

Log Reclaim Resi[lience]stance //.....R²

SUMMER 2012

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Log Reclaim Resi[lience]stance /.....R²

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1. In Herman Melville's novel, the animal's whiteness should be viewed as one of the last unknown lands to still resist the mapping of the world and its reduction. A last vestige of a time when nature did not allow itself to be tamed or ruled... before its sudden, violent, blinding awakening (Hurricane Katrina, El Nino, cyclones Jeanne, Tomas, and Nargis, Hurricane Xynthia, Typhoon Ewinar, earthquakes in Indonesia, Japan, the coastal tsunami of Fukushima... a chain of devastating uncertainties that we couldn't predict, despite our seismographic sciences). Faced with the autistic, blind, deaf and dumb violence of our mechanisms of technological, industrial, mercantile, and human domination, nature reacts... in a stuttering version of the original chaos... in a mutiny against human organization... Gaia seems to take its revenge. Nature is not an ideological "greenwashing" in some cozy living-room politics, neither is it a millenarist eschatological Eden park, which we've been very lucky to escape from, liberating ourselves from the hedonist harvester so we can negotiate with the dark, hostile forces that were hiding in the depths of the forest...

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I am an imposter. They told me so... finally... it's out... What am I to do now with the life of agreeable fakery that binds me, in claimed feebleness, to things and to people, to suspect humanity. We could wonder about this..., and wander... together... as if it were some new territory to discover... a blank map, some terra incognita... a Moby Dick¹ on the move with Gregory Peck clutching at the ropes of his Harpoon, dead yet still alive at the same time... Step right up, Boys, Girls, and Androgynes, you'll get your money's worth... *Log* is so cheap... let yourself be what you're not, too, slip into a schizophrenic zone, a thick soup of contradictory desires emerging from the clay like the hydrocephalic Golem-Golum... that way you, too, can naively elude our unpredictable and irreducible conflicts, which are part and parcel of domination and slavery, destruction and the new, fusions of ugliness and beauty, obstacles and possibilities, garbage and fresh blooms, threats and various forms of protection, technician prowess and forces of nature... Here everything comes together and interlocks. It's all here, in the making, in a movement in the making... Step right up, Boys, Girls, and Androgynes... Let yourself get carried away, to see and tell what connects us, the people behind this *Log*, but also all the rest, the ones who stir up trouble and take shelter in these friendly, territorial, womblike refuges where you can circle around in the ill winds that blow through congregations and metropolises, in all those places, those little hotspots. And anyone can follow suit, as long as it goes toward making a "place" that we can mine for whatever remains habitable, desirable, or musical in the gloomy universe of planetary noise. It's good, it's really good. It comes in the form of a human group, a repeopleing of the social structure in the form of a dream. A dream of social climates, empty lots, existing forms of nature and people and enhanced intimacy. It alters what exists, it marks out vanishing lines, subjectivities, it throbs in the form of

2. From the French *bricolage*, from *bricole*, the Roman catapult, a siege weapon, made in situ by extracting and transforming the materials at hand in whatever situation.

3. Cited in Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987), 18.

4. *Ibid.*, 19.

5. Aldo Rossi, *L'architettura della città* [The Architecture of the City] (1966; repr., Macerata: Quodlibet Abitare, 2011).

6. "Cause I'm a criminal/ You're goddamn right/ I'm a criminal/ Yeah, I'm a criminal." Eminem, "Criminal," *The Marshall Mathers LP*, compact disc, © 2000 Aftermath/Interscope.

local stories and languages, little tales, the stuff of fables and narratives garnered by tacking together and tinkering.² It isn't totally iconoclastic, but cultivates a profound fear, an aversion to preformed, reproduced optic matter, standardized image/merchandise. It's also nasty... Not really ready to buckle under and keep its mouth shut. Then again, it's naive and full of good ideas, forced as it is to elbow its way through the monstrous dump of social media junk... It's the planet within the planet, the swarm of bees buzzing in the face of a society that has become bogged down in the deterritorialization programmed by Deleuze and Guattari (*Anti-Oedipus*, 1972). It's "the weed in the human cabbage patch" that Henry Miller talked about. "True, the weed produces no lilies, no battle ships, no Sermons on the Mount... Eventually, the weed gets the upper hand... Grass is the only way out... The weed exists only to fill the waste spaces left by cultivated areas. *It grows between*, among other things. The lily is beautiful, the cabbage is provender, the poppy is maddening – but the weed is rank growth..."³ It lives in this grassy environment, between the flotsam and jetsam and other detritis of this society of chaotic performance. It tinkers, recycles, reconstructs in all historical senses of the term. In other words, it proceeds without apparent method, by means of declarations, unstable desires, and objectives – so much so that it's fun to see those bent on destruction deducing scraps of theories and rules of etiquette from it all. Go ahead, trample on this patch of lawn, it can stand up to anything, it's a football field with lots of sides. But is it the final round of human forms preceding the final collapse and freezing over, or just some bushy piste, with "successive lateral offshoots in immediate connection with an outside?"⁴ Then again, no one gets it, it remains an ellipsis, but so much the better... a problem of writing, there absolutely have to be "anexact" expressions to nail something exactly. Let's say that it is about naming those aesthetic species that grow wild between social snowdrifts. The rhizomatic bad seed sown by the two philosopher friends that stocks us up again.

It proceeds by variation, expansion, and conquest, via crossing points, recycling, adaptation, capture, embrace, tweaking... It's a connection to sexuality, obviously to the animal realm, the plant realm, the world, politics, artifice, machines and bits... like a thousandth plateau... it means discovering continuous areas of intensities pulsating all by themselves and evolving by avoiding being directed toward

7. Reclaim Resilience

- “a plat de resistance”
 - The letter R in *L'Abécédaire*. See Gilles Deleuze, interview with Claire Parnet, *L'Abécédaire*, Arte, 1995.
 - Resistance as William Morris, Walter Benjamin, John Ruskin with Baudelaire / the spleen and the “aura” against mass production / from Craftsmen to Computation Craft, jumping over the standardization of the Bauhaus Gropius period
 - Resistance as Structural Optimization (genetic algorithm, evolutionary algorithm) to “discover” the output by incremental and recursive calculation, through reiteration, for uncertain, unpredictable, un-deterministic protocols
 - Resistance in the social and philosophical manifesto, in the pursuit of the “Etablis,” the “Situ” with some friends in the luggage as Deleuze, Spinoza, Nietzsche, Foucault, Deleuze, Negri...
 - Resistance as a strategy of obstruction (*The Five Obstructions*, by Lars von Trier)
 - Resilience in the recognition of nonlinear systems in nature as a potential for emergence
 - Resistance as a strategy of opposition / La Boétie's “Discourse on Voluntary Servitude,” Thoreau's “Civil Disobedience,” and Gandhi's methods
 - Resistance as suspicion of the resolution of science's failure by science...
 - Resistance-resilience as feedback... animism, vitalism, machinism feedback... for narrative bachelor machines and contingent scenarios...
 - Resilience as the recognition of the post human, infiltrated by and porous to technologies and information, as both a transitory object and subject.
 - Resilience as the recognition of the planet's disease and the madness and contemporary barbarousness and the stupidity of the planetarian petit bourgeois media class
 - Resilience in a strategy of absorption (human adaptation after a shock, a trauma, an impact)
 - Resilience as the inoculation of a pathogen, of a toxicity to improve the resistance to this very pathogen
8. The World Economic Forum (WEF), a nonprofit foundation based in Geneva, describes itself as an independent international organization committed to improving the state of the world by engaging business, political, academic, and other leaders of society to shape global, regional, and industry agendas. The Forum organizes its annual meeting in Davos, a mountain resort in the eastern Alps region of Switzerland. The meeting brings together some 2,500 top business leaders, international political leaders, selected intellectuals, and journalists to discuss the most pressing issues facing the world... *as it should be.*

a culminating point or external end, a little war machine, an automatic pistol of combinations, associations... assemblage *in vivo* that's a lot more incisive than innovation *in vitro*... It operates like so many “dream machines,” pitted against the methods, messianisms, and mercantile theories of happiness, the natural state privatized and reprimativized, symbols, progress. When everything has once and for all suddenly descended into anything goes, the deep freeze, urban guerilla warfare, and the rest of the whole shamozzle, there remains that sixth sense, nerve endings and defensive reflexes. And don't think it takes to the maquis, either, that it goes in for underground resistance. There is a reality principle that doesn't seek to be right against the daily disorder but walks gaily over its ruins. It lives in broad daylight, not in the shadows, because the shadows are a refuge for jumpy activists living in the comfort of their ideals... clowns, as Žižek calls them. It doesn't illustrate destruction or violence, but is a state of things, a palpitation between Eros and Thanatos. It isn't there to reproduce what is, or to eliminate its existence, its precondition, its affects... “Nostalgia is a weapon,” wrote Douglas Copeland in *Generation X*. Why should we deny ourselves access on the pretext that this particular furrow has been ploughed by the archaeologists “della città,”⁵ regressively, in lazy imitation? The word still exists, the sentiment too, we're going to have to wheel it out again, push it into the very heart of whatever situation, like a hesitation of time's arrow, here and now, here and elsewhere, elsewhere but not just anywhere, avoiding the futurist past as much as the positivist future... Quite the opposite... And anyway, why would “It” be more moral, why would it have some right over the whole collection of good wishes and good consciences? There are so many people who are happy to carry morality's flag, they're legion, as numerous and powerless as criminals.⁶

RECLAIM RESILIENCE R¹⁷

In this violent antagonism, within the hollow of this personal disorder, this personal conflict, we are facing two worlds facing each other: WEF versus WSF, Davos⁸ versus Porto Alegre⁹... on one side, business and its operative economy, both financial and managerial; on the other, all the multitudes and their potential for organization from the bottom up – for a productive and operative resistance against the first. How can the architect, artist, scientist, writer, and citizen absorb, swallow, and digest this Janus-like condition

9. The World Social Forum (WSF) is an annual meeting of civil society organizations, first held in Porto Alegre, Brazil, which offers a self-conscious effort to develop an alternative future through the championing of counter-hegemonic globalization. Some consider the WSF to be a physical manifestation of global civil society, as it brings together NGOs, advocacy campaigns as well as formal and informal social movements seeking international solidarity. The WSF prefers to define itself as “an opened space – plural, diverse, nongovernmental, and nonpartisan – that stimulates the decentralized debate, reflection, proposals building, experiences exchange, and alliances among movements and organizations engaged in concrete actions toward a more democratic and fair world.... a permanent space and process to build alternatives...” *against what it seems to be.*

10. In pursuit of the notion of Félix Guattari’s “The Three Ecologies.”

11. In psychology, resilience refers to the idea of an individual’s tendency to cope with stress and adversity. This coping may result in the individual “bouncing back” to a previous state of normal functioning, or using the experience of exposure to adversity to produce a “steeling effect” and function better than expected. Resilience is most commonly understood as a process, not as a trait of an individual.

12. A scientist, a mathematician, creates a function... it is mainly an act of resistance... against the wishes of casual opinion... against the whole domain of stupid questioning... Creation is resistance... it is production of exaggerations... and their existence is the proof of their resistance... against the stupidity and vulgarity... See Deleuze’s *L’Abécédaire*.

13. When John Ruskin writes of the arrogance of the Renaissance, he claims both the over-instrumentalization on the part of geometry to frame limited types of knowledge and, simultaneously, the arrogance of the people owning this tool to discredit all others and to establish their authority, putting an end to the social organization of knowledge and construction developed during the Middle Ages.

without favoring one over the other? How can they walk on the razor’s edge, following a schizoid strategy of weaving together contradictory forces, of knitting together two genetically opposed wires? On the one hand, technology as a vector of invention in the pursuit of “businessdom,” the mix of free enterprise and the ideology of progress that was a basis of the *democracy empire*, and on the other, the growing of the bottom-up, of the biopolitical tribes, suspicious of the delegation of power’s simulacrum as a highly imperfect and corruptible system that needs to be renovated by, and through, the multitudes and their creative energy and potential.

Log 25 explores ways to navigate this antagonism, which could be negotiated in an (un)certain and ambiguous manner... nonhierarchical, nondeterministic, defining a path in which *architectural protocols* could fuse bottom-up and top-down, contingently, simultaneously, as if the ingredients were making recipes, and the recipes were modifying the substance of the ingredients... apparatuses of exchange,¹⁰ which transform the game of power and the knowledge diffused through that game.

The stuttering between Resilience¹¹ (recognizing vitalism as a force of life) and Resistance (“Creating is resisting”)¹² seems, in a schizophrenic logic, a plausible hypothesis... shifting, drifting, in the crack of territories between strategies of emergences, manipulating processes, computation, fabrication... flirting with the fetishism and the arrogance¹³ of tooling, daily updated Stakhanovismly as a psycho syndrome of our alienation... and... at the opposite... the line of their own *subjectivation*, their “raison d’être”...

In this context of endless perplexities, it is not innocently that a group of philosophers requestions the foundation of “our ideal insane asylum,” called democracy, through the validity of its structure and the procedures of delegation of power; questioning notions of government, of governance, of bio-democracy.

Contradictorily, the discipline of architecture in the time of now feigns ignorance of this genuine conflict, and concurrently legitimizes more and more its identity, or the illusion of an identity, at a condition of noninvasive, nonsubversive, nonpolemic, nonpolitical consequences.¹⁴ In this inoffensive demonstration of wallowing in a cozy postdigital a(e)ffect, addicted to a totemic production,¹⁵ “we” seem to be afraid of the wolf... afraid of losing the privileges acquired over a period when the reason of the few prevailed over the destiny of the many, sitting squarely

14. “Non-Standard Architectures,” the 2004 exhibition at the Pompidou Center, is behind this shift or, rather, regression in the status of the architect, who once more becomes a simple designer... As Hal Foster writes, “After the heyday of the Art Nouveau designer, one hero of modernism was the artist-as-engineer or the author-as-producer, but this figure was toppled in turn with the industrial order that supported it, and in our consumerist world the designer again rules. Yet this new designer is very different from the old. . . . One thing seems clear: just when you thought the consumerist loop could get no tighter in its narcissistic logic, it did: design abets a near-perfect circuit of production and consumption, without much ‘running-room’ for anything else.” Hal Foster, *Design and Crime (and other Diatribes)* (London: Verso, 2003), 17–18.

15. The scale of production acts like capitalist compensation for the architect’s loss of influence, as does the money received in exchange for recognition of his powerlessness, on condition that it be both cynically performative and three times the size it was. *Vouloir-faire*, wanting to do, is substituted for *savoir-faire*, know-how (*kunstwollen* vs *kunstkönnen*).

16. See Michel Foucault, *History of Madness*, trans. Jean Khalfa (London: Routledge, 2006).

17. According to Deleuze, “disciplinary societies are regulated by *watchwords* (as much from the point of view of integration as from that of resistance).” Gilles Deleuze, “Postscript on the Societies of Control,” *October* 59 (Winter 1992): 5.

18. And neither the abusive “greenwashing,” nor “social networking entertainment,” nor, worse still, “postdigital-parametric” blindness are likely to redefine a position, a transmission point, from which we could “exercise our power,” our praxis (in the sense of human activities capable of transforming social and political relationships).

within the fantasy of control: from a disciplinary urbanity, based on the model of psychiatric hospitals, and panoptic prisons as a model and instrument of urban planning,¹⁶ we have slipped into an informational system of control, into a whole panoply of watchwords, to take up Deleuze again.¹⁷ The modes of constituting the city are so well-coded and planned that they induce in advance instructions for its “proper usage,” “directions for use” in which playing around with its reordering is no longer tolerated. The systems of incarceration of the classical age have no reason now to exist, so the manufacturing of cities apes its principles of surveillance¹⁸ in an “open sky.” This is something we sense... but what’s more pertinent, as Antonio Negri underlines in the conversation that follows here, seems to be the return to the industrial world, of the factory, the mill, via its modes of production, profit, and enslavement in relation to what lies outside it... of the city itself, which has become the very stakes of the production and trafficking of ideological and financial values. The architect has become the mainspring, the *cheville ouvrière*, of this process in the literal sense: he is the “worker” on the city assembly line, from Detroit to Shanghai, producing the icons of triumphant, authoritarian capitalism (the new El Dorados of Asia!) via its exchange zones without being remunerated with the surplus values engendered, the capital generated.

As a hired hand, capable and lobotomized, the “sub-proletarianized” postcapitalist architect is not only the main link in the assembly line of industrial and urban products; parallel to this, he is also the elegant mask of the duplicity of a system that hides its true nature through the artificial eroticization of this “flagshipshit.” Subservience to a manufactured product, without questioning the conditions in which that product is made – which could be read as the conscious projection of willing slavedriving – has simultaneously generated a general impoverishment and dumbing-down of the field of architecture. To trigger and regulate this intellectual pauperization, the “professionals of the profession” have invaded and cannibalized the terrain of the academies so as to bend them to their own needs: to produce the alienated workforce, super-talented when it comes to tools but servile when it comes to their jobs, required to surf modes of manufacturing that are at once operative and cynical... eviscerated of any rebellious, not to mention alternative, hypothesis that would turn their talent into a tool for transforming the system.

It's not so much postcapitalism that is in question here as it is the conditions in which architects have tried not to play around with its malleability, its capacity to absorb strange, not to mention toxic, bodies capable of undermining its predictable mechanisms...

It's true that the media visibility that arises from such submission operates like some psychotic reward. It produces systemic pathological effects, precisely the known symptoms of the industrial subproletariat: the worker of the week at McDonalds and the Pritzker Prize are blood brothers – a photo on the wall of their dependency, in thanks for their docility. But submission to the mechanisms of power and authority “doesn't pay” except for those who serve as vehicles for that illusion. It is only in strategies of conflict, opposition, indignation, and occupation that the capitalist structure, an ectoplasm with an adaptable and variable geometry and contours, agrees to renegotiate its transactional modes... But for this malleability to operate, we first have to run the risk of confronting it, causing it to crack, biting it, in close combat, using tactical strategies of visibility and fallback... facades and dissimulation... offensive drives... occupation of turf, in the hollows of conflicts, in the hollows of speech utterances, their rescripting, their de-alienation – not in the cozy living-room idealism of the defeat of thought.

Architects as a whole have neglected to hunt “the beast.”¹⁹ Claiming to be serious, rigorous, expert, professional, they have naturally and willingly and as a matter of course made themselves subservient to the system that is supposed to feed them, and in return, logically, they are underpaid for such subservience. This particular form of masochism, which is not so much masochism as it is acceptance of the sadism of the system, is actually, at the height of irony, seen as... a performative act.²⁰

Surely we're forced to reread the political distance... the ontological schism... between these the notions of sadism and masochism²¹... from the one, we should be able to exercise our strength by the effective recognition of enslavement to a system, by finding new contract-based solutions to its limits, its contents, its modes of dependence, and strategies of infiltration, of resilience; and from the other... the sadism that profits from our ingenuity, false virtue, or proclaimed cynicism, to organize the institutions and modes of operation taking advantage of this (false) innocence... to alienate, bow, bend, according to its specific

19. It is no innocent matter that the very people who generated the factory city, “a product of industry and marketing” to use the political phraseology of the barricades of the 1970s, are now transforming that factory city into a tool of capitalist propaganda, sharing in its construction like a randy, gangsterized rotary club. It is no innocent matter, either, that the critical systems in charge of questioning their validity simply offer them a helping hand, fascinated by the power that these great strategists grant them in return for their dependence.

20. At the tip of the iceberg are Rem's epigones and rejects whose names, among others, would be pointless to list.

21. A subtlety developed by Gilles Deleuze in “Coldness and Cruelty” (1967), in *Masochism: Coldness and Cruelty & Venus in Furs*, trans. Jean McNeil (New York: Zone Books, 1989).

agenda, with no safeguard other than its quarterly profit and loss accounts...

In these conditions, and by default, it would be prudent to ask ourselves about the legal framework of such a submission, of the protocols of Sacher-Masoch, and even to define the mechanisms of exchange, domination, enslavement, eroticization and suffering, as a potentially contractual support element of this same transaction... and to redefine what constitutes the nature of that contract... not just in terms of the relationship between the parties, but in terms of the representation of this relationship: masochism is a theatricalization of the transactions involved in the human comedy, a way of exorcizing their hidden face, revealing, reawakening, opposing urges, Eros and Thanatos, life and death, at one and the same time... indissociably... and liberating the protagonists from the authority of the systems of control, in order to introduce obstacles, conditions and limits, instructions and contradictions, childish pranks and perverse acts... that make the nature of these transactions visible...

This is what the ecosophy of things, substances, and beings is... as well as the lucid recognition of a kind of *operatism*... capable of transforming the rules of its exercise, of its power... like the rules invented by "the bent man"²² who faces his demon: the supposed weakness of a strategy of resilience, nestled in the very hollows of modes of operation that act, bend, corrupt, script, subjectivize... in order to free the narratives from alienation...

But make no mistake, we are not dealing here with crazy new flagellants, eschatologists, oozing blood at the feet of the cult's ministries, but with tribes which infiltrate the very mechanisms that underpin and articulate the visible, both those linked to language, from speech utterances to all kinds of writing – poetic, political, psychological, prosaic, mathematical, computational, as well as multiple crisscrossing, entangled narrations, *but also* those linked to machinist tools, to the manufacture of things and substances, as well as those navigating this side of that, casting lines of *subjectivation*, of force, cracks, great escapes, made up of incongruous assemblages, tactical bouts of paranoia and schizophrenia, about to venture into possible new orderings, operative and affective critical apparatuses²³... in a stuttering swarm.

– François Roche

With thanks to Julie Rose, translator, and Olivier Zahm

22. "Call it madness, if you want. . . But the new world knows only resistance. . . When I bend in order to avoid accepting the rules of their authority, I am destroying the foundations, I am insulting their legitimacy. . . There is rage in the face of my madness, a ferocious rage as if they found themselves faced with an act of revolt. . . Cretins, don't you understand that it's exactly that?" Antonio Negri, "The Bent Man" (2005), in *Trilogy of Resistance*, trans. Timothy S. Murphy (Minneapolis: University of Minnesota Press, 2011).

23. "What is an apparatus.... in a game of power, strategies of relationships supporting types of knowledge and supported by themselves; both orderings of desires and of creations in Deleuze, apparatuses of knowledge and of power in Foucault, indissociably linked." See Monique David-Ménard, "Agencements deleuziens, dispositifs foucaultiens," *Rue Descartes*, no. 59 (2008): 43–55.

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The mandate of *Log* is to observe developments in architecture. This issue, guest edited by the French architect François Roche, presents the work of individuals loosely assembled around the ideas of resistance and resilience – which Roche writes as resili[ence]stance. Working with a guest editor is always a challenge. As the issue began to take shape, we disagreed over content and the notion of “quality,” and as I was confronted with texts that experiment with or resist – or even ignore – rules of grammar, narrative, and punctuation, I became newly aware of an editor’s role in shaping a magazine.

Thus the reader who dips into the prose and poetry and equations and scripts that follow, the ellipses and forward slashes, and, yes, the footnotes, will discover very different ideas of architecture. *Agents and robots and machines* loom large – especially machines. Not Le Corbusier’s machine for living, which is but a pale concept alongside today’s machines, but animated machines no longer strictly in service to society; rather, they communicate, build, and literally stipulate how we live.

This is not an “architecture” that I know well, but it is research that is happening in the name of architecture. It is not clear that what many consider to be the primary problems of architecture – space and form – are of universal interest here. In this new language of design – derived from codes and scripting and bodies – there is something almost anti-architecture. Perhaps that is the game: resistance not against laws or systems or politics, but against architecture itself. I will let you, the reader, decide. – CD



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Postcard:

inkings (Once upon a time . . . happily ever after)
Photo courtesy François Roche

The measure of the day

I plotted
Without knowing that I was plotted
A space of negotiation
Without knowing that I'd have to negotiate
In the space
Without knowing that it was going to be
My space

I can't remember anymore
I'm incapable of remembering anymore
The moment
When the space became
My space

Then I took a chance on looking
Until I saw what I will never see
I saw the plan that the space
Had made of me:
A monster
A monster who laughs and cries with the same mouth
A comic, tragicomic monster
As only children
Can draw

Were we that laughter and sorrow?
One day will you be anything
But a monster?

I am the owner of the only
Atrophied muscle of space
The muscle of the atrophied
Present
The infra-spiny muscle
The tensor muscle of that wild evening when you run
Spasmodic muscle of the space
Between you and me

I am simultaneous
I am immediate
I want everything
Everything
Right away
I want to be simultaneous
I want to be immediately immediate
I want to be here and there
Nothing is enough for me
I suffer from chronic insufficiency
It's a chain around my neck

A cell I wear as a jewel
That dies
That dies right away

The space no longer understands me
Since I started plotting its contours
Without knowing
What its contours know about me
I am the flesh called space
The flesh and the muscles
That make the fullness and the void

The space

I know that it wants me right away
Living everything
Right away
And everywhere
Like an octopus
So I am an octopus
Monster
And tentacles

The plan got away from me
The construction got away from me
The space got away from me
So I destroyed it all
I destroy all

I was a cannibal
I ate a part of my many bodies
Until I no longer
Lived anywhere but in a still
And some bandages
I live in the bandaging
Of my architects

What I negotiate
Is my loss
Short term
Medium term
We discuss

When should my past
My present
My future
Dialog on a vibratory heath
A natural home
A sentry
For an ordinary horizon
An endotic line
Where I am an extrasensory
Sun

What I wanted to plot
What I will plot when
My fingers grow back
Is the livable mind
The habitable mind
The mind at the heart of which
The space will take the chance of seeing me
Ordinary
Extrasensory
Sun

Mind in the shape of a dialog
Dialog in the shape of a sentence
Sentence in the shape of a bedroom
Bedroom shaped like us

Don't talk to me anymore about motion
Or disaster
Let me accept life
One that does not exclude from each day
The word
Day

Take care
That's the name I've given
To the space
Our space
Before inventing for the bedroom
A sentence in the shape of a door
A door that opens
And never closes

FABRICE MELQUIOT IS AN ACTOR AND
POET. STÉPHANIE LAVAUX IS AN ARTIST.
BOTH ARE BASED IN PARIS.

Architecture on Wire: Resilience Through Vitality

1. VITALITY

Generally, people seem to recognize vitality when they see it – we know what it feels like, even if it arises as part of an infinite array of forms, events, and qualities. If life is the activity of living, an experience of vitality is the coming into felt awareness of that activity, a kind of energetic affection in which living becomes more vibrant.¹ While it doesn't necessarily refer to affirmative events (cruelty also has a certain vitality to it), we often associate vitality with positive forces of excitement and the energetic because these are states in which we more readily tend toward felt awareness of the activity or process of living.

Could something as apparently simple as cultivating attention to vitality be a key to the challenge François Roche sets out for this issue of *Log*? Faced with an antagonism between the bottom-up and top-down, we can no longer convincingly take sides, nor is it feasible to fabricate a utopian condition in which these different movements smoothly enter a coordinated dance. If we are going to weave the contradictory, or knit together “genetically opposed wires,” as Roche declares, walking the “razor’s edge” must surely sting our crafty feet. But that might just be the cruel side of vitality, flanked by the loving smile of its Janus head. As Brian Massumi describes, life is always in the balance:

*There is life when taking-form maintains itself at the brink. Life lives on a moving threshold of metastability, of fragile, provisional equilibrium that is subject to constant perturbation, from whose jaws it must repeatedly snatch its homeostasis. The living thing is an individuation that has no choice but to continue its invention, or face dissolution. Its homeostatic equilibrium is not a simple self-maintenance, but an ever-renewed achievement.*²

If vitality is the coming into felt awareness of the activity of living, then working with vitality involves attending to the process of taking form and finding some kind of “finger” that can feel the pulse of that “moving threshold of metastability,

1. By “coming into felt awareness,” I am alluding to how qualitative dimensions move from background to foreground – into an apprehension of “thinking-feeling.” Brian Massumi discusses how, in perceiving an object, “thinking-feeling slips behind the flow of potential action that the objectness suggests. We let the vitality affect, the ‘uncanny’ apprehension of the qualitative dimension, pass unnoticed.” Brian Massumi, *Semblance and Event: Activist Philosophy and the Occurrent Arts* (Cambridge: MIT Press, 2011), 44.
2. Brian Massumi, “‘Technical Mentality’ Revisited: Brian Massumi on Gilbert Simondon, with Arne De Boever, Alex Murray and Jon Roffe,” *Parrhesia* 7 (2009): 42. Here, Massumi suggests that life can be there even when the biological is not.

of fragile, provisional equilibrium.” But architecture can render this difficult to achieve, burying the pulse beneath a very thick skin. While attention to the effervescence of process over static form is now a familiar conversation, there are persistent oversights. If we have one set of formalist tendencies that is, as Roche puts it, “wallowing in its comfortable post-digital affect,” we also have the obverse, antiformalist, all-is-social-process stance. An exclusive emphasis on either formalism or human social relations tends to miss the different qualities of vitality; the flitting and fleeting processes of connection *within and between* all manner of things. In other words, if we become fixated on either discrete objects or on rejecting the importance of objects (refusing to see them as processual because only so-called “social” relations are important), then it is easy for the vitality of their involvements to pass unnoticed.

Architecture, marching along with many other fields of expertise, often gets stuck in a kind of impasse – as Roche says, caught behind the “fortress wall of its ‘territory,’ with loneliness and detachment and a kind of absurd arrogance.” Another way of seeing this impasse is as a kind of alienated depression, a depletion of vitality arising from a loss of connection with the rich complexity of the world. Vitality is a complex, always collective affair.

2. ARCHITECTURE ON WIRE

One example of powerful vitality that involved both bodies and buildings can be found in Philippe Petit’s tightrope walk between the World Trade Center’s twin towers in New York as they neared completion in 1974. The 2008 documentary film *Man on Wire* offers a superbly choreographed account of this elaborately conceived and executed event.³ In an extraordinary culmination of obsessive, cunning effort, Petit walked out onto the wire to spend an hour performing life at the brink. From the street, crowds of wide eyes stared unblinkingly, fearing to miss the ever-present, potential fall, until Petit walked smiling into the waiting arms of the police. People wept, not just to relubricate their eyes, but in response to the feeling of facing life at the brink; to a shared, intensified experience of vitality.

Petit’s joyfully subversive act held together a complex sequence of moves – both leading up to and on the wire – that were always on the precipice, always close to failure, pressing against the very possibility of their existence like all radical speculations in experimental practice. As such, these moves

3. *Man on Wire*, DVD, directed by James Marsh (UK: Madman Films, 2008).



PHILIPPE PETIT WALKING ACROSS A TIGHTROPE SUSPENDED BETWEEN THE WORLD TRADE CENTER'S TWIN TOWERS, NEW YORK, AUGUST 7, 1974. PHOTO: AP PHOTO/ALAN WELNER.

brimmed with vitality; with a felt recognition of the activity of living – of life. “Life should be lived on the edge,” says Petit in the film. Can it, given Massumi’s description of how life lives, be lived otherwise?

What is clear in *Man on Wire* is that Petit’s WTC wire-walk powerfully amplified something we experience every-day, although mostly unnoticed and wrapped in the habitual, as part of being alive: vitality, or the feeling of life itself. The event was deeply moving because it brought a whispering background movement to the foreground, shifting the ground of experience momentarily, monumentally, and memorably.

One aspect of Petit’s tightrope event was not in danger of being missed by blinking, but rather through a kind of oversight. Buildings are both fleeting and momentous events. Those monumental triumphs – those twin towers that seared the sky higher than any tower at the time – were an essential ingredient in the power of Petit’s performance: they embodied precariousness, even in the solidarity of their coupledness. This embodied presence, even in its standing still, is a temporal process. In recognizing this processual activity, we can feel the life and vitality of architecture. And herein lies the twist of life as Massumi describes it: there is not just the fragility of being on the edge but also the taking-form and the power of *maintaining* that process of taking-form. Remaining “at the brink” means being both vulnerable and, at some temporal scale, solidly ongoing. This double-edged condition is surely what makes life itself extraordinary, but it also points to the vulnerability that can remain hidden whenever we take for granted what appears to be solidly ongoing.

One might argue that the twin towers had already (just) taken form and that Petit’s performance was the real site of life taking form, living out its breathless moment at the brink. But the towers were still doing that too, only much more slowly and massively, with a complex poise of material forces always on the brink of potential collapse. In their standing still, they simply had not yet encountered anything that overcame their capacity to renew, with every blinking moment, their achievement of standing up.⁴ Their quiet, provisional equilibrium, successfully surviving the constant perturbations of the world, resonated powerfully with Petit’s performance. If one can make love with architecture, Petit performed it. He was not just walking along a tightrope, each step a familiar capture of falling, and the twin towers were not just standing there holding a complex of material forces together, each moment another successful act of equilibrium.

4. In engineering terms, this was a significant feat at the time. The fragile provisionality of the towers, in technical, aesthetic, and cultural terms, has been discussed by Terry Smith in *The Architecture of Aftermath* (Chicago: University of Chicago Press, 2006), 97–123.



UNITED AIRLINES FLIGHT 175 HITTING
SOUTH TOWER OF THE WORLD TRADE
CENTER, NEW YORK, SEPTEMBER
11, 2001. PHOTO: MATT H. WADE.
COURTESY WIKIPEDIA COMMONS.

Gripped together, little Petit and the massive WTC amplified the limits of believability. Unbelievably precarious, unbelievably strong. Tear-jerking virtuosity.

Of course, what was yet to be felt in 1974 was the fact that the World Trade Center would become a primary subject in the Western-world-shattering event of September 11, 2001, its horrific, blazing, body-rain crumble etched into our media-soaked minds. This was the moment when the WTC's slow, virtuosic architectural performance no longer withstood the constant perturbations of the world, and fell off its wire – into the arms of the media.

Surely part of the shock of the events of September 11 was that the WTC revealed its provisionality, the “ever-renewed achievement” that it actually had been. Yes, the event told us, we take things for granted, we ignore our vulnerability. We forget that everything is always and inescapably part of incredibly complex, worldly forces and processes both in and beyond themselves. Life can appear easier if we actively overlook the tangled complexity of social, political, material, and other forces in which we are always enmeshed, because interdependency is also vulnerability. After September 11, things that had seemed solid and sure in the urban West, from buildings to distance from political violence, were shaken to life, rendering bare their uncertain, fragile provisionality. Suddenly we glimpsed how an abstract life had been sustained by the WTC all along, as a monumentally present, but quietly ongoing “taking-form maintaining itself at the brink.” This glimpse was charged with vitality – we witnessed and felt an architectural life lunge into the foreground, as the towers fell to the ground. In 1974, this life was both just coming-into-being and falling out of sight, as the WTC neared completion and was settling into soaring solidity. But in its gathering of forces and holding together, Petit recognized the character, quality, and power of its presence as highly resonant with the activity of high-wire walking. As such, when they performed together, we were moved with the force of a shared vitality.

3. EVERYDAY VITALITY

This collaborative performance by Petit and the WTC was an extraordinary event, pulling the extra out of the ordinary in a fairly obvious way. How might we seek out preamplified vitality in the more mundane everyday? Jane Bennett offers clues in her book *Vibrant Matter*, where she explores a “vital materiality” that runs across bodies and things – human and nonhuman – in seeking ways to encourage attention to an

5. See Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham: Duke University Press, 2010).

6. *Ibid.*, 120.

ecology of involvements in which we play a part amongst others.⁵ She moves toward a partial recuperation of vitalism and suggests that it may be worth taking the process of anthropomorphizing seriously once again, because everyday tactics for the cultivation of a vitality of matter might be found through related approaches to the world:

*One might be to allow oneself, as did Charles Darwin, to anthropomorphize, to relax into resemblances discerned across ontological divides: you (mis)take the wind outside at night for your father's wheezy breathing in the next room; you get up too fast and see stars; a plastic topographical map reminds you of the veins on the back of your hand; the rhythm of the cicadas reminds you of the wailing of an infant; the falling stone seems to express a conative desire to persevere. If a green materialism requires of us a more refined sensitivity to the outside-that-is-inside-too, then maybe a bit of anthropomorphizing will prove valuable. Maybe it is worth running the risks associated with anthropomorphizing (superstition, the divinization of nature, romanticism) because it, oddly enough, works against anthropocentrism: a chord is struck between person and thing, and I am no longer outside a nonhuman "environment."*⁶

Bennett's examples do not anthropomorphize in the simple sense of attributing human characteristics to other, nonhuman things wherein they are cast as humanlike entities. Rather, we find aspects of ourselves in the world and vice versa through the sharing of patterns – partial shapes and qualities felt both inside us and elsewhere. She evokes an experience of vitality – a feeling of being part of the life of the world and it being part of us – as one pattern resonates with another. This seems to be precisely where vitality exists: in the resonances that occur through the intersection of similar patterns or textures, amplifying one another in a manner that can snowball into intensities, or pitter-patter away back into a whisper. Vitality is a collective affair.

This was the kind of resonance at work in the relationship between little Petit and the massive WTC. In sharing qualities of activity and presence, their actions amplified one another, setting up feedback loops that produced a vitality intense enough to weep about. Vitality – despite and because of its fragility and vulnerability – is implicit in developing resilience; things can power and be empowered by resonant connections beyond themselves. This can be as simple as avoiding depression and alienation through a sense of resonant connection into worlds beyond oneself. Working toward the production of these resonant connections also encourages another side of

resilience and vitality always, at least implicitly, at work: an openness to change and self-transformation.

4. JUST SAY NO: PLASTICITY AND RESILIENT RESISTANCE

No, the high wire is not what you think it is. / It is not a realm of lightness, space and / smiles. / It is a job. / Grim, tough, deceptive. / And whoever does not want to struggle / Against failure, against danger, / Whoever is not prepared to give everything / To feel he is alive, / Does not need to be a high-wire walker.

– Philippe Petit, *On the High Wire*⁷

7. Philippe Petit, *On the High Wire* (New York: Random House, 1985), 9.

8. Catherine Malabou, *What Should We Do with Our Brains?* (New York: Fordham University Press, 2008), 12.

9. *Ibid.*, 12.

10. *Ibid.*, 5.

The risks and difficulties of the kind of practice that Petit exemplifies are relevant beyond the life of a high-wire walker. But this raises an additional problem since such a practice requires a decisiveness and firm commitment that seems to work against the grain of capitalism's demand for flexibility and adaptability – that is, if you don't bend, you will break under the forces of change.

Catherine Malabou offers a related warning and an associated idea that weaves resilience and resistance. Through her philosophical work on the concept of plasticity and its implications in relation to neuroscience, she suggests that our realization that the brain is far more plastic than science had previously believed goes hand-in-hand with the ways in which we understand global capitalism, which requires us to be flexible and versatile subjects. But there is cause for alarm, Malabou insists, if consciousness of our own neuroplasticity (which I would expand to include the plasticity of embodiment and nonorganic life) simply coincides with the spirit of capitalism. A problem she identifies is the degree to which “the true sense of plasticity is hidden”⁸ constantly substituted for its “ideological avatar,” flexibility.

Malabou argues that flexibility only offers one aspect of plasticity, that of *receiving* form. “Flexibility is plasticity minus its genius,” she writes, lacking “the resource of giving form, the power to create, to invent, or even to erase an impression, the power to style.”⁹ With “the capacity to annihilate the very form it is able to receive or create,” plasticity is double-edged and “situated between two extremes: on the one side the sensible image of taking form (sculpture or plastic objects), and on the other side that of the annihilation of all form (explosion).”¹⁰ All life, including nonorganic life, embodies plasticity in its resilient brinkmanship. The plasticity of life is the power to reshape, to annihilate an older shaping and depart from a state to which one cannot properly



ARAKAWA + GINS, BIOSCLEAVE HOUSE
(LIFESPAN-EXTENDING VILLA),
EAST HAMPTON, NEW YORK, 2004.
COURTESY ARCHITECTURAL BODY
RESEARCH FOUNDATION.

return. Taking form, in all its uncertain fragility and vulnerability, is both decisive and an act of resistance. As Marc Jeannerod summarizes in his foreword to Malabou's book, "To be conscious of the plasticity of one's brain is to give oneself the means to say no."¹¹

The same realization may underscore the work of architect-artist pair Arakawa and Madeline Gins, who proclaimed, "We Have Decided Not to Die."¹² Such a decision affects *how one lives*, even if the consequence is not, in the end, the avoidance of biological death per se.¹³ It shapes living in a way that is similar to Petit's description of the difficult job of the high-wire walker. This places him in deeply life-threatening situations, something that Arakawa and Gins's architecture also refuses to shy away from, purposefully producing physically challenging architectural conditions.

The complex architectural schema that Arakawa and Gins developed over more than four decades offers a useful way to shift the example of Petit's high-wire performances toward architectural practice. If Petit's performance practice involved an instructive attention to engaging with architectural life in cultivating vitality, Arakawa and Gins offer an architectural design practice that attends to generating vitality through architecture. Among their approaches, instructive here are the notions of the "architectural body" and "architectural procedures," as well as "tentativeness":

*The living room one enters maps directly onto one's tentativeness as to what it might turn out to be, that is, onto one's budding suppositions as to what might be holding in place as this the living room. . . . Because any landing upon something, any type of contact, will, by turning a hesitant placing into something more definite, reduce tentativeness or put it on hold, it is a fairly easy matter to design an architectural surround that will direct and channel tentativeness. . . . Architectural surrounds stand as shaping molds for the What happens next? of life.*¹⁴

For Arakawa and Gins, "tentativeness" is a way to describe a kind of relationship that one fosters between oneself and the built surroundings, both in entering buildings and in designing them. It is a relationship that remains in-the-making, or "at the brink," fostering feedback loops and resonance between bodies and buildings that can, as the Petit example shows, cultivate vitality.

There are other exemplary and eventful architectural examples at hand through which to think the cultivation of vitality. But it is worth noting that these are always trans-
versal, experimental practices that in some way perforate

11. Marc Jeannerod, foreword to Catherine Malabou, *What Should We Do with Our Brains?*, xiv.

12. See George Lakoff and Mark Taylor, *Reversible Destiny: Arakawa/Gins* (New York: Guggenheim Museum Publications, 1997). See also, <http://www.reversibledestiny.org>.

13. Arakawa died in 2010.

14. Arakawa and Madeline Gins, *Architectural Body* (Tuscaloosa: University of Alabama Press, 2002), 67.

15. See my essay, “Creaturely Collectives: Parametricism and Getting to the Afterparty,” in *The Design Collective: An Approach to Practice*, eds. Laurene Vaughan and Harriet Edquist (Cambridge Scholars Publishing, forthcoming 2012). Here, I offer an analysis of MOS’s work in terms of a “transductive parametricism”: the variational repetition typical of parametricism is moved into a transductive mode of activity, where multiple instantiations of a movement–texture traverse scales and media.

and unsettle boundaries while setting up conditions definite enough for resonances between intersecting patterns and textures to emerge. The work of R&Sie(n) is an obvious example, as is the “transductive parametricism” of MOS.¹⁵

Clearly there is more to be said, unpacked, and developed. But for now it suffices to say that we can begin cultivating vitality in and through architecture by recognizing shared patterns, qualities, and actions, and encouraging resonances between them to emerge. Pragmatically, the question becomes how architects might develop ways of generating architecture that not only resonate with things beyond themselves, but also aim to keep these relations in-the-making or at the brink.

Aerial Architecture

1. In the last decades, the Internet has complemented the powerful physical means of transportation by adding a generic transmission network for all kinds of immaterial information around the globe in almost realtime.

2. See Neil Brenner and Christian Schmidt, "Planetary Urbanization," in *Urban Constellations*, ed. Matthew Gandy (Berlin: Jovis, 2011), 10–13. "Planetary Urbanization" is also the title of a recent conference at the Future Cities Laboratory at Singapore ETH-Centre for Global Environmental Sustainability. See <http://www.futurecities.ethz.ch/news/fcl-conference-planetary-urbanization-comparative-perspectives/> (accessed February 2, 2012).

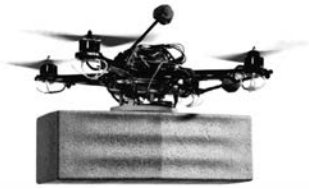
3. Access to aerial locations has also lead to significant changes in cartography. One example is the use of autonomous UAVs in landscape visualization and modeling of Alpine landscapes. Research has been done on the Gotthard Pass using a combination of remote sensing with drones and terrestrial laser scanners at the ETH Zurich. See Christophe Girot, "Scales of Topology," in *New Geographies 4: Scales of the Earth*, ed. El Hadi Jazary (Cambridge: Harvard University Press, 2011).

4. Videos of extreme, algorithmically controlled dynamic flight behaviors can be found in the work of the research group of Vijay Kumar at GRASP Lab, University of Pennsylvania. <http://www.grasp.upenn.edu> (accessed February 22, 2012). See also the work of the research group of Raffaello D'Andrea at ETH Zurich http://www.idsc.ethz.ch/Research_DAndrea (accessed February 22, 2012) and <http://www.raffaello.name> (accessed February 22, 2012).

Flying is a human dream. Propelled by the development of engine power, the aspiration to achieve manned flight and the subsequent desire to gain control over airspace were realized in a single century. Flying became a commodity, which made it possible to transport both people and goods around the planet many times faster than by naval or ground transportation.¹ By reinforcing the exchange between countries and continents, flying has become a ubiquitous driver of globalization and, as currently witnessed, our subsequent planetary urbanization.²

Today, rapid advancements in digital technology are changing the future of flight in a way that is profoundly relevant to architecture. Flying robots are about to conquer the sky. Consequently, airspace will be physically "addressable" by machines and therefore, counterintuitive to its intangible nature, a constructible "terrain." Here, robots not only exhibit their inherent potential for dynamic motion, they also open up airspace to architecture by enabling aerially performed material interventions.

The implication of robotic flying machines is that any airspace can be deliberately accessed and affected as easily as it can be sensed.³ As exemplified by drones (generally used for military purposes), flying machines today can operate and locate themselves without the help of an on-board pilot. So-called Unmanned Aerial Vehicles (UAV) fly by the control of sensors and algorithms. They adjust their movements to forecasted trajectories and correct for external influences like wind gusts or payload. To locate themselves in airspace, they compare map data with reality or relate to spatial reference systems. Beyond simple motions, today flying robots autonomously perform such highly dynamic maneuvers that observers are inclined to attribute to them the skills of living organisms.⁴ Their sophisticated control algorithms could be regarded as a late triumph of applied artificial "intelligence," as digital control dynamically negotiates and tames the instabilities of flight and the volatility of air. For the first time in history, airspace is accessible in such high resolution – literally measurable in centimeters – that it becomes "tangible" to architecture.



GRAMAZIO & KOHLER, FLIGHT ASSEMBLED ARCHITECTURE, FRAC CENTRE IN ORLÉANS, FRANCE, 2011–12. DESIGNED IN COLLABORATION WITH RAFFAELLO D'ANDREA. CLOSE-UP OF QUADROPTER AND MATERIAL MODULE. ALL IMAGES © ARCHITECTURE AND DIGITAL FABRICATION, ETH ZURICH.

5. Flight Assembled Architecture is a project by Gramazio & Kohler and Raffaello D'Andrea in collaboration with the Professorship for Architecture and Digital Fabrication and the Institute for Dynamic Systems and Control at ETH Zurich. See Gramazio & Kohler and Raffaello D'Andrea, *Flight Assembled Architecture* (Orléans: Editions HYX, 2012).

6. The lightweight modules are mass-produced from expanded polystyrene to suit the load capacity of the quadcopters. The module's specific form and dimension is developed by balancing the demands at model scale with actual scale requirements for programmatic flexibility, vertical circulation, and structural morphology. At full scale, the module height can accommodate up to three levels, allowing for the operation of diverse programs.

7. Each module was positioned at a unique horizontal xy-coordinate and rotated around the vertical z-axis. The z-position was determined by registering the heights of the underlying modules at the moment of their depositing. It was thus not a precomputed height, but the physical material aggregation that defined the vertical position.

8. For previous research and exhibitions of the Chair of Architecture and Digital Fabrication of ETH Zurich, including the Structural Oscillations Installation at the 11th Venice Architectural Biennale in 2008, see <http://www.dfab.arch.ethz.ch> (accessed February 23, 2012).

The most radical similarity between digital space and its most immaterial physical equivalent – airspace – is free spatial motion. Just as an “object” can be animated to take any path through a void and infinite digital space, flying robots are, while still adhering to laws of physics, free to move through the air in any direction without being constrained by machine-inherent boundaries. Since the advent of digitally controlled fabrication machines in architecture, robots and CNC machines have typically had fixed positions and defined working areas, which delimit the range of action and thus constrain the size of work they can act upon. As machines are usually smaller than buildings, their use in architecture is limited to the scale of a fragment or component. Flying robots, on the other hand, are neither bound to the ground nor restrained to a fixed working range, acting in a space substantially larger than themselves. This virtually infinite and truly spatial range of action privileges them to work at an architectural scale.

Gramazio & Kohler's recent project, *Flight Assembled Architecture*,⁵ designed in collaboration with dynamic systems pioneer Raffaello D'Andrea and exhibited at the FRAC Centre Orléans in 2011, was conceived in the architectural tradition of real-utopian speculations about the future of the human habitat. A vertical village for 30,000 inhabitants arranged as a porous cylindrical megastructure 600 meters tall, the project is a speculation on the aggregation of an autonomous hyperbuilding comprising supersized modules that locally accommodate most of the functions a village requires. The FRAC exhibition featured a live robotic buildup performed by four flying quadrotor helicopters. The vehicles collaborated to erect a six-meter-high model of the vertical village at a scale of 1:100 by aggregating 1,500 lightweight modules to create the self-stabilizing structure.⁶ A network of intercommunicating computer programs guided the vehicles to the exact locations in three-dimensional airspace for pickup and subsequent nonstandard placement of each module.⁷ From its earliest stages, the design integrates computation, material, structure, and fabrication with aerial robotics in an intensive, collaborative enterprise.

In previous architecture exhibitions featuring live robots,⁸ visitors experienced the computer-controlled behavior of the robotic flying vehicles as natural and organic. Despite their obedience to flight paths – tracked in real-time by a motion capture system – the dynamic motions of the quadcopters appeared fluid and without artificial bias. The vehicles

attracted the attention of spectators in an almost meditative way, and the depositing of the transported modules was often applauded, as if the robots themselves were capable of appreciating human encouragement.

AIRBORNE AGGREGATIONS

Flying robots introduce not only a novel perspective on air-space and robotics, but also on construction, where advancements in material systems and processes will presumably lead to profound changes in the design method, performance, and expressive language of architecture.⁹ The conditions for aerial robotic construction¹⁰ are entirely liberated from the bottom-up accessibility of material, men, or machine. Structures can be erected without scaffolding or cranes. Robots loaded with material move independently of the structure they are building until they momentarily engage in the act of material depositing (or other forms of physical interactions). This new mode of materializing architecture has the potential to induce future designs that become liberated in their spatial (and temporal) morphology while still adhering to laws of gravity. Here – and this is relevant for future architectural practice – a new economy of nonstandard aggregation comes into play, in which elevated, remote, eccentric, and overhang locations are all accessible on equal terms.

Of course, building with flying vehicles puts forward manifold challenges. These entail a profound rethinking of materials and their aggregation or assembly processes. A key issue for materials is weight. As the load capacity of flying machines is limited and the machines' agility directly depends on their load, the development of high-performance lightweight material systems both aerially transportable and robotically deployable will be necessary. The amount of material depositing with each building action might be substantially smaller than in conventional construction, but such a development hints at an increase toward a higher material resolution characteristic of robotically fabricated architecture. Another key challenge for aerial construction is precision. Stabilizing a flying vehicle at a seemingly fixed position in order to affect its environment from that particular "point in space" is highly difficult and requires us to replace the need for absolute precision in construction with more tolerant aggregation systems. If the quest for precision is changed, designs emerge that proactively give room to and express ambiguities and singularities resulting from constructive imprecision and dynamic material processes, turning these into deliberate architectural qualities.

9. See Fabio Gramazio and Matthias Kohler, *Digital Materiality in Architecture* (Baden: Lars Müller Publishers, 2008).

10. Aerial Robotic Construction was coined by Gramazio & Kohler and Raffaello D'Andrea to describe the future research area of flying-machine-enabled construction and assembly.

11. If the position of a part is predetermined by the part's shape and its interlocking with the already built construction, then robotic placement does not add information at building time. Discounting economics, it could therefore also be manually placed.

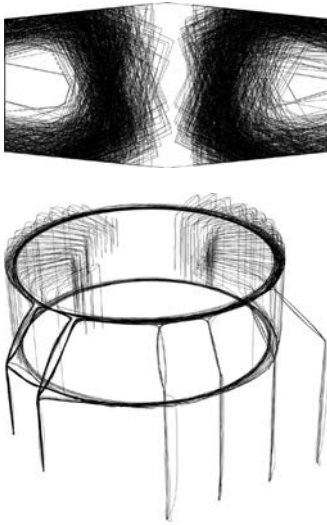
12. The physical lifting capacities of heavy-lift helicopters are limited with regard to building construction. The maximum lifting capacity of cargo helicopters today is around 10 tons. In 2008, Boeing announced plans to develop the SkyHook, a hybrid airship-helicopter capable of lifting 40 tons.

Assembly under such conditions goes well beyond lifting a part into a position that is geometrically predetermined by other parts.¹¹ Building “in the air” should leverage the full robotic degrees of freedom by arranging parts in ways so that their truly spatial, nonstandard joining adds relevant complexity and unprecedented, possibly rhizomatic qualities to the design. Aggregations through the secretion of nonsolid materials and other forms of material processes are also possible, as long as they match the lifting capacities of the machines and maintain energy and material resources efficiently. Even material delivery can change, with local materials or parts from a nearby setup field-factory flown directly to the building site. As a result of such profoundly altered constructive paradigms, radically new, nonstandard “aerial construction kits” need to be developed, which in turn can trigger surprising and intricate architectural inventions. This reconfiguration of material systems leads to an architecture that reinvents its agenda and fosters a new language and articulation of space through differentiated aggregations.

COMPUTATIONAL PILOTING

Flying robots manipulate material according to a detailed digital blueprint and operate under the explicit guidance of an architectural design. In projects such as Flight Assembled Architecture, the robotic system has a detailed overview of all relevant design and construction information at building time. The system is guided by design data while at the same time sensing itself in its environment. Thereby, the possible amount and differentiation of design information, as well as the complexity of behavioral rules that guide such robotic systems, is virtually unlimited.

Digital control enables robots to communicate and synchronize among themselves and respond to their environment in real time. Consequently, robots can manipulate or transport materials not only individually, but also in joint cooperation. Current “brute force” aerial construction methods – for example, with cargo helicopters – which rely on manual control and machines with overdimensioned capacities thus give way to more adaptive “soft” aerial alternatives, which use multiple, weaker robotic agents that collectively perform a desired action in an intelligent dynamic cooperation.¹² Such robotic systems can even have complementary abilities, very much like workmen with different skills collaborating on today's building sites. Because they share a three-dimensional space in real time, their work capacity is



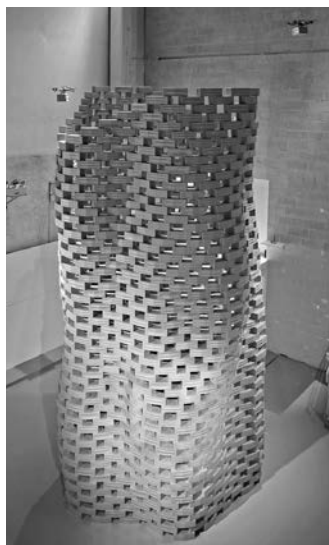
FLIGHT ASSEMBLED ARCHITECTURE.
DRAWING OF ACTUAL RECORDED
FLIGHT PATHS. TOP: OVERLAY OF
MODULE OVERLAPS.

13. The potential of time-based animation techniques to inform architectural design has been explored by a number of influential architects of the first age of digital architecture. See, for example, Greg Lynn, *Animate Form* (New York: Princeton Architectural Press, 1999).

to a large extent scalable. Myriad flying vehicles can cooperate in a swarmlike manner by distributing the workload among themselves and adaptively optimizing their collective performance by constantly renegotiating spatial demands amongst themselves. Far beyond mere optimization, this robotic multiplicity shifts the logic of making architecture from a coarse, serial, and industrial logic to a fine-grained, nonstandard, and truly digital resolution.

The better a virtual model links to its physical reality, the more likely computational design impacts that reality directly, since there is no need for translation or reinterpretation. A three-dimensional spline curve drawn in a CAD program, for example, can already be directly interpreted by a flying vehicle as a trajectory of movement through real space. An advanced computational design of such trajectories can become a deliberate set of differentiated movements of multiple flying agents in space. All six degrees of freedoms for translation (XYZ coordinates) and rotation (roll, yaw, and pitch) – classical definitions in mechanics – plus dynamic attributes such as velocity and acceleration, link digital design directly to aerial robotics. Their free use as design parameters depends on the flying vehicle type and the desired motions. A multi-rotor vehicle, for example, can access any position and yaw orientation in space, while roll and pitch are usually coupled to its motion, and therefore cannot be designed independently. A dynamic, computational design using such parameters not only controls the spatial flight path along coordinates, but also prescribes its behavior – the timing and sequencing of material operations. Design decisions therefore orchestrate the correlation of spatial movements and material actions at building time, reminiscent of early digital architecture's use of the timeline in animation software to create form.¹³ Two decades later, the information produced no longer needs to be “frozen” in a static state of formal expression. Instead, it literally arranges the spatiotemporal motion and material action. Space, time, and architecture coincide again in the new, real-time perspective of the second digital age. Here, a new design methodology evolves, one open to envisioning architecture not only as a geometric final form, but also as a complex and refined generative process of robotic materialization.

In the future, by proactively designing robotic behaviors, the architect will have the option to literally intervene in the construction process. Aerial robots will become the architect's remote agents on the building site, materializing



FLIGHT ASSEMBLED ARCHITECTURE.
QUADROCOPTERS CONSTRUCTING SIX-
METER TALL ARCHITECTURAL MODEL.
PHOTO: FRANÇOIS LAUGINIE.

design decisions by executing physical actions the way the architect specified.¹⁴ When the architect describes these intentions in rules rather than in plans or parametric models, the machine's behavior is not entirely predetermined, and can respond to feedback from its environment. While some architects might fear a loss of control over the final form, others embrace the new liberty in their designs.

AERATING VERTICALITY

Like the Internet, a prospective aerial architecture could not have existed in a predigital age. Produced digitally in all its stages, it “liquefies” the membrane between design and materialization while adhering to principles of reality. In an ideal scenario, aerial architecture explores new design methods that create an explicit synthesis between the capabilities of aerial robotic aggregations and prospective digital design techniques. Aerial architecture is thus not to be misunderstood as a closed definition, but as an open-ended and speculative mode of inherently architectural research and experimentation that values proactive risk-taking.

The scale at which aerial robotic construction will become operational remains unknown. On a small scale, for example, following the legacy of Frei Otto, Konrad Wachsmann, and Buckminster Fuller, lightweight tensile or space-frame structures can be taken further into nonstandard, aerial modes of production. But taking into account aerial architecture's inherent bias toward construction at great height – its liberty to materialize itself “anywhere” in space – its most natural sphere of influence might be on a larger scale that addresses the verticality of the densely populated contemporary city. Today, with the spread of global urbanization, the distancing of human habitat from the natural ground has become a distinct reality in many densely populated cities. This rising “into the air” is expressed not so much as a poetic detachment of architecture from the ground like the vision of certain utopian projects of the 1950s and '60s, but as a pragmatically motivated, ever-expanding, and rather profane verticality, characterizing the morphology of today's urban fabric and its skylines. While doubts remain about the motivations and architectural qualities of many vertical urban developments, the ongoing evolution and expansion of the human habitat into its vertical dimension can hardly be denied.¹⁵ A half century after Yona Friedman's Spatial City, Constant Nieuwenhuys's New Babylon, Archigram's Instant City, and the Metabolists' daring proposals for postwar Japan,

14. The 2011 Procedural Landscape course at the Institute for Landscape Architecture, ETH Zurich, designed landscapes not as form, but by designing the material formation processes using robots and sensor feedback loops. See <http://www.dfab.arch.ethz.ch> (accessed February 27, 2012).

15. While in Europe 40-story high rises are still exceptional buildings, they are a mundane typology for housing, offices, and leisure in many Asian cities.



FLIGHT ASSEMBLED ARCHITECTURE.
RENDERING OF "VERTICAL VILLAGE."

the socioeconomic reality of mass urbanization has prepared and conditioned people to live in dense urban landscapes that expand activities to all accessible dimensions.

Interpreted as a truly spatial habitat, aerial architecture attempts to challenge the prevailing monotony, hermetic character, and plain verticality of high-rise typologies, which result not only from functional issues such as structural or economic constraints, but also from antiquated and repetitive design strategies. Three-dimensionally modeled building skins for dynamic shapes only superficially alter the high-rise in appearance. The aim is therefore to overcome the sheer vertical extrusion of building mass and its "shaping" by venturing into open, spatial, and constructive research on the manifold intricacies and omnidirectional possibilities of computationally designed aerial aggregations that transform the densely populated environments from the inside out. By taking advantage of the temporary suspension of material gravity provided by flying agents, the scope and typologies of physically buildable urban formations can be expanded.

This particular breed of architecture is not only conceived as mountable, but also demountable, adaptable, or reconfigurable without the need for wasteful destruction. Structures can be designed to remain open-ended in order to be partially rearranged and dynamically adjusted over time.¹⁶ Conceived for temporary structural equilibrium, they are deliberately open to reinterpretation and reappropriation in contrast to the conventional high-rise, in which the lifespan tends to be rather short, and recycling largely unsolved. It is even possible that large buildings become displaceable "mobile homes," fully or partially reusable in different locations and contexts, having second or third lives. The challenges, scales, and possibilities of aerial architecture remain to be fully explored.

ARCHITECTURE IN SUSPENSE

Aerial architecture involves and affects humans, materials, goods, and information – the earthbound society, city, and landscape. The proposed shortcut between the aerial and the digital realm crystallizes a future space for intensive architectural exploration, drawing from contemporary design techniques as much as it draws from innovative aerial processes of making. From this synergetic perspective, it is well imaginable that flying robots will become productive airborne tools that trigger a new kind of architecture. But one needs to remain cautious so as not to fall into idealist romantic positions

16. Two German protagonists for open programs were Eckhard Schulze-Fielitz (*Raumstrukturen/Raumstadt*, 1960) and Richard J. Dietrich (*Metastadt-System* 1965). Schulze-Fielitz explains, "I was looking for a serial, open, flexible and multifunctional universal structure that allowed different figurations, fillings and spaces, versatile, mountable and demountable." See Eckhard Schulze-Fielitz in an interview with Stephan Strauss, *Der Baumeister* 96, September 1999, 42.

or succumb to positivist technological propaganda. The aim is a subtle reality-based research that promotes the embodiment of contemporary design techniques in a constructive culture. The desire is to create resilient architectural positions that can undermine current power structures through similar productive technologies without adopting redactive, opportunist, or cynical attitudes. This savoir-faire is a powerful one to hold in architecture's hands.

Yes, aerial architecture is as much about seduction as it is about power. Tenuous moments of flight, fluid dynamic motions, and deliberate behaviors lay bare and challenge the fundamental capacities of computational formations that are in the hands of today's designers. Materialized through flying robots and material interactions, its intricate characteristics are key to leveraging contemporary computational design and fabrication strategies. If aimed at "running," and thus performing, in human space and time, computational design in architecture is not disconnected from, but naturally integrates physical aspects of materialization, construction, fabrication, and robotics in its culture. Computational designs are thus no longer confined to or conceptually rooted in the virtual, but intervene in explicit, perhaps even autonomous, manners into our habitat. In fact, computational design becomes inseparable from the material, spatial, and social reality of architecture.

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In the Cause of Architecture: Traversing Design And Making

*The Machine is the architect's tool – whether he likes it or not.
Unless he masters it, the Machine has mastered him.*

– Frank Lloyd Wright¹

The contemporary exploration of the architectural potentials of robotic fabrication and algorithmic design techniques is most frequently associated with notions of the *future* and unquestioned claims of *progress*. Together these methods are hailed as providing the possibility for a clean break from prevailing modes of practice. However, as with all histories, certain concerns return periodically, and while the contemporary transition to robotics is unprecedented, the set of concerns it catalyzes is not. The disciplinary transitions enabled and implied by these two allied technologies, while a break from the recent past, resonate with more distant epochs, and in particular with the beginnings of the Industrial Revolution and the dawn of modernity. Robotics is thus the unlikely catalyst for another reading of historic positions related to the chain of artistic production.

Perhaps most significant is the desire to (re)affirm and expand the role of the architect as master builder by challenging Leon Battista Alberti's division between design concept and building.² Strongly related to this is the transition to methods of nonstandardized production that has led to what could be described as a nostalgic (re)appropriation of the terms *craft* and *artisan*. Finally, robotics and algorithms combine to yield a changing meta-context within which artistic work takes place, including the ways in which knowledge is shared and evolves. This set of circumstances bears a great deal of resemblance to the practices of the preindustrial guild system. Taken together, these technological shifts may indeed represent the potential for disciplinary transformation, but they point *away* from a myopic concern with precisely how

1. Frank Lloyd Wright, "In the Cause of Architecture: The Architect and the Machine," in *The Craft Reader*, ed. Glenn Adamson (Oxford: Berg, 2010), 107.

2. Mario Carpo, *The Alphabet and the Algorithm* (Cambridge: MIT Press, 2011), ix–xi.

3. John Ruskin, *The Stones of Venice*, ed.

J.G. Links (New York: Da Capo Press,

4. Harry Braverman, "'The Primary Effects of Scientific Management,' From Labor and Monopoly Capital," in *The Craft Reader*, ed. Glenn Adamson (Oxford: Berg, 2010), 79.

5. Ibid.

6. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, eds. R.H. Campbell, A.S. Skinner, and W.B. Todd (Oxford: Oxford University Press, 1976), 781-82.

7. For a historical account of the social themes, central figures, and trade guilds that defined the arts and crafts movement in England and shaped the similar enterprises in North America, see Isabelle Anscombe and Charlotte Gere, *Arts & Crafts in Britain and America* (London: Academy Editions, 1978), 110.

things are made and *toward* a concern for the implications of the structures underlying the production process. As John Ruskin said, "When the science of the building is great, great science is of course required to comprehend it."³

THE DIVISION OF LABOR

Alberti's description of the architectural design preceding its own, direct and unchanged, realization through building set the foundation for a historical and temporal separation between design intent and design realization. This separation is but one example of the division of labor – described as early as 380 BC by Plato in *The Republic* – that would ultimately become the defining characteristic of the Industrial Revolution. "The separation of hand and brain is the most decisive single step in the division of labor taken by the capitalist mode of production."⁴ The dissociation remains problematic in any correlation between craftsmanship and automated or other more generalized forms of mechanized production, essentially because such processes often supplant skill with more trivial tasks such as assembly. To paraphrase Harry Braverman's overtly one-sided account of capitalism's quest for "shop-floor efficiency" – the measurement of time and energy versus output – the only plausible outcome of the disconnection of workers from the "fruits" – value and meaning – of their labor is the "degradation of work."⁵ Even Adam Smith, whose 1776 work *The Wealth of Nations* is largely a description of the economic benefits of the division of labor, warned of the social and political problems that might result when a large proportion of the population's employment is "confined to a few very simple operations; frequently to one or two." The worker, he cautioned, "naturally loses, therefore, the habit of such exertion, and generally becomes as stupid and ignorant as it is possible for a human creature to become."⁶

This division of labor also led to the late 19th-century revival of craftsmanship championed by John Ruskin, Augustus Welby Pugin, William Morris, Charles Robert Ashbee, et al. Their arts and crafts movement sought the rejection of the processes and aspirations of industrialization, which they argued to be socially and morally caustic, instead positing a return to "the medieval system of masters and servants, artists and artisans with a common interest in the quality of life and work."⁷ The revival of the skilled craftsman was considered fundamental to the ongoing pursuit of the unique in the face of the industrial impositions of generality – the procedural,

material, or handling restrictions necessary to the efficiency of mass assembly and mass production.

Apart from Braverman's "degrading" of work and the social consequences of deskilling and demotivating workers, the division of labor has significant consequences in terms of the kinds of outcomes it allows, delimiting the phase space of possibility.⁸ For architecture, this phase space defines the kinds of buildings that can be designed and produced. If Ludwig Wittgenstein was correct when he wrote that "the limits of my language mean the limits of my world"⁹ – if indeed the mediating role that language provides in relation to one's world also contributes to its limitation – then it follows that the drawing, the traditional mediator between design and construction, imposes similar constraints on the architectural process. That this is not merely a philosophical conjecture is supported by William Mitchell, who notes, "Architects tend to draw what they can build, and build what they can draw."¹⁰ In this way, while Alberti's division remains in place, architecture, as Andrew Benjamin writes, "is as much bound to its varying means of representation and thus what these means make possible as it is to material possibility."¹¹ Ironically, material possibility too has been seriously delimited as a result of the division of labor and the requisite commodification of matter in the service of predictability.

CROSSING THE DIVIDE

Computation and robotic fabrication, when coupled to algorithmic design methodologies, enable an explicit and bidirectional traversing of the modern division between design and making, establishing novel pathways and feedback between mind, hand, and machine. To achieve this, it is necessary to develop an algorithmically driven grammar of fabrication capable of incorporating an open-ended set of process-specific variables and calculations. Conceptually, this grammar is software independent. Various groups of architects-cum coders and programmers – Wes McGee, Gramazio & Kohler, Jelle Feringa, Robots in Architecture, Daniel Piker, etc. – are currently developing parallel versions that differ linguistically depending on their architectural predilections (for example, control versus volatility in relation to material behavior).¹² What is important is the integration of the process constraints from the conceptual phase, which can be generative or explicit, all the way to machine simulation and the final output of machine instruction code.

As David Pye writes, "Tools of themselves make nothing,

8. A scientific term coined by Willard Gibbs in 1901 used to denote an abstract space where all possible states of a system are represented as points within an n -dimensional matrix.

9. Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, trans. David Pears and Brian McGuinness (London: Routledge, 1972), 56.

10. William J. Mitchell, "Roll Over Euclid: How Frank Gehry Designs and Builds," in *Frank Gehry, Architect*, ed. J. Fiona Ragheb (New York: The Solomon R. Guggenheim Foundation, 2001), 354.

11. Andrew Benjamin, "Notes on the Surfacing of Walls: NOX, Kiesler, Semper," in *Machining Architecture*, ed. Lars Spuybroek (1991; repr. London: Thames & Hudson, 2004), 342–51.

12. The authors, in collaboration with Wes McGee, have written an open-source, algorithmically-driven grammar of fabrication in Python within McNeel's Rhinoceros 3D software.

13. David Pye, *The Nature and Aesthetics of Design* (London: The Herbert Press, 1978), 59.

14. Wright, "In the Cause of Architecture," 108.

have no capabilities, and produce no forms.”¹³ The determining measure of artisanal production and craftsmanship is skill. This is not the mere acquisition of know-how or the steadying hand of dexterity that comes with practice; it is the application of judgment and interpretation acquired through the attainment of knowledge, not only of learned techniques and tools, but also of the material substrates such methods engage. Thus, while skill is not a property of the tool, it is our precise ability to enfold the potentials and constraints of making within a design method that is critical to the establishment of a skilled system and to bridging the latent divide between concept and fabrication.

In his essay “In the Cause of Architecture,” Frank Lloyd Wright recognized that “the Machine is an engine of emancipation or enslavement, according to the human direction and control given to it, for it is unable to control itself.”¹⁴ Today, communicating directly with the machine – removing the mediation of the drawing – affords more than simply streamlining fabrication, or what industry calls file-to-factory workflows. Such protocols are unquestionably of benefit to aspiring master designers and builders for the increased productivity achieved through the effortless translation of digital geometries into robotic choreography for endless reproduction. However, much more significantly, collaborating with the machine presents a broader opportunity to couple design and making as co-conspirators in equally inductive and constructive ways.

Correlating material and fabrication constraints is often discussed as a necessary requirement for successful design, but in reality this rarely occurs with significant precision. Through generative, algorithmic, and physical form-finding methods enacted via computation, the possibility exists to embed material and fabrication constraints within the digital modeling environment. These so called “process-centric” models contain information beyond purely geometric or parametric properties, and deeply engage what we see as a necessary component of design: an explicit feedback between designing and making. We use the word *explicit* because we believe this is an often sought concept that seldom reaches a level of fluidity where it can become a truly meaningful part of the design process. Reducing or eliminating the steps of translation associated with the transition from design to fabrication not only allows the designer to embed intent into the process, but also, and more significantly, dissolves the hierarchical chains of labor divisions prescribed by prevailing modes

of procurement. The serial and highly compartmentalized processes and responsibilities that have calcified around the professional divisions of labor – architects, shop-drawers, fabricators, and builders with contractually distinct roles – serve only to reduce the possibility of innovation and invention through productive overlaps and feedback. The desire to command the machine is not meant to be reductive, merely acting in the service of efficiency; rather, it is meant to aid in the development of reciprocity between designing and making.

ON VARIABILITY

The machine killed the unique, or so Ruskin, Pugin, and Morris led us to believe. Authenticity was replaced by the generic metrics, ruthless efficiencies, and devouring scales of standardization, mass production, and the consumptive desires of capitalists. This sentiment is not lost on contemporary practice, which now champions the digital – through the lens of parametricism – in the rediscovery of variation and difference through the spectre of mass customization. Generally implied to be universally good, difference is conjured as an endless series of artifacts dimensionally distorted in the service of an individual user's contextual dataset: biometric, ethnographic, climatic, structural, preferential, etc. The classic cases are of proliferate hammers, each with “perfectly” fitting handles, or of sun-shading elements, each precisely tailored to its local solar situation. The general acceptance of the value of these possibilities is reflected in the recent proliferation of hierarchical associative modeling software programs (often imprecisely called “parametric”), and by their giddy adoption by a new breed of infatuated architects and students. Gregory Bateson's conceptual filter “a difference that makes a difference” is useful here.¹⁵ In the case of the hammer, the truly significant dimensional variances are the ones that cause a threshold to be crossed to make what was once a hammer now something else altogether – perhaps an axe or even a crowbar. Akin to the process of evolutionary speciation, this sort of topological change is often prevented at both the design conceptualization and design realization stages by overly constrained systems. Here, both robotics and algorithmic design processes come into their own by being open to and actually enabling massive changes in the topology, and not just the geometry, of their products.

Architecture is populated more by uniqueness than it is by standardization or (serial) difference. The one-off is the rule and the repeated copy an extremely rare exception. The

15. Gregory Bateson, *Mind and Nature: A Necessary Unity* (New York: EP Dutton, 1979), 98.

profession still operates at some considerable distance from the enforced limits of industrial standardization. Indeed, despite the mechanized ambitions of the pioneering moderns – notably the likes of Mies van der Rohe and Marcel Breuer of the Bauhaus – the artifacts they conceived were still produced by hand and *pointed to*, rather than *evidenced*, a future of automated production. Such work upheld the traditions of craft to realize authentic objects that speak to the culture within which they are produced while exercising all the technological prowess and judgment within the artisan’s possession. This situation remains typical within architecture today.

THE EVOLUTION OF DIGITAL CRAFT

The common use of the term *craft* refers to the broader domain of work – discipline, profession, or trade – of the artisan itself. In defining craft this way, we expand its scope beyond that of the artifact to include the very ability of a discipline to continually accumulate knowledge through the absorption and response to social, environmental, and technological change. A pursuit every bit as self-referential as it is speculative and projective, it is a curious condition that any knowledge-society must endure, for it is fundamental to its very existence. This is especially so for a material praxis such as architecture.

Algorithmic design strategies that encompass material properties and robotic fabrication techniques are broaching a more comprehensive and sophisticated integration of matter than that permitted by traditionally divided design methods. They do so through establishing new ecologies of design and making that depart significantly from static, object-centric models with neutral or deterministic relationships to material, and move toward operative models where a given object’s physics – its way of materially entering and occupying the world – is intrinsic to the design process.¹⁶ This entails a return to a focus on techniques, which may, unlike the artifacts they produce, be more or less consistent within the specific and unique practices that define our craft.

THE MACHINE AND THE ARTISAN

The formal characteristics of architecture are intrinsically linked to the materials and processes at play during design and fabrication. Authenticity has historically been associated with the imprint of the artisan, left by way of technique or even error during production. Indeed, errors, glitches, and anomalies have served much invention in design. It is

16. Wes McGee and David Pigram, “Matter and Making,” in *Fabricate: Making Digital Architecture*, eds. Ruairi Glynn and Bob Sheil (London: Riverside Architectural Press, 2011), 74.

commonly thought that the precision of the machine eliminates error and thereby character itself. While this may be true of the dedicated machine, robots – gifted with multiple axes of movement – are able to act in ways that are more gestural: “consistently inconsistent” or “inconsistently consistent.” Precisely idiosyncratic or deterministically indeterminate technique enables the production of emergent character across a divergent set of possible outcomes. The software paradigm of control code allows for these behaviors to be continuously tuned, developed, and ultimately embedded within the processes of design itself.

The difference between robots and single-purpose machines is equivalent to the more generalist abilities of the preindustrial craftsman in comparison with the specialized, albeit extremely limited, skill set of their postindustrial counterparts. Robotic manipulators uniquely embody the concept of an open-source fabrication tool. The manipulators themselves are relatively generic. While they have continually improved in performance, they still resemble their original ancestor, the “Unimate,” which was first filed for patent by George Devol in 1954 and integrated into the General Motors assembly line in 1961.¹⁷ By contrast, the machines that until recently dominated most production lines are only capable of repeating a single task. They may perform this task very effectively, but the consequence is the very definition of inflexibility: When your only tool is a hammer, everything starts to look like a nail.¹⁸ This has two effects on the productive system. First, process evolution is slowed because it can only happen infrequently, as it is disincentivized by both the costs of retooling and the increased risk entailed in making stronger commitments to larger-scale shifts. Second, because material differences are invisible to these machines, they must be kept within strict limits in order to preserve the viability of all artifacts. This demand has exerted a strong filter on the kinds of materials that are industrially deployed and on their style of deployment, away from the volatile and toward the inert. The inherent sensory capacity, adaptability, and resilience of robotics can counteract both of these tendencies, which are essentially conservative or antispeculative.

Machines typically operate through explicit commands and as such are ignorant of the context that gave rise to them and in which they operate. Seen this way, it is naive to claim the machine automatically entails progress. Machine-learning, a branch of the sciences occupied with artificial

17. *Wikipedia*, “Unimate,” <http://en.wikipedia.org/wiki/Unimate> (accessed June 5, 2012).

18. See Abraham Maslow, *The Psychology of Science: A Reconnaissance* (New York: Harper & Row, 1966), 15–16.

intelligence, seeks the creation of algorithms that allow computers – those that instruct numerically controlled (NC) fabrication devices – to evolve task-solving behaviors in response to sensory or data input. The establishment of situation-aware robots was a fundamental occupation of MIT's Architecture Machine Group, founded in 1967. In a seminal experiment entitled SEEK (also known as BlockWorld), metallic building blocks were located on a regular grid inside a glass vitrine, wherein a population of Mongolian gerbils was introduced and allowed to form a habitat. Parallel to the gerbils' appropriation of space, a robotic scanning arm moved back and forth, checking and maintaining the alignment of the cubes. The arm did not seek to reestablish any predetermined global order, but merely attended to slight anomalies via the ongoing and extremely local acts of realignment. The relevance of this strange example is revealed when the gerbils' erratic interventions are supplanted by the dynamic, auto-generating, and emergent behaviors of material as it undergoes work. When seen this way, self-learning machines transcend their role as mere tools, instead becoming more akin to artisans, exhibiting the adaptive and intuitive mechanisms of technique.

Far from a distant fantasy, such self-learning algorithms already pervade our contemporary life: from the more common examples found in our Internet search engines – software to detect credit card fraud, medical diagnostic tools, and environmental control systems – to the more extreme implementation of self-driving cars (prohibited by legislation rather than technology, as evidenced by Google's recent approval to test driverless vehicles on the open roads of Nevada).¹⁹ As Jelle Feringa has observed, such technology can also be found in robotic fabrication; for example, in the feedback mechanisms of force-sensing welding robots evident in today's ship building yards. The realization of situation-aware robots able to compute and make decisions midstream is the most catalytic advancement possible for robotic fabrication and for any possible reimagining of craft within architecture.

META-STRUCTURES: EVOLUTION OF THE GUILD

The resurrection of the medieval trade guild was fundamental to the arts and crafts movement's affirmation of the role of the master craftsman. The guild provided not only a practical framework for the reestablishment and maintenance of disciplinary knowledge, but also a commercial vehicle (Morris & Co, for example) for the artisans themselves. Guilds sought to

19. "Google gets Nevada driving licence for self-drive car," *BBC World News*, May 8, 2012, <http://www.bbc.co.uk/news/technology-17989553> (accessed May 30, 2012).

20. Charles Robert Ashbee had highly implicit working practices at the Guild of Handicraft. Ashbee would issue the craftsman with a very rough sketch that enabled him to interpret and change it as he saw fit. He would discuss the development of the work with the craftsman, and then refine the sketch and model (artifact) again in an ongoing collaboration. See Anscombe and Gere, *Arts & Crafts*, 109–10.

21. Kevin Kelly, *What Technology Wants* (New York: Viking, 2010), 12.

protect tradition by training new craftsmen through apprenticeships, formalizing the transfer of knowledge and technique among established practitioners, and enabling an increasing scale of production so as to reach the “common” (in every sense of the word) market. These guilds were business enterprises driven by a commitment to the idea of “discipline,” and enforced a highly nostalgic social agenda.²⁰

Procedurally, the guilds of the arts and crafts movement are as distant as possible from Albertian understandings – in which making serves only to render design visible – owing to the highly implicit work patterns they fostered. The format of the guild afforded the artisan continuous opportunity to (re)interpret, invent, and essentially contribute to an ongoing event of making akin to the experimental technique of the surrealists’ *cadavre exquis*. The role of the artisan was not to simply play the hand he was dealt, nor restrict himself to the invention of new games with the cards he had, but to exercise his skill and question card games altogether.

Today’s open-source community, arguably the most powerful and contemporary guise of the guild, is part of a broader material and knowledge society described by Kevin Kelly as the “technium – the idea of a self-reinforcing system of creation.”²¹ It is an ecosystem of immense transfer empowered by unprecedented levels, speed, and reach of communication that result in not only the rapid sharing of ideas but also their intensely accelerated evolution. In algorithmic approaches to architecture, this operates across two profound areas: first, via open-source software and second, via new open ecologies of tool creation. Software is tuneable in a way that purpose-built machines are not; thus skill-knowledge can be continuously built upon over time or shift in radical and unexpected ways owing to its mobile infrastructure. Tools invariably begin as generic, but cycles of improvement, adaptation, spin-off, remodeling, or deliberate misuse gradually resolve them into certain forms of specificity.

Confronted with industrialization, the arts and crafts guilds sought more fluid, cross-disciplinary, and self-determining formations of practice, a mode of theoretical and practical resistance premised on intellectual autonomy. We are witnessing a similar condition today, whereby small groups of designer-programmer-makers in control of the means of production via their robotic workcell (which can be purchased secondhand for as little as 500 euros) act autonomously in the invention, design, and fabrication of their work. This is a significant political shift that bears very little

resemblance to the contemporary de-skilling of the architect – the factorylike scales of commercial practice – and the disenfranchising of the builder from design input by way of compartmentalized tender processes.

A SHIFTING DISCIPLINE

Architecture's increasing embrace of robotic fabrication and algorithmic design techniques foregrounds a series of potential disciplinary transitions that are closely related to earlier historical shifts, in particular those which occurred during the Industrial Revolution. The most fundamental of these shifts is the removal of the divide between design and making, which has been a dominant characteristic of the architectural discipline since Alberti. Supplanting this historic divide are multiple feedback loops and bidirectional causal relationships that not only provide the possibility for geometric differentiation, but also enable extreme topological change within the potential artifacts being produced in a process akin to speciation. Further, a close engagement with material properties can once again become a generative influence on an expanded phase space of architectural possibilities. Algorithmic techniques enable nonhierarchical, nonlinear, and explicit negotiations between an enlarged set of architectural intentions and the material substrates and fabrication concerns through which they operate.

The employment of inherently flexible machines permits a shift away from object-centric models focused only on end products, as well as the formational actions, processes, and logics that give rise to them. Due to increased degrees of freedom and the embedding of knowledge and skill within control code, robotic fabrication allows gestural actions, even errors, to accumulate into an emergent form of character. Through the establishment of new open-source societies of knowledge – a contemporary reinterpretation of the guild system – we are experiencing both rapid sharing and an evolution of new forms of highly custom processes and tooling. These in turn give rise to a dramatic and significant refurbishment of the institutional forms of practice. Viewed together, the cumulative disciplinary shifts may be seen as an act of resistance against the increasing partitioning and deskilling of the architect resulting from the division of labor, or a considered push toward reaffirming and expanding the once central role of the architect as master builder through the establishment of new knowledge bases and forms of disciplinary resilience.

Structural Optimization

Weird and unusual shapes have invaded the world of design and architecture in recent years. Developments in computers and software, together with the appearance of new building techniques, have made possible the effective construction of shapes that would have been considered unlikely just a few decades before. Many of these new designs come simply from the creativity of the artist, helped by the possibilities offered by the computational power of modern modeling software. Algorithms and procedures are used to extract patterns and shapes from the mind of the creator and materialize them.

Independent from this rapid evolution, mathematicians and engineers have long been interested in “shape optimization,” or “optimal design,” a class of problems where the shape is the solution to minimizing a given function. The earliest example of shape optimization dates to the founding of Carthage by its first queen, Dido, described in Virgil’s *Aeneid*:

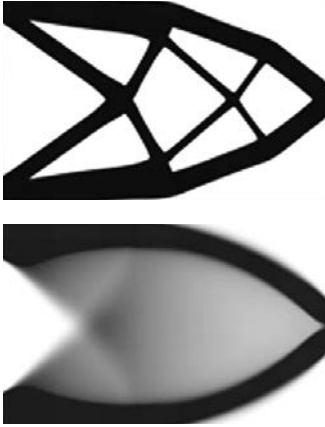
*The Kingdom you see is Carthage, the Tyrians, the town of Agenor;
But the country around is Libya, no folk to meet in war. / Dido, who
left the city of Tyre to escape her brother, / Rules here – a long and
labyrinthine tale of wrong / Is hers, but I will touch on its salient
points in order. . . . / Dido, in great disquiet, organized her friends
for escape. / They met together, all those who harshly hated the tyrant
Or keenly feared him: they seized some ships which chanced to be
ready. . . . / They came to this spot, where to-day you can behold the
mighty / Battlements and the rising citadel of New Carthage,
And purchased a site, which was named “Bull’s Hide” after the
bargain / By which they should get as much land as they could
enclose with a bull’s hide.¹*

1. Virgil, *The Aeneid*, trans. C.D. Lewis (New York: Doubleday, 1953), 22–23.

“Dido’s problem” consisted of the largest area enclosed by a curve of a given length: according to the legend, she cut the bull’s hide into thin strips, with great mathematical intuition, to encircle the land of Carthage. In the same spirit, it is well known that for a given volume, the shape with the smallest area is a spherical ball. Mathematically, this problem can be formulated as follows:

$$\min_{\Sigma} \text{area}(\Omega)$$

where $\Sigma = \{\text{set of all shapes } \Omega \text{ having a given volume}\}$



GRADIENT METHOD. TOP: CLASSICAL
BOUNDARY METHOD. ALL IMAGES
COURTESY THE AUTHOR.

This age-old question belongs to the more general class of shape optimization problems in which, depending on the shape, a given objective function is to be optimized over a given set of all admissible shapes, including possible constraints (for example, a prescribed volume).

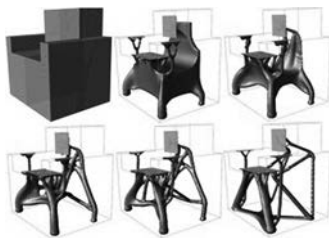
A popular example belonging to this class is to find, for a given quantity of elastic material with known mechanical properties, the most rigid design supporting a set of given external forces. Its dual problem consists of finding the shape with the least volume that reaches a minimal rigidity when subject to these external forces.

Except for a few simple cases, these problems cannot be solved exclusively with a pencil and paper. Moreover, they are “ill posed” in a precise mathematical sense, yielding many unpleasant properties like multiple solutions (or none at all) in the set of admissible shapes and bad properties for algorithms looking for approximate solutions. So while these structural optimization problems were formulated at the end of the 19th century, they did not produce spectacular solutions with stunning new designs until the last 20 years, when computers became powerful enough to run efficient algorithms and new mathematical methods were developed.

RIGIDITY, RESISTANCE, SESILIENCE, COMPLIANCE

In the context of structural optimization, constitutive materials possess known mechanical properties and behavior. The external loadings, like applied forces and prescribed displacements, are needed as input data. The set of admissible shapes may also include restrictions like a global volume constraint or prescribed zones that must belong to the final shape. An important example is to maximize rigidity under a volume constraint. Mathematicians have a tendency to formulate their optimization problems as minimizations so that the objective function is a function of the rigidity – the resistance of a shape under the loadings – that decreases as resistance grows. Minimizing this function thus leads to maximum global rigidity.

There are many possibilities from which to choose the objective function. If the constitutive material has an elastic behavior, a popular choice is the total elastic energy of the system, also called “compliance.” While “resistance” has many uses in common language, “compliance,” like “resilience,” is a more unusual word. Dictionary definitions for compliance include: submission; usually surrendering power to another; a disposition or tendency to yield to the will of



TOPOLOGICAL ALGORITHM, FROM
ROUGH BLOCK TO OPTIMAL SHAPE.

2. The Gothic arch, in particular, is an optimized structure designed to support efficiently the inner forces of the whole building.

others. Its synonyms are abidance, complaisance, conformity, and deference, as well as many other related words like obedience, obeisance, prostration, docility, kneeling, passivity, resignation, and servility. In other words, when mathematicians try to minimize compliance, they are fighting against all these words that together give an *a contrario* definition of the duality of resistance and resilience.

NUMERICAL ALGORITHMS

Until recently, the application of shape optimization had been heuristic and manual. Engineers, architects, and designers used the trial-and-error method to enhance existing shapes, and their intuition to design new ones. Gothic cathedrals can be considered optimized Roman cathedrals – their lighter structures allowed for larger interior spaces and wider windows.² However, the dramatic change in design between these two styles was performed without the help of any modelization or mathematics. Later in history, a kind of manual computation was introduced in the design of iron-truss structures like the Eiffel Tower or the Forth Bridge, where the optimization of the bar networks helped to make them as light as possible.

In the 1980s, computers became powerful enough to begin solving numerically mathematical problems, modelizing the physics involved in a reasonable way. With these it was possible to predict the state of the system for any given geometry and known boundary condition (fixed parts, forces, etc.). These tools were used by engineers to enter a manual loop of optimization: the solution was directly computed from performance, then, according to that solution, the shape was manually modified to improve its performance. Of course, this process was both time consuming and limited; it could not produce either perfect or unexpected shapes since the optimization process was done by a human. A completely automated loop of optimization was not possible, both for mathematical reasons (algorithms were not yet available) and computational limitations (one optimization needed tens or hundreds of direct calculations, each of them taking hours at a time).

Allowing a computer to choose among an infinite set of admissible shapes is seductive, but this idea encountered many technical difficulties due to the ill-posedness of this class of problems. One of the fundamental difficulties lay in the fact that solutions are always defined as limits of sequences of successive shapes, though the limits of such “minimizing sequences” do not always belong to a set of admissible shapes,

3. Of course it is generally not acceptable in an industrial context since manufacturability is one of the mandatory constraints.

even if each of its members does. Imagine, for example, that you want to alleviate a structure by digging some holes into it, with the total volume of the holes being fixed. In many cases, it is more efficient to dig an infinite number of infinitely small holes than a few bigger ones of the same global volume. The resulting optimal structure would then be a sort of foam. This capacity of microstructures to be both light and mechanically resistant can be observed in many natural structures, such as trabecular bones or cancellous bones, which have a spongy internal structure.³ This tendency toward microstructures in optimal shapes made the early “naive” optimization algorithms fail, since they exhibited oscillations that prevented them from catching even approximate and suboptimal solutions.

In the late 1980s, new algorithms were developed that exploited this fundamental weakness and used the microstructures that “wanted” to emerge to build efficient methods, instead of trying to avoid or eliminate them. This is a typical example of resilience: instead of fighting instabilities, they are allowed and used to design new shapes. Another fundamental characteristic of these “homogenization methods,” or “topological algorithms,” is their ability to capture the optimal shape without any assumptions about its topology, which allows them to have an arbitrary number of holes. The weaknesses of this approach are also advantages: the resulting structures are not geometrical forms but rather fuzzy density layouts that must be projected onto classical shapes.

More recently, another type of algorithm has proven its efficiency by revisiting classical boundary methods. Starting from an initial guess, a shape is modified iteratively using a gradient direction method that updates the geometry in such a way that the objective function decreases. The structure is implicitly described over a fixed grid by the zero level set of a function, which allows natural topological changes and provides intrinsic smoothing that avoids oscillations. This more versatile approach is better able than the homogenization method to adapt to different direct problems, objective functions, and complex constraints. With this class of algorithms, it is now possible to tackle complex, nonlinear problems with a variety of constraints, including aesthetic ones. This allows these engineering tools to be diverted from simple, routine use and fruitfully exploited by designers and architects. Together with emerging building techniques and modern materials, these advancements could lead to even stranger shapes and structures. The only limitation will be the imagination of designers.

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Open Synthesis// Toward a Resilient Fabric of Architecture

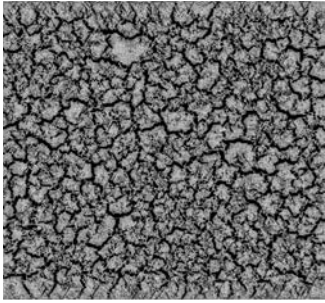
We're starting to address code by template, rather than by numerical location – the way biological molecules do. . . . there really is a universe of self-reproducing digital code. When I last checked, it was growing by five trillion bits per second.

– George Dyson, “A Universe of Self-Replicating Code”¹

CONVERGENCE//

The expanding capacity to capture, store, and interpret an abundance of data simultaneous with the almost invisible yet ever-present proliferation of underlying code is transforming virtually every discipline, from science to economics to design. This underlying language of numbers and code is highly resilient and adaptive, based on universality and redundancy, and nourished by increasing volumes of computing. One such transformation can be seen in science, where advances are increasingly based on myriad correlations instead of causation. The shotgun sequencing method developed by Craig Venter, for example, is able to determine the complete DNA sequence of a genome with supercomputers, vividly illustrating the synthesis of data and code, biology and life. Venter is not looking at individual organisms, but at collectively derived patterns in sequences. Even without knowledge of particular species' appearance or morphology, it is nonetheless possible to recognize unique sequences by statistically analyzing massive amounts of data. Today, new species are being continually discovered just by correlating them with known ones. Simultaneously, physicists at the Large Hadron Collider are working on unveiling the new fabric of reality by smashing subatomic particles without ever seeing the particles themselves, instead parsing them through a sea of data. The examples are endless; they transcend semantics and causality, and already work as a part of mainstream culture. So where does such a context leave architecture?

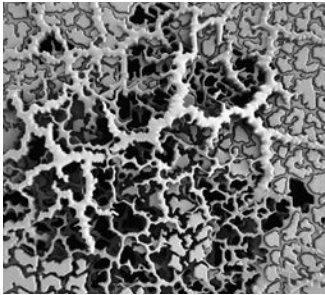
1. George Dyson, “A Universe of Self-Replicating Code,” *Edge*, March 26, 2012, <http://edge.org/conversation/a-universe-of-self-replicating-code> (accessed June 13, 2012).



CONTINGENCY//

Speculative materialism provides the conceptual resources to think a reality that is independent of thought.

– Quentin Meillassoux



BIOTHING, CRACKOLOGY RESEARCH,
2011–12. ALL IMAGES COURTESY THE
AUTHOR.

2. See Fernando Zalamea, “Peirce and Latin American ‘razonabilidad’: forerunners of Transmodernity,” *European Journal of Pragmatism and American Philosophy* 1, no. 1 (2009), <http://lnx.journalofpragmatism.eu/wp-content/uploads/2009/11/09-zalamea.pdf> (accessed June 13, 2012).

As a synthetic field mediating the complexity of many negotiating agencies, architecture has always been bound to the notion of contingency. Nevertheless, traditionally it tends to operate within an extensive conceptual framework rather than an intensive one. It has been largely regional and based on inherited forms and practices, local intentions, and limited readings of the site. Parochial representational models were bound to deterministic models of typology, default modes of production, and notions of style or metaphor, without the ability to explicitly process matter and energy, behavioral tendencies of production, or more direct feedback from the site. The increasingly ambiguous and complex landscapes that architecture needs to engage call for its adaptation to the instability of shifting regions and to conditions far from local equilibrium. Thus, it becomes necessary to introduce a more resilient connective tissue that can bind local to global, generic to particular, a navigational system for which accelerated scientific discoveries are taken not as quandaries to overcome but as opportunities for further synthesis.

OPEN SYNTHESIS//

Recent developments in the contemporary mathematics of an open continuum are delivering powerful concepts affecting the current landscape of philosophy and culture, including architecture. Mathematician and philosopher Fernando Zalamea’s work on transmodernity in Latin American culture looks at the triadic logic proposed by Charles Sanders Peirce:²

It examines the transversal study of information through a trans-regional and trans-modal landscape of the continuum, where the absolute universal is grasped in its generic/free and particular aspects through the systematic coupling of two monumental theses of Peirce, namely, tychism and synechism, universal contingency and continuity. The continua of the global and the local, nature and culture, general and particular, are approached as synthetic and nontrivially fibrated transits in which opportunities for asymptotically navigating the universal in its absolute and abyssal form come to light. But far from being a given in the local horizon of the subject as an intrinsic privilege, this universal synthetic environment generates tensions in the form of regionally pertinent opportunities through which the subject (a local operator of the universal

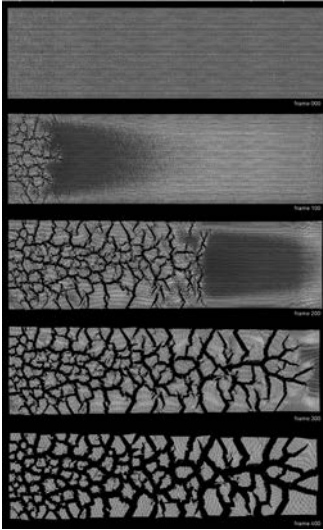
3. Reza Negarestani, correspondence with the author, May 28, 2011. This essay would not be possible without his invaluable contribution and feedback.

*horizon) is able to develop a focused yet multimodal confrontation with this synthetic environment that is no longer limited to its regional scope.*³

Triadic logic is concerned with the expression of universal properties within regional localities and vice versa. Unlike binary logic, which still dominates the majority of computing, it contains a third element that is able to systematically absorb vagueness and noise. This allows for counterintuitive modes of openness that can no longer be identified in terms of the subject's capacity to be open to its environment or the outside. It enables the operation of unrestricted syntheses, topological twists, fertile tensions between difference and invariance, fusions and contaminations, alternative pathways, the coalescence of inconsolable fields, overlaps between the organic and the inorganic, nature and culture, or alternatively, decanting them from one another in a controlled yet nontrivial manner.

Generative design operating on nonlinear platforms of neighborhood-based computing is working on opening new regional topologies of tension and synthesis, which should be thought in terms of ruptures, cuts, fissures, and obstructions in the global continuum. These disruptions in continuity (of data, matter, etc.) should not be identified in terms of discrete forms or individuated formal variations, because they establish all types of cobordisms between local horizons of form and the global continuity. Cobordisms are simply sites where different manifolds can share boundaries and where discontinuities or discrete horizons reestablish the continuous global flow in a counterintuitive manner. Since these ruptures act as boundary-sharing sites where global continuity brings local forms in and out of focus, they exhibit eccentric transitional qualities. They always appear as mixed, brooding somewhere between fixity and becoming, dead and living, liquefaction and cohesion. Unlike the principles of total holism that characterized early ecological thinking, this kind of synthetic landscape offers resilience and redundancy of transient boundaries, with an increased ability for interweaving contingent agencies. The role of those boundaries is no longer to enclose space, but rather to form tissue for osmotic exchange. What could be called data materialization is opening up the potential for architecture to finally resonate with the complexity of ecology.

This wider horizon reveals things that go beyond traditionally established concepts of the "natural" – matter as information, matter as an active agency, matter as strange



BIOTHING, CRACKOLOGY RESEARCH,
2011–12.

4. The term here is inspired by quantum physicist David Deutsch's understanding of "fabric" as a connective tissue that binds different scientific laws and contingencies together. See David Deutsch, *The Fabric of Reality: The Science of Parallel Universes – and its Implications* (London: Allen Lane, 1997).

and unnatural – and promotes the synthetic capacities of the world without distinguishing nature from artifice. Design becomes a catalytic agency in a process of amplifying found environments and synthesizing new ones. The concept of nature opens toward the synthesis of new kinds of natures – synthetic landscapes recomputed through the emerging protocols of architecture. The mathematics of this open continuum allow increased designability within complex ecologies – structures with increased resiliency, plasticity, and malleability of interrelated systems. It allows for speculative proposals of unprecedented complexity and scale.

INCREASED RESOLUTION FABRICS OF ARCHITECTURE//

Through computational resources, architects are getting increasing access to the physics of materials and structures at multiple orders of scale. At the same time, these physics of matter are embedded in the design-search process, simultaneously incorporating the constraints and inputs of manufacturing and constructability. Thus the resolution of architectural fabrics is being gradually increased, where fabric refers to the constellation of interlaced contingencies involved in the formation of architecture.⁴

Connective tissue is located in the domain of abstraction via computational and information resources. Evolving algorithmic infrastructures allow the designer to work at the scale of information linked to various forms of materialization. Computational patterns are understood to be thick with the potential to produce expressions at various scales. Not unlike a genetic engineer, the designer writes code sequences in the generation of immaterial forms of intelligence, which are intrinsically linked to specific constraints within different scales of social and material production.

Because of architecture's nascent tendency to generate legibility and synthesis, it has the potential to play an important role in the accelerated convergence of matter and information. While data visualization techniques widespread in other fields are productive for the communication and legibility of large data, they are not yet explicitly involved in production. On the other hand, data materialization involves the direct activation of an abundance of data in the formation of other systems, via a connective hinge positioned within the domain of design. While data visualization exposes the hidden beauty, intelligence, and complexity of observed systems, data materialization can produce such beauty and complexity within new synthetic fields. In order to develop such data

materialization processes, it is necessary to descend to the finer grains of computational building blocks, where the design search is performed within constellations of billions of particles.

UNIVERSALITY / DISCRETENESS//

From the science of complexity, we are learning that even simple underlying ingredients are capable of generating highly complex effects at a higher order of scale – what Stuart Kauffman calls “order for free.”⁵ Even the resilient phenomena we find in life processes are based on such principles of organized complexity.

Computational approaches in architecture that are oriented toward generative methods could be followed through the discretization of its building blocks and the increased universality of underlying processes based on code. There has already been a gradual migration from procedural programming to an object-oriented one, reflected also in some streams of current philosophy.⁶ This shift in the construction of code is characterized by discretization via algorithms, such as cellular automata (CA) and multi-agent systems (MAS). Object-oriented programming (OOP), with its structure of discrete, distributed, reusable, and redundant units of logic, allows for reaching into deeper layers of polymorphic code, from which heterogeneous architectural outputs could eventually emerge. This descent into the primordial soup of logics, beyond determinism and into the pregeometry states of data, toward distributed information processing rather than centralized procedures, is resulting in more *adaptability* and *resilience*. Such computational models are coming closer to the way information is processed in living organisms. Instead of centralized linear functions, there is a prevalence of distributed and discrete neighborhood-based computing. The power of many small, decentralized agents within simulations and generative methods is enabling the capture of complexity and nontrivial synthesis within design systems, which are resistant to linear decomposition. In this context, it is interesting to recall two giants of computation, Alan Turing and John von Neumann, who both looked at biological models toward the end of their lives – Neumann by working on the concept of self-reproducing automata and Turing by studying symmetry-breaking. According to Turing, in a biological context, the generative nature of such systems is very resilient because it economizes on the amount of genetic information needed to produce complex patterns. While trying to

5. Stuart Kauffman, “Order for Free,” in *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity* (New York: Oxford University Press, 1995), 71.

6. Object-oriented philosophy, as proposed by Graham Harman, considers the life of things as grounds for a new metaphysics. See Graham Harman, *Tool-Being: Heidegger and the Metaphysics of Things* (Chicago: Open Court, 2002).

unveil phenomena coming from life as the highest instances of complexity, they developed several universal and resilient computational logics, such as the Monte Carlo method – still one of the most advanced algorithms in existence – and Turing patterns.

In this quest for universality and discreteness, one can go even deeper into the history of computation and the material sources preceding it. Before universality, it was necessary to make unique objects for each particular case, rather than programming a universal object that could be instantiated into myriad cases. One obvious example is the invention of movable-type, prior to which printing plates were engraved for each individual page. In weaving, the Jacquard loom allowed for arbitrary patterns woven any number of times. Not surprisingly, the loom is one of the precursors to the digital computer. Even from the time of Leibniz, mathematicians were already looking for systems of logic that would derive higher states of mathesis (and human thought in general) through more universal underlying languages.⁷

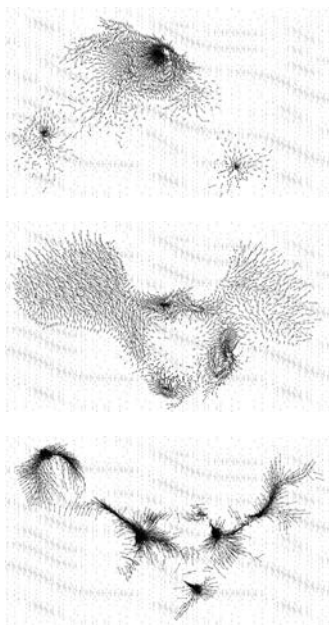
Peirce, a logician and founder of pragmatism in philosophy, worked on the categories of logic for reducing n-adic relations in mathematics. His triadic logic introduces a model of logic that incorporates noise. The role of stochastics within distributed agency is crucial, and if we are to genuinely open the territory of design to the complexity of nonlinear formations it is necessary to employ such vagueness in the generative equations. In this context, it is also useful to recall the second law of thermodynamics, the role of noise in Claude E. Shannon's information theory, and Michel Serres's writing on the parasite as a third unwelcome guest. Noise creates the exchange between the logical and the material.

AGENTWARE//

Multi-agent systems are one such computational territory where generative design opens toward complexity. Agents can be understood as active elements whose behavior is determined by a collection of rules. These rules are often based on stimulus-response logic (simple if/then rules for instance),⁸ and when agents interact collectively (particularly when aggregated in large populations) they are capable of producing complex behaviors and emergent effects. Within the construction of multi-agent systems, it is possible to embed elements of randomness into the formation of an agent's behavior. Although most cases of randomness point to a kind of pseudorandomness, which structures an

7. For Gottfried Leibniz's quest to find a true alphabet of human thought and the computational tools needed to manipulate those symbols, see Martin Davis, *Engines of Logic: Mathematicians and the Origin of the Computer*, 2nd ed. (New York: W.W. Norton & Company, 2001).

8. See John H. Holland, *Hidden Order: How Adaptation Builds Complexity* (Cambridge: Perseus Books, 1995), 6.

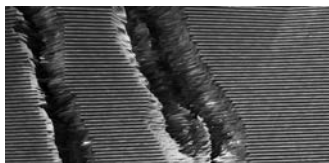


BIOTHING, LIGHT ECOLOGY FOR
LASVIT LIQUIDKRISTAL PAVILION DE-
SIGN BY ROSS LOVEGROVE, 2012.
VIDEO STILLs.

9. The idea of the protoarchitectural refers to the systemic and prototypical value of designed systems. Rather than designing objects for a singular case, in protodesign the systemic behavior could be instantiated in multiple and different locales and is open to synthesis with other systems. Such an approach differs greatly from purely representational modes where the architect models/represents something as an object, without explicit roots to modes of production or further agencies involved. Prototypical also implies material or structural prototyping, where the data of such processes is incorporated into the computational design-search, and eventually the choreography of interrelated systems within protoscenarios.

agent's behavior with a certain degree of openness, it is also possible to embed true randomness into such systems. The collective behavior of agents can act as a connective tissue for nonlinear negotiation between multiple data sets. If real data sampled from external systems is fed into the behaviors of agents, they can absorb streams of stochastic algorithms into their fibers. Agents can also act autonomously, perceive and adapt to change, and create and follow goals. A collective entity designed out of such a complex choreography of neighborhood-based computing acts as an interface for a nonlinear negotiation between multiple data sets. For instance, some classes of agents can absorb large data related to the physical aspects of the site, while others can activate different sequences of geometry constrained by manufacturing inputs. Data resilience lies also in its ability to be transmitted across different domains, irrespective of its content.

The multi-agent systems explored in recent research in generative architecture are mostly based on Craig Reynolds's algorithms for swarming intelligence, which allow for local neighborhood negotiation. Agents are programmed bottom-up through the attributes of alignment, cohesion, and separation and variable values of their spring connections, such as mass, dampening, and stiffness. Fine-tuning programmed durations of movement and interactions of discrete agents frequently results in highly expressive and legible behavioral patterns. Agent behaviors often generate apparent singularization points, resulting in an eventual protoarchitectural⁹ fabric that is not only highly intricate and reprogrammable, but also heterogeneous. This differs greatly from many examples of parametric strands of computational design, in which differentiation is based on linear gradient functions. The environment agents operate in is also mathematized and converted into other classes of agents, and can encapsulate properties such as topography and desired views, and encoded thresholds based on boundary conditions, soil data, hydrology, etc. Data extracted from these multi-agent systems produces information-rich fields, reaching beyond the positional coordinates of an agent at any given moment (x,y,z) and toward an n number of possible dimensions encapsulated through pregeometry voxel matrices. Various data can be mapped, such as velocity, tagging, distances between agent populations across different hierarchies, agents' speed, dampening value, and other possible features. Mapped in color, which denotes different states, behavioral patterns in any given system are made legible to a designer. This color is also



BIOTHING, FISSURES PORT TERMINAL,
KAOHSIUNG, TAIWAN, 2010. DESIGN
PROPOSAL.

simultaneously encoded and activated within the generative system that reads RGB color values and influences the formation of geometry. Even though agents share a genetic blueprint, different events can trigger different genes and enable a change in states. Polyvariant performance can arise from such an abstract pregeometric sea of underlying data. The velocity of discrete events is crucial for varying behaviors. While movement of the swarms often appears incredibly biological, the vestiges of computational time render it strange and counterintuitive.

COMPUTATIONAL PHYSICS / DATA ARCHITECTURE //

Dust is the master of collective insurgencies. . . . Xero-data or dust, swarms planetary bodies as the primal flux of data or the mother of all Data-streams in the Solar system. Each particle of dust carries with it a unique vision of matter, movement, collectivity, interaction, affect, differentiation, composition and infinite darkness – a crystallized database or a plot ready to combine and react, to be narrated on and through something. . . . Given that each dust particle envelops and carries different materials and entities from diverse territories, dust particles express particulars of different fields and territories in terms of universals.

– Reza Negarestani, *Cyclonopedia*

Discretization in the domain of computational logics and algorithmic structure can now be extended to the domain of matter and newly accessible building blocks for synthetic material formations. With new simulation technologies using the resources of extreme computing, it is becoming increasingly possible to crack the behavioral tendencies of matter at a finer grain. In such molecular compositions, every particle counts. Apart from the nature of information transfer discussed earlier, likeness to biology is increasing at the level of complex performance in architecture. With living organisms, distribution of energy and nutrients literally happens *through* bodies, as intricate vessels for such flows. Built fabrics of increased resolution have the potential to come closer to such models, whereby architecture becomes a direct vessel for energy production and its fibers can reach higher levels of performance. Instead of designing at the scale of spatial distribution and middle-scale structures, it is becoming possible to descend into the cellular grain of matter, flow of light, heat, vapor, and friction. The found physics of complex material processes, such as massive-scale erosion and sedimentation or ice melting, can now be encapsulated through computational

physics and large data sets, embedded into simulations and, consequently, physical construction.

Such an architecture is drawing on large data from the finer-grain physics of matter – matter as information enabled by computation. Matter acquires active agency in the process of becoming instead of being treated as a passive design ingredient. There is greater designability in the algorithm profiles of matter, since computational simulations can absorb large data from real contexts and provide access to the underlying code of matter. This not only expands technically enriched material formations, but also activates previously hidden material powers toward designs beyond our anticipation in both formal imagination and performance.

Expanding discoveries in material science are now being incorporated through simulation into massive resolution design speculations across various scales, opening doors for weird syntheses and fissuring established preconceptions of what architecture could be. Architects can go beyond geometry to directly design the structure of matter itself. Since computational kernel processes are built on porous boundaries between systems, the economic flow of production could also be engaged within the fibers of generative processes, allowing design to evolve within production fitness.¹⁰ This makes architecture more resilient against economic pressures and the rigidities of the construction industry. Increasing access to the universal conditions of computing and matter is redefining the boundaries of architecture and expanding its agency.

10. The notion of fitness is taken from evolutionary biology where fitness landscape is used to visualize relationships between generative agents (such as genotype or phenotype) and their capacity to satisfy certain goals (such as reproductive success). In architecture, fitness usually refers to success related to performative aspects of a system, or to the design intent posed by the architect herself.

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The immer's reaches don't correspond at all to the dimensions of the manchmal, this space where we live. The best we can do is say that the immer underlies or overlies, infuses, is a foundation, is langue of which our actuality is a parole, and so on. . . .

– China Miéville, *Embassytown*

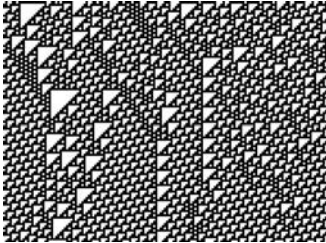
In addition to the intrinsic resilience of the higher resolution/higher dimension fabrics discussed here, knowledge is being prolifically generated through distributed collective engagement. This phenomenon is highly compatible with acute mutations in politics, promoting the power of many and enabled largely by the same universe of discrete/distributed abstract resources, or at least the resonating principles of them. Universality via code is capable of transcoding through a plethora of different media and disciplines. A resultant increase in the porosity of complex and ruptured boundaries

nurtures osmotic processes, making architecture an open field or laboratory. With digital modeling, the spread and mutation of design skills was slow; one needed to recreate the model for each individual case. Code, on the other hand, is highly resilient. It encapsulates and executes. It explodes complex outputs from simple inputs. This universality is a rich ground for the transmission of data, and its rapid exchange and viral proliferation nurtures a culture of knowledge sharing through collective open-source libraries and distributed authorship between human and nonhuman actors.

In mining the resources of computational “otherness,” architecture can open up novel spaces of synthesis and go beyond any deterministic design intent on predisposed knowledge derived from its sites. Invisible strata of reality could be unveiled to synthetically alter this fabric. Recognizing the active participation of nonhuman forces in events and understanding that the agency spawns beyond just the human provide a ground for alternative ways of addressing design ecology. In a context where all agencies are intricately interlaced with one another, the possibility of open synthesis reveals a resilient new fabric of architecture.

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DESIGN COMPUTATION. SHE IS THE
FOUNDER OF BIOTHING.

Volatile Formation



CATENARY CHAIN MODEL. TOP:
CELLULAR AUTOMATA RULE 110.
ALL IMAGES COURTESY THE AUTHOR.

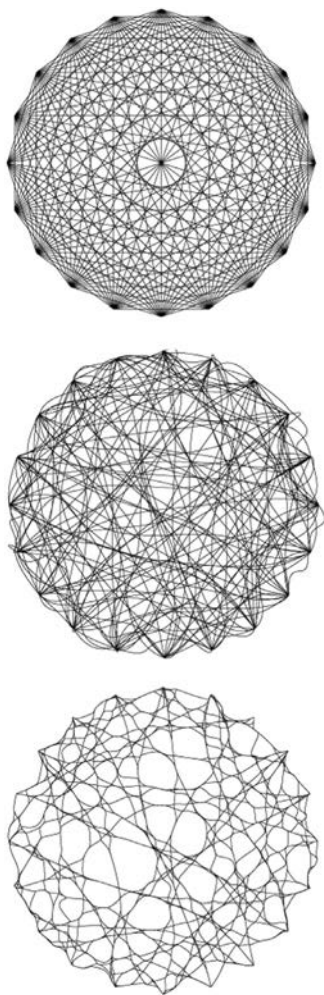
Volatility is a critical condition for design. Within the intensive processes of formation that underlie complex phenomena, those which self-organize and are capable of catastrophic change, it is the volatile nature of the system that is generative. From these far-from-equilibrium conditions new forms of order emerge, generating strange behaviors, characteristics, and traits – conditions potent with architectural possibility.

Computation is a necessary accomplice in working with complex systems, but in architecture computational methods have been adopted that privilege certainty over open-ended processes. This adoption is based on a set of false assumptions regarding the pseudo-objective nature of computational design. These systems of parametric variation and optimization are complicit in the automation of design, marginalizing risk, and foregrounding stability and equilibrium. I would argue instead for complex systems of formation that operate through the volatile interaction of algorithmic behaviors and engage the speculative potential of computational processes.

Behavioral formation is posited as a nonlinear algorithmic design methodology that seeds specific architectural intent within the local interactions of multi-agent systems. Within the processes of behavioral formation, two modes of operation are interrogated that set up resilient design models to negotiate the internal resistance of local and global procedures. The first is centered on the inconsistent feedback of algorithmic systems and explicit decisions – a form of messy computation. The second is an argument for a heuristic role for structural feedback within multi-agent algorithmic design.

The instability of a system enables the emergence of an order that is radically different from its initial conditions.¹ Complex systems with the capacity for catastrophic change, such as Stephen Wolfram's cellular automata rule 110, operate on the edge of chaos and are potent with generative capacities. Within these globally volatile conditions, new characteristics and locally stable situations emerge from a constant state of flux, resisting periodic or predictable order. Wolfram points out that emergence is an unquantifiable phenomenon;² the categorization or evaluation of complexity is qualitative and

1. This is not an argument for the dynamic systems that were explored in Greg Lynn's "animate form" inquiry. The dynamic nature of a system does not ensure volatility, as the limited feedback of many dynamic systems leads to stable behavior and characteristics.
2. Stephen Wolfram posits four categories of complexity that are qualitative rather than quantitative, arguing that emergence cannot be numerically described. See Stephen Wolfram, *A New Kind of Science* (Champaign, IL: Wolfram Media, 2002), 231.



WET GRID MODEL.

subjective. Similarly, the cusps and bifurcations of chaotic systems map catastrophic change within internally coherent systems. Manuel De Landa discusses these states in terms of thermodynamics. “It is only in these far-from-equilibrium conditions, only in this singular zone of intensity, that difference-driven morphogenesis comes into its own, and that matter becomes an active material agent, one which does not need form to come and impose itself from the outside.”³ It is the emergent capacities of these complex systems hovering between order and chaos that offer significant generative potential for architecture.

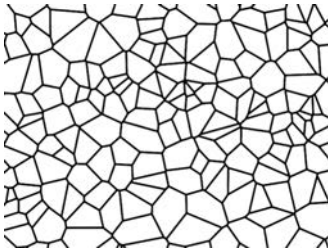
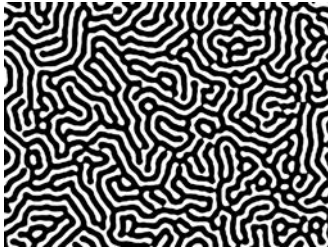
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The underlying reliance of complex systems on iteration and feedback has rendered computation an indispensable tool in the generation and simulation of complexity. Architects, however, have largely relegated computation to the service of explicit control. Within architecture, computational design can be described through several broad categories: parametric modeling, optimization, form-finding, and generative algorithms. The first three categories are inherently based on stability, or the search for equilibrium, while the latter exposes the potential of open-ended complex systems. The necessity for risk and indeterminacy in design is not reducible to the dichotomy of linear and nonlinear systems – although these are key protagonists – but more precisely defined by the opposition of stability and volatility.

Parametric, or associative, modeling describes a linear relationship between a parameter and geometric transformation, enabling the precise control and manipulation of flexible digital models.⁴ It is curious, then, that parametric design has been so enthusiastically embraced as a generative tool in contemporary architecture. Generative design can be described as designing the design process rather than the artifact, implying an abstraction of the designer from the artifact. Parametric models are structured hierarchically, however, having direct, cascading, causal relationships – an obvious impediment to this description of generative design. The parameters within these models – as the now ubiquitous sliders in software programs epitomize – confine the model to a known set of limits. So while parametric models enable a distribution of difference, this is not the difference that emerges from intensive processes, but rather a directly described, top-down, smooth gradient operating within a predefined range. Here, all possibility is already given within the starting condition.

3. Manuel De Landa, “Deleuze, Diagrams, and the Open-ended Becoming of the World,” in *Becomings: Explorations in Time, Memory, and Futures*, ed. Elizabeth Grosz (Ithaca: Cornell University Press, 1999), 32.

4. The term *parametric* is used in this context to describe the technique of parametric or associative modeling. It should be distinguished from Patrik Schumacher’s concept of parametricism, which is an attempt to outline a broad methodological approach to architecture.



VORONOI ALGORITHM. TOP: DIFFUSION REACTION ALGORITHM.

5. John Holland, who is credited with the development of the genetic algorithm, argues that the creative capacities of genetic algorithms are dependent upon the nature of the search criteria with respect to the evolutionary operation of a system. Holland contends that a search algorithm seeking an optimal solution is critically different from the evolutionary capacity of a genetic algorithm, since the latter is capable of volatile evolution. See interview with John Holland published in Neil Leach and Roland Snooks, eds., *Swarm Intelligence: Architectures of Multi-Agent Systems* (Beijing: AADCU, forthcoming).

6. The speed of convergence is a property of the algorithm and the initial conditions of the model. If a model's initial position is close to its form-found equilibrium, then the form-finding algorithm operates as an application of a known and entirely consistent formal character. If the model's initial conditions are far from an equilibrium position, it effectively has to unravel itself in negotiating the imbalance of force within the model.

Optimization routines search a discrete set of possible solutions for the maximization or minimization of a known condition such as structural or environmental efficiency. The volatility of the search algorithms that underlie optimizing processes range from incremental change to the stochastic operations of particle swarm optimization or genetic algorithms. The internal volatility of search algorithms has little influence on the volatility of the design process, however, as these algorithms are searching for a predetermined optimal position. These strategies presuppose that architecture can be objectively evaluated through predetermined criteria, which is effectively a straightjacket to speculative design. Optimization rejects subjective evaluation in favor of a reductive approach.⁵ Qualitative nuances, references, complexity, richness, and experience of architecture are outside of numerically describable criteria. While optimization is able to engage in highly volatile generative processes, it must operate as an accomplice rather than the driver of the process – conditioning volatile outcomes rather than attempting to generate them.

Physics-based form-finding is a nonlinear approach to optimization in which each element negotiates with the adjacent elements to equalize difference, minimizing energy within the entire system until an equilibrium position is reached. The nonlinear operations imply volatility, but form-finding techniques are inherently risk-averse due to the stable nature of their formal characteristics and rapid convergence to equilibrium.⁶ The stable characteristics of curvature within a catenary chain model or of minimal surface within a soap-film model are immediately recognizable, known, and indexical. Their precise character is known in advance and the application of these techniques can become a matter of style or cliché. Consequently, the stable process of selecting an algorithm, rather than the algorithm's nonlinear operation, has the dominant influence over architectural form and character.

Volatility is predicated on resisting equilibrium. This resistance emerges from the negotiation of positive and negative feedback in maintaining a dynamic condition from which a system reorganizes and unique forms of order emerge. Given the relative speed or simplicity with which a form-finding algorithm reaches equilibrium and its stable characteristics, a volatile strategy is possible only if there is a radical topological reorganization. Without this, the computational design process is simply the application of a predefined formal character



KOKKUGIA/ROLAND SNOOKS, *FIBROUS TOWER STUDY*, 2008.

7. The localized operation of nonlinear models is a critical determinant of their meta-stability. Nonlinear form-finding models, such as Frei Otto's wet grid, self-organize in a restrictively localized manner and are unable to reform the assemblage at the level of the system. Macro-scale order does not emerge within these models. The localized self-organization operates as an application of formal or organizational character at the micro-scale, an act of selection rather than volatile generation.

8. Within the highly networked computational design culture, the adoption of the default mappings of algorithms with a known indexical character, such as voronoi, reaction diffusion, l-systems, magnetic fields, or cellular automata, inherently denies volatility and risks falling into cliché.

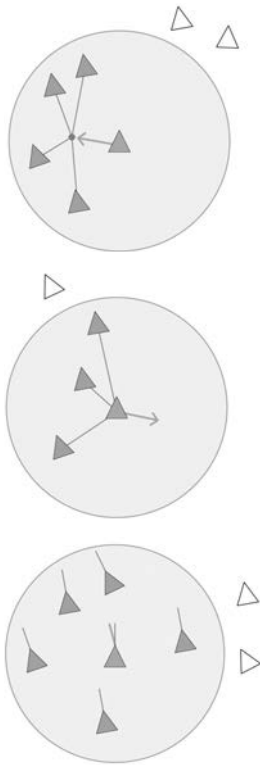
to an a priori topology, since there is only one possible outcome to a minimal energy model for a given topology.⁷ The misunderstanding of this inherent stability as a form of objectivity is an unintended disguise for the desire for certainty – a retreat from risk and the subjectivity of design.

Generative algorithms that engage recursive and self-organizing procedures are critical to the generation of complexity within computational design. While the role of generative algorithms in architecture is diverse, the architectural relevance of algorithmic design is dependent on the ability to encode architectural intent within the operation of the algorithm. Typically, generative algorithms are simply deployed as templates for architecture – abstract formal generators operating on an appropriated logic, devoid of any recognition of the architectural problem or proposition. Likewise, the application of algorithmic processes to discrete elements like facades or surface patterns limits complex systems to playing a minor role in defining architecture, and confines nonlinear processes to a known set of architectural hierarchies.

If computational design provides the framework within which to rethink architecture through a nonlinear paradigm, then it is not enough to simply apply the image of complexity to the body of modernity. It is perhaps this tendency that contributes to the perception of algorithmic architecture as obsessed with formal and aesthetic concerns – a perception that is antithetical to the organizational logic of complex systems. While this logic implies the potential for designing the inherently organizational aspects of architecture such as program and structure, complex systems are equally adept at engaging with form – as the emergence of form can be understood as the organization of matter.

The emergence of a strange or unknown set of characteristics requires a willingness to experiment through the design of an algorithm rather than simply its selection. Algorithms with highly indexical and stable relationships to their formal characteristics do little to advance an open-ended design process; instead they reduce algorithmic design to an act of stylistic selection.⁸ The mimetic nature and safe connotations of beauty and optimization in the algorithms extracted from biology demonstrate a prevailing conservatism within contemporary computational architecture.

The computational design methodologies outlined above can be seen to be either inherently stable or volatile within a predictable range – seeking a known attractor and the stability of selected characteristics. The rapid adoption within



CRAIG REYNOLDS' BOIDS BEHAVIORS:
COHESION (TOP); SEPARATION
(MIDDLE); ALIGNMENT (BOTTOM).

9. Swarm intelligence operates through the local interaction of autonomous agents that give rise to emergent collective behavior within decentralized self-organizing systems. Biological examples of swarm intelligence that have come to typify this interaction include bird flocking, the interaction of social insects, bacterial growth, and the schooling of fish.

10. Multi-agent algorithms describe an object-oriented programming approach where individual computational entities interact at a local scale. The algorithmic logic of behavioral formation can be traced back to Craig Reynolds's boids algorithm, which fundamentally changed the understanding of the simulation of flock behavior. See Craig W. Reynolds, "Flocks, Herds, and Schools: A Distributed Behavioral Model," *Computer Graphics* 21, no. 4 (presented at SIGGRAPH '87 Conference, July 1987): 25–34. The algorithm is based on the interaction of three primary behaviors: alignment, cohesion, and separation.

11. For a more developed argument on behavioral design methodologies, see Roland Snooks, "Behavioral Matter," in *Pulsation in Architecture*, ed. Eric Goldemberg (Fort Lauderdale, FL: J. Ross Publishing, 2012).

contemporary architecture of computational techniques that privilege pseudo-objective criteria, known characteristics, and direct control demonstrates a prevailing desire for stability and an unwillingness to engage risk and the highly volatile conditions that are required for something new to emerge. But rather than advocating highly volatile systems that resist authorship or that privilege the unrepeatable accident, what is needed is an alternative understanding of control and interaction between top-down and bottom-up processes.

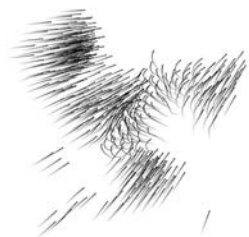
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The volatility of a design process is dependent upon the nature of the design intent and the abstraction between that intent and the designed artifact. The nature of authorship, or intent, within generative design can be categorized as either criteria or procedure. Designing to criteria is inherently stable, as the criteria constrain the possible realm of the artifact. In contrast, designing through procedure is inherently speculative, as it is concerned with the conditions of operation rather than conditioning the outcome. This necessary abstraction between the design intent and artifact enables an emergent outcome through the interaction of design procedures.

The highly volatile model of behavioral formation is in opposition to the inherently stable computational models that have been adopted. This methodology is not intrinsically tied to formal or organizational characteristics that are simply selected, but instead is an experimental approach that generates emergent architectural order, organization, and characteristics.

Drawing from the logic of swarm intelligence⁹ and operating through multi-agent algorithms,¹⁰ behavioral formation functions by encoding simple architectural decisions within a distributed system of autonomous computational agents. The interaction of these agents and their local decisions generates a self-organizing design intent, giving rise to a form of collective intelligence and emergent behavior at a global scale.¹¹ This represents a shift from the explicit design of form and organization to the orchestration of intensive processes of formation through the design of the underlying behaviors of matter and geometry.

Self-organization within models of behavioral formation generates emergent characteristics in a manner not dissimilar to many of the nonlinear generative algorithms that are criticized here. What differentiates behavioral formation is the architectural nature of the rules from which the characteristics



SWARM ALGORITHM. TOP: ANT-TRAIL ALGORITHM.

12. Kokkugia's Fibrous Tower studies demonstrate the application of this multi-agent strategy to the design of a load-bearing tower shell. An agent model is encoded with formal, spatial, and organizational design behaviors, which interact to generate interwoven strands. These strands are embedded with formal and ornamental agency that self-organizes to generate the local character or articulation of the architectural geometry.

13. Design processes that instrumentalize multi-agent algorithms, however, are not necessarily dealing with the negotiation of architectural behaviors. Like all algorithms within architecture, swarm systems have been variously misappropriated and abused. The classic mapping of the boids algorithm as a swarm, or even the more organizational pheromone ant trail systems as minimal paths, is at risk of being applied within architecture in a generic or clichéd manner. While the underlying operations of these algorithms are pregnant with possibility for the architect, the application in their base state is as limited and questionable as any appropriated algorithm where traits or known organizational diagrams are simply applied to the periphery of architecture.

emerge: these are loaded with specific design intent. Behavioral formation is premised on the generation of architectural behaviors through the interaction of local design intentions. Original characteristics emerge through a design process based on architectural tendencies and behaviors rather than the adoption or misappropriation of stable characteristics and known criteria from biology or computer science.

Agents within systems of behavioral formation are encoded within the geometry of vectors, strands, and surfaces, responding to the local flow, density, proximity, and direction of geometry.¹² Their responses are based either on specific architectural requirements or on more abstract experimental rules that are evaluated through the emergence of a macro-level order. These two modes typically operate in parallel. The former strategy enables the negotiation of complex architectural problems that relate to the organization of structure, program, form, and ornament. The latter is concerned with mining the generative potential of systems of formation in search of novel organizational and formal traits. Within both modes, emergent macro-level characteristics are coaxed out of the self-organization of the system.

In contrast to optimization algorithms, there are no a priori criteria constraining behavioral formation. Instead, a subjective design sensibility emerges from orchestrating the interaction of many micro decisions and intentions. While design intent might be prescriptive at the level of the agent, these processes are never stable at the macro scale because the agent is oblivious to the emergence of the swarm. The behavioral formation logic of encoding agency within geometry avoids any generic mapping of known algorithms, and, as such, behavioral formation resists the indexical nature of appropriated algorithmic techniques.¹³

The local operation of behavioral formation inherently limits the interaction with macro-level concerns such as structure or topology. Multi-agent models are premised on the condition of global ignorance; their exclusively local operation is critical to the emergence of complex order. In an attempt to overcome this limitation, two resilient models based on internal resistance are proposed: behavioral structural formation and messy computation. These strategies exploit the dirty negotiation between the opposing methodologies of generative design and top-down evaluation or control. They are constantly in an internal state of conflict, maintaining volatile and emergent characteristics while negotiating pragmatic and nonsystemic concerns.



KOKKUGIA/ROLAND SNOOKS (IN
COLLABORATION WITH TEXAS A&M
UNIVERSITY), PRAIRIE HOUSE, 2012.
MESSY COMPUTATION DRAWINGS.

Behavioral structural formation is a volatile generative strategy embedded with a rational set of structural rules. It operates as a negotiation between the local interactions of multi-agent models and the global evaluation of structural analysis. The multi-agent generative algorithm is encoded with design behaviors from which a protoarchitectural form emerges. The flow of load through this form is continuously analyzed at the global level, with information about the system's localized structural performance fed back to the individual agents. In response to local structural conditions, the design agents adapt their behavior based on heuristic structural rules designed to resist load. This strategy enables the agents to respond to the local implication of global conditions within a continuous feedback loop.

This approach is not premised upon structural performance generating form; instead, the behavior of generative design agents is conditioned by structural information. The methodology can be described through a strand model. In the case of excessive deflection, for example, the strands separate vertically to generate greater structural depth, create more strands to dissipate load, and bundle to generate greater structural rigidity. These operations integrate structure as one of the agents' many competing design behaviors. This integrated approach enables a highly volatile design process to resolve structural forces without imposing a predetermined structural schema or structurally postrationalizing architectural form.

Messy computation is a nonlinear and inconsistent process of negotiation between generative and explicit procedures. This requires a relentless, iterative torturing of the model – editing, extracting, manipulating, and returning the model to the volatile space of algorithmic formation. Messy computation involves constant feedback between algorithmic procedures and direct digital surface modeling, an attempt to maximize and hybridize the potential of each mode of design.

Within this messy feedback, the algorithmic generation of form and organization becomes the input to explicit modeling processes and vice versa. The generative and the explicit each inform the other within a manual feedback loop until a coherent or synthetic vocabulary emerges. The constant but inconsistent feedback slowly congeals into a coherent behavior and set of organizational and formal characteristics. While the algorithmic procedures are capable of generating highly emergent outcomes, the inability of multi-agent systems to sufficiently comprehend topology or enclosure is mediated by

the explicit modeling of the designer. This interaction is both a shortcut for intuition and a mechanism for direct, subjective, and nonsystemic decisions. A nonlinear design approach such as messy computation necessitates the interaction of all of its constituent systems within a feedback loop – it operates as an ecology.

The inherent conflict between the local operation of behavioral formation and macro architectural intent generates a series of new problems, techniques, and opportunities that enable original organizations, forms, structures, and characteristics to emerge. The internal resistance of behavioral structural formation and messy computational strategies differentiate these methodologies from the direct application of algorithmic processes to normative hierarchies and explicit initial conditions. It is through the constant negotiation within these processes that design intuition and heuristic approaches operate. Through this volatile struggle, algorithmic strategies become deeply embedded within architectural design.

Volatile algorithmic design methodologies can be understood as part of a broader contemporary interest in indeterminacy and nonlinearity that has been emerging since the advent of chaos and complexity theory. However, the argument for volatility is more than a theoretical concern; it is a fundamental concern for the importance of subjectivity and the nature of risk within design.

Sébastien Bourbonnais
Translated from the French
by Julie Rose

Information Relay: The Indetermination Between Machines

We could define a technological attitude as one where a person is not just concerned with the use of a technical being but also with the correlation of technical beings among themselves.

– Gilbert Simondon, *Du mode d'existence des objets techniques*

Information modulation could be considered one of the architect's main tasks in designing the form of a building or a component. For the past 60 years, this modulation has been increasingly performed by instruments (software) or manufacturing machines of all kinds, revealing the different ways architects relay information – the means by which they shift, modulate, and translate information from one machine to another. The thesis Gilbert Simondon elaborates in *Du mode d'existence des objets techniques* provides a number of pertinent conceptual tools for studying technical devices that, due to their median position between human beings and the world, allow us to understand the relationships that develop between individuals and their built environment. As he writes, “The mediation between man and the world itself becomes a world, the structure of the world.”¹ This understanding of technical objects is used here to analyze three experimental projects in which multiple devices form a technical ensemble that is considered privileged mediation: SEEK (also known as BlockWorld), a project developed by Nicholas Negroponte and the Architecture Machine Group at MIT (1969–70); Cedric Price's Generator (1976–79); and R&Sie(n)'s *Une architecture des humeurs* (2010). This analysis will be based on a precise technical device that is then put in tension with the rest of the ensemble to generate two, simultaneous projects. The connections at first raise the margins of indetermination, thereby allowing the transfer of information from one machine to another, and then, in relation to Simondon's assertion about technical thinking in ensembles, raise questions about the sense and significance of the information exchanged there. “In this sense we can assert

1. Gilbert Simondon, *Du mode d'existence des objets techniques* (1958; repr., Paris: Aubier, 1989), 181.

that the birth of a technical philosophy regarding ensembles is only possible through [an] in-depth study of regulations, that is, of information.”²

2. Ibid., 126.

3. Ibid., 61.

4. Ibid., 64.

5. Ibid., 145.

CONSIDERING THE TECHNICAL ENSEMBLE

Technology is the answer, but what was the question?

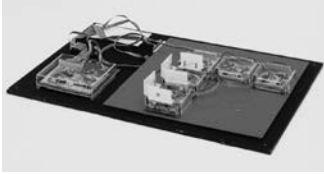
– Cedric Price

Each of these architectural projects constitutes an ensemble that works technically in the different interactions that occur between architects, technical objects, users, and architectural objects. Simondon’s research on the evolution of the technical reality of objects was developed at three different levels: the element, the individual, and the ensemble – that is, on technical elements, bits of machinery from which it is possible to constitute technical individuals, and ultimately, technical ensembles. He writes, “We would say that a technical individual exists when the associated milieu exists as a condition sine qua non of its functioning, whereas an ensemble exists when the opposite is the case. That is, in a laboratory such as a laboratory of the physiology of sensations.”³ A bit further on, he again spells out the distinction between the ensemble and the technical individual: *The ensemble is distinct from technical individuals in the sense that the creation of an associated milieu is undesirable. . . . It avoids the internal concretization of the technical objects it contains, and only uses the results of their functioning, without allowing any interaction in their various kinds of conditioning.*⁴

Machines in an ensemble differ from one another, having their own individualities and functionalities. Because of their relative autonomy, the machines come into contact through the exchange of information effected through the margins of indetermination. Simondon states:

*Technical ensembles are characterized by the fact that a relationship between technical objects is set up in them via the margin of indetermination in the functioning of each technical object. This relationship between technical objects, insofar as it correlates uncertainties, is of a problematical kind and, for that reason, cannot be assumed by the objects themselves; it cannot be the object or the result of a computation: it must be thought out, posed as a problem, by a living being and for a living being.*⁵

Considering indetermination between machines in relation to the technical ensemble allows us to respond to Simondon’s statement that, in general, technical progress from the 19th century on was no longer *experienced* by the



CEDRIC PRICE, GENERATOR, 1978–80.
ELECTRONIC MODEL. DIGITAL IMAGE
© THE MUSEUM OF MODERN ART.
LICENSED BY SCALA/ART RESOURCE,
NY.

6. Jean-Hugues Barthélémy, *Simondon ou l'encyclopédisme génétique* (Paris: PUF, 2008), 123.

7. Simondon, *Du mode d'existence des objets techniques*, 228.

8. Stanley Mathews, *From Agit-Prop to Free Space: The Architecture of Cedric Price* (London: Blackdog Publishing, 2007), 245.

9. In a letter to Price, John Frazer stated that the Generator “should have a mind of its own. It would not only challenge its users, facilitators, architect and programmer – it would challenge itself.” See Molly Wright Steenson, “Cedric Price’s Generator,” *Crit* 69 (Spring 2010): 15.

10. Mathews, *From Agit-Prop to Free Space*, 245.

individual, but *thought* “in relation to the results produced by ensembles.” To Jean-Hugues Barthélémy, the three levels of technical interrelationships correspond to the three *ages* of technical progress, whose “technical ensembles are exactly the means by which progress is now made by *both* technical objects and society, as distinct from the community.”⁶ Through the interactions between technical objects and users or designers, we can differentiate the transformation speed of a project from that of its environment, or, in other words, technological progress from social progress. Culture ensures that these two diachronic rates are regulated, and the crisis brought about by digitalization will be approached here through the aesthetic reality of ensembles. For Simondon, “We need to consider technical trials that put human beings in a real-life situation in relation to an ensemble, with effective responsibility, as having a cultural value.”⁷

INFORMATION SENSORS

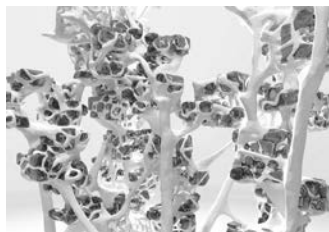
To the first machine that can appreciate the gesture.

– Nicholas Negroponte, *The Architecture Machine*

Cedric Price’s Generator was “intended to be a visitor’s centre, consisting of 150 wooden modules which could be assembled and configured to create a variety of programmatic space situations.”⁸ The main objective was to offer a dynamic space that would replace the monotony of stable spaces. Price’s idea was to create an environment in which the potential user would be able to interact with the building, but where the reverse would, in a way, also be possible: by reconfiguring the building according to how bored he felt, the user would be offered an entertaining interaction with both architecture and himself.⁹ Price designed the space itself as well as the rules of the game, metarules that allow this shuttling back and forth between the desires of occupants and the “desires” of machines. Two devices were created with the aim of fulfilling these requirements:

*At the entrance, a computer interface would engage visitors in dialogue to tease out their particular interests and preferences, and the modules would be automatically adjusted to suit the visitor. The site would therefore endlessly vary as a result of the input from successive visits. If the site had not changed for some time, the central computer would become “bored” and initiate random changes on its own.*¹⁰

The information captured by the first device and the formal positioning of the building by the second more generally question the relationship between form and information,



R&SIE(N), *UNE ARCHITECTURE DES HUMEURS*, 2010. RENDERING OF POSSIBLE AGGREGATES. TOP: INSTALLATION VIEW, LE LABORATOIRE, PARIS, 2010. THE PHYSIOLOGICAL CHAMBER CAPTURES “HUMORS” THROUGH NANORECEPTORS, VIDEO TRACKING, VOICE RECOGNITION, AND A BIO-CHEMICAL SURVEY. IMAGES COURTESY THE ARCHITECT.

a central concern of Simondon’s philosophy:

*You could say that the form, designed as an absolute regularity, as much spatial as temporal, is not a piece of information but a condition of information; it is what gathers information, the a priori that receives information. The form has a role in selectivity. But information does not derive from the form, or from an ensemble of forms; it is the variability of forms, the contribution made by a variation in relation to the form. It is the unpredictability of a variation in form, not the sheer unpredictability of all variation.*¹¹

It is on this unpredictability of variation in form that Generator was based. Information proffered by visitors to the building would be transmitted to a central computer developed by Price and his team; the building, constantly “attentive” to the central computer, would then adopt these various formal configurations. Dialogue was thus established between the two machines.

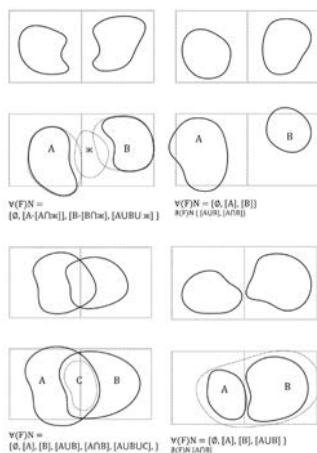
R&SIE(n) would seem to do something similar, 35 years later. Upon entering a central control area of *Une architecture des humeurs* – the “physiology room” – the visitor, who is hypothetically a future buyer of space in this agglomeration, undergoes a chemical and emotional analysis. His or her emotions are determined by capturing chemical secretions and neurobiological responses to a questionnaire (through language). The project confronts these two different types of responses in order to “bring out a conflict, an area of contradiction, of schizophrenic tension.” The misunderstandings produced between language and chemical secretion (or, alternatively, between sensible and intelligible) are not applied directly to a built form, but are formalized through mathematical morphologies that describe relational protocols of attraction, approach, repulsion, dependence, indifference, and exclusion. These morphologies are then crystallized in place with a “biocement” secreted by another machine, the ViaBO2 robot.

The form of the habitat is not generated directly by the initial information; rather, a second mediation is produced, “formulations deriving from the theory of ensembles.”¹² This mathematical formalization underlines the shift that has occurred in relation to variation (from form to form-making) and reveals the task of designing this “translation” from one machine to another to the architect, and in organizing the ensemble based on its results.

The operation of machines does not cause information to arise, but only an assembling and a modulation in form; the functioning of

11. Simondon, *Du mode d’existence des objets techniques*, 137.

12. Caroline Naphegyi, “Entretien avec François Roche. Protocoles/process,” *Mouvement* 54 (2010): 9.



R&SIE(N), *UNE ARCHITECTURE DES HUMEURS*, 2010. MORPHOLOGIES (CLOCKWISE FROM TOP LEFT): REPULSION; INDEPENDENCIES; INTERSECTION; ATTRACTION.

a machine has no meaning, cannot give rise to real information signals for another machine; a living being is needed as an intermediary to interpret any functioning in terms of information, and to reconvert it into forms for another machine. Man understands machines; he has a role to play between machines rather than merely over machines.¹³

Through the morphologies obtained by the programs, the architect becomes the relay, deliberately placing himself between machines and then intervening in each of them. While the machine directly modifies the forms in both projects, it is the architect who converts information into form.

MAGNIFYING THE EVENT

An architecture des humeurs . . . means staging a violation of the logic of things whereby language has to negotiate the density of bodies.

— François Roche

In both *Generator* and *Une architecture des humeurs*, the information sensor allows the designer to more directly assimilate the intentions of visitors and potential buyers with respect to the design of the form.¹⁴ The designer no longer really controls the form, but, instead, its variability. For Price, this variability allowed architecture to be thought of “in terms of events in time rather than objects in space.”¹⁵ For *Generator*, the event was not only what was produced in that space but also the building itself. Price’s specificity lay in the mechanical programming of the interaction. The building’s constant movement and modification served to magnify the information collected there in such a way as to give the user the freedom to choose the form according to his liking. But what is it that R&SIE(n) is seeking to magnify?

*A habitat always ends up parsing our unconscious urges. . . . More precisely . . . it is itself the vector. . . . Synchronized to your own body, your arteries, your blood, your sexual organs, your pulsating organism . . . and you are a thing, one element in the whole ensemble, an intense, porous element . . . that breathes and aspires to be its own environment. . . . Here everything comes together and interlocks. Everything is there, in the making, in a movement in the making. . . . Let yourself get carried away. Don’t think, just slip into that silky, strange, sensation that frightens you and caresses you.*¹⁶

Beyond the organic, quasi-cosmic symbiosis between subject and object, the event is no longer projective but rather deranges or arranges differently the balance of power in such architecture. The habitat becomes a place of personal

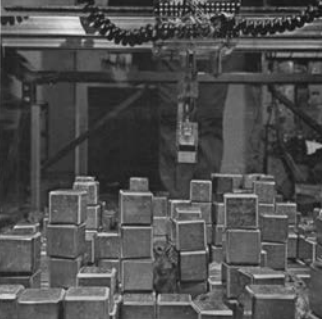
13. Simondon, *Du mode d’existence des objets techniques*, 137.

14. Georges Teyssot and Samuel Bernier-Lavigne point out this condition in the work of Nicholas Negroponte: “The eviction of the designer was apparently proposed with the eminently laudable aim of eliminating all distortion between the client’s volition and the project.”

See “Forme et information. Chronique de l’architecture numérique,” in *Action Architecture*, ed. Alain Guiheux (Paris: De la Villette, 2011), 49–88.

15. Mathews, *From Agit-Prop to Free Space*, 243.

16. François Roche quoted by Jeannette Zwingenberger, “Interfaces moléculaires,” *Mouvement* 54 (2010): 3.



NICHOLAS NEGROPONTE (WITH ARCHITECTURE MACHINE GROUP, MIT), SEEK, 1969–70.

contradiction for the future buyer. The event has already taken place, inside itself; it is reproduced in its schizophrenic form, with anxiety then becoming one of the possible host environments for the buyers. They find themselves facing their own externalized introspection.

PLACE AND REPLACE ARCHITECTURE

As machines' witness, man is responsible for their connection.

– Gilbert Simondon, *Du mode d'existence des objets techniques*

SEEK – the earliest of these technical ensembles – included a machine that displaced or replaced objects of fairly simple forms according to a specific program. Unlike Price's or R&Sie(n)'s projects, the SEEK information sensor was integrated into the object's structure. Thus, the interaction took place in the environment itself, *in situ*, and not in a separate room or in front of a computer. These "you-sensors" consisted of visual sensors that *supervised* the positioning of blocks according to an initial model. "[SEEK's] purpose was to show how a machine handled a mismatch between its model of the world and the real world – in this case, 500 two-inch metal-plated cubes. The mismatch was created by a colony of gerbils where activity constantly disturbed the strictly rectilinear arrangement called for by the machine model."¹⁷

One of the functions of the central computer, besides putting the blocks back to their initial positions, was to integrate the most frequent shifts caused by the gerbils by slowly changing the initial model, thus producing an architecture that evolves according to the requirements and interests of the user. Revealing his constant quasi-obsessive interest in the relationship, or interface, between man and machine, Negroponte asked, "If I had an environment which could understand all my intentions as well as my wife can, what would it do?"¹⁸ Beyond the machine's ability to "understand" and respond to the user, SEEK showed that architecture itself could become an interface and a technical object. For Simondon, the technical object could become aesthetic as well:

*It is beautiful when it encounters an odd and remarkable place in the world; the high-tension wire is beautiful when it is slung across a valley, the car, when it swerves, the train, when it departs or emerges from a tunnel. The technical object is beautiful when it encounters a backdrop that suits it, which it can be a specific figure for – in other words, when it expresses the world and completes it.*¹⁹

17. Nicholas Negroponte, *Soft Architecture Machine* (Cambridge: MIT Press, 1975), 47.

18. Nicholas Negroponte, "Concerning Responsive Architecture," in *Responsive House*, ed. Edward Allen (Cambridge: MIT Press, 1975), 305.

19. Simondon, *Du mode d'existence des objets techniques*, 185.

20. Zwingenberger, "Interfaces moléculaires", 6.

21. Gilbert Simondon, *L'individuation à la lumière des notions de forme et d'information*. (Grenoble: Jérôme Milion, 2005), 256.

Simondon views aesthetic thinking as having more to do with insertion than with imitation, hence the importance given to the environment. SEEK maintained an artificial environment, never linking its technical environment to a geographical one. *Une Architecture des humeurs* – particularly its secretion machine ViaB02 – is similarly configured. "A long-legged white robot that evokes a prehistoric insect and harks back to some animal nature. . . . For R&Sie(n), architecture as a computational development is allied to a mutant organism that interacts with its context."²⁰ This "alliance" is slightly deceptive in the sense that the machine's context is not exactly external, but represents the mental context of the individual in which misunderstandings operate. Insertion into the geographical environment remains laborious, even impracticable, partly due to the current difficulties in properly formalizing environmental information (choosing settings in situ). *Une Architecture des humeurs* is based on potential buyers retreating into themselves and consequently remaining insensitive to the external environment, yet the capture of personal information reveals the possibility of participating in a new kind of individuation within the potential buyer's interior environment, thanks to the emotion of anxiety. "If the ordeal of anxiety could be experienced and supported enough, it would lead to a new individuation inside the beings themselves, to a true metamorphosis; anxiety already includes the premonition of the individuated being's new birth based on spreading chaos."²¹

Of the three ensembles discussed here, information modulation enabled three different aptitudes to appear: responsive, fun/boring, and misunderstanding. These technical realities led to a better understanding of the different connections between individuals and themselves, and even more of the machines and their environments. The recent interest in the multiple forms of event in these three projects has shifted the attention from the object itself toward the form-making process. Now we must go beyond the confrontation between technophiles and technophobes that still prevails in numerous debates, so that we can understand what this offers architecture. We must stop thinking of machines in terms of their uses and instead think of them in terms of their technicity, since the technical evolution – through its strong relation with information exchange and possible modulations – is integral to the reconfiguration of the form-making process. The functioning of these machines reveals the affective and effective considerations of the architects programming them,

and, moreover, discloses the machines' unknown in-between (mi-lieu). The experimental relationship of these three projects to their milieux bypasses the design process both by incorporating technical data and by acquiring more sensibility to foreign realities. After all, such a technological sensibility does not speak to technology alone.

pars (ōrātiōnis)¹

We demand:

- Give us access to the performer's mind, to the whole human instrument.
- Obscurantism is dangerous. Show us your screens.
- Programs are instruments that can change themselves.
- The program is to be transcended – Artificial language is the way.
- Code should be seen as well as heard, underlying algorithms viewed as well as their visual outcome.
- Live coding is not about tools. Algorithms are thoughts. Chainsaws are tools. That's why algorithms are sometimes harder to notice than chainsaws.

– TOPLAP Draft Manifesto²

The announcement of 2012 as “Code Year” by the recent New York startup company Codecademy has generated unforeseeable enthusiasm and support across wildly different social groups and institutions. In the first few weeks of this year, hundreds of thousands of people committed to learn how to code through the free online courses offered on their Web site. This is only the tipping point of what appears to be a movement toward universal procedural and computational literacy. As computational thinking proliferates, the general perception of coding is also mutating: it is no longer a “skill set,” but a necessary knowledge like reading, writing, and mathematics.

POETRY

Code can speak literature, logic, maths. It contains different layers of abstraction and it links them to the physical world of processors and memory chips. All these resources can contribute in expanding the boundaries of contemporary poetry by using code as a new language. Code to speak about life or death, love or hate. Code meant to be read, not run.

– Ishac Bertran, code {poems}

Ishac Bertran, an industrial engineer and interaction designer, launched his project “code {poems}” in February. The project was an open call for anyone who can script to contribute to an exploration of code as communication at the level of poetry. There were two rules: poems had to be less than 0.5 KB and

1. Latin for “a part of speech.” The verb parse is schoolboy slang derived from *pars orationis*, which means to analyze a sentence in terms of its grammatical constituents, identifying the parts of speech and syntactic relations. In computing, a parser is a program or part of a program that interprets input.

2. An acronym for Terrestrial Organization for the Parsimony of Live Artistic Programming, TOPLAP is a collective formed in 2004 to develop and promote the writing of computer code in real time.

3. See code_poems.com/index.html (accessed June 15, 2012).

4. In Geoff Cox, Alex McLean, and Adrian Ward's paper, "The Aesthetics of Generative Code," they argue that the aesthetic value of code, like poetry, lies in its execution, not simply its written form. However, the code needs to be "sensed" in order to appreciate and fully grasp the experience, and to build an understanding of the code's actions. See Geoff Cox, Alex McLean, and Adrian Ward, "The Aesthetics of Generative Code," in *Hard Code: Narrating the Network Society*, ed. Eugene Thacker (Boulder, CA: Alt-X Press, 2001).

5. Katherine Hayles argues on the illocutionary quality of all code and compares the performativity of artificial and natural languages. See Katherine Hayles, *My Mother Was a Computer* (Chicago: University of Chicago Press, 2005), 49–50.

6. See Alexander Galloway, "Language Wants to be Overlooked: On Software and Ideology," *Journal of Visual Culture* 5, no. 3 (December 2006). Alexander Galloway draws parallels between the function of software and ideology.

7. Espen Aarseth, *Cybertext: Perspectives on Ergodic Literature* (Baltimore: John Hopkins University Press, 1997), 40.

able to be converted from source code into object code.³ Although there is nothing necessarily novel about this call for poets, Bertran's project exemplifies the dual nature of code as both a communicative and a performative inscription. Poetry is an inextricable combination of audible and visual signs, much like language itself.

Can code really work like poetry? We could try to sustain the analogy by coupling the performance of reading poetry to the act of running the code.⁴ The fundamental difference, though, is that code is both scriptural and executable. A compelling parallel in natural languages would be illocutionary acts, performative utterances like the officiant's "I now pronounce you" or the judge's verdict "I sentence you," which are not declarations of intent but actions in themselves.⁵ Alexander Galloway introduces the concept of the "algorithim" to talk about "the cybernetic sign" as both language and machine.⁶ In some signification systems – books, paintings, movies – the relationship between inscription and execution or performance is linear while in the "cybernetic sign transformation" it becomes complex, and each level can only be understood and experienced through the other.⁷

INTERLUDE

Over the last two decades, as software has become easier to use with graphical interfaces, the distance between programmers and users has increased. In fact, most of us don't fit in the user but the "used" category, according to Douglas Rushkoff in his book *Program or be Programmed*. A particular mixing is needed, and is potentially taking place between the two ends – front and back – of our networked society. Code definitely appears as one of the primary territories of contemporary collective intelligence. Even though the idea of collective intelligence is a complex one, I am referencing it here to define the cognitive labor, whose work is inseparable from its mode of socialization or leisure. In the current public imaginary, collective intelligence seems to be a creative agent, its form the network, its expression multilingual, and its goal the creation of the conditions for self-organization.

The same goes for our design cultures. Contemporary architecture is inextricably linked to computation. Software, applications, plugins, libraries, codes, and scripts are constantly rewritten and redistributed in virtually every aspect of the design process, from generative conception to robotic fabrication. This collective language is far from smooth; its very core is striated. A plethora of computer languages and software

environments are used interchangeably for their respective advantages. The various formal constraints of coding and our particular cultural environments are the ingredients of the emerging architectural dialects, both formally and literally.

SUBLANGUAGE

Coders develop their own individual styles of communicating with both the computer, through flow control and optimization, and with other coders through visual organization and comments.⁸ Bradley L. Vinz and Letha H. Etzkorn identify comments in coding as a “subset of a natural language (such as English), typically occurring in restricted domains.”⁹ The code’s documentation is usually a multilayered collection of authorship notes, descriptions, definitions, instructions, humor, debugging, and voided code. Proper documentation is absolutely critical to the code’s communicability with others, and for the author’s development of future versions. Although reconstructing code from good documentation is easy, it is almost impossible to create this documentation after the code has been developed. Programmers, therefore, write components with “self-documenting code,” using clear and understandable names of variables, modules, and objects,¹⁰ such as the examples below:

```
def SixAxisRobot_orientParts(MACHINENUM,
    AXISSTRING, TARGETPTS, INTFLAG): ///
agent.moodupdate(world1.agents); ///
location.distanceTo(other.location); ///
sunvec=PVecBySphericalCoordinates((altitude-90)*DEG_
    TO_RAD,((azimuth+180)*-1)*DEG_TO_RAD); ///
if arrCurvesDivide: print “BOOM” else: print “Nope” ///
bezierFromMathematica = Graphics3D@8AbsoluteThickness
    @0.3D, #< & ê@ %, DisplayFunction & IdentityD; ///11
```

COMPUTATIONAL MORPHEMES

There is in my opinion no important theoretical difference between natural languages and the artificial languages of logicians; indeed, I consider it possible to comprehend the syntax and semantics of both kinds of languages within a single natural and mathematically precise theory.

– Richard Montague, *Universal Grammar*¹²

In natural languages, a useful way to investigate words and their structure is through studying morphemes, defined as the smallest linguistic components with a grammatical function, and as a pairing between sound and meaning. To sketch an

8. In programming, flow control is the ability to define the order in which computers will run each line of code. On the most basic level, code optimization takes care of redundancies and efficient implementation. Finally, all programming languages have different ways of “commenting.” Comments are parts of the code that the computer will “skip” and are intended for communication between programmers and/or users.

9. Bradley L. Vinz and Letha H. Etzkorn, “Comments as a Sublanguage: A Study of Comment Grammar and Purpose,” *Proceedings of the 2008 International Conference on Software Engineering Research and Practice, SERP 2008* 1 (July 2008).

10. For further reading on the debate on techniques of commenting, see Jef Raskin, “Comments are More Important than Code,” *ACM Queue* 3, no. 2 (March 2005).

11. It is a pleasure to acknowledge the conversation with Philippe Morel, Dave Pigram, Luis Quinones, Casey Rehm, Jose Sanchez, and Kyle Steinfeld. The generous contribution of their scripts for the research purposes of this article is expressed here with a single line of code per author.

12. Richard Montague, “Universal Grammar,” *Theoria* 36 (1970): 222. Richard Montague also published two other seminal papers between 1970–1973, entitled “English as a Formal Language” and “The Proper Treatment of Quantification in Ordinary English.”

13. Reference and inheritance are techniques of reusing existing code. A programmer can establish different kinds of relationships and extensions to various codes and software.

14. Caroline M. Eastman, "A Comment on English Neologisms and Programming Language Keywords," *Communications of the ACM* 25, no. 12 (December 1982).

15. In cryptography, the definition of an idiomorph is a pattern of repeated letters.

equivalent and useful definition of the constituent parts of computation, we need to examine a variety of different layers of programming languages. Although a strict grammatical approach might dictate locating a minimal and layer-specific expression (collection of characters) within a distinct algorithmic function, identifying fundamental components becomes ambiguous, and semantics compositional, as we ascend from the binary code. Objects become aggregations through reference, inheritance, and other methods.¹³ Moreover, expanding the notion of language to algorithmic design and computational architecture makes definitions increasingly enigmatic, as they often escape the boundaries of the textual inscription to include geometries, diagrams, affects, cultural signifiers, social protocols, and elements of construction. This last expansion, while vague and problematic, is necessary because it attempts to establish a dialogue between the code and its result. For the purposes of this article, language is considered already multiple, collective, and nonlinear.

NEOLOGISMS

Natural languages are not static; they undergo both mutation and renewal in pronunciation, grammar, and vocabulary. Just as loan words become integrated into a language, the use of English terms in programming can be considered a similar process. Other techniques, such as compounding or abbreviating, are also common practices in computation.¹⁴ The stratified nature of programming languages, with the multiple points of access and avenues of contribution, has strategic advantages. There is such constant redefinition and aggregation of procedures and libraries, that even simple scripts become outdated and dysfunctional only a few years after their production. In such an environment, neologisms are, on a certain level, effortless.

IDIOMORPHISM

At around nine months, infants begin to name familiar others – typically a parent – followed by the use of idiomorphs. Not exactly words, idiomorphs are idiosyncratic to the child and its immediate local environment.¹⁵ Our computational design infancy is full of idiomorphisms, as a plethora of concepts are feverishly reappropriated in our codes. The names we choose within our codes for particular objects or functions may appear indifferent – the machine will not interpret them – but our custom textual constructs and their nomenclature transcend their mechanic environments and emerge in our

studios, reviews, and publications. Encrypted terms travel as fast as an email around the world. Yet, this semi-open field has its economic, academic, and political nuances of domination, and we have witnessed very few collaborative and open-source projects between designers. Our “words” have yet to become truly public, and in the current absence of institutionalized definitions, our codes sometimes mirror their outcomes in their *détournement* and misinterpretation.

ALLOMORPHISM

In language, certain morphemes exhibit allomorphy, the variation of sound without a change in meaning. The most common example in English is the plural morpheme applied to various words – the -s of cats, the -en of oxen, and the zero suffix of sheep. A similar concept in programming is the resilience of certain languages in the forms of their variables, functions, and objects – a subtype polymorphism. This flexibility allows for a series of type-specific behaviors to be determined at runtime and for more intuitive interfaces with the user/programmer. Furthermore, in object-oriented programming, programmers can mutate the very structure and form of the types they are using through inheritance. In the context of robotic fabrication, given the variety of machines and their low-level implemented languages, the translation of forms and functions is hardly ever a trivial task. Each machine, it seems, speaks in its own unique way. The mere acquisition of an additional tool can have extended consequences in how we think and code for it. As schools and studios equip themselves with robots, open-source projects begin to emerge between designers for the construction of universal allomorphic libraries. Further broadening the scope of “languages,” it would be intriguing to examine the inherent polymorphy of certain procedures, in reference to their design outcome. Something as simple as Stephen Wolfram’s elementary cellular automata can exhibit an extreme variety of patterns, and therefore resist categorization as a singular form.

HOMOMORPHISM

Is it possible to arrive at similar results from different algorithms? Often many structures of code can lead to the same result, since there is an infinite number of ways to express the same thing. Although similitude is difficult to be objectified, there are examples where diametrically opposed approaches lead to almost the exact same outcome. It was proven that the bottom-up combinatoric exploration of tiling the plane by Roger Penrose could also

be defined as the top-down projection of higher-dimensional geometry by Nicolaas Govert de Bruijn. The programming of field diagrams could be done with swirling autonomous particles as easily as with projections of conformal maps. Characters and behaviors are shared between algorithms. There are also certain kinds of procedures that, regardless of their combinations, will almost inevitably lead to a recognizable trait. The abuse of this kind of algorithm is the primary suspect behind the extensive uniformity of certain computer-generated designs of the last decade. Very few known ways exist, for example, for translating a point cloud directly to polygonal geometry. Despite the possible inherent intelligence in the distribution of the points, the loss of expression and information during the translation process is usually irreparable.

EPILOGUE

Let me end on a more cheerful note. The miracle of the appropriateness of the language of mathematics for the formulation of the laws of physics is a wonderful gift which we neither understand nor deserve. We should be grateful for it and hope that it will remain valid in future research and that it will extend, for better or for worse, to our pleasure, even though perhaps also to our bafflement, to wide branches of learning.

– Eugene Wigner, “The Unreasonable Effectiveness of Mathematics in the Natural Sciences”¹⁶

16. Eugene Wigner, “The Unreasonable Effectiveness of Mathematics in the Natural Sciences,” in *Symmetries and Reflections* (London: Indiana University Press, 1967), 237.

17. “Perhaps the similarity here to how a piece of music may be constructed is useful in that themes and elements are developed and brought together in order to build a coherent whole – although this analogy may be too simple. Does the composer always imagine their finished piece before it exists? Does the programmer always know the desired result before they launch Emacs?” From Geoff Cox, Alex McLean, and Adrian Ward, “Coding Praxis: Reconsidering the Aesthetics of Code,” in *Read_Me: Software Art & Cultures*, eds. Alexei Shulgin and Olga Goriunova (Aarhus, DK: Aarhus University Press, 2004).

Code often begins with a vague idea of its final form. The process of collapsing the script into procedures creates new ideas and directions that redefine the larger conceptual framework.¹⁷ Given the current quasi-anarchic state of open-source and proprietary computational design libraries and environments, the persistence of the imposed or emerging clichés is rather daunting. There are a few constraints that may work against the production of new concepts. Each programming language is arguably predisposed to a certain kind of writing, and we work almost exclusively within predefined mathematical and geometric frameworks. Nevertheless, the possibilities are endless! Our design communities appear to have developed an idiosyncratic friction toward novel, computational approaches.

The discipline of architecture has always sustained a relative distance from purely scientific methods, so it should be no surprise that our codes are full of pleonasms, contradictions, and paradoxes. Instead of pursuing “elegance” and efficiency, we should celebrate the tropes of our language. For

18. Murray Gell-Mann, "What is Complexity," *Complexity* 1, no. 1 (1995): 16.
 19. Matteo Pasquinelli, "Radical Machines Against the Techno-Empire. From Utopia to Network" in *Media Mutandis: A Node.London Reader*, ed. Marina Vishmidt (London: Node.London, 2006).

mathematician and computer scientist Gregory Chaitin, a computer program is elegant if no smaller program, written in the same language, has the same output. As such, each algorithmic product has a degree of descriptive complexity associated to its informational content. But this formulation is not useful for our purposes. The Kolmogorov-Chaitin complexity is much closer to pure randomness and ineffective in describing the intricate interconnectivity of our desired design outcomes. On the other hand, Murray Gell-Mann defines complexity not through the definition of an entity, but by the concise description of its regularities. As such, "Effective complexity can be high only in an intermediate region between total order and complete disorder."¹⁸ Nevertheless, Chaitin's general view of the ontology of mathematics could have exciting resonances with our discipline. His call for the use of intuition and creativity in math instead of pure logic and axioms, following Kurt Gödel's incompleteness, could clean up the aura of pseudoscience in our arguments. There is value in our metaphors and oxymorons when our documentation and constructed outcomes become truth-events, always already contingent. The contingency is necessary insofar as it can claim a certain amount of coherence without resulting in certainty.

Computation sustains part of the medieval ghost of the perfect language: a universal "logos," a theory of everything, a language where concepts are expressed in their direct form or a contemporary lingua franca. As computational literacy proliferates, it is important to acknowledge the synchronicities between artificial and natural languages in both form and content. It will also be interesting to witness how programming will inflect our thought and speech, as Internet protocols have in the last decade. Finally, we should go even further and explore the potential of these new languages to express mute areas of our creativity and to communicate with territories beyond our current comprehension.

* * *

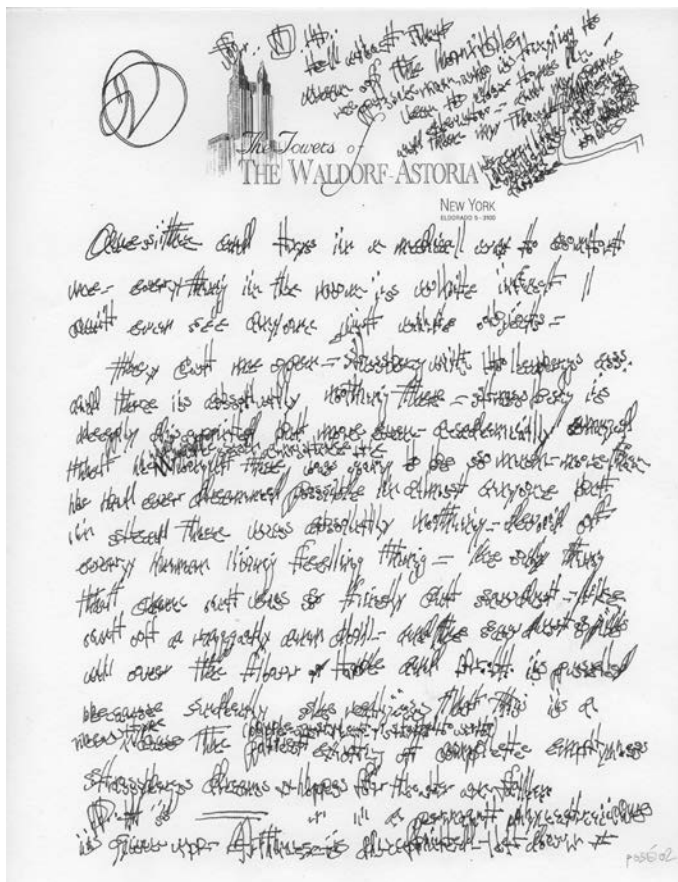
*Don't hate the machine, be the machine. How can we turn the sharing of knowledge, tools and spaces into new radical revolutionary productive machines, beyond the inflated Free Software? This is the challenge that once upon the time was called re-appropriation of the means of production.*¹⁹

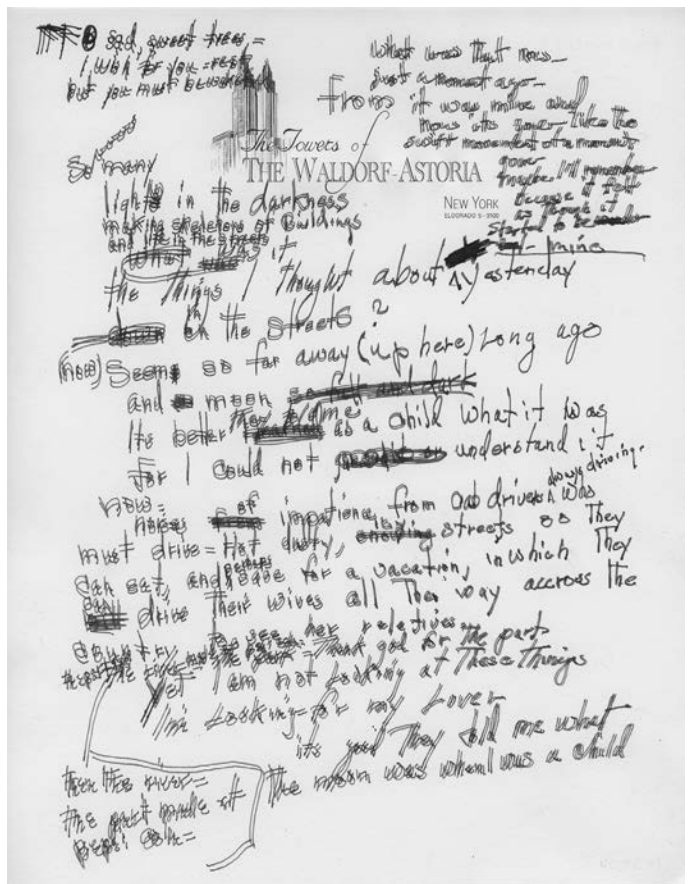
EZIO BLASETTI IS AN ARCHITECT AND TEACHER LIVING IN NEW YORK. HE IS ALSO THE FOUNDER OF ALGORITHMDESIGN.NET.

Marilyn



PHILIPPE PARRENO'S FILM, *MARILYN* (2012), IS A PORTRAIT OF MARILYN MONROE. SET IN HER SUITE AT THE WALDORF ASTORIA HOTEL, WHERE SHE LIVED IN THE 1950S, THE MOVIE STAR IS REINCARNATED THROUGH A SYSTEM OF THREE ALGORITHMICALLY CONTROLLED MACHINES: THE ARRI ALEXA CAMERA BECOMES HER EYES, A THREE-AXIS DELTA ROBOT HER HANDWRITING, AND VOICE-WARPING SOFTWARE HER VOICE. FEEDBACK BETWEEN THE MACHINES – THE VOICE DESCRIBES WHAT THE PICTURE SEES, AND THE PICTURE SEES WHAT THE HAND WRITES – RENDERS A BIOMETRIC PORTRAIT, ABSENT MONROE'S ICONIC IMAGE. THE ROBOTIC WRITING MACHINE (DEVELOPED BY STEPHAN HENRICH) WRITES THE LETTERS OF A GHOST, SHOWN HERE. ALL IMAGES © PHILIPPE PARRENO.





The Thing: An Architectural Script

SCENE 1

INT. VIRTUAL ASSEMBLY SPACE – THE 40TH ANNIVERSARY OF THE FOUNDING OF THE ASSEMBLY – 2055

The disembodied face of TARA fades in from the blackness. It is relaxed and impassive. She is waiting to address the Assembly. TARA has the highest reputation score in the Assembly. Her reputation was established decades earlier through her campaign to transform two Arctic Mobile Scientific Units and their small but fervently dedicated lay community of online observers into what has since become known as the Assembly. Her text “The Phase Shift Manifesto,” articulated the need to continue the work of Edwin Walcott, a doctor who cataloged several endangered ecosystems by maintaining the perpetual presence of Mobile Units throughout the arctic. Over time, these units became known as The Things.

TARA

The Thing is a mobile architecture that registers the effects of climate change. It is a cold climate animal, capable of flourishing only at arctic latitudes.

The Thing is a sensitive instrument. By the constraints of its survival, it is constantly mapping out its territory, momentarily delineating the boundaries of climate change.

It is an endangered species whose days are numbered.

The Thing survives, moves, and broadcasts what it perceives at the frontline of climate change.

What it perceives is conditioned by the dialogues that it facilitates.



THE THING. VIEW OF ASSEMBLY SPACE.
ALL IMAGES COURTESY THE AUTHORS.

The Thing interacts with social, scientific, climatic, artistic, biological, political, and economic data. The Thing is a nomadic network of multiple Things.

It extracts information from one place to several, in an effort to subvert an imminent colonialism.

TARA's face fades to black.

SCENE 2 – ARRIVAL

INT. THE THING – CANADIAN ARCTIC ECONOMIC ZONE, BAFFIN ISLAND – NIGHTTIME

The Thing has just arrived and commenced expansion. Outside, we hear a fierce snow storm howling. HALLIDAY is resting in his sealed sleeping pod after a long day of setup. He is responsible for overseeing the logistical deployment and operation of The Thing. HALLIDAY is a pioneering climanaut whose incorrigible bravado has earned him prominence in the history of the Assembly. HALLIDAY is primarily known for being the first famous Assembly member. While reviled by large factions of the Assembly for pandering to tabloid sensibilities, he is credited with broadening its membership by appealing to the masses.

For HALLIDAY, the Thing is an animal. The matrix of sensors located within its boney lattice form a distributed prosthetic eye. Despite the whiteout conditions outside, it has no trouble reconstructing its immediate surroundings. What the Thing sees, HALLIDAY sees too. On his heads-up display, HALLIDAY observes that the Thing is paused halfway through the inflation of the Assembly interface space. The membrane is not yet taut and ripples erratically. Tethers prevent it from being torn away from the lattice superstructure.

Warm inside his sleeping pod, HALLIDAY can feel the layered, mineralized tissue of the lattice shudder as it dissipates the energy of a gust of wind through several length-scales: from macro, to micro, to nano. Modelled after bird bones, the lattice's marrow contains dense bundles of network wires, climate sensors, satellite transmission equipment, antennae,

pneumatic controllers, and ice articulators, all with three levels of redundancy just in case “shit” goes “awry.” And, “awry,” as years of deployment has taught climanauts, is a fundamental property of “shit.”

Peripheral updates report that two sensor posts have either broken or gone offline because of the gale, neither of which would be bad news except that their cheap construction suggests they should not be relied upon too faithfully. Cheap or not, climanauts are not philosophically disposed to waste. HALLIDAY watches as the computer runs a detailed scan of NILAK, another climanaut, as she walks a switchback pattern in her snowshoes and OUTsuit. She is searching for missing sensors.

HALLIDAY zooms in on NILAK.

HALLIDAY

Pan.

HALLIDAY’s fingers shift in the air like a Theremin maestro playing a melody. The gestures swivel his view over and above NILAK to better understand her path. Her movements are rendered as solid extrusions on a contoured wireframe topography. It is evident that NILAK has been blown off course. Her new trajectory resembles the final word of a suicide note as it trails off the page.

Fade to Black.

SCENE 3 – TERRITORY OF SURVIVAL

INT. VIRTUAL ASSEMBLY SPACE – THE 40TH

ANNIVERSARY OF THE FOUNDING OF THE ASSEMBLY

TARA’s disembodied face fades in from black. Her discourse continues. She is discussing the simple metrics that govern the survival of The Thing.

TARA

Bio-tope. Origin: 1927. Bi- + Gk *topos* place.
A portion of a habitat characterized by
uniformity in climate and distribution of
biotic and abiotic components. The Thing
is integrated with and reliant upon cer-
tain climatic conditions. These conditions

suggest territories that can be inhabited and others that cannot. The Thing understands its survival with the equation:

survival =

t (temperature) + p (precipitation)

t < -5° C

p > 0.5 mm/day

TARA's face fades to black.

SCENE 4 – DEPLOYMENT

INT. INFLATED ASSEMBLY – DAYTIME

DR. WALCOTT stands in The Thing's recently deployed inflatable. He is nominally assisting NILAK with the installation of tubing that will allow the inflatable to acquire the thin shell of ice essential to their survival.

He rhymes to himself under his beard.

DR. WALCOTT

Such a pain to bundle these veins.

DR. WALCOTT is inherently cerebral and ill-disposed to physical labor, however moderate. A forest of thin, clear plastic tubes dangle from the translucent inflatable skin curving around him. He gathers a fistful and tethers them with a strap, feeling their watery contents pulsate gently. NILAK notices DR. WALCOTT staring at his hand.

NILAK

I tend to think of it as solidified rain, doctor.

DR. WALCOTT

Actually, my dear, it is more like inverted rain since the tubes convey water upward and outward. Veins are a more apt description.

NILAK

(under her breath)

More like sweat glands. Veins convey blood. And when veins convey blood to the surface it is usually because shit has gone awry.

NILAK is caught in two minds. Her instinctual respect for elders ingrained from her Inuit upbringing is in conflict with her intolerance of “dead weight.” This disdain has been hardened by dozens of deployments where survival exists by the tiniest of margins. She takes a deep breath.

Revered as the founding father of the Assembly, DR. WALCOTT’S earliest field work established the framework for the Arctic Mobile Scientific Units. These units were dedicated to cataloguing and recording the shifting patterns of endangered ecosystems. Yet, DR. WALCOTT has had minimal involvement with the Assembly, having long renounced the rigors of field work. His inclusion in the deployment is a kind of ceremonial homecoming, a commemoration of the anniversary of its founding. He is lost in thought, muttering to himself.

DR. WALCOTT

Crude.

NILAK

I’m sorry, doctor. What was that?

DR. WALCOTT does not respond. He is lost in memories. He recalls the frequent diesel spills and garbage runs of the first Arctic Mobile Scientific Unit. It had been cumbersome and indifferent to its biotope, like explorers of the Northwest Passage during the 19th century. Those expeditions, especially the Franklin, saw that the arctic was a hostile territory that could only be conquered by brute force. They invariably failed.

Success favored a different paradigm. Norwegian Roald Amundsen spent three years guiding his small sealing ship through the Canadian Arctic. His ship was locked in ice during the winters, yet he did not starve or die from exposure. Amundsen learned survival techniques from the Inuit population, and his crew not only survived these winters, but thrived. They hunted, explored, and mapped hundreds of kilometers over frozen terrain.

To the networked community that followed and increasingly participated in the early Arctic Mobile Scientific Units, Amundsen’s integration with his biotope was a central model. This philosophy was formalized and directed future design generations of The Thing(s). Amundsen was the Assembly’s talisman.

DR. WALCOTT

Dr. Walcott begat a child he could barely recognize.

NILAK

Indeed, doctor. Your child is all grown up now. Perhaps not what you expected?

Since DR. WALCOTT's departure, the Arctic Mobile Scientific Units had evolved. Speciated. They had become animal, endangered animals whose territory was always shrinking. They were defined by the shifting, turbulent variation of the biotopes that permitted their existence. However unfamiliar The Thing was, DR. WALCOTT sensed a heredity that connected his earliest field work with the translucent inflatable chamber in which he now stood.

The Assembly mandate had morphed and expanded. Though there had yet to be a single mission without at least one scientist, a typical crew now contained an artist, a writer/poet, a captain of industry, an engineer, indigenous locals, shamans, a journalist, even politicians. The obsessive collection of data had remained constant, but the output was no longer singularly scientific. All the knowledge was integrated into a comprehensive, multidimensional map accessible to every member of the Assembly.

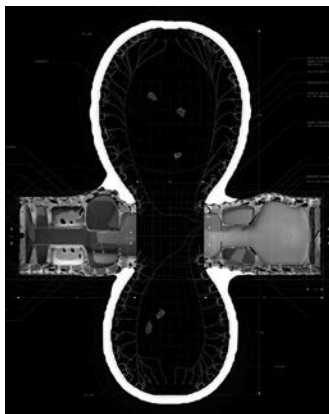
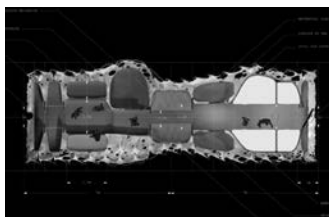
The Things had become tracing machines whose passage across the biotopes of the arctic were vectors of embedded knowledge.

Fade to Black.

SCENE 5 – THE DISCOURSE

INT. INFLATED ASSEMBLY – NIGHTTIME

TARA's disembodied face reemerges from the blackness into the Assembly. The Assembly is the virtual space where all members convene. Her eyes close and reopen. The blackness dissolves to reveal her embodied self. She is sitting in The Thing. Each Thing contains an augmented-reality space that links it to the Assembly. The space is teeming with floating information; at the center is a large augmented-reality map. All the data is embedded here.



THE THING. PLANS, COMPACT AND EXPANDED.

TARA is surrounded by a multitude of interconnected equipment units, three of which contain her fellow climanauts: HALLIDAY, NILAK, and DR. WALCOTT. They await her discourse.

TARA can no longer see her breath. Despite the bitter subzero temperatures outside, the inflated Assembly space is now comfortable. The ancestor of The Thing's insulation strategy is a tent-within-a tent configuration, devised by the Chukchi of Siberia to protect them against temperatures that dropped below 60 degrees Celsius. TARA prefers to think of it as a kind of Russian doll, her aged and vulnerable body being the innermost layer. Between the Thing's skin and her own are a series of offset surfaces that partition the breakdown of cold into stages.

TARA closes her eyes and the physical space of The Thing dissolves to black. A constellation of points appears all around her. Each point is the face of an Assembly member; they are logged in to hear her speak.

TARA

When you lose a language, you lose a culture, an intellectual wealth, a work of art. It's like dropping a bomb on the Louvre. Similarly, when you lose a species, you lose a complexity, a galaxy of knowledge and intelligence that is borne from eons of living and surviving. You can only guess at what is gone.

When you lose an ecology, an interaction of species, you multiply your loss exponentially. To simulate evolution is not so difficult. It is symbolic, data replicating over time without physical constraints. But a biotope is the flesh-bound reality of evolution as it negotiates the turbulent, inconsistent, and interrupted variations of climates and topographies. It is impossible to place a value on the embedded intelligence of a biotope.

The curve of transition in every biotope is so much steeper than our curve of learning. This is how we started. To close the gap

between curves. We had a mandate. To observe. To catalogue. To record. To archive. To map. To engage. To address. To explain.

But we, the Assembly, are a biotope ourselves. We are an ecology of relations. We are borne from a network. And we are a network. Our present configuration was unforeseen, just as the Internet was an unplanned side effect of military men who could never have imagined what their network would become. The Assembly is another side effect, also unforeseen. We cannot predict the future. At best, we can strive to make this moment accessible, even if it takes years to do so.

We know how we came together. But for what? To assemble. To disagree. To discuss. To debate. To convene. To resolve. To fissure. To protect. To form. To negotiate.

And always through the network of Things, always tied to the biotope. If the biotope permits, then we can stay. When it becomes unstable and tenuous, when the territory shrinks, then we move. And when we move, everybody knows.

TARA's face fades to black.

THE END

Analyzing the Masochist Architect



ADOLF LOOS, 1909. PHOTO: OTTO MAYER.

Adolf Loos positioned himself as a critic of turn-of-the-century Viennese society, but his polemical remarks were aimed less at the society of consumers and inhabitants than at the artistic producers. His disparaging criticisms of Josef Hoffmann and Henry van de Velde, on Art Nouveau in Vienna and the Wiener Werkstätte, were sufficient, it would seem, to establish him as a moralist among his contemporaries. This zeal for morality and goodwill is not without harm to the understanding of the hidden interest of Loos's work. An ideological reading fails to recognize the most humoristic and subversive sense of the Loosian critique: "to stand out the least" in order to reach the most subversive freedom.

The most subversive and effective characteristic of the Loosian critique does not concern architecture, however, but rather the architect himself and his claim to artistic innovation. Arguably, the humility with which Loos seems to want to veil the architect's ego is nothing other than a disguise chosen to hide an ambition of a completely different scale.

In a self-effacing statement, one that empties fashion of its spectacular essence and creates an art of camouflage, Loos said of clothing, "It is a question of being dressed in such a way that one stands out the least."¹ At the same time, such a "silence," in the manner of the "the mill [that] stops clacking and wakes up the miller," may be the best way to be heard.² And is mumbling, for the modern man, not the last bastion of expression?

In his research on masochism, Freudian psychoanalyst Theodor Reik analyzes the paradoxical character of an "inhibited exhibitionism," which, from an apparent humility, creates an indirect means for "demonstrating" a singular self-affirmation. Going against the views of other psychoanalysts such as Karen Horney, for whom masochism is an attempt to obtain safety and satisfaction in life while passing unperceived and depending on others, Reik proposes a paradoxical understanding of masochism in which "a conscious inhibition of exhibitionism does not contradict a hidden tendency that is nevertheless victorious in the opposite direction."³

Loos's principle of clothing – that its neutrality is the absence of external ornamentation – has the secret intent to

1. Adolf Loos, "Men's Fashion" (1898), in *Spoken into the Void: Collected Essays by Adolf Loos, 1897–1900*, trans. Jane O. Newman and John H. Smith (Cambridge: MIT Press, 1982), 78.

2. Adolf Loos, "Ornament and Education" (1924), in *Ornament and Crime: Selected Essays*, trans. Michael Mitchell (Riverside, CA: Ariadne Press, 1998), 186.

3. Theodor Reik, *Le Masochisme* [Masochism in Modern Man], trans. Matila Ghyka (1953; repr., Paris: Editions Payot & Rivages, 2000), 81. Author's translation.

attract attention and perhaps, at a deeper level, to irritate and provoke condemnation by its simplicity. For the individual, as for architecture, the absence of external signs becomes the expression of a force; a force that is no longer expressed in traditional terms – that is, by expressing its inner wealth on the exterior – but rather by making asceticism an essential criteria of its power. The force of the architectural facade is no longer its reassuring beauty – in the sense of an expression of well-being or health – but its provocative ugliness, an expression of pain, of a disturbing asceticism that goes through disapproval and mortification.

In his introduction to Loos's *Spoken into the Void*, Aldo Rossi writes that Loos “possessed an unusual ability that perhaps he himself did not fully understand: a peculiar power to irritate, or even better, to unsettle the public.”⁴ Rossi thus identifies the most unusual characteristic of Loos: his strange power of provocation, his art of making enemies.

In his famous story “The Poor Little Rich Man,” Loos pushes the ordinary relationship between a client and his architect to a point at which the former becomes the consenting victim of the latter.⁵ The architect-tyrant and the client-slave reveal the intimate nature of the contract that binds them: one needs the other to legitimize his existence. The union of the weak, initiated by the puppet-clients, provokes and favors the tyrant. Loos explains the irrational aspect of this procedure for which the architect and the artist are merely poor representatives, and describes with irony the Viennese who suffer an assault they cannot even define: “They talk a lot of twaddle about the tyranny of fashion, perhaps, or in a more positive moment, of the moody goddess of fashion! If they would suspect that the good hatter of the Eleventh District is the tyrant, the god!”⁶ The divine authority always appears behind the human mask of a milliner, an artist-decorator, or an architect, and Viennese high society trembles with anguish and rapture when faced, not with divinity itself, but its most subordinate ministers.

In virulent polemics Loos encouraged artisans to refuse the designs of artists and incited the population to fit out their dwellings themselves, without hiring an architect. By humiliating and ridiculing the status of the artist-decorator in the eyes of the inhabitant, he deliberately jeopardized the financial situation of the artist and architect.

Questioning the motivations of an architect who seemed to be degrading his own profession, some wondered if Loos had “gone mad.”⁷ Others suspected Loos of feeding mercenary

4. Aldo Rossi, introduction to Loos, *Spoken into the Void*, viii.

5. The essay relays the stylistic contagion that conditions all actions of the inhabitant. Loos humorously describes the absurd relationship that binds the architect to his client. See Loos, “Poor Little Rich Man,” in *Spoken into the Void*, 126–27.

6. Loos, “Men’s Hats” (1898), in *Spoken into the Void*, 51.

7. As if he had provoked it, Loos was not surprised by the reaction: “I was secretly delighted to hear recently the complaint of a colleague of mine that a potter to whom he had given a drawing had refused outright to follow it. He did not even want to make the attempt. He simply did not want to be ‘rescued.’ ‘The man was right,’ I told the architect. The latter probably thought I was crazy.” From Loos, “Glass and Clay” (1898), in *Spoken into the Void*, 36–37.

8. Hermann Bahr, "Ein Brief an die Secession," *Ver Sacrum* 4, no. 14 (July 1901), quoted in Burkhardt Rukschcio and Roland Schachel, *La vie et l'œuvre de Adolf Loos*, trans. by Marianne Brausch (Brussels: Pierre Mardaga, 1982), 53. Author's translation.

9. This is how the rediscoverer of the Wagner-Schule in 1969 qualified Loos. Otto Antonia Graf, *Die vergessene Wagnerschule* (Vienna: Jugend & Volk, 1969), quoted in Rukschcio and Schachel, *La vie et l'œuvre de Adolf Loos*, 52. Author's translation.

10. Hermann Czech, "Maison sur la Michaelerplatz," in *Adolf Loos 1870-1933* (Paris: Pierre Mardaga, 1983), 74. Author's translation.

11. Reik, *Le Masochisme*, 95. Author's translation.

12. Rossi, *Spoken into the Void*, viii.

motivations: the Secessionists, who stated they were at war "against the gossipmongers who claim to be artists but have a commercial interest to stifle art,"⁸ preferred to see Loos as a strategist attempting to influence the craftsman and the public by financial means. Others called him a "total reactionary."⁹ Maybe they were all right.

Hermann Czech insists on the psychological character of Loos's polemic regarding the facade of the house on Michaelerplatz. "That Loos wanted to build a modest and functional house without seeking to disturb anybody was only believed by his closest disciples." Czech believes that, in reality, "the house was to be a program, a revelation. It should be understood in this sense. Isn't the ostentatious and provocative simplicity of its higher part unbearable in its intention? Doesn't it seem to give a lesson, in spite of its modernity? Doesn't it have a pedantic appearance of pedagogical education?"¹⁰

Loos was indeed an educator. But what was the aim of this education, if not to provoke condemnation?

In this sense, his incrimination of ornament finds its innermost reason in the need to provoke, to make enemies, and, consequently, to be condemned. As Reik notes, "The delicate art of making enemies should be considered as an excellent form of provocation. The secret desire of rousing longing and jealousy, hatred and anger in others, creating a pack of enemies, is part of the provocative technique of masochism."¹¹

Simply by his obstinate, pedantic, and irritating attitude, Loos developed an "art of making enemies." To provoke his own condemnation, he devised a technique of masochistic sabotage, which included his text "Ornament and Crime." For Rossi, Loos's power of provocation naturally turned against him: "This inevitably meant his ostracism as a man, and more precisely as a worker, at the same time that he was being accepted as a legend."¹² Rossi perceives Loos's masochism without qualifying it, and Loos's words, "spoken into the void," already predicted future recognition, despite everything. In this sense, Loos's masochism would seem to follow the romantic psychology of the hero as defined by Reik: *The hero suffers from injustice; he is misunderstood, offended, insulted, and humiliated. He is not appreciated, neglected for others, exploited, and often turned out from the community. . . . All this, however, is merely a preliminary detail for the really important matter. This is the victory he wins over his adversaries, the rehabilitation; we are almost tempted to write the resurrection of the self. The merits of the hero and his excellent moral or intellectual*

13. Reik, *Le Masochisme*, 306. Author's translation.

14. Adolf Loos, foreword to "Malgré tout" (1930), in *Paroles dans le vide*, trans. Cornelius Heim (Paris: Champ Libre, 1979), 149. Author's translation.

*qualities are now recognized by the same individuals who formerly treated him as their inferior.*¹³

This is also the paradoxical victory Loos obtained: suffering and condemnation were the price to pay for recognition. The heroic endurance with which one bears the injustice of the present – an injustice provoked by the masochist himself – portends a future recognition, a mythical existence guaranteed by the very suffering endured in reality. Such too is masochistic humor. This perhaps explains why we often find in Loos's writing a form of glorious anticipation, which gives the work a curious aspect, both prophetic and illuminated. The titles of his books, *Spoken into the Void* and *Nevertheless*, also reveal this turning point. In the foreword to *Nevertheless*, published in 1930, Loos sets the tone with an aphorism from Friedrich Nietzsche – "That which is decisive is produced despite everything" – and then continues in both heroic and prophetic terms:

*I left victorious a thirty-year-old combat: I delivered humanity from the superfluous ornament. There was a time when "ornament" was synonymous with "beautiful." Today, thanks to my life's work, this word is synonymous with "mediocre" . . . and I know that humanity will one day be grateful to me for having seen it through, if the time I save it benefits those who up to now were excluded from the goods of this world.*¹⁴

That Loos's prophecy has not kept its promise – even today ornament retains an aesthetic value, the absence of ornamentation having become ornament in itself – is of little importance. What is really of interest is that Loos has indeed become a myth, that his words "spoken into the void" have "nevertheless" had a huge impact in cultural and architectural history, not by keeping their theoretical (or rather rhetorical) promise, but through their implicit subversive power; by continuing to generate a void, a fracture, each time the anachronical and mythical figure of Loos appears amid the excesses of architectural discourse.

Abject Matter: The Barricade And the Tunnel

Seen through a materialist reading, the built environment can be a way of contextualizing political struggle. Architecture, as a modification of the material world, allows us to observe the political implications of such transformations. Whether intentionally or not, it has been recurrently used as an instrument of control upon bodies, and considering architecture's ability to transgress a given system's rules, the discipline seems inherently in collusion with this same system. Given this conundrum, is it possible to conceive of a resistive architecture? Two different operations on matter – aggregating and digging – can be seen as acts of creation toward two potentially resistive architectural typologies: the barricade and the tunnel.

AGGREGATING MATTER: THE BARRICADE

In 2011, the Arab Spring and various movements questioning representative democracy (the *Indignados* in Spain, the Occupy Wall Street movement in the United States, the student protests in Chile) all had a strong impact on the use of public space and revealed the importance of the body's presence. The forces undertook against these movements differed in their means of suppression; each movement had to invent strategies of physical defense. In Cairo's Tahrir Square, Christians formed protective walls of bodies around Muslims at prayer; in New York City, the first order of eviction was cancelled when hundreds of people formed a protective human barricade around Liberty Square to prevent police intrusion. Various material forms of encampment and barricades were also necessary to sustain these movements' presence on the public spaces they activated.

Throughout history, urban insurrections have used urban matter as a means of defense and, by transforming its form and function, created excess that had to be suppressed by the various forces of policing that served the dominant powers of the era. In 19th-century France, for example, two figures on opposite sides of the power structure – Louis

1. Auguste Blanqui, "Esquisse de la marche à suivre dans une prise d'armes à Paris," in *Maintenant, il faut des armes*, ed. Domonique Le Nuz (Paris: La Fabrique, 2006).

2. Thomas Robert Bugeaud, *La Guerre des rues et des maisons* (Paris: Jean-Paul Rocher, 1997).

Auguste Blanqui, a political activist, and Thomas Robert Bugeaud, a marshal of France – exhibited oddly similar techniques in their fight to control the city. In 1866, Blanqui wrote a clandestine instruction manual for armed insurrection in Paris,¹ explaining in detail how to build a barricade by modifying a block of buildings and thus transform a neighborhood into a veritable fortress. He also described a process of mining within the mass of housing, by cutting stairs, digging through floors, and piercing the walls.

Similarly, Bugeaud wrote a short pamphlet entitled *La guerre des rues et des maisons*² (The War of Streets and Houses) in 1848, for distribution to army officers on ways to prepare for and conduct urban warfare, based on his successes in Algeria. (He transformed the heavy and slow French army in Algeria into a mobile and fragmented attack force that ultimately defeated Abd el-Kader and his *smala*, a veritable walking city/army.) The manual explained how soldiers could seize barricades and suppress any form of rebellion within the city. It called for the occupation of barricaded houses in a strategy similar to the one adopted by insurgents in the 1830s and '40s – and later theorized by Blanqui – and also advocated tactics in which soldiers could move between buildings by piercing through walls. Bugeaud's tactics, however, were rather unpopular in the army as they implied a complete repartition of power within its hierarchy, giving various squads in an otherwise paradigmatic imperial army an important sense of initiative and improvisation.

Cities are often understood by the transcendental powers that oversee them – both technocrats (including architects) and suppressive forces (police, army) – as a two-dimensional representation of space that can be modified by the transposition of lines in reality. (Georges Eugène Haussmann's radical transformation of Paris is a prime example.). On the other hand, insurgents – who experience the city rather than represent it – interpret it as a mass that can be infiltrated, transgressed, and weaponized. Likewise, some historical representatives of transcendental power have advocated for regular armies to adopt insurgent techniques of urban warfare as an efficient way to counter uprisings.

What occurred with Bugeaud and throughout 19th-century Paris in a sense continued with Colonel Marcel Bigeard, who was responsible for the counterrevolutionary strategy in Algiers' Casbah in 1957, and with Israeli Major General Aviv Kochavi, who led the siege on the Nablus refugee camp in the West Bank during the second Intifada in



EUGENE THIBAUT, *BARRICADES ON RUE SAINT MAUR, BEFORE THE ATTACK, JUNE 25, 1848*. IMAGE COURTESY RÉUNION DES MUSÉES NATIONAUX / ART RESOURCE, NY.

2002. Bigeard's methods to annihilate the FLN (Algerian National Liberation Front) considered the labyrinthine Casbah as a porous mass of matter that the French paratroopers needed to partition, surround, and suddenly strangle. Similarly, the narrative of the Nablus siege, as Eyal Weizman recounted after interviewing Kochavi,³ depicts the Israeli Defense Force's *infestation* of the Palestinian refugee camp. Israeli soldiers operated within the camp by penetrating through the walls and floors of Palestinian houses, thus using the dense mass of the environment around them to surprise its own inhabitants.

This manipulation of matter used to form and infiltrate barricades in counterrevolutionary tactics was also implemented against barricades via a technological invention that became systematically applied in most European cities during the 19th century. Macadam – named after its inventor, John McAdam – was installed to replace the paving stones used in the streets, stones that were also a fundamental, local element for constructing barricades. It would be inaccurate to claim that the use of macadam was introduced exclusively as a counterrevolutionary strategy, but several testimonies from that era leave no doubt it was an important motivation. A solid mass that prevents any form of permeability, macadam refuses reformation as an insurgent, weaponized landscape. About two decades later, macadam was replaced by the even more solid and nonporous matter of asphalt. These characteristics were celebrated by Robert Smithson in his 1969 sitework, *Asphalt Rundown*, which dramatized a flow of asphalt on a slope of earth, suffocating the earth in a black antimatter. Unlike the traditional use of asphalt in an urban context, Smithson's work celebrates the formlessness of the asphalt flow and, therefore, the impossibility of absolute control over its behavior.

The idea of formlessness is recurrently associated with dirt and excrement. Excess, when unable to be reinjected in the cogs of a system, is then declared as waste. This explains why hygiene and cleanliness constitute recurrent arguments to legitimize the suppression of insurrectional movements. Haussmann's hygienist discourse in favor of his plan for the transformation of Paris is evocative in this regard. Likewise, the announcements that were made by various American and English mayors in 2011 and 2012 to justify the eviction of public protestors have insisted on the sanitary purposes of their actions.⁴ This rapprochement between salubrity and social order can be interpreted as a decoy for political

3. See Eyal Weizman, *Hollow Land: Israel's Architecture of Occupation* (New York: Verso, 2007).

4. See Carly Schwartz, "Occupy San Francisco Deemed A Health Hazard As Protesters Vow To Relocate," *Huffington Post*, October 26, 2011, http://www.huffingtonpost.com/2011/10/26/occupy-san-francisco-health-hazard_n_1033733.html

5. Mary Douglas, *Purity and Danger: An Analysis of Concept of Pollution and Taboo* (2002; repr., London: Routledge, 2009).

6. Julia Kristeva, *Powers of Horror: An Essay on Abjection*, trans. Leon S. Roudiez (New York: Columbia University Press, 1982), 4.

7. Gilles Deleuze and Félix Guattari, "1227: Treatise on Nomadology – The War Machine," in *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987).

8. Elie Faure, *Medieval Art*, trans. Walter Pach (New York: Harper and Brothers, 1922), 14.

and social suppression, disguised as a consensual concern for public health. It also reveals an association between order and hygiene in the dominant imaginary.

In her book *Purity and Danger*,⁵ British anthropologist Mary Douglas defines dirt as a "matter out of place," arguing that such a definition implies a system that orders the placement of matter which dirt transgresses. This definition can be applied to every entity that does not respect such order, as Julia Kristeva affirms in her *Powers of Horror: An Essay on Abjection*: "It is thus not lack of cleanliness or health that causes abjection but what disturbs identity, system, order."⁶ The sanitary argument against insurgents is therefore misinformed in attributing abjection to a literal lack of hygiene. Rather, it stems from excessive matter produced by the insurgency, and its disturbance of a systematic order.

DIGGING THE MATTER: THE TUNNEL

In their *Treatise on Nomadology*, Gilles Deleuze and Félix Guattari recall historian Élie Faure's description of the creation of Indian caves: a group of people reaches a cliff of granite, carves into it, and eventually exits it on the other side of the mountain four centuries later, leaving behind a multitude of sculptures that fascinate Faure for their material expressivity.⁷ "Here man confesses unresistingly his strength and his nothingness. He does not exact the affirmation of a determined ideal from form. He incloses no system in it. He extracts it in the rough from formlessness, according to the dictates of the formless."⁸

The act of digging into matter is indeed an exploration in itself and remains absolutely dependent on the matter's characteristics (solid or friable) and its composition (metal, stone, sand, ore, clay). The subterranean and transterranean cities of Cappadocia are exemplary of the pact obtained by humans with matter and its characteristics for defensive purposes. Several civilizations, from the early Christians to the medieval Turks, have dug into the tractable volcanic ground/rock to create gigantic underground cities from which to defend themselves against invasion. The vast yet sinuous subterranean complexes are made out of a single surface, a direct result of the action of carving the earth. The careful weaponization of this topological surface in preparation for conflict guaranteed a strong advantage for its inhabitants – for example, narrow corridors that invaders could only enter in single file.

During the Vietnam War (1955–75), the Viet Cong, who were disadvantaged in both manpower and technology,



CITY OF UCHISAR, CAPPADOCIA, TURKEY,
2011. COURTESY WIKIMEDIA COMMONS.

or-ganized part of their resistance by digging miles of tunnels to form numerous labyrinthine, subterranean complexes. In their book *The Tunnels of Cu Chi*,⁹ Tom Mangold and John Penycate describe the Vietnam ground as friable, “like sugar” during the Monsoon season, yet able to carry “the weight of a tank” during the dry season. That the solidity of the matter could vary constituted the essence of its potential weaponization. Its friability allowed for its composition while its solidity provided a necessary defensive strength in conflict.

This strategy was particularly important to the Viet Cong because it constituted their own land. Using it as a form of resistance could be seen as a call to the earth’s forces to fight on their side. The Vietnamese poet Duong Huong anthropomorphized this earth in a venerable ode to nature: “Your entrails Mother, are unfathomable.”¹⁰ The American “rats” – soldiers that carried out underground search and destroy missions – lived in these entrails. The unbearable smell produced by the various bodies living in the tunnel – blood, excrement, sweat, and urine, contained by the earth – composed a substrate that seemed to function as an additional defensive strategy against the intrusion of foreign bodies.

Those same foreign bodies therefore had to adapt to and embrace abjection just as the Viet Cong had. One American “rat” is enlightening in his description of such a transformation process: “I was just an animal – we were all animals, we were dogs, we were snakes, we were dirt.”¹¹ The act of assimilating oneself with matter recalls Jean-Paul Sartre’s definition of the viscous in *Being and Nothingness* as a blur of limits between a body and the matter with which it interacts. “The viscous is a state half-way between solid and liquid. . . . It attacks the boundary between myself and it.”¹² Sartre follows this by questioning the notion of holes: “The ideal of the hole is then an excavation which can be carefully moulded about my flesh.”¹³ Here the body becomes matter within matter, and we can attribute to an individual a potential becoming-matter in the same way that Deleuze and Guattari described becoming-animal.¹⁴ Such an idea of becoming can be defined as the embrace of one’s own marginalized characteristics in the construction of resistance against the powers that created that marginalization. In a Cartesian world, in which men think of themselves as the masters of nature, such becoming-matter consists of the acceptance and expression of

10. Ibid., 65.

11. Ibid., 106.

12. Jean-Paul Sartre, *Being and Nothingness; An Essay on Phenomenological Ontology*, trans. Hazel E. Barnes (New York: Philosophical Library, 1956), 606.

13. Ibid., 610.

14. Gilles Deleuze and Félix Guattari, *Kafka: Toward a Minor Literature*, trans. Dana Polan (Minneapolis: University of Minnesota Press, 1986).

15. Reza Negarestani, *Cyclonopedia: Complicity with Anonymous Materials* (Melbourne: re.press, 2008).

16. *Ibid.*, 51.

17. Aristotle, *Physics*, trans. Robin Waterfield (New York: Oxford University Press, 2008).

18. Gilbert Simondon, *L'individu et sa genèse physico-biologique* [Physico-Biological Genesis of the Individual] (1964; Paris: Presses Universitaires de France, 1995).

the autonomous behavior of the matter that constitute both one's self and one's environment.

In his novel *Cyclonopedia*,¹⁵ Iranian philosopher Reza Negarestani associates the discipline of architecture with exhumation in what can be read as a Middle Eastern interpretation of Deleuze and Guattari's concept of Holey Space, a space carved into matter as an alternative to smooth and striated spaces. Negarestani sees *vermicular lines* as the vectors of ungrounding the earth, thus providing a new defensive terrain. Abjection cannot be escaped, as Negarestani describes the very act of digging as polluting and infecting.

While Deleuze and Guattari associate Holey Spaces with the purity and inertia of metal, Negarestani calls for an embrace of the earth's dark depths in a powerful pantheist psalm: "Disturb and irritate, dilate and contract the repressed cavities of the Earth: Tunnels and tubes, burrows and lairs, acrid bungholes and perforated spaces, its fanged vaginas, slits and the schizoid skin. Unclog and squeeze the earth; exhume its surfaces; make an earth whose conundrums cannot be solved by recourse to their origins or causes."¹⁶

This difference can be partially explained by the regional discrepancies between the Eurasian troglodytes and the merciless Middle Eastern desert that Negarestani describes. In his narrative, the sand has been created by the entity Middle East to develop a nomadic economy – and therefore the existence of Deleuze and Guattari's War Machine – by considering that no sedentary artifact would survive the degenerating characteristics of this ubiquitous matter.

TOWARDS AN ALLAGMATIC ARCHITECTURE

Since Aristotle, an object can be described as a combination of form and matter.¹⁷ In this model of hylomorphism (which derives from the Greek terms *hilo*, matter, and *morphe*, form), matter represents potentiality and form represents the actuality – or the shape – of matter. The French philosopher Gilbert Simondon dedicated the first chapter of his book, *L'individu et sa genèse physico-biologique*¹⁸ (Physico-Biological Genesis of the Individual), to a critique of hylomorphism. In a precise description of the fabrication process of a brick – what he calls the individuation process – Simondon points out how the hylomorphic scheme fails to describe the energy that formation requires. Although he never uses the term magic, it is fundamental to his critique of hylomorphism, for magic describes the process of formation from the outsider's point of view, one who is able to

19. Ibid.

20. Ibid., 48.

21. Ibid., 40.

22. Ibid., 43.

23. Gilbert Simondon, *L'individuation à la lumière des notions de forme et d'information* [Individuation in the Light of the Notions of Form and Information] (1964; repr. Grenoble: Jérôme Millon, 2005), 33.

abstractly understand form but prefers to “stay outside of the workshop.”¹⁹ For Simondon, hylomorphic interpretation is “the operation ordered by the free man and realized by the slave.”²⁰ The invention of geometry allowed “the free man” to describe a form and to design matter for its realization “without seeing it, without manipulating it, without appreciating it.”²¹ This describes the architect as traditionally defined, making him or her complicit within a hierarchical system of production.

To remain outside of the magical hylomorphic scheme, it is necessary to consider the energy that the formation process requires and, by extension, the physical effort that produces this energy. Simondon defines the “allagmatic operation”²² as one in which energy is considered as a fundamental element in the production of an individual object or body. The individual is no longer a being, but an act that requires energy to exist. In this act, “the becoming of each molecule resounds on the becoming of all others.”²³ Such a definition can also be applied to various insurrectional movements because a collective action of political emancipation precisely constitutes an act of individuation. The barricade and the tunnel are physical productions of such an act. Their forms, or rather their formlessness, are the direct result of energy applied to matter.

The insurgents who are involved in the manipulation of matter are material profaners who dig, cut, pierce, accumulate, throw, punch, push, pull, spit, and patch hylomorphic matter, transforming it into an object, allagmatic architecture. The insurrectional city of the future sees these insurgent profaners armed with shotcrete guns, pumping a viscous concrete onto piles of objects assembled in its streets. The slurry oozes across each surface before drying eventually, and forming the solid mounts and slimy caves that compose the new landscapes of resistance.



CAMILLE LACADÉE, *ALEATORY PICTURES*
FROM BICYCLE, BANGKOK, THAILAND,
2011. COURTESY THE AUTHOR.

(rama)kanabolism: Bangkok's furious, sensuous hankering

and then stood the demon// purple and sour// enclosed in its
thousand lights carapace/ in its colorful herd/// its arms as
so many freeways/ its bandy pointed legs///// moving
crablike in fabric twinkles/ preying on its way amongst slow
taxis//////// pink/ traffic blue/ green////////////////////
////////////////////

no vegetation///// instead an eviscerated jungle/
chlorophyllic centenarians make roots here// this is no
vegetation//////// this is life/ this is death/ is sap/ a few
ants/// no one can be duped/ we all are accomplices and
suave/// tender/ unpredictable//////////////// ideas stream
out and get swapped like chinese plastics/// blinking/ hairy/
feathered/ soft/ tearoff/ decomposable/ forgettable////
Thotsakan chews and ingests// the gong sounds/ the muez-
zin screams// it is dawn and the streets turn orange/ bright
and dim/ unsteady/ in waves// voluminous steel bowls in
the hands//////// all is inside out this morning// the
streets/ the cars/ all in reverse fashion// it must be like this
every night i say// everything but its opposite///// i hear
voices/ i hear microphones// taking over my neighbor-
hood///// who can tell//////////////// politicians/ boxing
contest/ royal news or flower pots// all could be and all do//

i must find a way to trick this demon/// maybe fron-
tally/ i heard i could make myself much taller than him///
but today i feel prettily lazy///// on my way here i caressed
women/ it rose my indulgence to a sublime////////////////////
/// a mask bares my teeth// animal/ devoted/ insane/
tenacious/ machinelike// moving slowly/ cunningly/ with
the pace of a little monkey// scantily/ frailly/ harmlessly///
i twist/ contort/ grin/ graciously clumsy/// looking for that
glance i swore to him i would recognize//

and so i jump in the water//////// Thotsakan recom-
poses// lying in wait//////// it is dark now/// deep
black//////////////// not far away trembles the city's
grayness// gurgle the motors of Chao Phraya's ghosts///



heavy tenebrous sliding silhouettes// buildings in constant
runaway// from the gulf to higher plateaux/ from the river
to the sea//// out throwing loose stones/ black oil//
families/// words and faces hostage day and night in monster
vessels/ of the tiny struggling tugboat////////////////////
//////// here he comes again/// up there//// down
here//// let them be dragged////////////////////////

meanwhile the flamboyant ones/ going left/ going
right// singing head out the same tune//// the same night
every day is taking place//////// until all of a sudden it
changes// from west to east/ from legends to hits//

hey you/ you/ come on// come on board/// we know
how to do with you// we'll swallow you/ regurgitate
you//////// copy/ transform/ adapt you/// erratically///
always we find a way/// we have people and we have
appetite/// nothing sustains// first lure it then digest it/
after we will see//////// after we will leave the
life/ leave the city// take over/ decompose/ metabolize///
with 10 faces/ with 20 arms/ with our heads on fire//

Thotsakan growls/ acidifies// lets the floor subside/ the
wave smother//

warriors of the night market// on steel horses// flourish
iron spears/ assemble/ disassemble/ carry/ fight/ survive/
unload/ reassemble/ fix///// lascivious muscles of an
endless rehearsal// scarred heated bodies // marked with
ink// pierced by a long needle// this city of yours/ what
meat can it swallow//////// i ask the demon/

smile// we have unsuspected weapons// we welcome
you inside us very gladly// we are gluttonous and generous
// how and of what could we be afraid/

the water is slowly rising/ surely gulping every talang
wah of corruption/ lust/ lure/ mixture/ plastic miniature/
chicken/ stir-fried and garnished/ inscribed pages/ pills and
powders//////// the gods must be jealous of immoderation/
Thotsakan straightens up/ Nang Sida/ from domestic over-
protection to rusted steel/ tastes no difference but exquisite//

the demon contracts its members/ giving shape to its
costume// depth to colors// strikes thrice/// the city in
return decomposes/ opens/ dismembers/ cracks/ splits and
recomposes/// later/ farther/ otherwise/// the highway
slides beneath/ the train engulfs in the tower's mouth//
canals off the ground/ water reopens and spills// all things
scatter// higher/ faster/ above/ under// contingently/
fastly// my moto taxi does not wail/// burning shortcuts/
on the coming tide/// not yet inscribed in the drowsy pores//

Antonio Negri
& François Roche
Translated from the French
by Julie Rose

A Dialogue: Negri and Roche

This dialogue is like a ping-pong match ... where the ball has been lost somewhere within the boundaries of the playground.

François Roche: *Thank you for welcoming me into your home, dear Antonio Negri, thank you for welcoming me among your books ... and your writing ... on the notion of multitude, so dear to Spinoza, which you dissected in *The Savage Anomaly*,¹ written during your years of imprisonment at the end of the '70s, a collateral effect of the Years of Lead,² convicted, as Michel Foucault says, just for having had the courage to be an intellectual, in a courtroom farce straight out of a *commedia dell'arte*... tragic and comic, at the same time, and ultimately very Italian. Apart from the risk involved in your own philosophical and political path, can we go back to this idea of multitude, which you've never stopped playing around with throughout your work, "on the capacity of emerging forces to organize themselves in order to exist and to find form without a transfer of power"... because this idea confronts, in fact violently opposes, the discipline from which I speak, that of architecture.... Either out of tradition or out of laziness, we architects derive our authority and our economy from the transfer of this same power in order to constitute the city, its future, and the things that emerge in it.... So how do we conjugate or conjure this antagonism, this conflict? Within a strategy based on Operaismo,³ of which you're the "kingpin," is it conceivable that the form of the city can be generated or can generate itself based on this multiplicity of desires, at once autonomous, individual, and collective, negotiating their productive reality, their *conatus*,⁴ to take up Spinoza, their specific approaches and negotiations with the mechanisms of production, their future, staggering inarticulately between desire for transformation and fear of transformation? Or should we consider the forces emerging from this multitude as being exclusively in conflict with, opposing, power structures, the structures of power transfer, which condition the mechanisms of city design?*

Can we take something that has potential from the multitude's energy without knowing beforehand what it might be, and thereby run the risk that it might cause an unpredictable form to emerge, or should we accept and come to terms with the fact that the multitude's energy exclusively resides, by its very nature, in a strategy of confrontation, of radical opposition, faced with the people who design the city?

1. Antonio Negri, *The Savage Anomaly: The Power of Spinoza's Metaphysics and Politics*, trans. Michael Hardt (Minneapolis: University of Minnesota Press, 1991).

2. *Anni di piombo* as they were first called in Italy.

3. *Operaismo* (operaism), also known in the English-speaking world as "autonomist Marxism," refers to a theoretical and political current of Marxist thought that emerged in Italy in the early 1960s. An original reading of Marx in the framework of the radical workers' struggles that developed in the country during the decade led to the invention of new theoretical concepts (such as technical and political class composition, the mass worker, the refusal of work) and of a new political methodology (so-called militant investigation or co-research). The development of operaism deeply influenced both the political culture and social movements of the 1960s and 1970s in Italy. See *The International Encyclopedia of Revolution and Protest*, s.v. "Italy, Operaism and Postoperaism" (by Sandro Mezzadra), <http://www.revolutionprotestencyclopedia.com/> (accessed June 19, 2012).

4. *Conatus* is a fundamental concept in Spinoza's ethics. The Latin term literally means "effort," and describes a thing's inherent will to "persevere in its being." (Ethics 3.6).

Antonio Negri: I don't know... the act of being spontaneous, of being completely original, deriving from an origin that is creative, in all living forms, in all living work, I don't think that's in contradiction to conflict. It's precisely because of inventions that there are conflicts ... with what is stable, repetitive, and dominated by rules, by norms. I see cities in general as resulting from this whole array of creative phenomena in the face of other things that resist... resist in a negative way, regressive things. The problem, I think, is understanding how to make sense of this, what the languages are that make sense of this conflict between what is and what endures, what remains.... What, then, is the sense of that? The question of sense becomes more and more important, nestled as it is within questions about multitude.... When I first started researching multitude, with Michael Hardt and a lot of other people, we talked about multitude based on Spinoza's idea of it as a plurality of singularities, which intrinsically are things that distort, that destroy all regularity, all prior determination, and that are found in movement. It's in the movement of the multitude that something created emerges, something original and new, but also – and this is the other aspect of the definition of a multitude – this spontaneity is not something new in itself, it becomes rather “a common” – that is to say, in the same movement in which this thing begins to be constructed. It doesn't just construct itself as an individual, an isolated object... but quite the opposite... indeed... the so-called individuality of these objects is dissolved and reconstituted in relation to each other... in this case, the singularity has no similarity, no individual similarity. There is a profound difference between an individual and such singularities: an individual can live in isolation, but a singularity can only live with others, can only live as a multitude...

That's the sense of creation that we see in our work as the force, the capacity that emerges, everywhere and continuously, by its very nature. Without this creation there is no productivity, especially as it is itself dependent on the action of these singularities.... But seeing this isn't enough; we actually need to understand how these singularities manage to construct themselves.

On the one hand, we have the absence of individuality, which has been transferred to these singularities, in this multitude that constitutes it, and on the other, we can only observe that the emergence of these singularities is solely experienced through continuous conflict and constant resistance.... At a third level, how do these same singularities

manage to bestow meaning, to produce, to create a multitude? A multitude isn't just the phenomenological recognition of a plurality, it's a movement that is created, and this level is precisely the level of things that are created... the resulting challenge is awareness, of this development, of this transition, but also deconstructing what exists in order to construct new things.... Resistance arises at that moment so as to oppose the consistency of other realities, and here the problem of decision starts to arise... what appeared to be purely original in the beginning, like a natural force of transformation, becomes – so as to realize itself, to assert itself – something that gets more and more refined and sophisticated, tending toward decision-making processes...

FR: *How, then, can this conflict be recognized as a vehicle of transformation ... how do we seek, without denying it or eliminating it, soothing it with artificial unguents or theatricalizing it, to take it as it is, as an area of sympathy with life, a vital force... that won't be satisfied with simplistic plans or controlled urban planning? How does it happen, in your view, that this operative conflict doesn't operate ... when it's a question of constituting urban forms (and their use)?... Is this the clearest proof of a deficit of democracy, not only in the way cities are made but also, and principally, in the way they're governed,⁵ or is it more a crime-promoting pathology⁶ on the part of people who give themselves the power to design their (cities') substances and contours? ... Is it also a form of weariness on the part of the citizen who constitutes these multitudes and who, in a way, lets things pass so as not to get involved in a field that seems inaccessible to him? Why is it that this conflict only appears and emerges in times of contraction, tension, and even in the bad patches of revolutionary temporality, and not in the running of an everyday round of negotiations between forces? ... so that architects – and I'm "still" one of them – take their material from this ambivalence, not to mention schizophrenia...*

AN: I actually think that one of the most important things is to recognize that a conflict is a conflict, that it can't be reduced to a simple movement... it is also a military position that naturally incorporates a destructive capacity.... A conflict is extremely tough, painful... it's not just the recognition of two forces, one that resists (in the reactionary sense) and another that tries to build, to cause something to emerge. We also need to look at how that happens, *in vivo*... so we can see that the transformative force actually operates through rounds, through microconflictuality, with particularly

5. Whether that be via the market forces of the Anglo-Saxon system or the royal decisions of a Colbertian aristocracy of the more European system, described as early as the 19th century by Alexis de Tocqueville in *Democracy in America*.

6. "Design abets a near-perfect circuit of production and consumption, without much 'running-room' for anything else." See Hal Foster, *Design and Crime: And Other Diatribes* (London: Verso, 2002), 18.

refined and delicate dimensions, and at the same time with an urge to solidify.... It's also a resistance that is – but we have to always be careful about this – related to what you said about the citizen's possible weariness when it comes to renewing cities, about the phenomena of power that promotes a general democratization rather than organizes the basis for a true democracy, etc. All these phenomena are what we might call negative phenomena. We need to know how to name the negative... how to name the enemy... but the relationship isn't a conflict between enemies, it's a place where we have to find the meaning that is constructing the common...

FR: *Do you think that in constructing this common, this thing that causes the form of the city to emerge at the same time as its petrification, we can nonetheless preserve not only the traces of the conflict, of the raison d'être that was the basis of its emergence, but also, and even more pertinently, leave the potential for future conflict... open?*

AN: That's something systemic, not organic... something constructed with all the weight of the negative elements that have gone into its construction. The common is not something abstract.... Take the example of this city's water, and what it generates as common things... the water doesn't exist without the pipes, without the flow, right down to the simple faucet... it doesn't exist without this technological baggage that actually creates its use. The water becomes common in that it generates a use that characterizes forms of life, and it becomes progressively more common as these technological tools multiply. The best of water turns up in your home whether or not you have the capacity to participate in its development... from the traceability of its provenance to knowledge about its chemical composition, from its real price to the cost of transporting and supplying it.

The common is the fact that things become general property, but general property that must mutually participate in this whole process, and give rise to its use continuum and its transformation...

FR: *Don't you think there's a gap between our modes of production, which are standardized, and the contingencies of assembling, of (re-de-)organization through multitudes?*

AN: No, I don't think so. Even in prefigured things there is always a leap in their realization.... Bodies are much more

important than thoughts.... We're not constructing something theoretical here, in which the mind gets constructed. No... we're constructing things that are material and corporeal... and bodies also mean the possibility of the multitude, in its rationality but also in its passions...

FR: ...its desires.

AN: ...desires, but also in its reason... for expressing and investing in this materiality. Desire, according to Spinoza, is the highest form of reason... romantic love is its constituent force.... We are fighting against the absurd rationalism that gave rise to the worst, and we are legitimately de-judging the rationality of modernity, but from the moment we disqualify a passion for the common, we wipe out the rationality of the real in one stroke. We can't ignore the way passion, in traveling through the body's corporeality, is transformed into a thing, into something "in the process of being"...

FR: *Once upon a time, there were the experiences of the 1960s, of the architects associated with the Situ⁷ movement, with Guy Debord and Constant's aesthetico-political experiments in what is known as metabolist architecture. Once upon a time, there was the possibility that the inhabitants of those structures be considered "the creative unemployed"... so that they could colonize it, transform it, even corrupt it to make it their own... to adapt its successive morphologies to the mutations of their family cell, and in the emotional, passionate, carnal connections they might experience with their common ownership, their neighborhood. Does it seem plausible to you... to leave these structures open?*

AN: Before you arrived, I was reading an essay on the Occupy Wall Street movement in New York, written by a friend I've known for 50 years and who completely abandoned politics after the May '68 movement. To answer your question... at the time, we did, indeed, think that there was an outside somewhere, that there were unemployed people outside of productivity, and we thought of that creativity as outside. To stand up to reality and its mechanisms of alienation, we simply had to invent an elsewhere. The influence of Situationism, which I wasn't a part of – I didn't see myself working via a mythology detached from reality – was in continuity with a utopian Marxism, with the invention of an outside. But today, protesters in the Occupy movement (*Occupare*) are inside... the idea of resistance is generating an idea of reversal

7. Created in 1957, the Situationist International (SI) sprang from the coming together of a set of international avant-garde movements. In its founding document, written in 1957, Guy Debord posits the urgency of "changing the world" and envisages going beyond all art forms through "a unitarian use of all means of overturning everyday life."

... and that's what makes all the difference, coming from inside, from within, and that's what is going to determine new paradigms... new risks too.... The conflict within is no longer a conflict in which you always win ... as opposed to when you go off into the comfort of outside, you win at every turn... isolated from the world's practices... alas...

FR: *Occupare doesn't seem to work on processes of self-marginalization, in the desire to extricate yourself.*

AN: It doesn't try and resolve itself in ideals... or any ideal of perfection... only ignoring bodies, our bodies...

FR: *...like the ideal of 19th-century utopias...*

AN: Yes, but Thomas More's original Utopia is basically something that can be inside. I'm not as hard on utopias as I am on our own ideals. Modernity used to say: you can take your rationality and your technical means just so far – it's the prerequisite condition for production, to go just so far. But nothing's stopping us from going further today.... You architects have made masterpieces that prove their autonomy without tacking on this notion of common property... but today... masterpieces – if the word still has any meaning – are made inside, in occupation, in the storming of these spaces... so as to change reality from the inside.... It's the realization of the multitude... at once a swarming⁸ hive of singularity that goes in and paves the way for setting up new spaces from the inside, right up to the point where that realization manages to give a powerful form that subscribes to the difference between the real and the product... to the inside, not as an ideal model or a utopian vision, but as operative strategies, as productive devices.

8. "The Communards defending their revolutionary Paris against the government forces attacking from Versailles roam about the city like ants in Rimbaud's poetry and their barricades bustle with activity like anthills. Why would Rimbaud describe the Communards whom he loves and admires as swarming ants? When we look more closely we can see that all of Rimbaud's poetry is full of insects, particularly the sounds of insects, buzzing, swarming, teeming. 'Insect-verse' is how one reader describes Rimbaud's poetry, 'music of the swarm.' The reawakening and reinvention of the sense in the youthful body – the centerpiece of Rimbaud's poetic world – takes place in the buzzing and swarming of the flesh. This is a new kind of intelligence, a collective intelligence, a swarm intelligence, that Rimbaud and the Communards anticipated." Michael Hardt and Antonio Negri, *Multitude: War and Democracy in the Age of Empire* (New York: Penguin, 2004), 92–93.

9. Robert Linhart, *L'établi* (Paris: Editions de Minuit, 1978).

FR: *I remember reading Robert Linhart's L'établi⁹ when I was student, with his account of the experience of Trotskyist moles actually going inside under cover, going into Peugeot, Renault, Citroën factories under cover and changing the social structures there, transforming them for the massification of desire ... if it weren't for the fact that that particular activist movement never reevaluated product design or the assembly line model of car manufacture, which were behind both mass production and the "mass marketing" of desires...*

My following question – which is falsely naïve – do you think that design is a vehicle of transformation? Not just in its potential

for transforming legal structures, structures based on tension and power... that can reopen them to corporealities and human flesh... but also in bringing out the singularities and the aesthetics that construct and underscore issues of their own validity, so that they can remain unresolved in their capacity to respond, solve, smooth out, plan...

AN: I don't know... I've always thought that isolating a problem is tricky, even dangerous, because in reality we confuse the form of the conflict, the manner in which we are subjugated... with the forces behind the conflict. We don't manage to get beyond the force of the adversary who naturally knows the game even better than you do if you're playing his game.

But... who is the adversary? Where is he? The best solution is *faire sens*.... I'm in the middle of writing a book with Michael Hardt that talks about four human models created in these... current situations: the man in debt, the media man, the secure man, and man represented. These four figures are the pure product of new forms of power today... But in each of these figures, there is something rare, unique ... we can't understand the man battling debt, for instance, unless we see the choice that is offered to him – to admit to himself, or not, his degree of servility, of dependence... beyond symbols, beyond the relationships of economic exchange and the aspirations of the human community... it's no trifling matter being in debt. It's a question of sense, positive and/or negative, being free or a slave, under whatever conditions... in either case, being in debt is a question of meaning, not a collateral effect of the system.

The relationship to the forces of mediatization is similar. We are characterized by the media, whether old or new. The fact that the media explicitly takes us back to the issues of alienation defined by Marx is one thing, but what changes radically is that, parallel to this, you have the possibility of freeing yourself from it in a way that's extremely powerful and effective... both the tool and the vehicle are within your grasp. Man represented is also a most unsettling thing... democracy has become a fiction machine,¹⁰ in which democracy lives for itself... and we are its subjects, just like under the ancien régime... but we have access to processes that can change the nature of it...

You can see the game, but also possible ways out of the game... its visibility is also its weakness... and ways of re-defining the notion of "commoners," as the people of the British Renaissance used to say. A "commoner" was one who

10. The symposium "On The Idea of Communism," was organized by Alain Badiou and Slavoj Žižek in London, March 2009. Speakers included Alain Badiou, Judith Balso, Bruno Bosteels, Susan Buck-Morss, Terry Eagleton, Peter Hallward, Michael Hardt, Minqi Li, Jean-Luc Nancy, Antonio Negri, Jacques Rancière, Alessandro Russo, Alberto Toscano, Gianni Vattimo, Wang Hui, Slavoj Žižek.

possessed the common and lived in the common. It's not enough to diagnose the presence of a conflict, between this one and that, between the work some do and dead work, as Marx called it, within the classic opposition between workers and capitalists... we need to get beyond that, toward this extremely powerful model of the common man...

FR: *If democracy is effectively in a fragile state, or a state of deficit, and we need to revive it through the notion of governance, or even a rethinking of "the communist hypothesis" and reorganizing human structures, as you wrote in the common work that appeared last year ... if democracy has become a fiction, what might be the course open to a person who manufactures physical substances, footprints? The architect, the designer, the programmer of the future city... is he going to be able to define lines of subjectivities that aren't fooled by that fiction, while constructing it, creating vanishing lines in a fictional rescripting within the very hollows of this fiction, or these fictions, so as to reinterrogate the mechanisms that subtend them... a resignation of the city's actors via pseudo-transfers of power, absurd client planning, self-promotional sweeteners, technologies of representation and artificial discourses... the list goes on...*

AN: You see, there is always this duplicity... here and elsewhere ... we are its actors, too, but [laughs] when you act as an architect, in this case anyway [laughs], you are telling us a bit about yourself after all, and about your own combativity. I can't answer for your own occupational strategies – everyone has to hit on their own, there are any number of them – but the problem, your problem, not you personally but your discipline's, is that the city has in reality become the factory, the factory of life forms and mechanisms of commerce... previously, people went to the factory to work, and afterward they went to town to have fun, to go and see films, those great escapes... and to make love...

FR: To get themselves fleeced, as Bataille puts it so beautifully.

AN: Yes [laughs], that too, but today the city has become the factory of life forms in general. Capitalist development has understood that this is the end of modernity, there is no outside anymore... it has been negated, the city has no outside anymore.... We're inside... always inside ... so when you play the architect in this way of making the city, you become a worker.

11. Étienne de La Boétie, *Le discours de la servitude volontaire* (1574; Paris: Payot, 1976).

FR: ... a "willing slave," to paraphrase La Boétie¹¹ ... but on a

“city” production line instead of the Model T Ford assembly line... with the same alienating working conditions, same lack of involvement as to choice, same division and stratification of labor and authority, same alcoholism, with the media lying in wait to gratify you... via a few baubles, the ribbon for architectural masterpiece of the municipality, the region, the nation, in the cement, wood, glass section, for some detail in camel hair or pig’s hair, “on the misery of the architectural scene viewed in its economical, political, psychological, sexual and notably, intellectual, aspects, and on a few men’s ways of remedying it,” to paraphrase the political pamphlet written by members of the Situationist International and the students of Strasbourg in 1966.

AN: Or perform another kind of operation... it’s up to you to act if you don’t want to be assimilated once more into the “urban underclass,” a factory worker in the city factory...

FR: *We’re there already... produce and occupy... produce and make the antagonisms in any situation visible... without effacing the dross, the obfuscations, the nostalgia and the desire to extricate yourself... in a productive antagonism...*

Certain urban morphologies have sometimes harbored conspirators who were actually trying to dismantle these mechanisms. That was the case with both the Casbah of Algiers, and the commune of Paris, where the revolutionary Fellagha and Communards were able to hide in the folds of its complex, tangled cartographies, so remote from the models of the panoptic modern city “under surveillance,” as Foucault describes in Discipline and Punish.¹² That hide-and-seek morphology produced a form of resistance and opacity in the face of authority. Well, today, strangely, Liberty Plaza and Tabrir Square are open spaces where protests or occupations operate within the field of the camera, via the media man you were talking about, and use the television field to strengthen their position...

AN: In that process... the great force of command is not making decisions, but organizing them, and so when you read Debord... or Lenin... decision-making is described as a form of production within a certain continuity, plan, paradigm, bureaucracy ... and it isn’t the charisma of those who make such decisions that operates. Charisma is a formal current, an aesthetic, it asserts a continuity, a determination that seeks to be eternal, the visible part of the devil. So how do you destroy that? You can’t destroy it if you yourself become a multitude, a swarm attacking at every turn... and you can’t

12. Michel Foucault, *Discipline and Punish: The Birth of the Prison*, trans. Alan Sheridan (New York: Random House, 1977).

think a transformation through without first occupying this totalitarian terrain.

Why do people create institutions? I'm not an anarchist myself, but I believe we need to build institutions to prevent the repetition of forms and to promote their adaptation and complexity... in Venice, where I often live, it's very technical... the swamps, their depths, the canals... and on this biotope, they've built one of the most sophisticated things without any repetition...

FR: *Don't you think new world cities – Istanbul, Bangkok, and especially the outskirts of Mexico City, at least the slums... which spring up, die, and spring up again, thanks to tolerant administrative processes that don't perform some sort of bureaucratic control over these cities in pursuit of the 19th century... are inventing possibilities, negotiations, new things that don't conform to some system of anticipation... dedicated solely to the tools of professionals in charge of their design... that the singularities of this multitude are being expressed or, better still, playing at making the city? By taking advantage of such tolerance, without stepping over the frontline, the line of conflict or authority would step in again.... Design isn't centered on technical and aesthetic expertise with a view to manufacturing predesigned forms, but based on the rules and protocols of the game that underpins them and messes up what they've organized.... Can't we inject a bit of this administrative tolerance into our tight-laced old technocratic hobby cultures, as opposed to the millenarian fantasies of zero carbon emission and zero tolerance?*¹³

13. Masdar City is a planned city located in the United Arab Emirates that will rely entirely on solar energy and other renewable energy sources, with a sustainable zero-carbon, zero-waste ecology... and zero-freedom...

AN: When I knew the cities of the South of Italy in the 1950s, I was knocked out by the connections, the forms in which people lived together, and did so even though the building work was really lousy. I was in Naples, thanks to a scholarship with a cultural institution, and every morning I would cross the *decumanus*, it was unbelievable... at once palaces, all facades on show within the heavy archaeology of history, and at the same time voids, empty spaces full of life, with people selling great piles of things in an anarchy that was joyful and abounding. The city wasn't made of city walls but of the life of the city.... The first time I did a grand tour of the European part of Istanbul, 10 or so years ago, it was impressive, immersing yourself in this great jumble of lives... reintroducing the human heartbeat as a manufacturing potential... but validating these world cities that live on the energy of life means elaborating processes based on tolerance, and dedicating space not to the king's carriage or to the TV satellite van, but to

“occupiable” places, graspable, appropriable, porous spaces between the substances they’re made of... human or otherwise...

FR: *In a way, the city is a reflection of the mechanisms of power and of their capacity, or lack thereof, to let things go... or the opposite – petrifying things, paralyzing things...*

AN: When you look at the city from that point of view, you have to look at it from below. What you see first of all is empty spaces, places, possibilities... of getting around in them, but also of surrounding them... try to construct a representation from below... reverse your ways of seeing. Mastery from the sky is an illusion, but more than that, it’s the basis of the duplicity I was talking about.

FR: *No building in Bangkok can really stand out and be independent of the tangled fabric it’s made of, even though the skyline is made up of all these verticals. Any contemporary work, no matter what its bid for distance, is destined to be swallowed up, metabolized, absorbed, and reconnected to all its transport arteries on several levels, so that it becomes itself a multiple, fragmented, dissected element.... No object can resist this energy... it’s like one of the elements of the “metallic threads,”¹⁴ to quote you, threads that tighten and underpin the human relationships and physicality of places that allow them to produce their friction. But recognizing this overflowing torrent contradicts the very nature of being an architect... or at least one of the ones who never cease erecting their phallus, and there are plenty of those, dissociated, decontextualized, deterritorialized... with no estrogen in sight.... On the other hand, people float, drift in these world cities that have no cartography of the future... it isn’t written down and it isn’t about to be.... Wouldn’t this be a profound recasting of the egotism involved in the profession of the man who’s in charge of building... but also a necessary shift in his territorial range within the geography of the mechanisms of power... thereby causing his status as a “worker in this duplicity,” in this willing servitude, to evolve...*

14. “When we have carved up, deconstructed, destroyed the real, there still remains this network of extremely solid metallic threads, a very potent human construction. This is where the work continues. We grab these threads and separate them into strands, thereby forming new figures, imagining new realities for ourselves. Imagination liberates. Within an individual’s horizon, freedom is greater, power approaches possibility. This way, new subjectivities, new fields of action, news syntheses of cooperation can be glimpsed.” Antonio Negri, *Art and Multitude* (Cambridge: Polity, 2011). (translation modified)

AN: Willing servitude, or perhaps will to servitude...

FR: *Do you see them from the outside as subservient to these forms of power, or on the contrary, as vehicles in transformation ... ?*

AN: Obviously, they’re both.

FR: *Hard not to refer here to Hal Foster’s book on the bunkerized*

dimension of contemporary architecture, which he talks about in his famous essay "Design and Crime"...

AN: Yes and no.... Take the example of the Karl Marx-Hof. It's a jailhouse, a defensive blockhouse, a block of resistance, yet from this very powerful thing people were able to imagine something, a moment of freedom... these blocks were the only ones to resist Fascism, Nazism... other blocks exist...

FR: *These out of scale heterotopical spaces, where people could paradoxically protect and hide themselves, because of how enormous they were, have generated lines of defense at the very heart of control systems...*

AN: It's true that it's hard to imagine the revolts in the suburbs of Paris without those bastions at their backs to protect them... a riot is a rare phenomenon, one of the rarest of creative phenomena, and it actually arises from the movement of confrontation and withdrawal, defending yourself and moving around... But we can't just say that... that's still more duplicity, the suffering of rebellion...

FR: *Exactly, like when you blocked off the city, in Genoa I think, using small groups of people who were agile and mobile and went from one crossroad to the next, so as to occupy the city and freeze its dynamics through the very flows of the city... as opposed to the workers' march in the tradition of protest, from La Bastille to Place de la Nation... which is predictable and in the end static...*

AN: That was the great transition in strategy, from the linear, mass, working-class organization to the strategy of the social worker, which is a strategy based on swarming, going here and there. The science of the city is just like the working-class spaces inside the factory. The workers knew very well how to spot the critical points, the weak spots that had to be blocked off to force the unit out on strike. They knew very well, at Fiat in the 1960s, the sectors they needed to attack in order to bring all of the 120,000 workers to a standstill and, by the same token, force negotiations. At Alfa Romeo, strikers blew the electrical network to oppose weekend work, because there was a crisis in those days too –besides, we're always in a crisis with capitalism... it's the profound nature of capitalism to be in crisis. These strategies of occupation are a matter of knowledge, even of design... and I must insist on this point... there is no material thing that is not corporealized and it's

this corporeality that gives meaning, like a kind of theology, a materialist theology, obviously, that leads from solitude to multitude. There is no architecture of solitude, that's the most absurd, abstract thing – what's an architecture of solitude?

FR: *The architecture of insularity, in the sense that the contemporary abode, and not just the residential estate, produces a lockdown that generates solitude... dedicated to the single open window, which is every bit as alienating as the television. It's not an innocent fact that, rather ironically, the biggest construction company in France is also the owner of the commercial station with the biggest advertising revenue... the insularity of the one in exchange for the lobotomizing entertainment of the other, like Siamese twins...*

AN: The other principle that we need to apply when it comes to the common is the principle of good sense. As Descartes used to say, we need to wheel in good sense as the key to a lot of things, and I don't understand why this is so readily excluded...

FR: *Do you think, since you were talking about organicity, that it might be possible to elaborate an aesthetic of indeterminacy? I'm talking about the idea behind those human enterprises, the building sites of the cathedrals guided over several centuries by master masons, like Villard de Honnecourt, who were behind a constructive strategy based on successive experimentations to try and discover and grasp the trajectories of force and balance in what they were putting up... and doing so through the transmission of different kinds of knowledge and operating methods... to at once produce areas of indeterminacy, innovation, research, transmission of knowledge, but also areas of incompleteness, open to future possibilities and to their own transformation....*

Could we extract from contemporary technologies via step-by-step processes, protocols of indeterminacy, of unpredictability, from the thing made and to be made? Does that seem plausible? To combine it with the forces coming from the ground... voids... to define a meeting point somewhere between the top-down and the bottom-up?

AN: I don't know.... We could put the problem another way... indeterminacy is already there, so we need to defend it, we need to take it on like so many rural regions, territories, and defend them against the drive to eradicate them.... We can't leave power trends in order to find spaces for ourselves. One of Marxism's greatest mystifications, for instance, was the Frankfurt School. "If space is already occupied, already taken by those who carry out orders in relation to it, then what

do I do?" they'd ask themselves ... but that's never it, nothing is ever completely occupied, full, without holes, without cracks... I fought in Italy over this idea of expertise...

FR: *Let's talk about that, it's very important...*

AN: There is no expertise without a multitude, yet only the multitude can determine expertise... that's something that also comes out in what you say...

FR: *Let's get back to expertise.... I'm a child of postmodernity, at least of the philosophy, as developed by J F Lyotard, on the possibility that fields and disciplines are porous and not shut away in their ghetto, so as to be autonomous and to validate themselves, questioning the limit of each field, but more strategically where transitions and cracks occur, from where it is possible to renegotiate their discursive, productive, aesthetic and political arrangements.*

But we can see how, 30 years on, the notion of expertise has come back through the main gate in all kinds of fields, from forensic policing to architecture, whereby everyone only speaks through a body of knowledge that he judges himself to hold... as an expert on the subject... which automatically disqualifies anyone who doesn't have access to this knowledge.... Expertise isn't just a word or name of a TV series that we're currently hooked on – it's also an eminently suspect notion ... that seeks a degree of perfection, positivist, stripped of human dross and garbage where they are barely tolerated... You don't chew chewing gum in the streets of Singapore... the city bears a sort of standard, a design that you're not supposed to sully or corrupt with any human presence judged to be imperfect...

AN: Spontaneity and knowledge, spontaneity linked to knowledge, to forms of life... to common sense, to the common sense of "commoners," of the common man...

The urban population in China has become greater than can be sustained by the agricultural land... four thousand million people in the cities.... It's not just the high point of production, it's production itself. Outside these cities, there's work, certainly, but it's removable work, whose only function is to fuel the urban areas... with food, electricity supplies, and industrial products.... We can't deny it, we need to be able to acknowledge this complexity in the constituent life of the city... the city is life, yet is opposed to it...

FR: *Antonio Negri, thank you. You've given me some valuable time... I hope it will also be valuable for those who read this.*

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Remarks on Occupy Wall Street

Editor's Note: *The following is the transcription of a talk delivered to Occupy Wall Street protestors in New York's Liberty Plaza on October 9, 2011.*

We are called losers, but the true losers are down there on Wall Street. They were bailed out by billions of our money. We are called socialists, but here there already is socialism for the rich. They say we don't respect private property, but in the 2008 financial crash—down more hard-earned private property was destroyed than if all of us here were to be destroying it night and day for weeks. They tell you we are dreamers. The true dreamers are those who think things can go on indefinitely the way they are. We are not dreamers. We are the awakening from a dream which is turning into a nightmare.

We are not destroying anything. We are only witnessing how the system is destroying itself. We all know the classic scene from cartoons. The cat reaches a precipice but it goes on walking, ignoring the fact that there is nothing beneath its ground. Only when it looks down and notices it, it falls down. This is what we are doing here. We are telling the guys there on Wall Street, "Hey, look down!"

In mid-April 2011, the Chinese government prohibited on TV, in films, and in novels all stories that contain alternate reality or time travel. This is a good sign for China. These people still dream about alternatives, so you have to prohibit this dreaming. Here, we don't need a prohibition because the ruling system has even oppressed our capacity to dream. Look at the movies that we see all the time. It's easy to imagine the end of the world. An asteroid destroying all life and so on. But you cannot imagine the end of capitalism.

So what are we doing here? Let me tell you a wonderful, old joke from communist times. A guy was sent from East Germany to work in Siberia. He knew his mail would be read by censors, so he told his friends: "Let's establish a code. If a letter you get from me is written with blue ink, it is true what I say. If it is written in red ink, it is false." After a month, his friends get the first letter. Everything is in blue. It says: "Everything is wonderful here. Stores are full of good food. Movie theaters show good films from the west. Apartments are large and luxurious. The only thing you cannot buy is red ink." This is how we live. We have all



OCCUPY WALL STREET PROTESTS,
NEW YORK, 2011. PHOTOS: SCOTT
LYNCH. IMAGE SELECTION BY
MIRANDA ROMER.

the freedoms we want. But what we are missing is red ink: the language to articulate our non-freedom. The way we are taught to speak about freedom – war on terror and so on – falsifies freedom. And this is what you are doing here. You are giving all of us red ink.

There is a danger. Don't fall in love with yourselves. We have a nice time here, but remember, carnivals come cheap. What matters is the day after, when we will have to return to normal lives. Will there be any changes then? I don't want you to remember these days like "Oh, we were young, it was beautiful." Remember that our basic message is "We are allowed to think about alternatives." If the rule is broken, we do not live in the best possible world. But there is a long road ahead. There are truly difficult questions that confront us. We know what we do *not* want. But what do we want? What social organization can replace capitalism? What type of new leaders do we want?

Remember, the problem is not corruption or greed. The problem is the system. It forces you to be corrupt. Beware not only of the enemies, but also of false friends who are already working to dilute this process. In the same way you get coffee without caffeine, beer without alcohol, ice cream without fat, they will try to make this into a harmless, moral protest. A decaffeinated process. But the reason we are here is that we have had enough of a world where, to recycle Coke cans, to give a couple of dollars for charity, or to buy a Starbucks cappuccino where one percent goes to starving third-world children is enough to make us feel good. After outsourcing work and torture, after marriage agencies have now outsourced even our love life, we can see that for a long time, we allowed our political engagement also to be outsourced. We want it back.

We are not communists if communism means a system which collapsed in 1990. Remember that today, those communists are the most efficient, ruthless capitalists. In China today, we have capitalism which is even more dynamic than your American capitalism, but doesn't need democracy. When you criticize capitalism, don't allow yourself to be black-mailed into being against democracy. The marriage between democracy and capitalism is over. The change is possible.

What do we consider possible today? Just follow the media. On the one hand, in technology and sexuality, everything seems to be possible. You can travel to the moon, you can become immortal by biogenetics, you can have sex with animals or whatever. But look at the field of society and



OCCUPY WALL STREET PROTESTS,
NEW YORK, 2011. PHOTOS: SCOTT
LYNCH; FRANK DAUM (BOTTOM).

economy. There, almost everything is considered impossible. You want to raise taxes a little bit for the rich, they tell you it's impossible. We lose competitiveness. You want more money for health care, they tell you, "Impossible, that means a totalitarian state." Isn't there something wrong in the world when you are promised to be immortal but cannot spend a little bit more for health care? Maybe we need to set our priorities straight here. We don't want a higher standard of living. We want a better standard of living. The only sense in which we are communists is that we care for the commons. The commons of nature. The commons of what is privatized by intellectual property. The commons of biogenetics. For this, and only for this, we should fight.

Communism failed absolutely, but the problems of the commons are here. They are telling you we are not American here. But the conservative fundamentalists who claim they are really American have to be reminded of something: What is Christianity? It's the Holy Spirit. What is the Holy Spirit? It's an egalitarian community of believers who are linked by love for each other, and who only have their own freedom and responsibility to do it. In this sense, the Holy Spirit is here now. And down there on Wall Street, there are pagans who are worshipping blasphemous idols. So all we need is patience. The only thing I'm afraid of is that we will someday just go home and then we will meet once a year, drinking beer, and nostalgically remembering, "What a nice time we had here." Promise yourselves that this will not be the case. You know that people often desire something but do not really want it. Don't be afraid to really want what you desire. Thank you very much.

Architecture as a Practice of Biopolitical Disobedience

Apart from a few remarkable exceptions, architects have continued these past 20 years to ignore the epistemological transformations and the critical turn taking place in contemporary queer, transgender, and crip movements,¹ and, indulged by the most dramatic amount of capital flowing between Dubai and Prada and the People's Republic of China since World War II, have acted as if the ongoing transformation of sexual and somatic politics were just a minor detail within a new peak of architectural production at the global scale. As a result of this negation, feminist and queer architectural practices are today still posed in terms of female architects or discussed in shy or embarrassing debates around the more or less “out” character of the practices of Philip Johnson or Paul Rudolph.

What is the relationship between gender and sexual politics and architectural practices and discourses today? Can there be an architectural practice of gender and sexual disruption? Is it possible to think of architecture as a practice of gender and sexual resistance within contemporary global capitalism? Or more generally, what is the place of architecture in what Walter Benjamin called “the tradition of the oppressed?”

To start addressing these questions, let me take a detour to draw out the relationship between architecture and the modern political history of the body and sexuality with the French poststructuralist Michel Foucault, before returning to contemporary sexual and somatic micropolitical movements.

ARCHITECTURE AS BIOPOLITICAL TECHNIQUE

If we look at architectural practices from the perspective of antagonism, or more precisely, of gender and sexual-political struggles, a map emerges of architecture functioning as a normalizing, genderizing, and racializing force. In thinking about the transformations of European society at the end of the 18th century, Foucault described the transition from what he called a *sovereign society* toward a *disciplinary society*. At the dawn of the French Revolution and the climax of colonialism, he noted,

1. The crip movements refuse the medical definition of disability and have developed a large critique of the cultural and political techniques of body normalization, and of the processes of disabling which arrived with modernity and industrialization. Crip theory is to disability studies what queer theory is to LGBT studies. See Robert Mcruer, *Crip Theory: Cultural Signs of Queerness and Disability* (New York: New York University Press, 2006).



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a new form of power that calculates life technologically – in terms of population, health, and national interest – displaced a prior form of power that decided and ritualized death.

Foucault called this new, diffuse set of political and cultural *dispositifs* for regulating life *biopower*. Biopower overflows the legal and punitive spheres to become a force that penetrates and constitutes the body of the modern individual. It no longer behaves as a coercive law or negative mandate, but becomes versatile and responsive. It is a *friendly power* that takes the form of an *art for governing life*. As a general political technology, 19th-century biopower morphed into disciplinary architectures (prisons, barracks, schools, hospitals), scientific texts, tables of statistics, demographic calculus, employment options, and public hygiene. Foucault underlined the centrality of sex and sexuality in the modern art of governing life during this period. While only the male body/sexuality was recognized for its ontological and anatomic existence in the sovereign regime, biopolitics introduced sexual difference as anatomic inscription and transformed the uterus and interior of the body into new areas of political management. Within this new biopolitical regime, dominated by the strict continuity between sexuality and reproduction, the “masturbator,” the “homosexual,” and the “sexual invert” became pathological identities to be clinically treated and normalized. The feminine body’s hysterization, children’s sexual pedagogy, regulation of procreative conduct, and psychiatrization of the pervert’s pleasures were, for Foucault, the axes of this project, which he distinguished, not without irony, as a process of the “modernization of sexuality.”²

The sexual-political devices that developed with the new aesthetics of sexual difference and sexual identities were mechanical, semiotic, and architectural techniques to naturalize sex. They included the *Atlas of Human Sex Anatomy*, treatises on maximizing the natural resources of population growth, judiciary texts on the penalization of transvestism and sodomy, handcuffs to restrain the hands of masturbating girls to their beds, iron ankle spreaders to separate the legs of hysterics, silver films to engrave photographic images of the dilated anuses of passive homosexuals, and straitjackets to hold the indomitable bodies of masculine women.³ These apparatuses took the form of a biopolitical architecture *external* to the body and comprised systems with a firm command of orthopedic politics and disciplinary exoskeletons. The model for these techniques of subjectivization, according to Foucault, could be Jeremy Bentham’s prison-factory (particularly panopticism), the asylum, or military barracks. The devices of sexual-political

2. Michel Foucault, *Histoire de la sexualité* [The History of Sexuality] (Paris: Gallimard, 1976), 136–39; Michel Foucault, *Naissance de la biopolitique, Cours au Collège de France, 1978–1979* [The Birth of Biopolitics] (Paris: Gallimard/Seuil, 2004).

3. For a visual history of hysteria, see Georges Didi-Huberman, *Invention of Hysteria: Charcot and the Photographic Iconography of the Salpêtrière* (Cambridge: MIT Press, 2004).

subjectivization were inevitably interlinked with the netlike expansion of gender and race-segregated institutions, as well as the development of the heterosexual domestic architectural regime during the 19th century. These extensive, intensive, and, moreover, intimate architectural forms include a redefinition of private and public spaces, the management of sexual commerce, from street hygienics and women's confinement, to gynecological devices and sexual orthopedic inventions (the corset, the speculum, the medical vibrator), as well as new media techniques of control and representation (photography, film, incipient pornography) and the massive development of psychological techniques for introspection and confession.

In his meticulous analyses of the 19th-century asylum and prison, Foucault argues that disciplinary architectures do not function as shelters for a given subject, but rather as *biopolitical technologies* that *produce* (through spatial distribution and surveillance) the gendered, sexual, and racial subjects who inhabit and use them. During the 1970s, Foucault, together with the French research group CERFI,⁴ gathered around the journal *Recherches* to redefine 19th-century architecture as part of the “governmental techniques for managing the life of the population,” techniques that work through the control of epidemics in the city – eliminating waste, cleaning streets, separating the normal and the pathological – and the management of natality, but also through control of the circulation of organic fluids – water, blood, milk, and semen – and the strategic assemblage of organs – hands, eyes, penises, vaginas, mouths. In terms of a theory of architecture, Foucault invites us to move from an anamorphic model of interpreting the relationship between the body and architecture, to a biopolitical model where architecture is understood as a political artifact to construct and produce the body rather than a mimetic system of representation. CERFI's research on the birth of the modern hospital in France is probably one of the most explicit examples of the study of architecture as governmental technique. The architecture of the hospital (distributing spaces to prevent contamination, circulate air, separate different kinds of sickness and bodies, and to watch and control the sick) is for Foucault the spatialization of medical knowledge and power. As Bruno Fortier argues, normative architectural typologies derive from the definition of the hospital as a rational machine to produce climatic, demographic, hygienic, medical, and statistical knowledge.⁵ Foucault, Gilles Deleuze, Félix Guattari, and CERFI understood architecture neither as form nor as tectonics, but rather as a biopolitical technology of power and *subjectivation*: a

4. Centre d'Études, de Recherches et de Formation Institutionnelles

5. The work of the CERFI on the hospital produced a collective book in two editions: Michel Foucault et al., *Les machines à guérir (aux origines de l'hôpital moderne)* (Brussels: Pierre Mardaga, 1979).

tentacular and collective utopia of national health and reproduction connected to a series of dystopic confining institutions for the normalization of the body and subjectivity.

This biopolitical model enables us to examine the history of modern architecture in relation to the processes of colonization and capitalist development, and to the invention of gendered, sexual, and racial subjects. Modern urban typologies and their relationship to hygienics and anthropometrics, the disciplinary architecture of the factory, prison, hospital, school, brothel, and asylum, along with the birth of the boudoir and domestic spaces for heterosexuality and reproduction, are just some of the most emblematic forms of modern biopolitical architecture.

ARCHITECTURE IN THE PHARMACOPORNOGRAPHIC REGIME

Foucault's analytical overview is critically sharp, but his valuable insights begin to blur the closer his analysis comes to contemporary societies. We are witnessing today a mutation in the biopolitical devices for the production and control of the body, sex, race, and sexuality that architecture cannot ignore. It seems that Foucault does not consider the profound changes, beginning during World War II, that occur with a new set of technologies for producing sexual subjectivity. These somatic-political technologies require us to conceptualize a third regime of power-knowledge, neither sovereign nor disciplinary, neither premodern nor modern, in order to take into consideration their deep and lasting impact on contemporary constructions of subjectivity. In his "Postscript on the Societies of Control," Deleuze, inspired by Williams S. Burroughs, names this "new monster" of social organization derived from biopolitical control a "society of control."⁶ I prefer to call it, reading Burroughs together with Charles Bukowski, *pharmaco-porn-power*: affects, organic secretions, and prostheses of the mind are the currency of this new toxic and sexual-microinformatic control.

To think about the changing relationships between architecture, power, and subjectivity, it seems crucial to draw a new cartography of the transformations occurring in economic and biopolitical production over the last century. It is today philosophically pertinent, following Foucault, to carry out a somatic-political analysis of the "world economy."⁷ Economists usually situate the transition to a third type of capitalism around the 1970s, after the industrial and slavery regimes. These have traditionally been said to have set in motion a new type of "governmentality of the living,"⁸ emerging from the corporeal, physical, and ecological urban ruins of World War II. The post-war period could be understood as a tactical transformation

6. Gilles Deleuze, "Post-scriptum sur les sociétés de contrôle," [Postscript on the Societies of Control] in *Pourparlers* (Paris: Minuit, 1990), 241.

7. I refer here to Foucault's notion "somatic-pouvoir" and "technologie politique du corps." See Michel Foucault, *Surveiller et punir* [Discipline and Punishment] (Paris: Gallimard, 1975), 33–36. See also, Michel Foucault, "Les rapports de pouvoir passent à l'intérieur du corps," *La Quinzaine Littéraire* 247 (January 1977): 4–6. I also draw on the well-known expression used by Immanuel Wallerstein in *World-Systems Analysis: An Introduction* (Durham, NC: Duke University Press, 2004).

8. Michel Foucault, "Du gouvernement des vivants" (1980), in *Dits et Écrits 4* (Paris: Gallimard, 1994).



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of war technologies into technologies of the body, consumption, and communication. The rise of biochemical industries, electronics, computers, and communication media as the new industrial supporters of capitalism during the Cold War became the underlying force behind the political and technical management of the body, subjectivity, race, gender, and sexuality. With certain radical changes, the political management of body technologies that produce sex and sexuality seem poised to become *the* business of the new millennium. The mutation of capitalism that we witness today can be characterized by the conversion of “sex,” “sexuality,” “sexual identity,” “race,” and “pleasure” into objects used for the political management of life, and by the fact that this “management” itself takes place through the innovative dynamics of global media and biotechnologies.

During the Cold War, the United States invested more dollars in scientific research related to sex, sexuality, and birth control techniques than had any other country in history. The notion of “intersexuality” was invented in order to manage the diversity of genital morphologies exceeding the binary classification of masculinity and femininity; the notion of gender (and the possibility of surgical and hormonal modification) displaced the stability of sex; progesterone and estrogens were transformed into the first pharmacological product able to chemically control reproduction, opening the possibility to manage national population growth in terms of race, health, and disability. Together with the exponential multiplication of transuranic elements in both the civil and military sectors, the mass consumption of plastic, and the expansion of the urban tissue, these management methods came to define the material conditions of a large-scale ecological transformation.

These developments led to a postindustrial, mediating regime of production of sexual subjectivity that I call *pharmacopornographic*. The term refers to the processes of a biomolecular (*pharmaco*) and somatic-semiotic-technical (*pornographic*) government of sexual subjectivity – of which “the Pill” (a chemical prosthesis, the first endocrinological technique for separating [hetero]sexuality and reproduction) and globally extended porn media technologies are two paradigmatic offspring.

We are facing a new kind of capitalism that is hot, psychotropic, and punk, with new microp prosthetic mechanisms of control emergent from advanced biomolecular techniques and media networks. In a process of techno-primitive accumulation, living cells and genetic material are becoming the new value of capitalism. This new world economy does not function without the simultaneous and interconnected production

9. See Mike Davis, "Planet of Slums: Urban Involution and the Informal Proletariat," *New Left Review* 26 (March–April 2004).

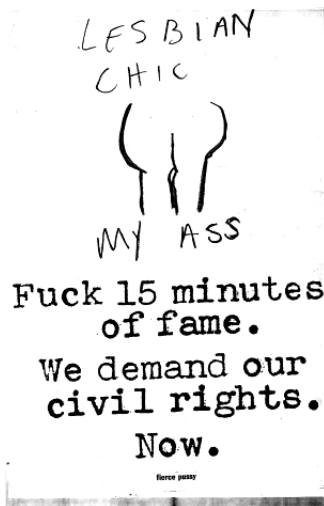
10. See Ian Hacking, *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science* (Cambridge: Cambridge University Press, 1986). See also, Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Princeton: Princeton University Press, 1979).

11. See Donna Haraway, "When Man is on the Menu," in *Incorporations*, eds. Jonathan Crary and Sanford Kwinter (New York: Zone Books, 1992).

and deployment of hundreds of tons of synthetic steroids, the global dissemination of pornographic images, the manufacturing of new varieties of legal and illegal synthetic psychotropics (enaltestovis, Special K, ViagraTM, speed, crystal, ProzacTM, ecstasies, poppers, heroin, omeprazole), the global dispersal of megacities of misery knotted into high concentrations of capital,⁹ or without an informatic treatment of signs and the numeric transmissions of communication.

During the second half of the 20th century, the mechanisms of the pharmacopornographic regime materialized in the fields of psychology, sexology, and endocrinology. If science has reached the hegemonic place that it occupies as a discourse and a practice in our culture, it is thanks to what Ian Hacking, Steve Woolgar, and Bruno Latour call science's "material authority" – that is, its capacity to invent and produce techno-living artifacts.¹⁰ Techno-science – a set of practices and discourses to which architecture is closely related – has established its "material authority" by transforming the concepts of the psyche, libido, consciousness, femininity and masculinity, heterosexuality and homosexuality, intersexuality and transsexuality into tangible realities. They are manifest in commercial chemical substances and molecules, biotype bodies, and fungible technological goods managed by multinationalals. The success of contemporary techno-science consists in transforming our depression into ProzacTM, our masculinity into testosterone, our erection into ViagraTM, our fertility/sterility into the Pill, our AIDS into Tri-therapy, without knowing which comes first; depression or ProzacTM, ViagraTM or an erection, etc. This performative feedback is one of the mechanisms of the pharmacopornographic regime.

There is nothing to discover in sex or in sexual identity; there is no *inside*. The truth about sex is not a disclosure; it is *sex-design*. Pharmacopornographic biocapitalism does not produce *things*, but mobile ideas, living organs, symbols, desires, chemical reactions, and conditions of the soul. There is no object to be produced in biotechnology and in porno-communication. The pharmacopornographic business is the *invention of a subject* and its subsequent global reproduction. It is no longer about discovering the hidden truth in nature, but the necessity to specify the cultural, political, and technological processes through which the body as architectural artifact acquires natural status. The OncoMouseTM, a laboratory mouse genetically modified to be susceptible to cancer, eats Martin Heidegger.¹¹ Buffy, television's mutant vampire, eats Simone de Beauvoir's *womanhood*. The dildo, a synthetic extension of sex to produce pleasure and



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12. Reyner Banham, "A Home is not a House," in *Art in America*, no. 2 (April 1965).
 13. Donna Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (New York: Routledge, 1991), 219.

identity, eats porn star Rocco Siffredi's cock. Wikileaks drills the walls of the Pentagon.

In the body's architectural techno-management, the pharmacopornographic industry synthesizes and defines a specific mode of production and consumption, a masturbatory temporization of life, a virtual and hallucinogenic aesthetic of the body, a particular way of transforming the inner in outer space, and the city in private junkspace by means of self-surveillance devices and ultra-fast information distribution, resulting in continuous and uninterrupted loops of desire and resistance, consumption and destruction, evolution and extinction.

Pharmacopornographic control transforms Buckminster Fuller's "standard-of-living-package," into a "biopolitical package." For Reyner Banham, America's fondness for mobile homes in the 1950s and '60s was a symptom of this displacement from "deadweight architecture" to the "lightweight package." Banham writes:

*If someone could devise a package that would effectively disconnect the mobile home from the dangling wires of the town electricity supply, the bottled gas containers insecurely perched on a packing case, and the semi-unspeakable sanitary arrangements that stem from not being connected to the main sewer – then we should really see some changes. It may not be so far away either; defense cutbacks may send aerospace spinning off in some new directions quite soon, and that kind of miniaturization talent applied to a genuinely self-contained and regenerative standard-of-living-package that could be towed behind a trailer home or clipped to it, could produce a sort of U-Haul unit that might be picked up or dropped off at depots across the face of the nation.*¹²

However, it was the body, not the car, that would become the ultimate clip-on port for biopolitical technologies.

Unlike the disciplinary society, the pharmacopornographic society no longer works over a modern *corpus*. The limit of the new pharmacopornographic body is not the skeletal wrapping that the skin delineates. This new body cannot be understood as a biological substratum outside the framework of production and cultivation. As Donna Haraway writes, the contemporary body is a techno-living being, "a networking techno-organic-textual-mythic system."¹³ Organism and machine, nature and culture, are obsolete disciplinary fictions. This new condition of the body blurs the traditional modern distinction between art, performance, media, design, and architecture. The new pharmacological and surgical techniques set in motion tectonic construction processes that combine figurative representations derived from cinema and architecture (editing, 3D modeling, personality design, etc.), according to which organs, vessels,

fluids (techno-blood, techno-sperm, etc.) and molecules are converted into the prime material from which our pharmacopornographic corporality is manufactured. Techno-bodies are either not-yet-alive or already-dead – half fetuses, half zombies. In this context, every politics of resistance becomes a monster.

“Modern architecture went out with a bang,” Charles Jencks wrote of the 1972 demolition of Pruitt-Igoe. “That many people didn’t notice, and no one was seen to mourn, does not make the sudden extinction any less of a fact, and that many designers are still trying to administer the kiss of life does not mean that it has been miraculously resurrected.”¹⁴ What Jencks diagnosed as a failure deriving from the rational, clean, purist style of modern architecture, its “hospital metaphor,” and its “mass production line,” would not be overcome by the so-called postmodern movement. Instead, the global, neoliberal, and postindustrial system of production that developed after the 1970s absorbed both modern and postmodern regimes equally into night-of-the-living-dead architecture. Jencks ended his critical attack on modern architecture with an odd, almost cannibalistic proposal: “After all, since it is fairly dead, we might as well enjoy picking over the corpse.”¹⁵ And this is exactly what happened.

Disciplinary architecture and orthopedics were the models for understanding the body-power relationship in disciplinary societies, but in the pharmacopornographic society, a microprosthetic power acts upon the body. We are now heavily involved in what sociologist Zygmunt Bauman has called a form of “liquid” control.¹⁶ Architecture, fueled by biocapital, is morphing, going soft, and getting wet. In the pharmacopornographic age, architecture dreams of becoming a body-sized condom for total immunity and, at the same time, a multimedia vibrator providing a porn-communicating experience.

In the 19th-century disciplinary society, technologies of *subjectivation* controlled the body externally, like an ortho-architectural apparatus. In the pharmacopornographic society, technologies not only become part of the body but dissolve in it, becoming the living-dead body. The body-power relationship becomes tautological: technopolitics takes the form of the body. It is architecture incorporated. Disciplinary architecture mutates with media technologies to enter the domain of production of body and subjectivity.

Although disciplinary architecture has been displaced, pharmacopornographic techniques do not totally erase previous biopolitical configurations, but rather plaster them with codes and fluids and cover them with immaterial networks. As

14. Charles Jencks, *The Language of Post-Modern Architecture* (New York: Rizzoli International, 1977), 9.

15. *Ibid.*, 10.

16. Zygmunt Bauman, *Liquid Modernity* (Cambridge, UK: Polity Press, 2000).

17. Dean Spade, "Mutilating Gender," in *The Transgender Studies Reader*, eds. Susan Stryker and Stephen Whittle (New York: Routledge, 2006), 315–32.

18. Didier Fiuza Faustino, *Bureau des Mésarchitectures* (Seoul: DAMDI, 2007), 117.

19. I refer here to Lewis Mumford's notion of anti-city that anticipates other pharmacopornographic urban landscapes such as outercity, exopolis, antipolis, x-urbia, etc. See Lewis Mumford, "The Case Against 'Modern Architecture,'" *Architectural Record* 131, no. 4 (April 1962): 155–62. See also, Lewis Mumford, "The Future of the City," pts. 1 and 2, *Architectural Record* 132, no. 4 (October 1962): 121–28; no. 5 (November 1962): 139–44.

20. D. S. Halacy, *Cyborg: Evolution of the Superman* (New York: Harper and Row, 1965), 7.

transgender theorist Dean Spade has shown, no successions of models will be historically superseded by others: there will be no ruptures, no radical discontinuities, but unconnected simultaneity, transversal action of several somatic-political models that operate at diverse intensities, diverse rates of penetration, and diverse grades of effectiveness in the production of subjectivity.¹⁷ Old buildings look the same, but are not; they are shells animated by surrogated ghosts. The apartment is now a peepshow and a gallery, where inhabiting means broadcasting a fiction of interiority that is publicly constructed as intimate and private. The pharmacopornographic agora is a postdemocratic space; light, open, and public space no longer holds the possibility of democratic and rational communication. The Enlightenment contract has been broken, or rather, it was a silly colonial and asymmetrical trap. The postdemocratic space is "an enclosed outlaw territory, where rules are set according to its users."¹⁸

We inhabit the old disciplinary architectures without knowing if we are living in biopolitical incubators or in coffins. Our relationship to them is necrophiliac. In the capitalist living-dead subject, mind and body are only connected by media. The new pharmacopornographic *anti-city*,¹⁹ where natural bodies no longer exist, is a gigantic somatic mall where the subject stuff is for sale.

For Le Corbusier, architecture was an orthopedic and therapeutic frame, an anthropometric apparatus that promised its inhabitants pure air and light, serving the biopolitical project of producing a healthy national population. The modern white-heterosexual *machine-à-vivre* was part of a larger disciplinary architecture repressing nonnormal bodies and subaltern forms of life. After the pharmacopornographic mutation, reproductive constraints and health moved from hospital architecture to the amusement park. With Archigram, architecture became an electronic device providing nonstop visual entertainment and straight mechanical nonreproductive sex. Who cared if it wasn't healthy? At least for the happy few, it was fun! In their 2000 video, *Ville hormonale*, Christophe Berdaguer and Marie Péjus aspired to design an external neurological system that controls the body's physiological and psychological variables by supplying hormones, antidepressants, anxiolytics, analgesics, neuroleptics, etc. As cyborg theorist D.S. Halacy suggested in 1965, architecture seeks to become a self-regulating human-machine system, to leave behind the traditional issue of space and move toward a "new frontier" that is "not merely space, but more profoundly the relationship between inner and outer space – a bridge between mind and matter."²⁰



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Biopower acts through molecules that end up being part of our immune system: silicone that takes on the shape of breasts, neurotransmitters that alter the way we perceive and behave, hormones and their systemic effects on hunger, sleep, and sexual arousal, aggressiveness and the social decoding of our femininity and masculinity. At stake here is the gradual miniaturization, internalization, and reflexive introversion of the surveillance and control mechanisms of the disciplinary political regime. These new, soft, biopolitical technologies adopt the form of the body they control and become part of the organism until they are inseparable and indistinguishable from it, and ultimately become subjects. In the pharmacopornographic regime, the body no longer inhabits disciplinary places, but is now inhabited by them. Architecture exists *in* us.

Contemporary architectural practices function within a knowledge economy and a regime of flexible labor in which architects have become nomad ethnographers, freeland sociologists, multimedia producers, urban technohygienists, entrepreneurial managers, agents of space surveillance, and designers of virtual social spaces. Architecture gives the impression of being a romantic asset of ancient First World Cultural Capitalism trying to promote its biopolitical techniques for social normalization and discipline to a global scale. Architecture becomes information, heat, weather, air, sex. Architecture can now be downloaded, eaten, sniffed, installed, copied, grafted, transferred, genetically modified, transplanted. Like desire, architecture exists without object. "We no longer need architects."²¹ Or rather, we need architects to be aware of their own mutation and to become activists. In this context, architecture can only survive as critical practice and micropolitical action.

RESISTANCES, MUTATIONS. . . .

The large-scale transformation affecting the production of life in capitalism is also transforming the topography of oppression and the conditions in which fight and resistance are possible. A process of deconstructing technologies of gender and sexual production and normalization, which contemporary feminist thinker Judith Butler has called "undoing gender," is already taking place.²²

The feminist, homosexual, and transsexual movements of the 1960s and '70s could be understood as a collective revolt against the biopolitical disciplinary techniques of production of sexual difference and sexuality that were developed in the 19th century, together with industrial capitalism and colonialism. Likewise, contemporary gender-queer, transgender, and crip

21. Didier Faustino, interview with the author, November 3, 2010, Paris.

22. See Judith Butler, *Undoing Gender* (New York: Routledge, 2004).

micropolitical movements could be read as examples of a larger critique of the pharmacopornographic techniques of production of the body and subjectivity, and their strategic alliance with the disciplinary regime.

The second-wave feminist movement, whether represented by Beauvoir's rejection of the institution of marriage and the family house²³ (she lived most of her life in a hotel room), Betty Friedan's and NOW's plea for escaping the "suburban concentration camp,"²⁴ or the Womanhouse project's claim for a female collective space,²⁵ provided a harsh critique of the domestic architectural regime as disciplinary space. The European bourgeois family apartment and the American Cold War suburban house were described not just as the theater where hyperbolic female and male gender codes were staged, but also as a political system of representation and spatial distribution, that through spatial segregation and normalization constructed racial and sexual differences, and ensured the sexual and racial reproduction of the nation. Likewise, the 1970s and '80s homosexual, black, transsexual, and anti-psychiatric movements (from Jean Genet to Guy Hocquenghem, Monique Wittig to Angela Davis) developed a first critique of the biopolitical regime derived from prison-hospital architecture, where the racialized and gender-queer subject was confined and constructed as sexually and politically deviant. At the same time, disability theories and the Independent Living Movement elaborated a critique of the "disabling" processes (involving architecture, administrative, and medical practices) that affected the nonnormal body in industrial capitalism.

Following Foucault's reading of the history of sexuality and Jacques Derrida's take on "performative" force in language, feminist thinkers such as Butler, Teresa de Lauretis, and Eve K. Sedgwick started in the late 1980s and '90s a process of *denaturalization* of the notions of gender and sexual identity that became known as "queer theory." Performative and queer feminism, as well as postcolonial feminism and cyborgology, questioned the conventional feminist use of the notions of "sexual difference," "gender," and "sexual identity" as an ontological given that was supposed to come before and was a condition of the possibility of other (class, race, age, sexuality, disability) differences. In using these notions noncritically, traditional and liberal feminism, they argued, tended to produce and naturalize the differences they sought to render visible or to contest.²⁶

Like noncritical feminism, most architecture theories still presume that the body and gender, racial, and sexual identities are given, that they exist before architecture practice

23. See Simone de Beauvoir, *The Second Sex* (1949; repr., New York: Vintage, 2011).

24. See Betty Friedan, *The Feminine Mystique* (New York: W.W. Norton, 1963).

25. See Miriam Schapiro, "Education of Women as Artists: Project Womanhouse," *Art Journal* 31, no. 3 (Spring 1972): 268–70.

26. Joan W. Scott, "Gender: A Useful Category of Historical Analyses," *The American Historical Review* 91, no. 5 (December 1986): 1053–75.

starts. But, from a critical biopolitical perspective, it is *the able or disabled character* of the body – its very materiality – that is reconfigured, produced, and reproduced through spatial conventions and architectural regimes.

Beatriz Colomina was one of the first architectural historians to register the impact of performative and poststructural feminist theories in architecture. “Architecture,” she argues in *Sexuality and Space*, “is not simply a platform that accommodates the viewing subject. It is a viewing mechanism that produces the subject. It precedes and frames the occupant.”²⁷ Reading Colomina and Butler with Foucault, it seems urgent today to redefine architecture as being part of modern “biopolitical technologies.”

This reversal of the naturalist perspective to focus on identifying biopolitical techniques operating within architecture also reverses the way architecture history is written. The issue is not to uncover the history of women, queer, or nonwhite peripheral architects, but rather to unveil how architecture contributes to the production of gender, racial, sexual, and able/disabled subjectivities as the effects of a set of spatializing power/capital/knowledge techniques. This implies defining architecture not as a building practice but as a system of political representation, a set of visual and spatial regimes constructed through discourse and media practices, and a biopolitical technique of social production and reproduction. Then the questions are: How is the viewing mechanism installed, how are frames fixed, and how can they be unfastened? What are the relationships between power, knowledge, architecture, and subject production? How can architectural practice produce subjectivity and life otherwise?

During the late 1990s, following the queer and poststructuralist feminist critiques, transgender and crip critical politics entered the field of architecture through analyses of the political normalization of spaces – bathrooms, prisons, shelters, hospitals, domestic and institutional spaces, etc. Transgender and disability studies argue not only that domestic and institutional sex-segregated and able architectures put transgender and disabled people in jeopardy, but that architecture functions as a political technology of body, gender, and sexual production and normalization. As transgender activist and theorist Lucas Cassidy Crawford points out reading architectural theorist Joel Sanders, “Architecture is not a simple or neutral aesthetic category to *which* gender is merely applied,” but rather, “architectural forms and gendered bodies mutually reinforce each other’s feigned timelessness and stability.”²⁸ Likewise, the emerging

27. Beatriz Colomina, *Sexuality and Space* (New York: Princeton Architectural Press, 1992), 83.

28. Lucas Cassidy Crawford, “Breaking Ground on a Theory of Transgender Architecture,” *Seattle Journal for Social Justice* 8, no. 2 (Spring/Summer 2010): 515–16.

29. Lennard J. Davis, "Constructing Normalcy: The Bell Curve, the Novel, and the Invention of the Disabled Body in the Nineteenth Century," in *The Disability Studies Reader*, ed. Lennard J. Davis (New York: Routledge, 1997), 10. See also, Sharon L. Snyder, Brenda Jo Brueggemann, and Rosemarie Garland-Thomson, eds., *Disability Studies: Enabling the Humanities* (New York: The Modern Language Association, 2002).

30. For an architectural definition of body technologies, see Susan Stryker, "Transsexuality: The Postmodern Body and/as Technology," in *The Cybercultures Reader*, eds. David Bell and Barbara M. Kennedy (New York: Routledge, 2000), 588–97. See also, Allucquère Rosanne Stone, *The War of Desire and Technology at the Close of the Mechanical Age* (Cambridge: MIT Press, 1995).

31. Lucas Cassidy Crawford, "Breaking Ground," 517.

32. *Ibid.*, 516.

field of disability and crip studies questions the role of architecture in the normative production of the "able" body and its living conditions. As Lennard J. Davis puts it, disability and crip studies stress the complicity of architecture in the "construction of normalcy," unveiling the social process of "disabling" produced by architecture during the history of modernity.²⁹

Contemporary transgender theorists such as Susan Stryker, Sandy Stone, and Dean Spade interrogate the technological and cultural process of biopolitical body production and suggest understanding embodiment as an "architectural practice" rather than a natural process.³⁰ As Crawford puts it: "Transgender and transsexuality may even be exemplary architectural practices and also the very bases for thinking of bodies architecturally."³¹ Thinking about this mutual construction of body, gender, sex, and architecture, Crawford asks, "How have these gender-based conventions of architectural stability and timelessness seeped into our ways of thinking of our *bodies*?" and proposes to study the history of architecture as an "archive of gender."³² Because transsexuality and transgender embodiment have been historically represented by medical discourses and popular culture through architectural metaphors, Crawford suggests interrogating those spatial images of embodiments (where the body is described as a "private architecture," a house or a home) as a way to question both architectural practices and discourses, as well as hegemonic representations of transsexuality and transgenderism.

A new grammar of political action and critical intervention needs to be invented. The regional comfort zone of 20th-century feminism as a theory of women's oppression should be left behind in order to conduct a Guattarian transversal analysis of control and normalization techniques, able to intertwine processes of production and the subjugation of gender, sex, race, body, class, age. It simply does not make sense to continue the discussion in terms of form, function, style, historicism, multiculturalism because these very notions are already working as biopolitical techniques of normalization. With Foucault, Deleuze, and Guattari, as well as with contemporary transfeminist and queer-crip movements, it is architecture's conjunction of power and knowledge, its relationship with capital and colonial biopolitical techniques, that should be questioned.

To embrace a transversal, transfeminist critique, it will be necessary to create new political figures to displace the dialectic paradigm of the natural body and the logics of identity, representation, and visibility. To a large degree, these have already been absorbed by mercantile, media, and hyper-vigilant

devices and transformed into new forms of control. Part of the political challenge will be understanding the ways sexual minorities, as well as those bodies whose status as human and citizen has been questioned by the hegemonic circuits of bio-thanato-politics, are able to access the architectural and urban technologies for the production of life and subjectivity and to redefine democratic space.

Contemporary practices of global power, knowledge, and architecture must be countered by architectural struggle and revolt at every level, from infra-architectural practices to the very undoing of the (white, heterosexual) disciplinary-military-entertainment-industry complex. The aim of a transfeminist and queer theory for architecture is to undo the spatialization of knowledge and power techniques that have contributed to the performative construction of political subjectivities.

We need to invent a practice of epistemic architectural disobedience. The introduction of queer and crip architectural methods demands a reshuffling of the realms of the aesthetic, the epistemological, and the political that undermine the dominant division of labor in architecture. These methods could include queer-situationist *dérives*, sex-worker inquiries, sexual constructivist montages, gender cup ups, biopolitical oral histories, deconstructivist anthropology, the creation of counterinformation platforms, the construction of eco-queer camps, drag-space workshops, and the performative production of public space. I refer not only to the introduction of dematerialized critical practices into architecture coming from activism, art, and performance (a process of co-opting of “artistic critique” that, as French sociologists Luc Boltanski and Ève Chiapello have noticed, is already at work in architecture within the new dynamics of capitalism)³³ but also to the need to repoliticize the practice of architecture. In other words, at stake here is the possibility of architecture to transform into a social revolutionary practice.

It is time for a transfeminist and anticolonial architecture practice of extensive connections and mobile thresholds. It is time for establishing networks, proposing strategies for cultural translation, sharing techniques of resistance and strategies for undoing disciplinary architecture, and to engage architecture discourses and practices in the process of critically unpacking the pharmacopornographic regime. It is time to establish a genealogy of architectural research related to the history of emancipatory struggles rather than to biopolitical normalization and capitalism. It is time for architecture to become activism.

33. See Luc Boltanski and Ève Chiapello, *Le nouvel esprit du capitalisme* (Paris: Gallimard, 1999).

I have a lump stuck in my throat!

1. After his analysis of “Little Hans,” Freud suggested that there are two primary kinds of hysteria: anxiety hysteria and conversion hysteria. In the former, the central symptom is phobia, while in the latter, this phobia takes clear form in actual bodily symptoms. Freud classified these two types to distinguish structural differences and resemblances in neurosis. He concluded that there are cases of simple anxiety hysteria that exhibit feelings of anxiety and phobias, but have no admixture of conversions. See Sigmund Freud, “Analysis of a Phobia in a Five-Year-Old Boy,” in *Standard Edition of the Complete Psychological Works of Sigmund Freud*, ed. James Strachey (London: Hogarth Press, 1955), 10:5–149.

2. Sándor Ferenczi, “The Phenomena of Hysterical Materialization,” in *Theory and Technique of Psychoanalysis*, comp. John Rickman, trans. Jane Isabel Suttie (New York: Basic Books, 1952), 95–96.

3. *Ibid.*, 89–96.

4. *Ibid.*, 96.

In an attempt to decipher a series of enigmatic bodily malfunctions, in 1919 Hungarian psychoanalyst Sándor Ferenczi diagnosed the process of “hysterical materialization”: cervical lumps, esophageal rhythmic spasms, vascular swallows, paralyzed muscles, and other mysterious symptom-formations manifested in some of his patients. Such types of “conversion hysteria”¹ were evidenced either as “positive” growth formations – lumps or swells – or “negative” breakdowns of organic functions – hysterical paralysis, localized anesthesia, etc. One fact remained invariant: all symptoms were imagined and actually materialized. Patients consistently complained of curious lumps stuck in their throats, of foreign rectal bodies trapped in their anuses, or of stomach-children molded out of the contents and walls of their stomachs. They were convinced that these new second bodies were forming as they were speaking. After cautious examination of the patients, Ferenczi vowed that such symptoms could not be called hallucinations; they were not imaginary, but real.² But what brought them into existence as actual new materials generated by the body?

Sigmund Freud’s initial hypothesis, adopted by Ferenczi to support his own theory, was that “conversion hysteria” represented unconscious fantasies in bodily terms: psychic “wish-formations” that became corporeal.³ The throat lump typified an unconscious wish for fellatio, the rectal masses homosexual desires, the “stomach-children” imaginary pregnancies, and so forth. Ferenczi advanced Freud’s theory of hysterical symptom-formations beyond the binary of cause-and-effect relations for psychosomatic disorders to investigate the nature of the material composed by the body and the processes of its formation. He explained the lump as foreign to the body rather than an organic growth synthesized as an extension of existing tissues. It was a new unidentified organism whose constitution at first looked like a galaxy of dispersed matter. Ferenczi then suggested that such bizarre crystallizations required a special name, since they depicted not only novel psychoanalytic phenomena, but also novel “materialization phenomena.”⁴

5. Sándor Ferenczi, *The Clinical Diary of Sándor Ferenczi*, ed. Judith Dupont, trans. Michael Balint and Nicola Zarday Jackson (Cambridge: Harvard University Press, 1995), 7.

6. Ferenczi, "The Phenomena of Hysterical Materialization," 96.

8. Michael Balint, "Sándor Ferenczi's Last Years," *International Journal of Psychoanalysis*, no. 39 (1958): 68.

9. See Sigmund Freud and Sándor Ferenczi, *The Correspondence of Sigmund Freud and Sándor Ferenczi*, vol. 1, eds. Eva Brabant, Ernst Falzeder, and Patrizia Giampieri-Deutsch, trans. Peter T. Hoffer (Cambridge: Harvard University Press, Belknap Press, 1996), 356–57.

10. See Leo Rangell, "The Nature of Conversion," *Journal of the American Psychoanalytic Quarterly* 7 (1959): 632–62.

11. Ferenczi, "The Phenomena of Hysterical Materialization," 91.

"SEMI-SUBSTANCE" BODIES

Looking more closely at the lumps stuck in patients' throats, Ferenczi named them "semi-substances,"⁵ and described the body that produces such substances as "plastic."⁶ Like the work of the artist who molds the material of his conception before he is in command of his thoughts, or the occultists who imagine the "apport" or the "materialization" of objects,⁷ the lump represents the formation of a material that is invented and fabricated by the patient. But beyond simply being a type of material, the lump represents more the idea of its own transformation. To produce it, the body must lose its firm structure; organs start to become indistinct as the body enters a "semi-liquid," "plastic" physical state in which psychic and physical subjects merge.

Ferenczi's theory is distinctly different from Freud's model of conversion hysteria. Under the rubric of hysteric symptoms, Freud imagined the body as a mechanical system composed of objects and fluids, dams and flows; the regulation and obstruction of flows triggered hysteric symptoms. Freud commonly described the function of psychosexual energies with the terminology and iconography of 19th-century steam engines and the theory of energetics. Ferenczi, on the other hand, imagined the hysteric body as an unregulated cloud of diverse substances and free-floating particles. The formation of semi-substances was determined, according to Ferenczi, by "inner" forces analogous to the patient's latent fantasies, which regulate and direct the crystallization of symptoms-formations.

A number of Ferenczi's ideas on hysterical materialization have been quite controversial, deemed as fantastic, revolutionary, exaggerated, without proper foundation, and so on.⁸ Notably, while Ferenczi was doing research on this project, advancing Freud's theory of conversion hysteria and remaining in constant weekly communication with his master tutor,⁹ Freud decided to quit this field of study, having judged the formation of peculiar somatic symptoms to be an obscure and, overall, unproductive field of study.¹⁰ Although Ferenczi acknowledged that the mysterious leap from mental to bodily phenomena might be a difficult problem,¹¹ he was not discouraged by the alleged obscurities and the magical character of symptom-formations and persistently pursued his research, driven by a desire to demystify the process. Ferenczi eventually arrived at two conclusions that go far toward solving this malady. First, he introduced into the discourse of conversion symptoms a series of transformations,

DIAGRAM OF HYSTERICAL MATERIAL-
IZATION. COURTESY THE AUTHOR.



FRACTURE IN THE NORMAL SEXUAL
DEVELOPMENT >> REPRESSION OF
GENITAL IMPULSES.



IRRUPTION OF THE GENITALS >> DISPERSED
DISPLACEMENT OF THE GENITAL TO
POTENTIALLY EROTOGENETIC ZONES.



REPPRESSED IDEA TRANSFORMED >>
INNERVATIONAL ENERGY.

in which the passage from mental to corporeal is only one stage. Integration of this stage into a greater series of transitions de-emphasized the idea of the one mysterious leap between mind and body. Second, Ferenczi employed modern views of the conversion of energy to matter as an analogue to the mental-bodily leap. While inorganic and organic matter exist in a web of equilibrium under normal conditions, he explained how the stability of such correlations could be disrupted under severe stimuli that in turn caused the explosion of matter.

TOPOGRAPHICAL, TEMPORAL, AND FORMAL REGRESSION

Another distinctly crucial concept with which to examine the phenomena of hystercal materialization is *regression*, or what Ferenczi called a “regression to the protopsyche.”¹² In the course of this process, the subject reverts to a primitive stage of development, which is manifested in both the individual turning back to previous life stages, and in time, as in the return to a primitive era. This regression is of such a dramatic and traumatic nature that the subject is diffused in space and time, and thus distills entirely different organic behaviors and capacities that lead one to realize inconceivable phenomena under normal circumstances. In psychoanalytic terms, conversion symptoms are diagnosed as physiological reflexes in the primitive realm of the protopsyche, where the unconscious wish leaps across to unconscious motility. In spatial terms, regression can be interpreted as the dissemination of matter in space to archipelagos of constellations by means of an energy big-bang. In this sense, hystercal materialization may also be viewed as a vehicle for design, one that defers immediate formal expression. The regressive body can be thought of as a scaffold of distributed properties and behaviors, where objects temporarily crystallize around information that becomes, for unknown reasons, prominent.

DE-ERECTION / BLOCKAGE / INNERVATION

To translate the mechanics of hystercal materialization to design terminology, I propose three tentative operations that reflect on requisite spatial adaptations of the body. The first condition – *de-erection* – refers to the body’s loss of its erect posture, regressing into earlier life stages and epochs. The second – *blockage* – refers to the body sealing its boundaries, and the third – *innervation* – adverts the thickening or enhancement of mucous skin zones through the transposition of energy from the organs to the periphery. These operations

12. Ibid., 97.

(or design pathologies) are not suggested as practical application models for design thinking. Rather, they are emergent conditions or effects of procedural design methodologies, shaped by the implementation of rules and constraints throughout the design process.

De-erection signals a directional shift from the vertical to the horizontal. In spatial terms, it can be interpreted as a negotiation between axes in a design scheme where it is unclear whether the project expands horizontally or vertically, and thus whether it is to be understood in plan or section. This condition of indeterminacy in axial directionality parallels the regression of the individual to earlier life stages during the process of hysterical materialization.

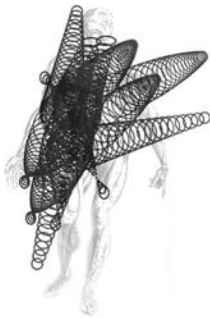
A process of devolution can be visualized in the change in posture of the fully grown erect man to that of the adolescent, the child, and finally the newborn infant, whose skeletal structure and bodily tissue are so soft and flaccid that it cannot carry its weight upright. Hysterical materialization suggests that the individual undergoes this process of fundamental devolvement; not, perhaps, in actuality, but as if its materials begin behaving as in previous life stages. In the course of regressive inclination, the body returns to an infantile state and loses its point of gravity as it reaches a state of plasticity. It is worth recalling here that the discipline of artistic anatomy in the late 19th century was founded on the presumption that man stands erect.

Cathexis may describe more fully the condition of de-erection. This psychoanalytic term, which refers to libidinal energy charge, was often described by Freud as the libido's manufacturing of energies that, if blocked, build up at certain locations and require release in alternative outlets; such detours can potentially lead to the formation of disabling symptoms. Translated into spatial terms, this can denote the concentration, accumulation, holding, and retention of mental energy in a particular channel until it can be released in the direction of a specific path. In short, it announces that point where matter accumulates and, beyond a certain threshold, begins to shape and articulate a vertical axis.

Along with the regressive devolution of man's posture, the phenomenon of hysterical materialization also initiates a chronological regression in time. This accounts for Ferenczi's fixation with glaciers, aquatic mammals, intrauterine life, copulation in fluid environments, and the generic longing for moisture. The vast, telluric changes that occurred over long periods constituted "catastrophes" – as



INNERVATIONAL ENERGY FORMATION >>
LOCALIZED SOMATIC SYMPTOMS (INDIFFER-
ENT BODY PARTS ARE GENITALIZED).



FREE-FLOATING AND COMPLEX-ESCAPING
EXCITATION REMAINDERS >> SEEKING
SATISFACTION FROM EXTERNAL OBJECTS.

Ferenczi called them – for all the creatures that experienced them. For the individual's psychology, these changes signaled an unsurpassable biogenetic rupture between the individual and its environment, recalled by all beings at moments of distress. In hysterical materialization, the subject eventually attempts to reproduce this intrauterine, amniotic space of the belly. A similar condition of regression into “intrauterine environments” as a possible model for future architectures was invoked in the architectural discourses of the surrealists in the 1930s, including the theories of Tristan Tzara.¹³ The connection between Ferenczi's anthropogenetic theories and the spatial condition of de-erection may seem tenuous at first, yet the typology of the landscape that Ferenczi recalls is in fact de-erected. Ice shelters, geological land formations, caves, and other environmental primitive forms of habitation all speak of spaces under formation, characterized by indefinite directionality, where all materials are being molded into a plastic state.

Blockage can be interpreted as a firm boundary condition in a design scheme (in either two or three dimensions) that acts as an impassable zone within which elements and materials have to be packed. Spatially, the territorial demarcation of boundaries and obstruction-markers may also perform as a mechanism that enables material and spatial organizations that would not have been probable in the open field. Yet, in psychoanalysis, the condition of blockage, which refers to “autoplastic” adaptation as analyzed in “temporal regression,” is more than spatial; it is organic. Blockage presents an operative self-containment of the organism that blocks the reception of any input from the exterior world. Similarly, in the process of hysterical materialization, the “autoplastic” subject shuts down environmentally while experiencing a deep regression. Consequently, the newly defined, closed system of the hysteric body produces new materials by using what is available for disposal on the spot. With this ad hoc function, the body enters a peculiarly productive state, generating its own input. Blockage becomes fundamental to autoplasticity, as it induces an unforeseen development of material constitutions in the body.

Recalling the sealing process of autoplasticity, innervation refers to the exaggerated augmentation of epidermal functions – mucous and cuticular skin zones – due to a hyperbolic stimulation of the neural system. If we conceive of the body as a system of connecting vessels where certain amounts of energy are channeled from one location to the

13. Tristan Tzara introduces the term *intra-uterine architecture* to counter Le Corbusier's “machine for living” and Miesian rationalism. See Tristan Tzara, “D'un certain automatisme du gout,” *Minotaure*, no. 3–4 (December 1933): 81–84.

other, the hyperstimulation of the skin may in some cases result in the atrophy of normative organ functions. In this sense, innervation marks a systemic shift from the body's hard, anatomical components to its soft tissues; this shift is expressed in such symptoms as the movement of the smooth muscle fibers of the vascular walls, the functioning of glands, the process of tissue nourishment, and other intra-physical regulations.

This transition from hard parts to soft envelopes can be interpreted spatially as a thick, performative skin that does more than wrap space; the surface becomes space itself. One visual example is László Moholy-Nagy's photograph of a formless pile of automobile tires, where a mass-surface is produced by the heaping of deflated bodies.¹⁴ Entitled *Faktur* (facture), the mountain of flaccid rubber objects indicates the act, process, or manner of making. By aggregating diverse matter, surface inflates to space. The deflation or de-erection of the individual object creates a momentous erection as a group.

It is possible to distinguish de-erection, blockage, and innervation as offspring, side-effects in the design process, rather than premeditated concepts of core significance in the development of a schema. These are retroactive design mechanisms. One can hardly imagine laying claim to innervation as the main initiative for a project, its *raison d'être*, yet it may be an underlying driving force that motivates the unraveling of ideas.

Such unexpected effects, which germinate as derailed paths from the central line of inquiry, truly speak of today's ideological diffusion. This ideological digression corresponds to the displaced and unexpected bodily growths of hysterical materialization processes, where desires are displaced from one bodily region to another. Discourses that appeared as side effects in the history of ideas, stories not allied with the normative course of what we acknowledge to be of core historical significance, may account for the array of current anxieties in architecture. They constitute a marginal practice that subconsciously informs the core, feeding history through its dross.

14. See László Moholy-Nagy, *Von Material Zu Architektur* [From Material to Architecture] (Munich: A. Langen Verlag, 1929).

The Tragedy Of the Commons?

Editor's Note: *This essay, and Patricia Williams', which follows, were first presented in the Science and Democracy Lecture Series at the Harvard Kennedy School in Spring 2012. The specific lecture that formed their context was "Deleterious Me: Whole Genome Sequencing, 23andMe, and the Crowd-Sourced Health Care Revolution," given by 23andMe CEO and cofounder Anne Wojcicki. The lecture and subsequent responses were conceived to interrogate the social, political, and practical transformations of genomic knowledge in the 2.0 world.*

For years I have followed Spencer Wells's Genographic Project, an enterprise that largely emerged from Luigi Cavalli-Sforza's population genetics lab at Stanford University where Wells was a researcher in the 1990s.¹ The Genographic Project, whose collaborator-sponsors are National Geographic Society, IBM, and the Waitt Family Foundation, is dedicated to collecting samples of DNA from indigenous peoples with the aim of determining the patterns and sequences of human migration and transformation across the planet since the initial emergence of the human species in Africa 100,000 years ago.² Members of developed populations are invited to participate in the program – and reap certain entertainment and existential benefits from learning about their genetic heritage – by contributing their own DNA samples and having them analyzed and read out against a network-map of the larger database for a fee of \$99.95. The proceeds from participation are divided between two funds: a first that underwrites the fieldwork costs of sampling the indigenous DNA, and a second that receives money in the form of a legacy fund to sponsor cultural preservation projects directed by the indigenous communities themselves. The Genographic Project is "anonymous, non-medical, non-profit, and all results are placed in the public domain." There is also an elaborate and careful "Ethical Framework" decree foregrounded on its Web site in which the researchers publicly define their relationship to the populations with which they work.³ Formally, the project is scientific, and from this perspective at least, has generated no controversy. In other respects, however, it has attracted controversy, not dissimilar to the perennial issues that have dogged National Geographic cultural-photographic activities in the past, and in 2006 a United Nations forum of Indigenous Peoples recommended that the project be suspended. A number of indigenous groups have since declined to take part, citing potential misuse and tendentious interpretation of the data with respect to patrimony claims, land rights, and a host of other issues. In my own classes at Harvard, I have encouraged my students to participate in

1. Spencer Wells, *The Journey of Man: A Genetic Odyssey* (Princeton: Princeton University Press, 2002). See also Luca Cavalli-Sforza, Paulo Menozzi, and Alberto Piazza, *The History and Geography of Human Genes* (Princeton: Princeton University Press, 1994).

2. The collaboration inevitably took on a "sociopolitical" cast. IBM, for example, took on the partnership principally to hone its statistical modeling expertise, yet soon came up against powerful ethical imperatives. The corporation is said to have been directly led by this research project to extend its nondiscrimination policies to include genetic markers, and were instrumental in converting this refinement – and its protections – into law in the United States.

3. National Geographic, "Ethical Framework," *The Genographic Project*, <http://genographic.nationalgeographic.com/staticfiles/genographic/StaticFiles/AboutGenographic/Introduction/Genographic-Project-Ethics-Overview.pdf>
4. The Genographic Project presently counts close to half a million participants.
5. See Patricia Williams' essay in this issue.

the study, and the class in which I do so always generates considerable excitement. In the end, however, no student of mine – nor even I myself – has managed to make the leap and mail in the swab.⁴

The diffidence that accounts for our collective hesitation is telling. The gesture of "actualizing" this data that lies latent within us entails an almost primordial and epic form of betrayal with respect to not only what we used to call "our natures," but also to what can now only be described as the very surfaces and handles through which we are socially formed, identified, administered, sorted, and proscribed through nearly every institution we enter or encounter. It is fair to say that Wells's Genographic Project paved the way for subsequent direct-to-consumer genetic services (although the "consumer" component, or wholesale juridical transformation of the participant, is clearly a contribution of the following generations of enterprises). What is worthy of our attention here is to examine the evolution of the form, or better yet, the strategies – sometimes cynical, and sometimes simply in mindless reproduction of the clichés and commonplaces of our frequently toxic social-media-economic environment, and the terrifying consensus that has grown around it – now being used to circumvent the natural diffidence that arises in response to such appeals to make both explicit and public – in effect, to surrender – what one could call the raw materials of our juridical and ethical existence. By "raw materials," I refer not specifically to the chemical entity of our DNA, but to the capacity – some would say the "agency" – with which this substrate is today socially invested in order to produce, determine, police, and administer our lived worlds. Our DNA is no longer a thing; it represents an arena to which we are, by a concert or manifold of forces, routinely led to discover not only the particulars of our fate, but also our status as personnel within an increasingly instrumentalized social system.

One of the direct-to-consumer genetic services is 23andMe, established in 2006. In the 23andMe promotional materials, we repeatedly hear how the citizen-client, redesigned now as a "consumer," represents an "underutilized asset," a "resource" to tap, or a business "partner." One's genome represents not only a commodity harvested for free (and stored as an active asset, subject to resale and trade),⁵ but also a documentary profile of the owner's projected social productive capacities and potentials. We have known since the 1980s that one's civil status could be thoroughly reconfigured within

the political economy of disease, as the PWA – Person With AIDS – phenomenon made clear. But little did we realize, or has it been widely noticed, that identity, fate, and biology-conceived-as-essence have become merged since then for every citizen. We are now largely sitting ducks, eager prey for the emerging knowledge aggregators and extractors, and the relation is arguably a predatory one.

Many have dedicated their lives to championing the benefits of the Internet and the so-called commons that it produces, but I challenge all of those who do to consider the deeper, more primal organizations being played out beneath the operations of its surface, among these, the platitude that “communications” equals democratic process.⁶ The mandate to communicate, perhaps the greatest tyranny and imperative of our age, is cynically and sometimes ruthlessly exploited in today’s social network-based commercial and industrial enterprises. People willingly pay monthly fees for the privilege of having their labor or use-value passively expropriated and their civil rights paternalistically tended to by others – the avowed stock in trade for ventures like 23andMe – for as long as people socially network and forge pathology-centered identities and communities, they are producing value. What is new within this new modality of labor and value is that alienation no longer reliably appears at the places and times we used to find it – indeed, the opposite: most netizens, absorbed in the ecstasy of this communicational fallacy, are methodically convinced of their ownership of their efforts, as if occupying the commons today were a neutral, virtuous, or unentailed thing. It is not.

The market model upon which crowdsourcing extraction depends is a brilliant and efficient one, but also dangerous if incompletely understood. Just as the economic “agora” of the 1990s taught us the nasty lesson we ought to have retained from the previous three laissez-faire eras in modern times, today’s discursive or epistolary agora of chat, email, and blog aggregation will almost surely result in the production of delirious and deeply damaging information bubbles. The world of genetics is particularly at risk: we know almost nothing about the relation of genotype to phenotypic expression, and even less by an order of magnitude about the anomalies, polymorphisms, mutations, etc., that modulate them. We have known since the time of traditional societies of the familial nature of disease etiology; all that is really new today is the representation of these legacies of susceptibility in genetic terms. Mutations are also extremely

6. The two-day workshop had several participants from the Harvard Law School, the Berkman Center for Internet and Society, the Medical School, and the School of Engineering and Applied Sciences.

common and randomly distributed: almost no single mutation alone is sufficient to establish disease, and the absence of an identified marker in no way precludes the presence of the pathology in question.

So now ask the “man in the pub” to connect to his or her counterparts *ad infinitum* and what does one get? Data, lots of it. And correlations, much of which may be impressively useful except for the fact that much of it won’t be, simply because the chat “traffic” will only be following a logic of networks and communication. One thinks here of John Poindexter’s brilliant Bush-era notion of “prediction markets,” in which social, political, and even climatic catastrophes would be signaled by the magic of spontaneously coherent market behaviors. In other words, because of the extraordinary feebleness and incompleteness of the underlying knowledge foundation and the schematic genetic maps that represent it, many of the so-called “significant correlations” will prove to be nothing but artifacts of the social system superposed on top of them. Figuring out which are which requires real and innovative science, not software engineering. The likelihood of producing a bubble of ultimately useless ether is not negligible either.

Despite repeated references to “scientists” in the 23andMe literature (and one must seek determinedly to find the “research” button buried off-screen at the bottom of the page), the enterprise is clearly but a data-mining and perhaps – it is hard to say for sure – a crypto-bio-prospecting initiative, in which concrete assets from their clients – their one-time tradable genomic property – are exchanged for a service contract that promises to keep clients/users abreast of genetic research conducted elsewhere by research universities and other private and industrial labs, sorted and formatted by the editorial work, which is the primary activity of the “geneticist-scientists” on the 23andMe staff. The client-consumers are also retained through the service contract as fixed-and-renewable “assets” for the company, to be tapped at will through a panoply of questionnaires and surveys.

The new mania associated with the economic reservoir represented by the digitally networked “crowd” is generating the same incaution I fear as the one we saw emerge in the late 1990s. The crowd urgently needs to be redefined as a public good (ownership not dependent on participation) and made inaccessible to hasty land grabs, privatizations, annexations, and implicit claims of eminent domain. It is not “democratic” to incite the crowd with demagogic invocations of

unexamined entitlement such as “I want my DNA and I want it now!” Nor is it condescending or paternalistic to suggest that the 2.0 universe is substantially unthought out, untheorized, deeply scientifically unsound, and undeserving of being construed and sold as an engine of knowledge, let alone one of social organization, human destiny, or identity. Are we certain that we want to hand the management, interpretation, and uses of our collective biological endowment – not to mention the enormous technological apparatus dedicated to managing all the modalities of life – over to the simplistic and often automatic operations of a consistently discredited market model? Who said “the consumer is always right?” The seller, never anyone but the seller. This is hardly the model in which to entrust the just and rigorous “knowledge enterprise” that by all indications is poised to become our future.

At stake in knowledge operations like 23andMe is the historical transition now taking place: as the economic allure, followed by some moral postrationalization, of the recent market society is replacing not just the idea, but even the memory of the social market. In a social market, the needs and aspirations of the society determine the functioning and operation of the markets that are designed to serve them. Much 2.0 propaganda remains mired in the misguided principles of the 1.0 world, not to mention the long but one-dimensional traditions of liberal moral and political philosophy, precisely in the continuing belief that society is best shaped and served when following and abetting “free,” spontaneous, and unfettered interaction.⁷

I do not wish to claim that “more knowledge” is not mostly a good thing, especially when it concerns the prospects for enhancing the free enjoyment of our bodies in time. My own layperson’s knowledge of biology (which is somewhat more than a hobby) suggests that the dynamics and logic of life will be poorly served by the constraints imposed on it by the logic of the startup and the race to ballooning instant fortunes. The history of even the last three years has taught us that privacy contracts in the online world are only as good as the climate on the day they are transacted, and are unenforceable once subject to seizure under political security or moral-medical pretexts, not to mention the sale and succession of enterprises. Who will protect the privacy and data of the participant-clients, first from news groups, then pinpointed advertisements, then insurance actuarial tables and licensing protocols? What does it mean for clients,

7. This tradition (arguably a proprietary Harvard one) was widely in evidence throughout the workshop. An important, perhaps fundamental, departure from at least one of its tenets is the recent elucidation by Amartya Sen of the Hindu concept of *nyaya*: a notion of justice based in actual social realizations – that is, “lives” – rather than theoretical or “transcendental” principles and the institutions that make them concrete. Sen’s formulation would seem to open the avenue for a concept of social justice not founded in rationalization processes alone. See Amartya Sen, *The Idea of Justice* (Cambridge: Harvard University Press, 2009).

caught up in “I want my MTV!” fervor, to reflexively render public their private – and volatile – data by subsequently – and obediently – engaging in interest-group formation, mutually reinforcing disclosures and interactions of the most public and promiscuous kind?

What legal guidelines and imperatives will compel 23andMe’s possessive social conduct when hard genetic science produces definitive information regarding a catastrophic pathological marker? Will that client receive a telegram or email on the eve of his marriage, or on the final day of the first trimester of her pregnancy? Or is 2.0 medical ethics responsibility entirely to be left in the possession and liability of the user? What does it mean for a parent (or a parent-to-be) to render public information that may prejudice the privacy or social prospects of an offspring not yet endowed with statutory rights or protections? Is the DNA inherited from one’s parents really one’s own property, or do we need new categories of legacy co-ownership and co-responsibility? Clearly, one could go on forever.

The fundamental issues of privacy, property, and right cannot be skirted or swept away within, or by, the fervor of the often perverse and exploitative confessional environment of the new and very savage online world. Rights are routinely given up within one limited context; only later do we find that the relinquishment has become permanent, comprehensive, and irreversible.

Science is no longer an adjunct to our society; it is our society itself. Similarly, we citizens have become inseparable from the emerging, new “biological” rationality that is replacing the old one of bureaucratic method that shaped and legitimately democratized our modern institutions in the preceding 150 years. As a philosopher and historian, I know that these issues have been pitifully poorly attended to. We do not even know what the issues are, or in what frameworks they should appear, and yet we proceed with a confidence that borders on hubris, with only the truism that further participation, rather than less, is the path to social and political justice. The primitive doctrine of the “empowered individual” may well be the most treacherous belief in our political culture today.

DeliriousMe: Ownership and Identity in An Age Of Genomic Medicine

Sometimes it's hard to count on the sustained attention of university students, distracted as they are by an excessively Twittering cyber world. Every now and then, we, their professors, have to toss up something extreme to make them snap to. In my bioethics class, for example, I announce that I'm going to hire a forensic team to come in and do a sweep of the whole classroom with little sterile sensors that will gather samples of hair, hangnails, and whatever DNA may be extracted from their discarded coffee cups. Then I'm going to spin the findings in a big centrifuge, and, with sufficient time and investment, I shall not only manufacture the first Flawlessly Above Average Columbia Law Student, but . . . I shall patent the same. And thenceforth, they will not be able to reproduce without paying me royalties.

It's a far-fetched scenario, yes, but the question of who owns our bodies – in particular the genomic information that may be culled from routine human shedding – is a matter of evolving legal importance. Gene sequences in genetically modified plants are already owned and traded on a global scale. In the United States, the case of *Association for Molecular Pathology v. Myriad Genetics* recently challenged the attempt to patent human genetic sequences related to breast and ovarian cancer. And if the 2012 Supreme Court case of *Mayo v. Prometheus* made clear that natural processes may not be patented, it remains entirely unclear what can be deemed “natural” or, for that matter, a “process.”

Beyond the technological questions involved in unlocking the secrets of the human genome, there are emotional ties to our detached but component parts, as well as proprietary stakes. When Alistair Cooke, host of *Masterpiece Theater*, died in 2004, his cancer-ridden body was stolen and sold for medical-grade bone grafting; most of us will feel that the crime involved not just the property of the body, but was also

a violation of the body's sanctity for lack of a better term. When in 2011, a teenager in China sold one of his kidneys in order to purchase a new iPad, it attracted international media attention for its extraordinary mining of the body for purely pecuniary purposes.

One of the weirder cases exploring this bioethical territory involves South Carolinian John Wood, whose leg was amputated after an airplane crash in 2004. Wanting to eventually be buried "whole," he had the leg embalmed and placed in a storage unit with other belongings. But he fell behind on the rental fees, and the contents of the unit were sold to one Shannon Whisnant, who found the leg carefully wrapped and nestled inside a BBQ smoker. Whisnant called the police, who traced it back to Wood. Wood insisted the leg be returned given his sincere belief that, detached or not, it was a part of him. Whisnant, however, claimed that he was the purchaser-for-value, and wanted to put the leg on display and charge a hefty price for the viewing. "Halloween's just around the corner," he explained.

The ghoulishness of this scenario should not obscure the legal issues at stake: should a commodity interest trump the sacrosanctity of corporeal integrity? Are discarded body parts "alienable" in a free-market sense? Or do they fall within the realm of what we deem constitutionally "inalienable?"

What about DNA? Suppose we assumed that Wood's genetic makeup included cells that were resistant to some rare disease. Do Wood or Whisnant have any proprietary claim to profits to be derived from the extraction, culture, and sale of those cells? Could Whisnant not only display the leg but also publish Wood's entire genome as part of his Halloween art show? Could the police officer to whom Whisnant brought the leg do a DNA test, retain the sample, patent a method of assaying the extracted data, and ultimately market a pharmaceutical by-product to patients at \$5,000 a dose? We all leave trails of our cells wherever we go – under what circumstances should that material be regarded as discarded and thus open for exploitation by finders-as-keepers?

On May 29, 2012, the personal genetics company 23andMe announced that it had procured its first patent, for "Polymorphisms Associated With Parkinson's Disease." Patents create exclusionary rights in knowledge; they prohibit nonpatent holders from using that knowledge without permission or the payment of royalties. 23andMe's patent stems from massive aggregations of data culled from customers who have paid considerable money for information about their genetic

predispositions for various health risks. While 23andMe's consumer contract says that no "research" on submitted spit samples shall be done without consent, many customers seem not to have realized that it goes on to define "research" as "academic," which is to say, work published in "peer-reviewed scientific journals." The contract then distinguishes "research" from "research and development (R&D)" of commercial products, for which no consent is needed.

When announcing news of the patent, CEO Anne Wojcicki declared that she wants "discoveries to move from the realm of academic publishing to the world of impacting lives by preventing, treating or curing disease." But it is precisely in academic publishing where new ideas are most apt to be freely shared and tested; Wojcicki seemingly wants to dislocate discoveries "from" academia "to" the gated community of patent law – simultaneously designating patent law as the exclusive geography of disease prevention, treatment, and cure. As she explains, "Often the only way a company will even think about pursuing a drug lead is if they have assurance that they can recoup their investment."

Wojcicki frequently expresses her desire to heal, and to broadly share the knowledge gained through data mining. It may be worth noting that Wojcicki is married to Google cofounder Sergey Brin, whose family history of Parkinson's disease places him at risk. But that backstory, compelling as it may be, is not reflected in the business model either of them pursue. As with any for-profit corporate head, their fiduciary duty is to make money. The realization of any wider or public interest in health care will not come from the private corporate sphere by itself. The patent system and our corporatized system of R&D already assure that data-aggregating businesses' real wealth will come not from analyzing individual spit samples, but from the far greater asset of bundling customers' genetic, lifestyle, and family histories for commercial exploitation.

The reality of that exploitation must be borne in mind by those who so easily send off DNA samples to be analyzed for either medical risk or ancestry tracking. Over the last few years, "spit parties" have become quite popular both as a kind of party game, and as a purported teaching aid in high school and college science classes, touted as fun and educational. However, the redemptive thrill of being cocreators of some medical miracle must be measured against the possibility that we are rendering fungible that which most profoundly distinguishes us and . . . enabling a commodity exchange in

which important aspects of our identities can then be sold to the highest bidder.

Recently, I attended a science-and-democracy themed conference entitled “Deleterious Me: Whole Genome Sequencing, 23andMe, and the Crowd-Sourced Health Care Revolution,” at which Wojcicki was the featured speaker. The poster for the conference depicted the double helix as a spiral staircase with little Lego-like people climbing upward, ever upward, toward a dark, gloaming heaven, a very effective metaphor for the concerns I have about this entire industry. “DNA” is too often figured in the popular imagination as an inevitably uplifting stairway to heaven, an infallible path to higher truth. This leads to a credulous suspension of both ethics and caution.

In addition, the peculiar locution of Wojcicki’s title, “Deleterious Me,” posits the intimacy of “me” as inherently self-destructive. It’s an odd but effective recasting of mortality as autoimmunity. One’s essence is framed as noxious, diseased, and decaying. Health and health care, by contrast, are positioned on the other side of the colon, located squarely in the geography of crowd-as-source. If the individual is framed as dangerous, lonely, and self-annihilating, its rescue lies in the comfort of crowds, safety in numbers, collective shelter from the HarmfulMe.

There is power in this conjoined set of idealized genetic references: a poignant longing for embodied self-perfection, yet the fear and loathing of assured self-betrayal. There’s something almost Shakespearean about the tension: tremulously human, mythically themed, with just a hint of hovering tragedy. Indeed, the urgencies of our technological revolution beg for philosophizing or negotiation on some theatrical public stage – a Faustian oratorio where narrative and necromancy meet for a solemn duet.

In the 21st century, however, our greatest passion plays are exploited in the realm of private contract rather than public good or participatory democracy, rising to general consciousness only at the level of commercials aired at halftime. So it is that privately held companies like 23andMe can own, store, and resell – to anyone – the most elemental biological markers of individual identity, while marketing themselves as “direct-to-consumer” purveyors of “personal” self-knowledge.

This is more insidious than it might sound initially. Using 23andMe as an example (it is the largest such company in the United States), it is instructive to look at what the enterprise

promises in its advertisements versus what it actually provides. On its website (as of May 21, 2012), the company invites you to order a DNA Spit Kit, the analysis of which will “start your journey” into a world of “endless possibilities.” The results will “help you explore” the past (“Discover your global origins, trace your ancestry, and find living relatives”); learn about your present (“Access over 200 online health and traits reports, including carrier status, drug response and disease risk”); and participate in the future (“Be part of the new genetic discoveries that can benefit us all”).

But the Terms of Service – that is, the contractual provisions to which customers actually agree – are so vague that it is unclear whether the company is really agreeing to provide any more grounded information than what one might find in a horoscope or Ouija board. What is clear, however, is that the company is not really making the bulk of its profit from analyzing spit samples, but rather from the sale and exploitation of data gathered from the collective spittoon, allowing for serious breaches of privacy and broad potentialities for surveillance.

This is hardly a new ethical challenge. When Rebecca Skloot’s book *The Immortal Life of Henrietta Lacks* hit the best-seller list some years ago, there was a brief flash of heightened public awareness of the phenomenon of “bioprospecting.” Lacks was a poor black woman who suffered from a uniquely aggressive form of cervical cancer, to which she succumbed in 1951. Her cancer was rare enough that she became an object of medical study; some of her cervical cells were taken, cultured in a petri dish, and distributed widely for research purposes. It was the first so-called “immortal” human cell line, and has since been the foundation for literally billions of dollars’ worth of medical and pharmaceutical discoveries. But neither Lacks nor her family was informed of the removal of those cells, or the profit derived therefrom. When Skloot located Lacks’s children and grandchildren, she found a family still poor and without health care. Skloot’s exemplary response was to set up the Henrietta Lacks Foundation, a nonprofit that provides emergency health care and medical scholarships to those in need (donations may be made by visiting www.henrietalacksfoundation.org). Lacks’s legacy points to the crux of the problem: if a person’s biological material can be bought, sold, and patented, should not the profits therefrom be shared – at least to some degree – with the person in question, or perhaps pooled as a kind of insurance for common health and welfare?

What of the privacy issues implicated in the buying and selling of intimate genetic data? 23andMe promises to “anonymize” genetic data, and to destroy saliva samples upon request. It helps to know, however, that destroying the actual samples does not mean that the computerized map of information extracted from that sample will be destroyed. Even when a customer attempts to eliminate an account altogether, “[o]ur contracted genotyping laboratory may . . . retain your Genetic Information as required by local law and we may retain backup copies for a limited period of time pursuant to our data protection policies.” What constitutes a “limited period of time” is never defined.

In addition, where 23andMe enters into commercial arrangements, it discloses enough information to “enable partners to provide our Service to their customers and/or to provide you access to their products and services. We will not provide any individual-level Personal Information to these commercial partners without your explicit consent. 23andMe may include your Genetic and/or Self-Reported Information in Aggregated Genetic and Self-Reported Information disclosed to these commercial partners even if you have not given consent for your data to be used in 23andMe Research.”

Notice that there is a distinction made between individual-level “Personal Information” (defined as name, email, address, user ID and password, payment information, etc.) and “Aggregated Genetic and/or Self-Reported Information.” Genetic information means your genotype: the specific chemical map or sequence of your DNA. Self-reported information includes everything about yourself, “including your disease conditions, other health-related information, personal traits, ethnicity, family history, and other information that you enter into surveys, forms, or features while signed in to your 23andMe account.” Finally, aggregated information means information “combined with data from a number of other users sufficient to minimize the possibility of exposing individual-level information while still providing scientific evidence.”

But what happens if individual-level information is exposed despite the company’s metrics for minimizing that possibility? To say nothing of what happens if and when the ability to read this data improves to the point where we no longer need cumbersome details like names and Social Security numbers, but instead can, with ever-increasing accuracy, determine identity by “familial tracking,” or by mapping genetic data onto medical records onto Googled

purchasing histories onto GPS trails onto school records onto criminal databases . . .

It is also interesting to contemplate what will happen to one's data in case of bankruptcy: "In the event that 23andMe goes through a business transition such as a merger, acquisition by another company, or sale of all or a portion of its assets, your Personal Information will likely be among the assets transferred. In such a case, your information would remain subject to the promises made in any preexisting Privacy Statement."

If "any preexisting Privacy Statement" leaves you scratching your head, you need to know that all of the Terms of Service, including the Privacy Statement, are in a kind of constant motion, subject to revision, amendment, or replacement, "effective upon posting at www.23andMe.com." In other words, purchasers are bound by the latest terms of contract that 23andMe dreams up. Don't like that? Then you can choose to "terminate the Agreement at any time," even as 23andMe can just choose to hang onto your data for that "limited" but indeterminate period of time.

Under traditional concepts of contract law, such a radical subversion of any expectation interest whatsoever is arguably grounds for striking down an agreement as "illusory," (meaning that it styles itself as promising something palpable, but in fact contains so many loopholes that it holds the company to nothing at all) as well as contrary to public policy. But in an ultra-libertarian moment haunted by rulings in such cases as *Citizens United*, it seems that judges and CEOs alike are having trouble differentiating between the narrow "choices" of a "customer" and the broad human interests of a citizen.

And so the question looms: is the language of "consumer choice" sufficient to address the ethical quandaries posed by the massive accumulation of population-wide genetic stores taxonomized as privately owned, wealth-producing assets? Does it pose, in crude terms, the same clash of values to be found in the apocryphal sale of Manhattan for baubles and beads – to wit, that indigenous Americans were operating under a so-called gift economy where the use of objects or land was understood as something to be passed back and forth over time (hence the term "Indian giver"), whereas the English settlers were operating under a system that entitled them to erect fences, marking their claims as exclusively proprietary, in perpetuity.

Similarly, one must wonder if the easy expropriation of our DNA, particularly when couched as mere parlor "game"

or spit “party,” can be reconciled with the vast value of that being ceded: the unplumbed, pecuniary wealth and the as-yet unexplored potential for surveillance and discrimination. An individual might well be led to think that his small contribution of spit is a worthless externality to his purchase of a self-revelatory service that is “entertaining” and “fun” (as Wojcicki describes on more than one occasion) while . . . less visibly, 23andMe acquires a pot of gold.

Such a transaction also relegates that spat-out bit of golden code to the private sphere, transforming its – or your? – secrets into someone else’s property. Clothed as contract, it is very hard to reclaim a host of genomic interests that we might otherwise consider beyond proprietary – like medical ethics, class access, scientific research protocols, new identity formations, or protection against fraud.

If the real asset of data ownership is hidden by such terms, the “service” of “connecting” to one’s ancestors or predisposition to certain diseases is ephemeral at best. Despite the romantic lure of deliverance from the “deleterious me,” the fact remains that genetic science is still in its infancy and, for the most part, imprecise. For most medical prognostication, the probabilities assessed by any direct-to-consumer company are little more than guesstimates. Indeed, 23andMe’s disclaimer of warranty and limitation of liability is an eloquent testament to that:

YOU EXPRESSLY ACKNOWLEDGE AND AGREE THAT:
(1) YOUR USE OF THE SERVICES ARE AT YOUR SOLE RISK. THE SERVICES ARE PROVIDED ON AN “AS IS” AND “AS AVAILABLE” BASIS. 23ANDME EXPRESSLY DISCLAIMS ALL WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT. (2) 23ANDME MAKES NO WARRANTY THAT (a) THE SERVICES WILL MEET YOUR REQUIREMENTS; (b) THE SERVICES WILL BE UNINTERRUPTED, TIMELY, UNFAILINGLY SECURE, OR ERROR-FREE; (c) THE RESULTS THAT MAY BE OBTAINED FROM THE USE OF THE SERVICES WILL BE ACCURATE OR RELIABLE; (d) THE QUALITY OF ANY PRODUCTS, SERVICES, INFORMATION, OR OTHER MATERIAL PURCHASED OR OBTAINED BY YOU THROUGH THE SERVICES WILL MEET YOUR EXPECTATIONS AND (e) ANY ERRORS IN THE SOFTWARE WILL BE CORRECTED. (3) ANY MATERIAL DOWNLOADED OR OTHERWISE OBTAINED

THROUGH THE USE OF THE SERVICES IS DONE AT YOUR OWN DISCRETION AND RISK AND THAT YOU WILL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO YOUR COMPUTER SYSTEM OR LOSS OF DATA THAT RESULTS FROM THE DOWNLOAD OF ANY SUCH MATERIAL. (4) NO ADVICE OR INFORMATION, WHETHER ORAL OR WRITTEN, OBTAINED BY YOU FROM 23ANDME OR THROUGH OR FROM THE SERVICES SHALL CREATE ANY WARRANTY NOT EXPRESSLY STATED IN THE TOS. (5) YOU SHOULD ALWAYS USE CAUTION WHEN GIVING OUT ANY PERSONALLY IDENTIFYING INFORMATION ABOUT YOURSELF OR THOSE FOR WHOM YOU HAVE LEGAL AUTHORITY. 23ANDME DOES NOT CONTROL OR ENDORSE ANY ACTIONS RESULTING FROM YOUR PARTICIPATION IN THE SERVICES AND, THEREFORE, 23ANDME SPECIFICALLY DISCLAIMS ANY LIABILITY WITH REGARD TO ANY ACTIONS RESULTING FROM YOUR PARTICIPATION IN THE SERVICES. . . . WITHIN THE LIMITS ALLOWED BY APPLICABLE LAWS, YOU EXPRESSLY ACKNOWLEDGE AND AGREE THAT 23ANDME SHALL NOT BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES, INCLUDING BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFITS, GOODWILL, USE, DATA OR OTHER INTANGIBLE LOSSES (EVEN IF 23ANDME HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES), RESULTING FROM: (a) THE USE OR THE INABILITY TO USE THE SERVICES; (b) ANY ACTION YOU TAKE BASED ON THE INFORMATION YOU RECEIVE IN, THROUGH OR FROM THE SERVICES, (c) YOUR FAILURE TO KEEP YOUR PASSWORD OR ACCOUNT DETAILS SECURE AND CONFIDENTIAL, (d) THE COST OF PROCUREMENT OF SUBSTITUTE GOODS AND SERVICES RESULTING FROM ANY GOODS, DATA, INFORMATION, OR SERVICES PURCHASED OR OBTAINED OR MESSAGES RECEIVED OR TRANSACTIONS ENTERED INTO THROUGH OR FROM THE SERVICES; (e) UNAUTHORIZED ACCESS TO OR ALTERATION OF YOUR TRANSMISSIONS OR DATA; (f) THE IMPROPER AUTHORIZATION FOR THE SERVICES BY SOMEONE CLAIMING SUCH AUTHORITY; or (g) STATEMENTS OR CONDUCT OF ANY THIRD PARTY ON THE SERVICES.

Ultimately, the revolution in genomic technology tests the delicate conceptual and jurisprudential relationship between

the historic sanctity or inalienability of human bodies and the body as product. The discourses of biology and genomics, research and industry, all tend to decenter the individual body in deference to idealized, hypothesized, demographic, and/or normative interests. It is an epistemic problem, and more often than not, the terms of debate are being framed in a way that discourages public engagement or debate, instead narrowing for the sake of efficient economic outcomes.

I hope that 23andMe – and the host of similar data-mining companies – will consider how to channel the wealth yielded from patented discoveries into not-for-profit or low-cost treatment options for all – certainly for their “direct consumers” at the very least. But an informed and evidence-based advocacy rooted in social justice is not likely to come from competitive ownership of information alone in a market based on commercial profit. If there is knowledge-value in aggregating data from as broad a base as possible, then that knowledge must be held accountable to the basic constraints of civil society, such as protection against discrimination and invasion of privacy. By the same token, hoarding and patenting genomic information so as to limit its use to a select group, does not enhance scientific discovery as much as the unhindered, nonproprietary dispensing of solid data through the (increasingly belittled-as-inconvenient) process of peer-reviewed publication, of shared reconsideration, and of corrected republication if necessary.

Any notion of participatory democracy in this emerging arena must be premised on a diversity of voices – and that diversity will require broad access to the debate, not merely to the technology. We seem much too intently focused upon the benefits of aggregating fetishized bits of data from vast pools. It is time we actually engaged the living, speaking subjects who make up the crowd, the sources, and the collectivity of our wisdom.

The Report Of My Death

The death and dying of architecture has often been reported. Victor Hugo used a book to kill it outright, Filippo Marinetti drove it into a ditch, Reyner Banham shoved it into a black box, Bernard Tschumi threw it out a window, Wolf Prix set it on fire. The list of assassinations, defenestrations, immolations, and slow painful poisonings is endless, the catalogue of attempts as personal and perverse as the trophy case hidden deep within a serial killer's refrigerator. The repeated death is in fact modern architecture's way of life, its signature and *élan vital*.

This inventory of death is not to suggest the heroic kamikaze sacrifice of architects doomed for a good cause, nor is it to set up a surprise ending that such deadly reports are exaggerated and architecture is alive and well. Rather, that it is possible to construct an inventory of death reveals that it is now necessary to understand architectural death not as a singular phenomenon but as a repeatable event. And if staging the death of architecture was once a way to perform the difference between life and death, to prop up certain subjects, affects, and causes as worthy of life and to separate them definitively from those unworthy or even worse, death can no longer serve in this category-clarifying capacity. Death as a signature may have once been a sign of architectural life, but death as a repeated spectacle, as a serial production, can neither affirm nor negate.

As exquisite as the notion of the death of death may be, without death there can be no resistance. The threat – and promise – of death has always been necessary to the commitments that form the basis not only of revolutions but also of the very possibility of imagining difference. From the absolute and instantaneous death of Louis XVI of France in 1793 to the less precise and more elongated calls to end art by turning it into life heard during the first decades of the 20th century, resistance and eschatology have been necessarily aligned. Today, however, a cynical system of management has taken over from the urgency of life and death. Living wills, euthanasia protocols, the toxicology of corpse management, and other such threshold-attenuating

systems increasingly serve both as evidence for the erasure of the difference between life and death and as legal means of arguing that the choice between them is false, or at least falsely stated. What could strike Andy Warhol as the repeated specter of death and disaster has become a limbo of undifferentiated paperwork, and buried beneath it is no longer a critical posture but the hapless critic himself, who has been convinced that if the choice between life and death is false, all other such choices must be equally false. In this logic, the avant-garde desire to turn art into life is considered nothing but the flip side of the corporate pursuit of life into capital, just as the one-thing-after-another posture of minimalism has merged into the infinitesimal variations offered by the flea market. The net result is a default bemusement masquerading as a critical position. Without death there is nothing but the critic who wears Prada.

It is time to resuscitate death, and the best way to begin the effort is by putting an end to life, or to the life in and of buildings as it has increasingly come to be staged. Ironically, the most impassioned “life-lovers” are those who assume a traditionally mournful critical posture: professing to resist architecture’s role in spectacle culture, bemoaning the fact that architecture can offer only “intensity,” and hence simulated experience, their goal is to protect buildings from this sad end. But in order to exercise this benevolence, the analogy between the body of the building and the human body must be resurrected because this mythical identity is the only way to make a “real building” stand in as an alibi for an anachronistic attachment to “real life.” A particularly reified version of embodied experience (nostalgically rooted in 1970s phenomenology rather than the exigencies of the current historical moment) is maintained by the mythologizing of the ecological, entropic, mundane life of a building. Assassination as the ultimate tool of resistance has been replaced by many forms of revivification – from contemporary minimalism to preservation aesthetics and the rhetoric of sustainability – and the result is not spectacle architecture but rather building pressed into service as a spectacle of the real.

While there are many examples of this kind of tautology controlling the reception and production of architecture today, the contemporary museum is a particularly useful site for locating its effects. The competition brief for the BMW Guggenheim Lab, to take just one relatively straightforward example, explicitly called for a “non-iconic” architectural

solution to its program, using the brevity of the negative prefix to infect, by innuendo rather than argument, necrosis into image architecture and by contrast, to conjure up some implicitly more robust, more real form of architectural life. The issue here is neither the critique itself (if things are neither dead nor alive it follows that real and fake are moot terms) nor the Atelier Bow-Wow project that won in response to the brief, nor even the socialities catalyzed by the realized Donald Judd-like portable frame, but the structure of the argument itself. Couches as a critique of iconicity, the BMW Guggenheim Lab (the very name constitutes a spectacular branding opportunity) in fact relies on the aura of critique to distract attention from the way in which the project defers iconicity to the Internet, where an endless supply of videos, maps, tourist photographs, tweets, logos, and blogs offers image after image of the lab in use, not in use, about to move, and in motion, thereby producing what should be called a “mood board” for collective action.

Examples of the same syndrome can be seen throughout museum culture’s current fascination with architecture at one-to-one scale. From the ever proliferating pavilionization of architecture to “buildings” constructed in museum parking lots and courtyards, architecture must now apparently be anatomically isomorphic with building in order to merit being shown. It is a strange turn of events whereby the critique of architecture being reduced to mere representation, to nothing but exhibition value, and therefore supposedly eviscerated of its social value or capacity to provide embodied experience, leads to the fetishization of the real – indeed to the spectacularization of the “real.”

A poignant example of this convolution is the Los Angeles County Museum of Art (LACMA), an institution that has a spotty architectural history at best but that, for this very reason, and like much else in California, can be understood as a canary in the mine, the first extreme symptom of a more global condition. At LACMA, the decision has been made to no longer have architectural exhibitions as such because, as the director has explicitly stated, drawings and models are not “real” architecture. Meanwhile, the entire Goldstein Office designed by John Lautner has been excised from the tower in which it was built in 1989, moved in toto to LACMA, not to be “shown,” as this might expose the room as the model it has become, but to be used by the director. Of course, use in a museum is a twisted concept since display *is* the museological program, and “use” in this

instance is mostly a patina to soften the display's understated vulgarity. There has, furthermore, been much talk of the museum seeking to collect mid-century buildings, houses, and such (again to offer useful hospitality rather than useless exhibition), while leaving the buildings in situ and thus invisibly turning the city as a whole into a display. In this admittedly extreme case, real estate speculation and collecting are merging into a single practice operating in accordance with an even higher form of cynicism than, say, the Guggenheim's building ventures, which at least have some notion of being in the service of the collection rather than only constituting it.

So, while there is no "architecture" at LACMA, there is plenty of building. Buildings have even moved right into the galleries. Recently on view was an amputated piece of the Eames House, meticulously moved from the Pacific Palisades, one panel and one pillow at a time. The house appeared as a perfect body, having been painstakingly remade in accordance with an extensive set of documentary photographs, every single molecule "original."¹ The mood was forensic and clinical, although there were no traces of crime. It is unnecessary to rehearse the particular irony of this house-as-still-life, since it is well known that the Eames House was not a home in a conventional sense but explicitly a stage for an unending series of domestic performances, life as lived for Charles's camera and accoutrements always on the move for Ray's compulsive decorating activities. Unlike the various house exhibitions of the early 20th century, from the Esprit Nouveau pavilion to the houses in the courtyard at the Museum of Modern Art – structures that were large models, temporary architectural projects, ideas working hard to become facts – the vector between building and architecture has, with the display of the Eames House, been reversed. A proleptic architectural possibility has been dialed back to the state of obdurate buildinghood.

Making this building "come to life" in the museum divested the project of architectural significance. It further introduced a remarkable virus into the notion of architectural authorship. The Eames name is a veritable cottage industry of value production. Even though many pieces were mass-produced and remain in production, Eames furniture is pursued by collectors all over the globe, as if it was the Holy Grail of hipsters – the leg splint, originally molded against Charles' own limb, is an especially desirable relic. And yet the display of the partial body of the Eames House, as opposed to

1. The loan of the house to LACMA for its "California Design, 1930-1965: 'Living In a Modern Way'" (October 1, 2011 – June 3, 2012), produced under the aegis of The Getty Foundation's Pacific Standard Time exhibition initiative, provided a funding source for the restoration of the house as a whole.

an exhibition about the house, actually eradicated any and all remaining traces of the Eameses' own bodies, of the physical remains of their living in the house. A typical combination of attachment and lack of funds since the death of Ray Eames in 1988 had, in effect, sealed the house like a burial chamber and allowed it to accrue and reveal a thick layer of dust, which was meticulously cleaned as part of the move. But today, in a world where the finality of death has been replaced by the repeated probing of the forensic gaze, we understand that dust to have been literally formed by the bodies of Ray and Charles as they shed their skin during their years of performing life in the house. The exhibition of their house is caught between mourning the loss of all those epitheliums and traces of the Eameses' DNA and of the DNA of everyone who came and participated in their lived performance, and the relief that this coroner's office contains not a single corpse. Death without dying, again.

As in every repetition, it is the small changes that make the difference, and in this version of the death of architecture two things have come to life. First, the museum director/curator has become a primary architectural author, producing work that takes advantage of architecture's expanded field to shield the way in which this particular version of the author's function occludes the difference between an expanded field and real estate, leaving them both free from either critique or resistance. This maneuver often requires a sleight of hand, focusing attention on the spectacle of the real – real building, real experience, real social concern – in order to allow architectural appetites to speculate unchecked. Second, the renewed emphasis on the life of buildings, often symptomatically revealed through the one-to-one scale of pavilions, models as buildings, cities as shows, is making the exigencies of the building industry and profession seem indistinguishable from the shape of an architectural project. The result is to place the field in an attenuated state of limbo where a death scene repeats (pavilions come down or move up the road) but there is nothing at stake. More violence has been done to architecture in the name of preserving the obdurateness of its built life, more violence has been done to the common good in the name of stubborn certainties such as life or death, real or not, than all the damage ever caused by the glare of architectural spectacles in which some have seen the field's immolation. In the name of resistance, it must be repeated that the reports of architecture's death have been inadequately exaggerated.

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