architecture that understands something about itself and its relationship to the world and to us. A magical architecture that can translate the minute changes in the world around it—the call of a bird, the warmth of the sun, the fall of a foot, or possibly even the energy of a thought—into shape, a space, and a wander within.[179]

This new, surreal, architecture must be carefully tuned, for by crossing a space—by simply (or not so simply) experiencing it—we could, quite literally, transform it. How do we find our footing in this architecture? The building must be attuned to our offerings and expectations as occupants; it must be trained, by the architect, to send/receive/organize; to accept useful inputs, process those inputs in a meaningful way, and use that information to adjust itself, as is possible and necessary. The architect's job, in this paradigm, is as caretaker of the body of knowledge pertaining to the spatial intelligence of human beings.[180] It becomes the architect's responsibility to collect, organize and judiciously use this information in the description and modification of place; in the modulation of these new, persistently changing spaces.

UNMAPPED SPACE

The mere presence of man in an unmapped space and the variations of perceptions he receives crossing it constitute a form of transformation of the landscape that, without leaving visible signs, culturally modifies the meaning of space and therefore the space itself.

Francesco Careri, *Walkscapes*, 2002, 50.[181]

I, AS AN ARCHITECT TO BE, have attempted to take care, here in a collection of meandering thoughts about the path (as act, as object, and as tale), of some small fragment of the spatial intelligence of human beings. I choose the path as my subject because it is already mine; because of my own glorious compulsion to walk. And I choose the path because it is ours; because as much as we have made of the path in

our long history—made it into places, philosophies, politics—the act of walking has quite literally made us: the current incarnation of the Hominid *genus*; the "knowing man".[182] And I choose the path because:

THE PATH WAS OUR FIRST ARCHITECTURE. "Before erecting menhirs—known as *benben* in Egyptian, 'the first stone that emerged from the chaos'—man possessed a symbolic form with which to transform the landscape. This skill was walking..."[183] During the period between the moment my ancestors became obligate bipeds (around 2.5 million years ago) and the moment they stopped time, or started it, by raising a large stone vertically and planting it in the ground (during the Neolithic Era, around 5,000 BCE) they developed from hunting-gathering wanderers into hunting-gathering nomads and then into pastoral nomads.[184] I call these people—these nomadic people—my ancestors because I believe Francesco Careri when he names them, as opposed to their settled, or sedentary, counterparts, as the first architects; the first to construct mental maps of space, ordering the relationship between themselves and their shifting geographies. This "space along" is a necessary construct for the subsequent materialization of the menhir and the space around it.

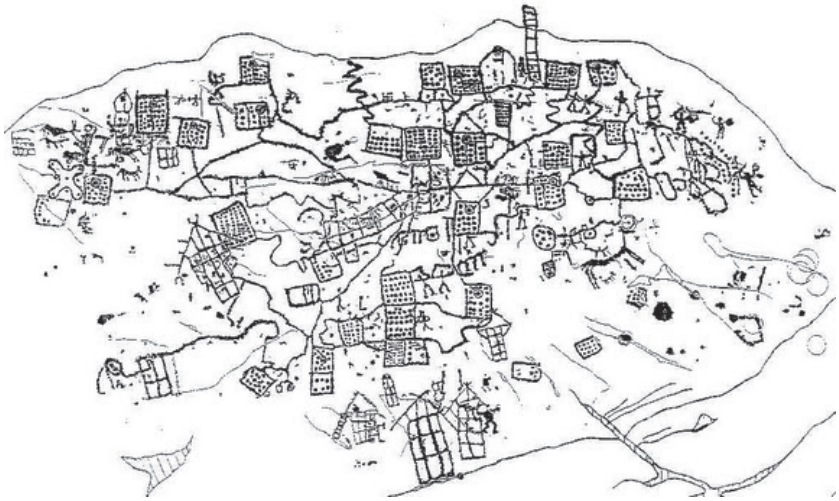
(Whether my nomadic ancestors were indeed the first architects, or whether their understanding of shifting points-lines-and-planes is simply the first which fits with my own way of understanding architecture, is hopefully immaterial; at least it is not a useful enquiry as it is so frustratingly paradoxical. A nomadic ancestry does, however, form a suitable foundation for an understanding of human spatial intelligence as it pertains to a change-based architectural paradigm. It permits us to stand on two feet and walk through this mutable architecture, stumbling at first, finding our way carefully, leaving a trail of spirit and thought and experience embedded in the building for the next occupant to accept and retrace, or reject and draw anew.)

MENHIR

Menhirs appear for the first time in the Neolithic age and represent the simplest objects, but with the greatest density of meaning, of the entire Stone Age. Their raising is the first human act of physical transformation of the landscape: a large stone lying horizontally on the ground is still just a stone without symbolic connotations, but when it is raised vertically and planted in the ground it is transformed into a new presence that stops time and space: it institutes a "time zero" that extends into eternity, and a new system of relations with the elements of the surrounding landscape.

Francesco Careri, *Walkscapes*, 2002, 51.[185]

THE OLDEST EVIDENCE ... The evidence of my ancestors' emerging understanding of the path as "the line that crosses space" is carved into the rocks along the migration paths of their prey; images identifying these places as points in an otherwise chaotic territory, between which are voids filled with invisible traces, with patterns of change: with paths. The oldest of these carvings—or petroglyphs—are dated to the early Paleolithic Period, around ten thousand years ago, and depict mammoths and horses and hands and feet; likely symbolizing their prey along with clues regarding direction and time, which together represent the paths of their prey, which is to say the animals' migration routes (patterns in space and time). It is six thousand years after these symbolic depictions of paths that more explicit maps—like the Bedolina map: still abstract and magic-religious, not literally representative[186]—were carved on cave walls; maps representing a dynamic, complex system with "full" spaces—spaces of staying—within voids which are crisscrossed by paths linking these "full" spaces; these points within the apparent emptiness of the territory of going.



"Bedolina Petroglyph," Valcamonica, Italy, 2,500 BCE.

THE KAMYANA MOHYLA, or "The Rock Mound," in the Molochna River valley, Ukraine is dated to the 20th century BCE; discovered in the 1930's by Valentin Danylenko.[187]

THE BEDOLINA MAP in the Po Valley, Italy; discovered in the early 19th century, first studied by M. Bertrand Lloris in 1960; dated between 5,000 and 2,500 BCE.

The Songlines, or Dreaming tracks, of Indigenous Australians are a part of the same tradition as that of the Bedolina map. They record the tale of the space crossed within the story of a "creator-spirit's" journey through the void during the Dreaming[188]—the time when the world was empathetic, magical; when the order of space was just emerging from the paths walked by Paleolithic people. The Songlines are navigational tools for these pre-nomads; they describe landmarks, waterholes and other natural phenomena which, when sung in the correct order, describe the paths through their territories; the experiences of their territories; the architecture of their territories. These points in the vast "empty" Australian landscape connected with story-paths were created—and are persistently renewed—by being sung and walked by generations of human beings.[189]

The repeated action of walking across the void became, for my ancestors, a way of thinking about that void as a territory of going, within which are spaces of staying. Between these spaces of staying are imagined, symbolic lines found in the patterns of change, and experience, of that territory of going; these lines (the implied and the drawn) are the first architectural order. As this order emerged—and as the brains and the hands of my ancestors made one another, and together made human consciousness—early human wanderers diverged into two cultures: the culture of the points, of the "full" spaces, of staying, and the culture of the paths, of the void, of going. They became agriculturalists or livestock-raisers; Cain's kin or Abel's.

IT WAS THE LIVESTOCK-RAISERS ... (Abel's kin and mine) who took ownership of the spatial intelligence which permitted navigation through vast and empty—though familiar—spaces. They trod paths into material existence as they trekked through the void, between good pastures, waterholes and agricultural settlements. And they embellished and honoured the space along these paths by raising enormous stones and planting them vertically in the ground.[190] (It took more than 3,000

THE HORIZON

While the horizon is a stable, more or less straight, line depending upon the landscape itself, the sun has a less definite movement, following a trajectory that appears clearly vertical only in its two moments of vicinity to the horizon: sunrise and sunset.

Francesco Careri, *Walkscapes*, 2002, 50.[191]

men to lift one of the largest of these stones into position indicating that multiple tribes would have had to co-operate to mark these points. This degree of co-operation hints at the value to the collective—both agriculturalists and livestock-raisers—of the nomad's experience of these places and the paths between them.) These menhirs were located in neutral zones—in the voids between the territories of settled tribes—and they were placed laterally with respect to the path indicating that, while also individually identifying points of experience and stabilizing the vertical dimension, together they constructed the border of a space to be crossed (or perhaps danced in); together they were a physical construction of a complex symbolic space: a space of going.[192] From these "lettered stones"—these repositories of experience, myth, and sacred energy—sprung a new type of space; a space not for crossing, but for gathering within: the space around.[193]

(T)he name still used today for the menhirs by the shepherds of Laconi, in Sardinia: *perdas litteradas* or "LETTERED STONES", "stones of letters".[197]

AT THIS POINT IN OUR WANDER TOGETHER we begin to tumble rapidly towards a conclusion. The conclusion not of the story of the path as it relates to contemporary discourse in architecture—which is to say, how the path can become architecture—but the conclusion of my own personal *cosmogeny* of architecture; the story of how the path *is* architecture (and what kind of architecture it is).

COSMOGENY is any theory concerning the coming into existence or origin of the universe, or about how reality came to be.[198]

The menhir, and the space around it, was transformed by Heliopolitan Egyptians (circa 3,100 BCE[194]) into *benben*, or volume, "said to represent the vertical petrification of the first sunbeam."[195] The form of the mehnir evolved along with the idea of it, becoming those iconic forms of ancient Egyptian architecture: the obelisk and the pyramid.[196] It is the path, however—not the menhir—which I choose as the model for a *cosmology* which allows me to work within the emerging building-as-organism paradigm.

COSMOLOGY, in strict usage, refers to the study of the Universe in its totality as it now is and by extension, humanity's place in it.[199]

I choose the path because the path is transformed by the Heliopolitan Egyptians into the concept of the Ka, "the symbol of *eternal wandering*, a sort of divine spirit that symbolizes movement, life, energy

WALKING AS A TOOL

The aim is to indicate walking as an aesthetic tool capable of describing and modifying those metropolitan spaces that often have a nature still demanding comprehension, to be filled with meanings rather than designed and filled with things. Walking then turns out to be a tool which, precisely due to the simultaneous reading and writing of space intrinsic to it, lends itself to attending to and interacting with the mutability of those spaces, so as to intervene in their continuous becoming by acting in the field, in the here and now of their transformation, sharing from the inside in the mutations of these places that defy the conventional tools of contemporary design.

Francesco Careri, *Walkscapes*, 2002, 26.[200]

"Ka statue of King Hor in shrine," Egyptian Museum, Cairo, 1,700 BCE.

and embodies the memory of the perilous migrations of the Paleolithic period."[201] While the menhir becomes volume—petrified sunlight—the path becomes *interior space*[202]: conceptually, a space which takes shape over time in response to occupation; in response to walkers. The path thus has evolved into the spatial order of occupants-as-walkers (complete with the ability to walk order out of chaos); a spatial order which I imagine will suit the new changed-based architectural paradigm within which I find myself immersed.

Ancient Egyptians believed that the KA (spirit) was one of the five parts of the soul. The other four parts are the Ren (name), the Ba (soul/personality), the Sheut (shadow) and the Ib (heart).[203]

POSTSCRIPT

I HAVE ONE MORE SECRET TO TELL before I end this tale: I lost my voice a decade ago during the "freedom from freedom" that crashed down so quickly after the heady days of my (first) "year off". For a long time, the act of writing was too painful to bear (I didn't want to hear what I had to say). To find my way back to the pen and the page I borrowed the voice of Jeffrey Kipnis from "On the Wild Side," an author I came across who expressed, both in argument and form, the core of the thesis I was longing to write: something is different in the way I (and my generation) are thinking about order in the world; we are thinking holistically, or ecologically, rather than critically.

It seems that this way of thinking is a result of our immersion in a world where truth is inherently relative (we know it depends on which paper you read, and what time you read it and the encyclopedia is rewritten before the news has even made the front page, much less been accepted as a cultural narrative); a world where our every (consumer) decision—from what toilet paper to buy to where to vacation—comes with some degree of consciousness of that consumption's effect on our entire planet and everyone in it.

Unlike my Paleolithic ancestors—who were unself-conscious members of their tribes—and unlike my self-conscious pre-modern ancestors, and my critically self-conscious great-great-great-grandparents, I understand myself as both a self-conscious individual *and* a local agent of an emergent human consciousness (which shares some of the traits of a tribal consciousness) which is itself one member species in the ecology of the cosmos from which emerges cosmic consciousness.

JEFFREY KIPNIS (born 1951, Georgia, USA) is an architectural critic, theorist, designer, filmmaker, curator, and educator. Not a registered architect, Kipnis first came to prominence through his association with avant-garde architect Peter Eisenman, and their joint collaboration with French philosopher Jacques Derrida. Kipnis holds a Masters degree in physics from Georgia State University, USA (1981), and in 2006, he was awarded an honorary diploma by the Architectural Association School of Architecture, London, in recognition of his contributions to the discipline of architecture as a teacher, critic, and theorist.[204]

Emergence is not a renaming of synergy – it is not a matter of a whole greater than the sum of the parts. There are no parts in emergence, only new wholes, though the emergence of a new whole does not simply eradicate the wholes that merge to form it. The properties of a water molecule is irreducibly specific. And a water molecule is not water. Even if you had all the water molecules in the universe, you could not quench your thirst unless they organize into liquid water. The ability of water molecules to organize into a thirstquenching liquid, itself a new material organization other than a sum of water molecules, is one of the unique, emergent properties of the water molecule, one of its new ways of sending, receiving and organizing. And the emergence of liquid water? Not thirsty? Then try some other feelings; savor the exhilaration of a shower, zone out on the surface reflections of a pond, rhapsodize to the hypnotic sound of ocean waves, or reflect on the well-spring of life on earth.

Jeffrey Kipnis, On the Wild Side, 2004.[205]

INTELLIGENCE: EVOLVED. Kipnis argues that Criticality, as a state of consciousness, *was* deeply intelligent but that it has stalled as a creative eruption and is now suppressing more creative (and more intelligent) moods than Criticality's correlate mood, Objectivity. This argument is not only articulated in "On the Wild Side," but embedded in the voice of the author as he *evokes* the giddy, fresh, wet, rhythmic *moods* of an ecological consciousness. I stole Kipnis' voice because of these moods. Not because they encourage the reader to drift into a state of ecological consciousness—though I have used that tactic in this text—but because they permit a cross-disciplinary discourse rooted in a respect for the subjective experience and specific intelligence of each participant/discipline as contributors to an emergent, cosmic intelligence. (These are the moods of late night arguments with colleagues over drinks, of podcasts like RadioLab and This American Life, and of science-writers like Steven Johnson, Jaron Lanier, James Surowiecki, and Jonah Lehrer).

WHERE DID PLATO GO? As (architects) participating in this discourse Kipnis (and Careri, and Weinstock, and Menges) and I argue that *everything* is matter, and that matter is the processes of the organization of urrstuff. This raises a problematic question: does the artifact of architecture cease to be? Does it matter? In my book, the Platonic idea of matter, and of artifact, is eclipsed by a new incarnation of Aristotelian matter, and history, and meaning: D'Arcy Thompson's bird-bone trusses, A.N. Whitehead's Philosophy of Organism and Lanier's red bucket. I can't bring myself to explicitly reject the Platonic ideal form, but my attention is inevitably drawn not to the idea of a shape but to the emanations of the shape itself and to the infinitely various and specific feelings erupting as those emanations are received by the surrounding ecology.

History, for me, is not contained in a form frozen in one moment in time, rigidly projecting one, static, material organization. History exists within the promiscuous eco-linkages effected by the processes of the organization of matter and the responding ecological reconfigurations. While this trope sets me up to be an architect of forgettable architecture (forgotten as it is formed), it permits me to escape the society of the spectacle, where object, author and consumer are thought of as separate, and instead reveal the inescapable participation of each of these in a complex evolving history/ecology. "Now, these days, it dawns on us at long last that we are not in the universe, but of the universe" (Jeffrey Kipnis, "On the Wild Side," 2004).[206]

Though beyond our scope at the moment, a meditation on the specificity of emanations and the different types of feelings induced by an emanation, among individuals within a species and across species – not just living ones – is crucial to the materialist recuperation of knowledge, wisdom, information, communication and consciousness from the dematerialized-idealist versions fomented by critical analysis, particularly as semiotics, mathematics, programs and other wraiths conjured by the cult of ideas.

Jeffrey Kipnis, On the Wild Side, 2004.[207]

NOTES

MOVEMENT 1: HOMO LUDENS

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