S1 COSMOGONY 2018–2022

E1 CHAOS/ORDER
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S2 ONTOGENY 2022–2026
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PROFESSUR
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HEIZ

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S1

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CHAOS
ORDER

ETHZ

VOLUPTAS S1E1

# CHAOS

# ORDER

**VOLUPTAS**

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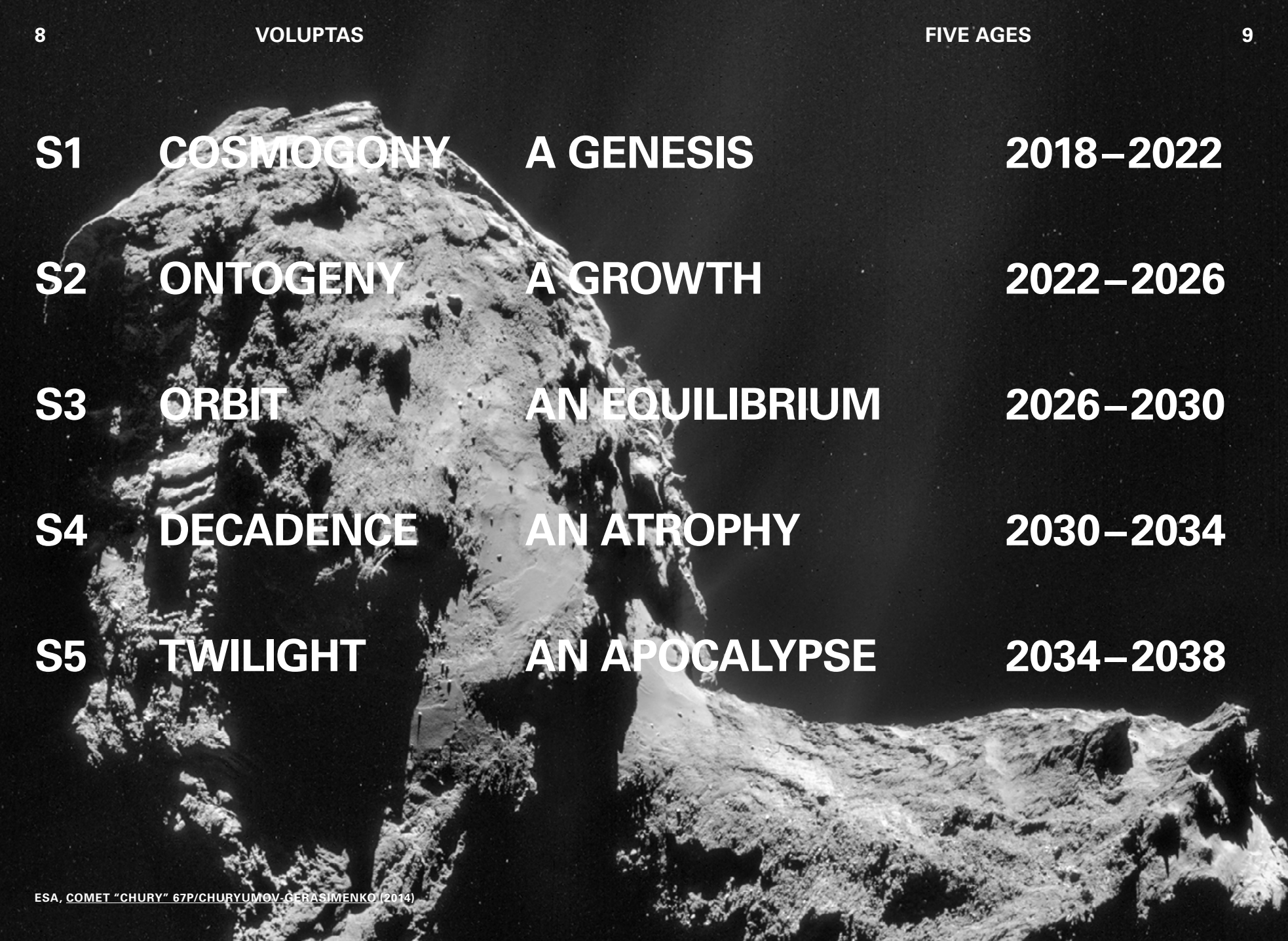
**WILLIAM ADOLPHE BOUGUEREAU, THE NYMPHAEUM (1878)**

Voluptas is the euphoric daughter of its time – the intoxicating offspring of measure and spirit. Amending the millenary Vitruvian ordinances of *firmitas*, *utilitas* and *venustas*, Voluptas initiates a transversal investigation on contemporary issues and sets combinatory dynamics as the channel of proliferating singularities. Its looping trajectory toward a saturation of problem settings aims at the empirical emanation of an alternative view of the urban condition. Enforcing *desire* as its prevalent agent, Voluptas is the elegiac display of residual energy.



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| S1 | COSMOGONY | A GENESIS | 2018–2022 |
| S2 | ONTOGENY | A GROWTH | 2022–2026 |
| S3 | ORBIT | AN EQUILIBRIUM | 2026–2030 |
| S4 | DECADENCE | AN ATROPHY | 2030–2034 |
| S5 | TWILIGHT | AN APOCALYPSE | 2034–2038 |

ESA, COMET "CHURY" 67P/CHURYUMOV-GERASIMENKO (2014)

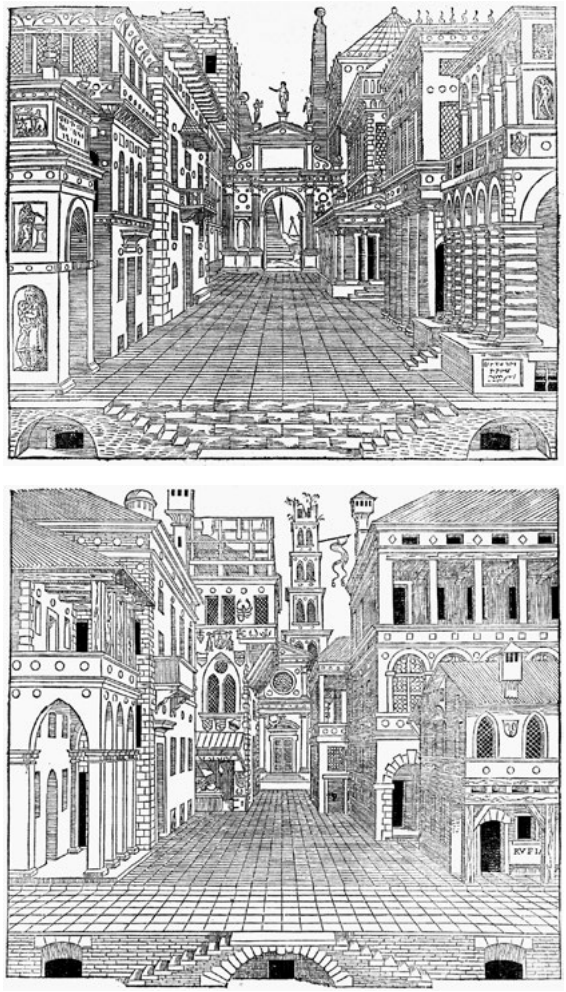

ABRAHAM BOSSE, FRONTISPIECE OF THOMAS HOBBES' LEVIATHAN (1651)



In the chapter XVI of his Leviathan – *Of Persons, Authors and Things Personated* (1651), Thomas Hobbes defines the person as he "whose words and actions are considered, either as his own or as representing the words and actions of another man […]" accordingly delineating two subcategories: that of the natural person – when the words are his own – and that of the artificial person – when these are representing the words and actions of another; he further states: "Of persons artificial, some have their words and actions 'owned' by those whom they represent. And then the person is the 'actor', and he that owns his words and actions is the 'author', in which case the actor acts by authority – but is not the author […]. So that by authority is always understood a right of doing any act, and 'done by authority', done by commission or license from him whose right it is."

The distinction between authorship and actorship expediently polarizes the paramount questions of the content and of the form. The point is not to apply a literary notion to some emulative acceptation of its content, but rather to hypothetically submit a conceptual intendment to its potential adequation in the field of architecture; and as such, Hobbes' axiomatic statement informs us on the condition of the architect, whose authority is fundamentally a licensed and commissioned one.

As a tributary of given programmatic, economic and legal prerequisites and impelled through exogeneous necessities, architecture resolutely assigns its agent to performing a given act in the name and interest of (x): the architect is a political actor.



SEBASTIANO SERLIO, TRAGIC & COMIC SCENERIES (1545)

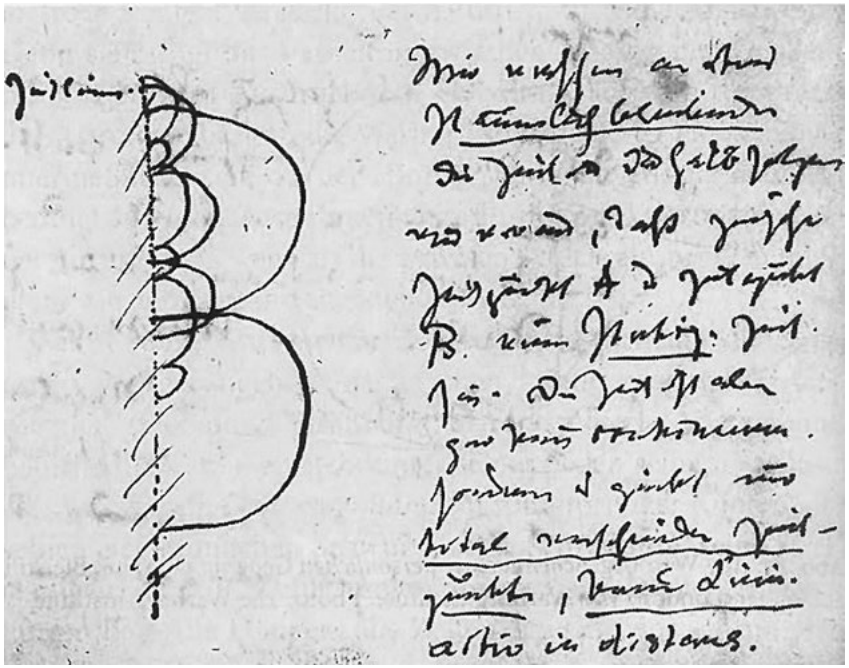


In the second book of Serlio's *Regole Generali di Architettura* (1545), the tragic scenery shows a series of court buildings, war memorials, civil monuments settled along the rigid axis of a central perspective and punctuated by a memorial threshold opening onto an unobstructed vanishing point; rigorously subordinated to the spinal street, the laminary lineup is ordered such as ingresses are staged perpendicular to the street avoiding frontal views of the representative entablatures. Corroborating the prevalence of the public over the private, a pair of outward orientated stairs lead to the set.

The comic stage setting on the other hand displays a turbulent sequence of doorways, storefronts and arcades disjointedly eroding the central political void; no convergence point here, but the richly ornamented porch of a religious shrine as the absolving sign to a collection of artifacts striving for attention. Converging steps to the stage achieve to portrait the manifest surrender of the public realm to the sphere of the intimate.

As a result of the transversal capitalist conformity, of its economical horizon and its inferent indvidualism, the city has long capitulated under the assaults of private interests; the ascendency of the *oikos* over the *polis*, respectively of the *product* over the *process*, has disrated the urban content to a long accumulative array of equivocal signs.

Bowing under the conceited laughs of licentious opportunism and its compulsion for visibility, the contemporary city has deserted the tragedy: comic scenery is now its only stage.



FRIEDRICH NIETZSCHE, DYNAMISCHES SCHEMA DER ZEIT (1873)

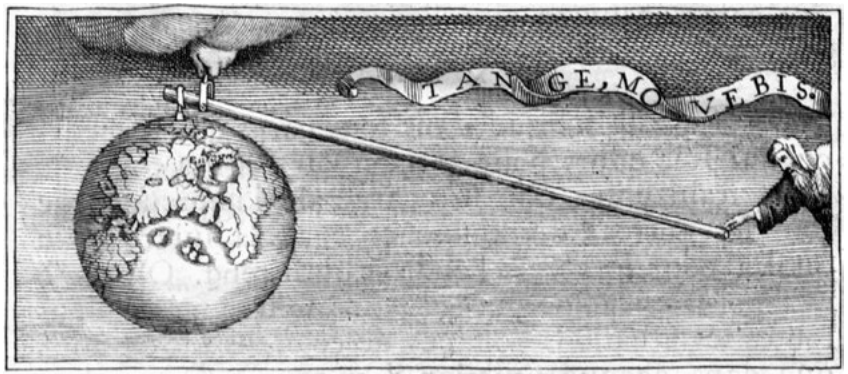
# ORIGINAL/REPERTORIAL 15

A byproduct of the pervasive theatricality of the metropole is its relentless need for the new, therein not only complying with the essence of its outcome, the product – which is to be consumed and therefore ever renewed – but also with the quickly evolving rules of comic features; whereas Aristophanes' rhetorics hardly trigger any hilarity anymore, we are still moved by Antigone's tragic audacity.

By indulging in an often irrelevant alterity, metropolitan actors seem to have made any meaningful difference hardly legible: however legitimate discordances may be, they are bound to the prerequisite of repetition as the dominant marker of singularities.

Derived from the late latin *repertorium* – storehouse – a repertory is the entire assortment of things available in a field or of a kind; inasmuch as the manyfold identities of a repertoire account for its protean expertise – its range so to speak – yet its most essential attribute lies in its availability: a repertory is a potential to be constantly re-activated.

In its search for a dynamic consideration of time, withstanding the contemplative view of collective memory and its sententious unfolding of events, manner advocates for a deflective handling of history, of its canons as much as of its failures, and generates anexact figures – rigorously inexact, that is "inexact by essence and not by accident" – *Gilles Deleuze & Félix Guattari in: Mille Plateaux* (1980). History is a beat.




ARCHIMEDES, LEVERAGE, IN: VARIGNON, PROJET D'UNE NOUVELLE MÉCHANIQUE (1687)



*"Give me a place to stand and I will move the Earth"*: in a time of relentless information where an undiscerning allegiance of the scientific proficency to accumulative datas and a so called 'economy of attention' dictate the legitimacy of a vast majority of decisions, Archimedes' remark quoted by Pappus of Alexandria *(in: Collection or Synagoge, Book VIII, c. AD 340)* suggests an alternative stand; echoing the metaphorical telescopic device of Marcel Proust's *A la recherche du temps perdu*, the admonition invites to deliberately distantiate the observer from its subject to stimulate greater leverage: now set on the fringe of its field of expertise, contemplating the invigorating complexity of phenomenas, the observer records signs of transversal mutations.

As the blessed child of clashing progenitors – economy, environment, society, program, vanity – the condition of architecture not only stifles its product to a paradoxical figure, that of a radical consensus but also confines its agent to an imperative ductility to critically address conflicting demands; yet, the improbable fragmentation of competences and the persistent bias prevalence of *homo faber* over *homo sapiens* have disrated any non-utilitarian determinations to trivial scrutiny.

Driven by exogenous and contradictory requirements and at the converging point of manyfold ruling interests, the architect's expertise is protean by necessity rather than by inclination; aware of the trans-generational nature of the urban environment and accordingly resisting to the most immediate fervours of its time, the architect is the last generalist.

PIPILOTTI RIST, EVER IS OVER ALL (2005)



# TWILIGHT OF THE IDOLS, OR, HOW TO PHILOSOPHIZE WITH THE HAMMER

## FRIEDRICH NIETZSCHE

## 1889

Foreword

It's no small trick to preserve your cheerfulness in the midst of a gloomy matter which is loaded with inordinate responsibility. Yet what could be more necessary than cheerfulness? Nothing goes right unless exuberance plays a part in it. Overabundance of strength is the only proof of strength. A *revaluation of all values*, this question mark so black, so monstrous that it casts a shadow on the one who poses it – such a fateful task forces one to run out into the sun at every moment, to shake off a heavy seriousness that has become all too heavy. Every means is right for this, every "case" is a lucky break. Above all, *war*. War has always been the great cleverness of all spirits who have become too inward, too deep; even wounds can have the power to heal. A saying whose source I withhold from scholarly curiosity has long been my motto:

*increscunt animi, virescit volnere virtus.*

Another way to recover, which under certain circumstances I like even better, is *sounding out idols*… There are more idols than realities in the world: that's *my* "evil eye"

on this world, and my "evil *ear*" too… To pose questions here with a *hammer* for once, and maybe to hear in reply that well-known hollow tone which tells of bloated innards – how delightfull for one who has ears even behind his ears – for me the old psychologist and pied piper, in whose presence precisely what would like to stay quiet *has to speak up*…

This book too – the title gives it away – is above all a recovery, a sunny spot, a sidestep into a psychologist's idleness. Maybe a new war as well? And are new idols sounded out?… This little book is a *great declaration of war*, and as for sounding out idols, this time they are not just idols of the age, but *eternal* idols that are touched here with the hammer as with a tuning fork – there aren't any older idols at all, none more assured, none more inflated… And none more hollow… That doesn't stop them from being the ones that are *believed* in the most – and, especially in the most prominent case, they aren't called idols at all…

*Turin*, September 30, 1888, on the day when the first book of the *Revaluation of All Values* was finished. […]



## "Reason" in Philosophy

[…] 6
You will be thankful to me if I condense such an essential and new insight into four theses: I thus make it easier to understand, and I dare you to contradict it.

*First proposition* The grounds on which "this" world has been called apparent are instead grounds for its reality – *another* kind of reality is absolutely indemonstrable.

*Second proposition* The distinguishing marks which have been given to the "true being" of things are the distinguishing marks of nonbeing, of *nothingness* – the "true world" has been constructed by contradicting the actual world: this "true world" is in fact an apparent world, insofar as it is just a *moral-optical* illusion.

*Third proposition* It makes no sense whatsoever to tell fictional stories about "another" world than this one, as long as the instinct to slander, trivialize, and look down upon life is not powerful within us: in that case, we *revenge* ourselves on life with the phantasmagoria of "another," "better" life.

*Fourth proposition* Dividing the world into a "true" and an "apparent" world, whether in the style of Christianity or in the style of Kant (a *sneaky* Christian to the end), is merely a move inspired by *décadence* – a symptom of *declining* life… The fact that the artist prizes appearance over reality is no objection to this proposition. For "appearance" here means reality *once again*, but in the form of a selection, an emphasis, a correction… Tragic artists are *not* pessimists – in fact, they say *yes* to everything questionable and terrible itself, they are *Dionysian*… […]

## The Four Great Errors

[…] 4

*Error of imaginary causes.* – I'll begin with dreams: a particular sensation, for instance, a sensation due to a distant cannon shot, has a cause imputed to it afterwards (often a whole little novel in which precisely the dreamer is the protagonist). In the meantime, the sensation persists in a kind of resonance: it waits, as it were, until the drive to find causes allows it to come into the foreground – not as an accident anymore, but as "meaning". The cannon shot shows up in a *causal* way, and time seems to flow backwards. What comes later, the motivation, is experienced first, often with a hundred details that flash by like lightning; the shot *follows*… What has happened? The representations *generated* by a certain state of affairs were misunderstood as the cause of this state of affairs. – In fact, we do just the same thing when we're awake. Most of our general feelings – every sort of inhibition, pressure, tension, explosion in the play and counter play of the organs, and in particular the state of the *nervus sympathicus* (sympathetic nervous system) – arouse our drive to find causes: we want to have a *reason* for feeling that we're in *such and such* a state – a bad state or a good state. It's never enough for us just to determine the mere fact *that* we find ourselves in such and such a state: we admit this fact – become *conscious* of it – only *if* we've given it some kind of motivation. – Memory, which comes into play in such cases without our knowing it, calls up earlier states of the same kind, and the causal interpretations that are rooted in them – but *not* their causation. Of course, memory also calls up the belief that the representations, the accompanying occurrences in consciousness, were the causes. In this way there arises a *habituation* to a particular interpretation of causes that actually inhibits and even excludes an *investigation* of the cause.



5

*A psychological explanation of this error.* – Tracing something unfamiliar back to something familiar alleviates us, calms us, pacifies us, and in addition provides a feeling of power. The unfamiliar brings with it danger, unrest, and care – our first instinct is to *do away* with these painful conditions. First principle: some explanation is better than none. Since at bottom all we want is to free ourselves from oppressive representations, we aren't exactly strict about the means of freeing ourselves from them: the first representation that serves to explain the unfamiliar as familiar is so beneficial that we "take it to be true". Proof of *pleasure* ("strength") as criterion of truth. – Thus, the drive to find causes is conditioned and aroused by the feeling of fear. Whenever possible, the "why?" should not so much provide the cause for its own sake, but instead provide a *type of cause* – a relaxing, liberating, alleviating cause. The fact that something already *familiar*, something we have experienced, something inscribed in memory is posited as the cause, is the first consequence of this requirement. The new, the unexperienced, the alien, is excluded as a cause. – So we not only look for some type of explanation as the cause, but we *single out* and *favor* a certain type of explanation, the type that eliminates the feeling of the alien, new, and unexperienced, as fast and as often as possible – the most *customary* explanations. – Consequence: one kind of cause-positing becomes more and more prevalent, concentrates itself into a system, and finally comes to the fore as *dominant*, that is, as simply *excluding* any *other* causes and explanations. – The banker thinks right away about "business", the Christian about "sin", the girl about her love. […]

## What the Germans Are Missing

[…] 6

– In order not to be untrue to my type, which is a *yes-saying* type and deals in contradictions and criticism only indirectly, only unwillingly, I will set forth right away the three tasks for which educators are required. One must learn to *see*, one must learn to *think*, one must learn to *speak* and *write*. The goal of all three tasks is a noble culture. – To learn to *see* – to accustom the eye to composure, to patience, to letting things come to it; to put off judgment, to learn to walk around all sides of the individual case and comprehend it from all sides. That is the *first* preliminary schooling in spirituality: *not* to react to a stimulus right away, but to keep in check the instinct to restrict and exclude. Learning to *see*, as I understand it, is almost what is unphilosophically termed will-power: what is essential here is precisely *not* to "will", to be *able* to put off a decision. All unspirituality, all commonness is based on the inability to resist a stimulus – one *has* to react, one follows every impulse. In many cases, such a compulsion is already sickliness, decline, a symptom of exhaustion – almost everything that unphilosophical coarseness calls vice is simply this physiological inability *not* to react. – A useful application of having learned to see: one will have become, as a *learner* in general, slow, suspicious, and resistant. It will be with a hostile composure that one will let strange *new* things of every sort make their initial approach – one will draw one's hand back from them. Leaving all one's doors open, submissively flopping belly-down before every little fact, a constant readiness to jump in and interfere, to *plunge into* other people and other things, in short, the celebrated "objectivity" of modern times is bad taste, is *ignoble* par excellence. – […]



## Raids of an Untimely Man

[…] 8

*Towards a psychology of the artist* – For there to be art, for there to be any aesthetic activity and observation, one physiological prerequisite is indispensable: *intoxication*. Intoxication must already have heightened the sensitivity of the whole machine: otherwise, no art will be forthcoming. All kinds of intoxication, as different as their causes may be, have this power: above all, the intoxication of sexual excitement, that oldest and most primordial form of intoxication. Likewise, the intoxication that follows all great cravings, all strong emotions; the intoxication of the festival, of the competition, of daredevilry, of victory, of every extreme commotion; the intoxication of cruelty; the intoxication of destruction; intoxication due to certain meteorological influences, such as the intoxication of spring; or under the influence of narcotics; finally, the intoxication of the will, the intoxication of an overloaded and swollen will. – What is essential in intoxication is the feeling of increased strength and fullness. This feeling leads us to donate to things, to *make* them take from us, to force ourselves on them – this process is called *idealizing*. Let's get rid of a prejudice at this point: idealizing does *not* consist, as is commonly thought, in taking away or subtracting what is small and incidental. Instead, what is decisive is an immense drive to *bring out* the principal traits, so that the others disappear in the process. […]

RICHARD LINDNER, BOY WITH MACHINE (1954)



# GILLES DELEUZE
# FÉLIX GUATTARI

# 1972

## Desiring Machines

To a certain degree, the traditional logic of desire is all wrong from the very outset: from the very first step that the Platonic logic of desire forces us to take, making us choose between production and acquisition. From the moment that we place desire on the side of acquisition, we make desire an idealistic (dialectical, nihilistic) conception, which causes us to look upon it as primarily a lack: a lack of an object, a lack of the real object. It is true that the other side, the "production" side, has not been entirely ignored. Kant, for instance, must be credited with effecting a critical revolution as regards the theory of desire, by attributing to it "the faculty of being, through its representations, the cause of the reality of the objects of these representations." But it is not by chance that Kant chooses superstitious beliefs, hallucinations, and fantasies as illustrations of this definition of desire: as Kant would have it, we are well aware that the real object can be produced only by an external causality and external mechanisms; nonetheless this knowledge does not prevent us from believing in the intrinsic power of desire to create its own object – if only in an unreal, hallucinatory, or delirious form – or from representing this causality as stemming from within desire itself. The reality of the object, insofar as it is produced by desire, is thus a psychic reality. Hence it can be said that Kant's critical revolution changes

nothing essential: this way of conceiving of productivity does not question the validity of the classical conception of desire as a lack; rather, it uses this conception as a support and a buttress, and merely examines its implications more carefully. In point of fact, if desire is the lack of the real object, its very nature as a real entity depends upon an "essence of lack" that produces the fantasized object. Desire thus conceived of as production, though merely the production of fantasies, has been explained perfectly by psychoanalysis. On the very lowest level of interpretation, this means that the real object that desire lacks is related to an extrinsic natural or social production, whereas desire intrinsically produces an imaginary object that functions as a double of reality, as though there were a "dreamed-of object behind every real object," or a mental production behind all real productions. This conception does not necessarily compel psychoanalysis to engage in a study of gadgets and markets, in the form of an utterly dreary and dull psychoanalysis of the object: psychoanalytic studies of packages of noodles, cars, or "thingumajigs." But even when the fantasy is interpreted in depth, not simply as an object, but as a specific machine that brings desire itself front and center, this machine is merely theatrical, and the complementarity of what it sets apart still remains: it is now need that is defined in terms of a relative lack and determined by its own object, whereas desire is regarded as what produces the fantasy and produces itself by detaching itself from the object, though at the same time it intensifies the lack by making it absolute: an "incurable insufficiency of being," an "inability-to-be that is life itself." Hence the presentation of desire as something supported by needs, while these needs, and their relationship to the object as something that is lacking or missing, continue to be the basis of the productivity of desire (theory of an



underlying support). In a word, when the theoretician reduces desiring-production to a production of fantasy, he is content to exploit to the fullest the idealist principle that defines desire as a lack, rather than a process of production, of "industrial" production. Clement Rosset puts it very well: every time the emphasis is put on a lack that desire supposedly suffers from as a way of defining its object, "the world acquires as its double some other sort of world, in accordance with the following line of argument: there is an object that desire feels the lack of; hence the world does not contain each and every object that exists; there is at least one object missing, the one that desire feels the lack of; hence there exists some other place that contains the key to desire (missing in this world)."

If desire produces, its product is real. If desire is productive, it can be productive only in the real world and can produce only reality. Desire is the set of passive syntheses that engineer partial objects, flows, and bodies, and that function as units of production. The real is the end product, the result of the passive syntheses of desire as autoproduction of the unconscious. Desire does not lack anything; it does not lack its object. It is, rather, the subject that is missing in desire, or desire that lacks a fixed subject; there is no fixed subject unless there is repression. Desire and its object are one and the same thing: the machine, as a machine of a machine. Desire is a machine, and the object of desire is another machine connected to it. Hence the product is something removed or deducted from the process of producing: between the act of producing and the product, something becomes detached, thus giving the vagabond, nomad subject a residuum. The objective being of desire is the Real in and of itself. There is no particular form of existence that can be labeled "psychic reality." As Marx notes, what exists in fact is not lack, but passion, as a "natural and

sensuous object." Desire is not bolstered by needs, but rather the contrary; needs are derived from desire: they are counter products within the real that desire produces. Lack is a countereffect of desire; it is deposited, distributed, vacuolized within a real that is natural and social. Desire always remains in close touch with the conditions of objective existence; it embraces them and follows them, shifts when they shift, and does not outlive them. For that reason, it so often becomes the desire to die, whereas need is a measure of the withdrawal of a subject that has lost its desire at the same time that it loses the passive syntheses of these conditions. This is precisely the significance of need as a search in a void: hunting about, trying to capture or become a parasite of passive syntheses in whatever vague world they may happen to exist in. It is no use saying: We are not green plants; we have long since been unable to synthesize chlorophyll, so it's necessary to eat… Desire then becomes this abject fear of lacking something. But it should be noted that this is not a phrase uttered by the poor or the dispossessed. On the contrary, such people know that they are close to grass, almost akin to it, and that desire "needs" very few things – not those leftovers that chance to come their way, but the very things that are continually taken from them – and that what is missing is not things a subject feels the lack of somewhere deep down inside himself, but rather the objectivity of man, the objective being of man, for whom to desire is to produce, to produce within the realm of the real. The real is not impossible; on the contrary, within the real everything is possible, everything becomes possible. Desire does not express a molar lack within the subject; rather, the molar organization deprives desire of its objective being. Revolutionaries, artists, and seers are content to be objective, merely objective: they know that desire clasps life in its powerfully productive embrace and reproduces it



in a way that is all the more intense because it has few needs. And never mind those who believe that this is very easy to say, or that it is the sort of idea to be found in books. "From the little reading I had done I had observed that the men who were most in life, who were molding life, who were life itself, ate little, slept little, owned little or nothing. They had no illusions about duty, or the perpetuation of their kith and kin, or the preservation of the State… The phantasmal world is the world which has never been fully conquered over. It is the world of the past, never of the future. To move forward clinging to the past is like dragging a ball and chain." The true visionary is a Spinoza in the garb of a Neapolitan revolutionary. We know very well where lack – and its subjective correlative – come from. Lack (*manque*) is created, planned, and organized in and through social production. It is counter produced as a result of the pressure of antiproduction; the latter falls back on (*se rabat sur*) the forces of production and appropriates them. It is never primary; production is never organized on the basis of a pre-existing need or lack (*manque*). It is lack that infiltrates itself, creates empty spaces or vacuoles, and propagates itself in accordance with the organization of an already existing organization of production. The deliberate creation of lack as a function of market economy is the art of a dominant class. This involves deliberately organizing wants and needs (*manque*) amid an abundance of production; making all of desire teeter and fall victim to the great fear of not having one's needs satisfied; and making the object dependent upon a real production that is supposedly exterior to desire (the demands of rationality), while at the same time the production of desire is categorized as fantasy and nothing but fantasy.

EGYPTIAN HIEROGLYPHICS (3000 BC)



# THE ELECTRONIC REVOLUTION

# WILLIAM S. BURROUGHS

# 1970

[…] The *is of identity*. You are an animal. You are a body. Now whatever you may be you are not an *animal*, you are not a *body*, because these are verbal labels. The *is* of identity always carries the assignment of permanent condition. To stay that way. All name calling presupposes the *is* of identity. This concept is unnecessary in a hieroglyphic language like ancient Egyptian and in fact frequently omitted. No need to say that the sun *is* in the sky, sun in sky suffices. The verb *to be* can easily be omitted from any languages and the followers of Count Korzybski have done this, eliminating the verb *to be* in English. However, it is difficult to tidy up the English language by arbitrary exclusion of concepts which remain in force so long as the unchanged language is spoken.

The *definite article the*. *The* contains the implication of one and only: *the* God, *the* universe, *the* way, *the* right, *the* wrong; if there is another, then *that* universe, *that* way is no longer *the* universe, *the* way. The definite article *the* will be deleted and the indefinite article *a* will take its place.

The whole concept of *either/or*. Right or wrong, physical or mental, true or false, the whole concept of *or* will be deleted from the language and replaced by juxtaposition, by *and*. This is done to some extent in any pictorial language where two concepts stand literally side by side. These falsifications inherent in the English and other western alphabetical languages given the reactive mind commands their overwhelming force in these languages.

Consider the *is* of identity. When I say to be me, to be you, to be myself, to be others – whatever I may be called upon to be or to say that I am – I am not the verbal label *myself*. The word *be* in the English language contains, as a virus contains, its precoded message of damage, the categorical imperative of permanent condition. To be a body, to be an animal. If you see the relation of a pilot to his ship, you see crippling forces of the reactive mind command to be a body. Tell the pilot to be the plane, then who will pilot the plane?

The *is* of identity, assigning a rigid and permanent status was greatly reinforced by the customs and passport control that came in after World War I. Whatever you may be, you are not the verbal labels in your passport any more than you are the word *self*. So you must be prepared to prove at all times that you are what you are not. Much of the falsification inherent in the categorical definite *the*: *the* now, *the* past, *the* time, *the* space, *the* energy, *the* matter, *the* universe. The definite article *the* contains the implications of no other. *The* universe locks you in *the* and denies the possibility of any other. If other universes are possible, then the universe is no longer *the*; it becomes *a*. The definite article *the* is deleted and replaced by *a*. Many of the RM commands are in point of fact contradictory commands and a contradictory command gains its force from the Aristotelian concept of *either/or*. To do everything, to do nothing, to have everything, to have nothing, to do it all, to do not any, to stay up, to stay down, to stay in, to stay out, to stay present, to stay absent. These are in point of fact *either/or* propositions. To do nothing *or* everything, to have it all, *or* not any, to stay present *or* to stay absent. *Either/or* is more difficult to formulate in a written language where both alternatives are pictorially represented and can be deleted entirely from the spoken



language. The whole reactive mind can be in fact reduced to three little words – to be *the*. That is to be what you are not, verbal formulations.

I have frequently spoken of word and image as viruses or as acting as viruses and this is not an allegorical comparison. It will be seen that the falsifications of syllabic western languages are in point of fact actual virus mechanisms. The *is* of identity, the purpose of a virus is to *survive*. To survive at any expense to the host invaded. To be an animal, to be a body. To be an animal body that the virus can invade. To be animals, to be bodies. To be more animal bodies, so that the virus can move from one body to another. To stay present as an animal body, to stay absent as antibody or resistance to the body invasion.

The categorical *the* is also a virus mechanism, locking you in *the* virus universe. *Either/or* is another virus formula. It is always you *or* the virus. *Either/or*. This is in point of fact the conflict formula which is seen to be an archetypical virus mechanism. The proposed language will delete these virus mechanisms and make them impossible of formulation in the language. This language will be a tonal language like Chinese, it will also have a hieroglyphic script as pictorial as possible without being too cumbersome or difficult to write. The language will give one option of silence. When not talking, the user of this language can take in the silent images of the written, pictorial and symbol languages.

I have described here a number of weapons and tactics in the war game. Weapons that change consciousness could call the war game in question. All games are hostile. Basically there is only one game from here to eternity. Mr. Hubbard says that scientology is a game where everybody wins. There are no games where everybody wins. That's what games are all about, winning and

losing… The Versailles Treaty… Hitler the occupation Jig… War criminals hang at Nuremberg… It is a rule of this game that there can be no final victory since this means the end of the war game. Yet every player must believe in final victory and strive for it with all his power. Face by the nightmare of the final defeat, he has no alternative. So, all technologies with escalating efficiency produce more and more total weapons until we have the atom bomb which could end the game by destroying all players. Now mock up a miracle. The so stupid players decide to save the game. They sit down around a big table and draw up a plan for the immediate deactivation and eventual destruction of all atomic weapons. Why stop there? Conventional bombs are unnecessarily destructive if nobody has them, hein? Let's turn back the war clock to 1917:

> Keep the home fires burning
> Through the hearts are yearning
> There's a long, long trail winding…
> Back to the American Civil War…

"*He has loosed the fatal lightning of this terrible swift sword*". His fatal lightning didn't cost as much in those days. Save a lot on the defense budget this way on, back to flintlocks, matchlocks, swords, armors, lances, bows and arrows, spears, stone axes and clubs. Why stop there? Why not grow teeth and claws, poison fangs, stingers, spines, quills, beaks and suckers and stink glands and fight in out in the muck hein?

That is what this revolution is about. End of game. New games? There are no new games from here to eternity. *End of the war game.*

CHRIS MARKER, LA JETÉE (1962)



# REM KOOLHAAS

# 1978

## Europeans: Biuer!
## Dalì and Le Corbusier conquer New York

[...] Method

"I believe that the moment is at hand when by a paranoid and active advance of the mind, it will be possible to systematize confusion and thus help to discredit completely the world of reality":[3] in the late twenties Salvador Dalì injects his Paranoid Critical Method into the bloodstream of Surrealism.

"It was in 1929 that Salvador Dali turned his attention to the internal mechanism of paranoid phenomena, envisaging the possibility of an experimental method based on the power that dominates the systematic associations peculiar to paranoia; subsequently this method was to become the frenzied critical synthesis that bears the name of 'paranoid critical activity.'"

The motto of the Paranoid-Critical Method (PCM) IS "*The Conquest of the Irrational*."

Instead of the passive and deliberately uncritical surrender to the subconscious of the early Surrealist automatisms in Writing, painting, sculpture, Dalì proposes a second-phase Surrealism: the conscious exploitation of the unconscious through the PCM.

The PCM is defined by Dalì mostly in tantalizing formulas: "the spontaneous method of irrational knowledge based on the critical and systematic objectifications of delirious associations and interpretations...".[4]

It is easiest to explain the PCM by describing its exact opposite.

In the sixties two American behaviorists – Ayllon and Azrin – invent a "reinforcement therapy" which they call *Token Economy*. Through the generous distribution of colored plastic tokens, inmates of a particular insane asylum are encouraged to behave like normal people whenever possible.

The two experimenters "posted a list of desired behaviors on the wall and then gave bonus points (tokens) to those patients who made their beds, swept their rooms, worked in the kitchen, etc. These tokens were redeemable for canteen items or for amenities such as a color TV, staying up later at night or a private room. These incentives proved very effective in motivating the patients to look after themselves and take care of the ward."[5]

The hope that underlies such therapy is that, sooner or later, such systematic simulation of normality will turn into real normality, that the sick mind will insinuate itself successfully into some form of sanity like a hermit crab into an empty shell.

1 Salvador Dalí, "New York Salutes Me!", *Spain*, May 23, 1941 2 Le Corbusier, as quoted in *New York Herald Tribune*, October 22, 1935 3 Salvador Dalí, *La femme visible* (Paris: Editions Surréalistes, 1930) 4 Salvador Dalí, "The Conquest of the irrational", appendix of *Conversations with Dalí* (New York: Dutton, 1969), p.115 5 This "theory" was actually put into practice, as described in Robert Sommer, *The End of Imprisonment* (New York: Oxford University Press, 1976), p. 127

CHRIS MARKER, LA JETÉE (1962)



# ESSAYS CRITICAL AND CLINICAL

# GILLES DELEUZE

# 1997

## Bartleby; or, the Formula

*The Confidence-Man* (much as one says the Medicine-Man) is sprinkled with Melville's reflections on the novel. The first of these reflections consists in claiming the rights of a superior irrationalism. Why should the novelist believe he is obligated to explain the behaviors of his characters, and to supply them with reasons, whereas life for its part never explains anything and leaves in its creatures so many indeterminate, obscure, indiscernible zones that defy any attempt at clarification? It is life that justifies; it has no need of being justified. The English novel, and even more so the French novel, feels the need to rationalize, even if only in the final pages, and psychology is no doubt the last form of rationalism; the Western reader awaits the final word. In this regard, psychoanalysis has revived the claims of reason. […] The founding act of the American novel, like that of the Russian novel, was to take the novel far from the order of reasons, and to give birth to characters who exist in nothingness, survive only in the void, defy logic and psychology and keep their mystery until the end. Even their soul, says Melville, is "an immense and terrifying void", and Ahab's body is an "empty shell". If they have a formula, it is certainly not explanatory. *I prefer not to* remains just as much a cabalistic formula as that of the Underground Man, who cannot keep two and two from making four, but who will not *resign* himself to it either (*he prefers that two and two not make four*). What counts for a great novelist – Melville,

Dostoyevsky, Kafka, or Musil – is that things remain enigmatic yet nonarbitrary: in short, a new logic, definitely a logic, but one that grasps the innermost depths of life and death without leading us back to reason. The novelist has the eye of a prophet, not the gaze of a psychologist. For Melville, the three great categories of characters belong to this new logic, just as much as this logic belongs to them. Once it has reached that sought-after zone, the hyperborean zone, far from the temperate regions, the novel, like life, needs no justification. And in truth, there is no such thing as reason; it exists only in bits and pieces. In *Billy Budd*, Melville defines monomaniacs as the Masters of reason, which is why they are so difficult to surprise; but this is because theirs is a delirium of action, because they make use of reason, make it serve their own sovereign ends, which in truth are highly unreasonable. Hypochondriacs are the Outcasts of reason, without us being able to know if they have excluded themselves from it in order to obtain something reason cannot give them – the indiscernible, the unnameable with which they will be able to merge. In the end, even prophets are only the Castaways of reason: if Vere, Ishmael, or the attorney clings so tightly to the debris of reason, whose integrity they try so hard to restore, it is because they have *seen* so much, and because what they have seen has marked them forever.

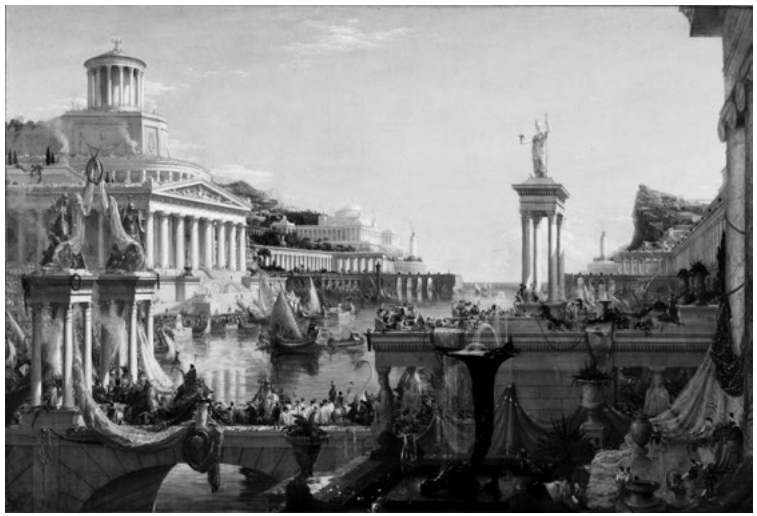
But a second remark by Melville introduces an essential distinction between the characters in a novel, Melville says that we must above all avoid confusing true Originals with characters that are simply remarkable or singular, particular. This is because the particulars, who tend to be quite populous in a novel, have characteristics that determine their form, properties that make up their image; they are influenced by their milieu and by each other, so that their actions and reactions are governed by general laws, though in each case they retain a particular



value. Similarly, the sentences they utter are their own, but they are nonetheless governed by the general laws of language. By contrast, we do not even know if an original exists in an absolute sense, apart from the primordial God, and it is really something extraordinary when we encounter one. Melville admits that it is difficult to imagine how a novel might include several of them. Each original is a powerful, solitary Figure that exceeds any explicable form: it projects flamboyant traits of expression that mark the stubbornness of a thought without image, a question without response, an extreme and nonrational logic. Figures of life and knowledge, they know something inexpressible, live something unfathomable. They have nothing general about them, and are not particular – they escape knowledge, defy psychology. Even the words they utter surpass the general laws of language (presuppositions) as well as the simple particularities of speech, since they are like the vestiges or projections of a unique, original language. (*langue*), and bring all of language (*langage*) to the limit of silence and music. There is nothing particular or general about Bartleby: he is an Original.

Originals are beings of Primary Nature, but they are inseparable from the world or from secondary nature, where they exert their effect: they reveal its emptiness, the imperfection of its laws, the mediocrity of particular creatures… the world as masquerade (this is what Musil, for his part, will call "parallel action"). The role of prophets, who are not originals, is to be the only ones who can recognize the wake that originals leave in the world, and the unspeakable confusion and trouble they cause in it. The original, says Melville, is not subject to the influence of his milieu; on the contrary, he throws a livid white light on his surroundings, much like the light that "accompanies the beginning of things in Genesis".

# CHAOS/ORDER 53



THOMAS COLE, THE COURSE OF THE EMPIRE: THE SAVAGE STATE, THE CONSUMATION (1836)



# UNKNOWN

# 2100 BC

## Gilgamesh King In Uruk

I will proclaim to the world the deeds of Gilgamesh. This was the man to whom all things were known; this was the king who knew the countries of the world. He was wise, he saw mysteries and knew secret things, he brought us a tale of the days before the flood. He went on a long journey, was weary, worn-out with labour, returning he rested, he engraved on a stone the whole story. When the gods created Gilgamesh they gave him a perfect body. Shamash the glorious sun endowed him with beauty, Adad the god of the storm endowed him with courage, the great gods made his beauty perfect, surpassing all others, terrifying like a great wild bull. Two thirds they made him god and one third man.

In Uruk he built walls, a great rampart, and the temple of blessed Eanna for the god of the firmament Anu, and for Ishtar the goddess of love. Look at it still today: the outer wall where the cornice runs, it shines with the brilliance of copper; and the inner wall, it has no equal. Touch the threshold, it is ancient. Approach Eanna the dwelling of Ishtar, our lady of love and war, the like of which no latter-day king, no man alive can equal. Climb upon the wall of Uruk; walk along it, I say; regard the foundation terrace and examine the masonry: is it not burnt brick and good? The seven sages laid the foundations.

## The Coming Of Enkidu

Gilgamesh went abroad in the world, but he met with none who could withstand his arms till he came to Uruk. But the men of Uruk muttered in their houses, "Gilgamesh sounds the tocsin for his amusement, his arrogance has no bounds by day or night. No son is left with his father, for Gilgamesh takes them all, even the children; yet the king should be a shepherd to his people. His lust leaves no virgin to her lover, neither the warrior's daughter nor the wife of the noble; yet this is the shepherd of the city, wise, comely, and resolute." The gods heard their lament, the gods of heaven cried to the Lord of Uruk, to Anu the god of Uruk: "A goddess made him, strong as a savage bull, none can withstand his arms. No son is left with his father, for Gilgamesh takes them all; and is this the king, the shepherd of his people? His lust leaves no virgin to her lover, neither the warrior's daughter nor the wife of the noble." When Anu had heard their lamentation the gods cried to Aruru, the goddess of creation, "You made him, O Aruru, now create his equal; let it be as like him as his own reflection, his second self, stormy heart for stormy heart. Let them contend together and leave Uruk in quiet."

So the goddess conceived an image in her mind, and it was of the stuff of Anu of the firmament. She dipped her hands in water and pinched off clay, she let it fall in the wilderness, and noble Enkidu was created. There was virtue in him of the god of war, of Ninurta himself. His body was rough, he had long hair like a woman's; it waved like the hair of Nisaba, the goddess of corn. His body was covered with matted hair like Samuqan's, the god of cattle. He was innocent of mankind; he knew nothing of the cultivated land.



Enkidu ate grass in the hills with the gazelle and lurked with wild beasts at the water-holes; he had joy of the water with the herds of wild game. But there was a trapper who met him one day face to face at the drinking-hole, for the wild game had entered his territory. On three days he met him face to face, and the trapper was frozen with fear. He went back to his house with the game that he had caught, and he was dumb, benumbed with terror. His face was altered like that of one who has made a long journey. With awe in his heart he spoke to his father: "Father, there is a man, unlike any other, who comes down from the hills. He is the strongest in the world, he is like an immortal from heaven. He ranges over the hills with wild beasts and eats grass; he ranges through your land and comes down to the wells. I am afraid and dare not go near him. He fills in the pits which I dig and tears up my traps set for the game; he helps the beasts to escape and now they slip through my fingers." His father opened his mouth and said to the trapper, "My son in Uruk lives Gilgamesh; no one has ever prevailed against him, he is strong as a star from heaven. Go to Uruk, find Gilgamesh, extol the strength of this wild man. Ask him to give you a harlot, a wanton from the temple of love; return with her and let her woman's power overpower this man. When next he comes down to drink at the wells she will be there, stripped naked; and when he sees her beckoning he will embrace her, and then the wild beasts will reject him."

So the trapper set out on his journey to Uruk and addressed himself to Gilgamesh saying, "A man unlike any other is roaming now in the pastures; he is as strong as a star from heaven and I am afraid to approach him. He helps the wild game to escape; he fills in my pits and pulls up my traps." Gilgamesh said, "Trapper, go back, take with you a harlot, a child of pleasure. At the drinking-hole she

will strip, and when he sees her beckoning he will embrace her and the game of the wilderness will surely reject him. "Now the trapper returned, taking the harlot with him. After a three days' journey they came to the drinking-hole, and there they sat down; the harlot and the trapper sat facing one another and waited for the game to come. For the first day and for the second day the two sat waiting, but on the third day the herds came; they came down to drink and Enkidu was with them. The small wild creatures of the plains were glad of the water, and Enkidu with them, who ate grass with the gazelle and was born in the hills; and she saw him, the savage man, come from far-off in the hills. The trapper spoke to her: "There he is. Now, woman, make your breasts bare, have no shame, do not delay but welcome his love. Let him see you naked, let him possess your body. When he comes near uncover yourself and lie with him; teach him, the savage man, your woman's art, for when he murmurs love to you the wild beasts that shared his life in the hills will reject him." She was not ashamed to take him, she made herself naked and welcomed his eagerness; as he lay on her murmuring love she taught him the woman's art. For six days and seven nights they lay together, for Enkidu had forgotten his home in the hills; but when he was satisfied he went back to the wild beasts. Then, when the gazelle saw him, they bolted away; when the wild creatures saw him they fled. Enkidu would have followed, but his body was bound as though with a cord, his knees gave way when he started to run, his swiftness was gone. And now the wild creatures had all fled away; Enkidu was grown weak, for wisdom was in him, and the thoughts of a man were in his heart. So he returned and sat down at the woman's feet, and listened intently to what she said. "You are wise, Enkidu, and now you have become like a god. Why do you want to run wild with the



beasts in the hills? Come with me. I will take you to strong-walled Uruk, to the blessed temple of Ishtar and of Anu, of love and of heaven: there Gilgamesh lives, who is very strong, and like a wild bull he lords it over men."

When she had spoken Enkidu was pleased; he longed for a comrade, for one who would understand his heart. "Come, woman, and take me to that holy temple, to the house of Anu and of Ishtar, and to the place where Gilgamesh lords it over the people. I will challenge him boldly, I will cry out aloud in Uruk, "I am the strongest here, I have come to change the old order, I am he who was born in the hills, I am he who is strongest of all."

She said, "Let us go, and let him see your face. I know very well where Gilgamesh is in great Uruk. O Enkidu, there all the people are dressed in their gorgeous robes, every day is holiday, the young men and the girls are wonderful to see. How sweet they smell! All the great ones are roused from their beds. O Enkidu, you who love life, I will show you Gilgamesh, a man of many moods; you shall look at him well in his radiant manhood. His body is perfect in strength and maturity; he never rests by night or day. He is stronger than you, so leave your boasting. Shamash the glorious sun has given favours to Gilgamesh, and Anu of the heavens, and Enlil, and Ea the wise has given him deep understanding. I tell you, even before you have left the wilderness, Gilgamesh will know in his dreams that you are coming." […]

He was merry living with the shepherds, till one day lifting his eyes he saw a man approaching. He said to the harlot, "Woman, fetch that man here. Why has he come? I wish to know his name." She went and called the man saying, "Sir, where are you going on this weary journey? The man answered, saying to Enkidu, "Gilgamesh has gone into the

marriage-house and shut out the people. He does strange things in Uruk, the city of great streets. At the roll of the drum work begins for the men, and work for the women. Gilgamesh the king is about to celebrate marriage with the Queen of Love, and he still demands to be first with the bride, the king to be first and the husband to follow, for that was ordained by the gods from his birth, from the time the umbilical cord was cut. But now the drums roll for the choice of the bride and the city groans." At these words Enkidu turned white in the face. "I will go to the place where Gilgamesh lords it over the people, I will challenge him boldly, and I will cry aloud in Uruk, 'I have come to change the old order, for I am the strongest here.'" Now Enkidu strode in front and the woman followed behind. He entered Uruk, that great market, and all the folk thronged round him where he stood in the street in strong-walled Uruk. The people jostled; speaking of him they said, "He is the spit of Gilgamesh." "He is shorter." "He is bigger of bone." "This is the one who was reared on the milk of wild beasts. His is the greatest strength." The men rejoiced: "Now Gilgamesh has met his match. This great one, this hero whose beauty is like a god, he is a match even for Gilgamesh."

In Uruk the bridal bed was made, fit for the goddess of love. The bride waited for the bridegroom, but in the night Gilgamesh got up and came to the house. Then Enkidu stepped out, he stood in the street and blocked the way. Mighty Gilgamesh came on and Enkidu met him at the gate. He put out his foot and prevented Gilgamesh from entering the house, so they grappled, holding each other like bulls. They broke the doorposts and the walls shook, they snorted like bulls locked together. They shattered the doorposts and the walls shook. Gilgamesh bent his knee with his foot planted on the ground and with a



turn Enkidu was thrown. Then immediately his fury died. When Enkidu was thrown he said to Gilgamesh, "There is not another like you in the world. Ninsun, who is as strong as a wild ox in the byre, she was the mother who bore you, and now you are raised above all men, and Enlil has given you the kingship, for your strength surpasses the strength of men." So Enkidu and Gilgamesh embraced and their friendship was sealed.

JAKOB JORDAENS, THE INFANCY OF ZEUS (1630)

# THEOGONY
# HESIOD
# 700 BC CA.



Hail, children of Zeus! Grant lovely song and celebrate the holy race of the deathless gods who are for ever, those that were born of Earth and starry Heaven and gloomy Night and them that briny Sea did rear. Tell how at the first gods and earth came to be, and rivers, and the boundless sea with its raging swell, and the gleaming stars, and the wide heaven above, and the gods who were born of them, givers of good things, and how they divided their wealth, and how they shared their honors amongst them, and also how at the first they took many-folded Olympus. These things declare to me from the beginning, you Muses who dwell in the house of Olympus, and tell me which of them first came to be. In truth at first Chaos came to be, but next wide-bosomed Earth, the ever-sure foundation of all[1] the deathless ones who hold the peaks of snowy Olympus, and dim Tartarus in the depth of the wide-pathed Earth, and Eros (Love), fairest among the deathless gods, who unnerves the limbs and overcomes the mind and wise counsels of all gods and all men within them. From Chaos came forth Erebus and black Night; but of Night were born Aether[2] and Day, whom she conceived and bore from union in love with Erebus. And Earth first bore starry Heaven, equal to herself, to cover her on every side, and to be an ever-sure abiding-place for the blessed gods. And she brought forth long hills, graceful haunts of the goddess Nymphs who dwell amongst the glens of the hills. She bore also the fruitless deep with his raging swell, Pontus, without sweet union of love. But afterwards she lay with Heaven and bore deep-swirling

Oceanus, Coeus and Crius and Hyperion and Iapetus, Theia and Rhea, Themis and Mnemosyne and gold-crowned Phoebe and lovely Tethys. After them was born Cronos the wily, youngest and most terrible of her children, and he hated his lusty sire.

And again, she bore the Cyclopes, overbearing in spirit, Brontes, and Steropes and stubborn-hearted Arges[3], who gave Zeus the thunder and made the thunderbolt: in all else they were like the gods, but one eye only was set in the midst of their foreheads. And they were surnamed Cyclopes (Orb-eyed) because one orbed eye was set in their foreheads. Strength and might and craft were in their works. And again, three other sons were born of Earth and Heaven, great and doughty beyond telling, Cottus and Briareos and Gyes, presumptuous children. From their shoulders sprang a hundred arms, not to be approached, and fifty heads grew from the shoulders upon the strong limbs of each, and irresistible was the stubborn strength that was in their great forms. For of all the children that were born of Earth and Heaven, these were the most terrible, and they were hated by their own father from the first. And he used to hide them all away in a secret place of Earth so soon as each was born, and would not suffer them to come up into the light: and Heaven rejoiced in his evil doing. But vast Earth groaned within, being straitened, and she thought a crafty and an evil wile. Forthwith she made the element of grey flint and shaped a great sickle, and told her plan to her dear sons. And she spoke, cheering them, while she was vexed in her dear heart: "My children, gotten of a sinful father, if you will obey me, we should punish the vile outrage of your father; for he first thought of doing shameful things." So she said; but fear seized them all, and none of them uttered a word. But great Cronos the wily took courage and answered his dear



mother: "Mother, I will undertake to do this deed, for I reverence not our father of evil name, for he first thought of doing shameful things." […]

And of Amphitrite and the loud-roaring Earth-Shaker was born great, wide-ruling Triton, and he owns the depths of the sea, living with his dear mother and the lord his father in their golden house, an awful god. Also Cytherea bore to Ares the shield-piercer Panic and Fear, terrible gods who drive in disorder the close ranks of men in numbing war, with the help of Ares, sacker of towns; and Harmonia whom high-spirited Cadmus made his wife.

1 Earth, in the cosmology of Hesiod, is a disk surrounded by the river Oceanus and floating upon a waste of waters. It is called the foundation of all (the qualification "the deathless ones…" etc. is an interpolation), because not only trees, men, and animals, but even the hills and seas (ll. 129, 131) are supported by it. 2 Aether is the bright, untainted upper atmosphere, as distinguished from Aer, the lower atmosphere of the earth. 3 Brontes is the Thunderer; Steropes, the Lightning Flash; and Arges, the Vivid One. 4 I.e. Athena, who was born "on the banks of the river Trito" (cp. l. 929l. 5 Sc. the Aegis. Line 929s is probably spurious, since it disagrees with 929q and contains a suspicious reference to Athens).

WILLIAM TURNER, SNOW STORM: HANNIBAL AND HIS ARMY CROSSING THE ALPS (1812)



# THE THIRTY-SIX STRATAGEMS

# SAN SHI LIU JI

# 1941

Chaos Stratagems

19 *Steal the firewood from under the pot*
When faced with an enemy too powerful to engage directly you must first weaken him by undermining his foundation and attacking his source of power.

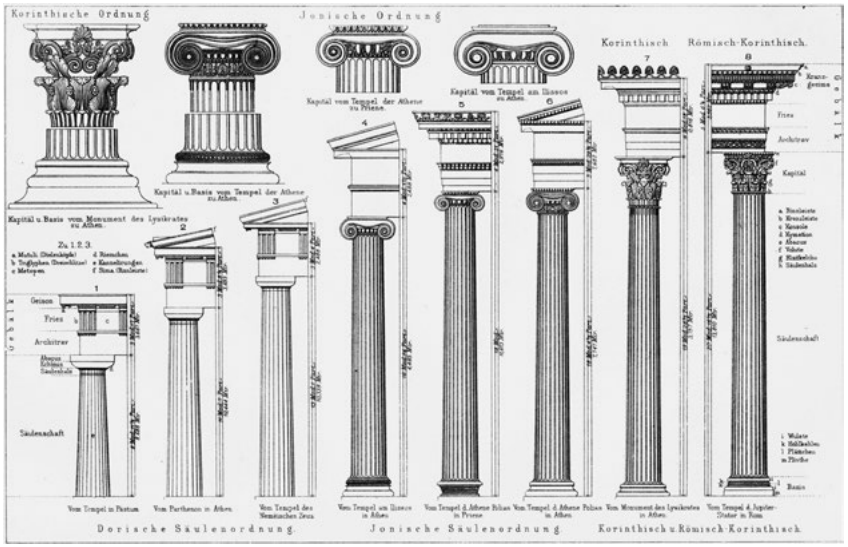
20 *Trouble the water to catch the fish*
Before engaging your enemy's forces create confusion to weaken his perception and judgement. Do something unusual, strange, and unexpected as this will arouse the enemy's suspicion and disrupt his thinking. A distracted enemy is thus more vulnerable.

21 *Shred your skin like the golden cicada*
When you are in danger of being defeated, and your only chance is to escape and regroup, then create an illusion. While the enemy's attention is focussed on this artifice, secretly remove your men leaving behind only the façade of your presence.

22 *Shut the door to catch the thief*
If you have the chance to completely capture the enemy then you should do so thereby bringing the battle or war to a quick and lasting conclusion. To allow your enemy to escape plants the seed for future conflict. But if they succeed in escaping, be wary of giving chase.

23 *Befriend a distant enemy to attack one nearby*
It is known that nations that border each other become enemies while nations separated by distance and obstacles make better allies. When you are the strongest in one field, your greatest threat is from the second strongest in your field, not the strongest from another field.

24 *Borrow the road to conquer Guo*
Borrow the resources of an ally to attack a common enemy. Once the enemy is defeated, use those resources to turn on the ally that lent you them in the first place.




**MEYERS, CLASSICAL ORDERS (1892)**



# THE PHILOSOPHY OF COMPOSITION

# EDGAR ALLAN POE

# 1846

Charles Dickens, in a note now lying before me, alluding to an examination I once made of the mechanism of "Barnaby Rudge," says – "By the way, are you aware that Godwin wrote his 'Caleb Williams' backwards? He first involved his hero in a web of difficulties, forming the second volume, and then, for the first, cast about him for some mode of accounting for what had been done."

I cannot think this the precise mode of procedure on the part of Godwin – and indeed what he himself acknowledges, is not altogether in accordance with Mr. Dickens' idea – but the author of "Caleb Williams" was too good an artist not to perceive the advantage derivable from at least a somewhat similar process. Nothing is more clear than that every plot, worth the name, must be elaborated to its *dénouement* before anything be attempted with the pen. It is only with the *dénouement* constantly in view that we can give a plot its indispensable air of consequence, or causation, by making the incidents, and especially the tone at all points, tend to the development of the intention.

There is a radical error, I think, in the usual mode of constructing a story. Either history affords a thesis – or one is suggested by an incident of the day – or, at best, the author sets himself to work in the combination of striking events to form merely the basis of his narrative-designing, generally, to fill in with description, dialogue, or authorial comment, whatever crevices of fact, or action, may, from page to page, render themselves apparent.

I prefer commencing with the consideration of an *effect*. Keeping originality *always* in view for he is false to himself who ventures to dispense with so obvious and so easily attainable a source of interest – I say to myself, in the first place, "Of the innumerable effects, or impressions, of which the heart, the intellect, or (more generally) the soul is susceptible, what one shall I, on the present occasion, select?" Having chosen a novel, first, and secondly a vivid effect, I consider whether it can be best wrought by incident or tone whether by ordinary incidents and peculiar tone, or the converse, or by peculiarity both of incident and tone – afterward looking about me (or rather within) for such combinations of event, or tone, as shall best aid me in the construction of the effect.

I have often thought how interesting a magazine paper might be written by any author who would – that is to say, who could – detail, step by step, the processes by which any one of his compositions attained its ultimate point of completion. Why such a paper has never been given to the world, I am much at a loss to say – but, perhaps, the authorial vanity has had more to do with the omission than any one other cause. Most writers – poets in especial – prefer having it understood that they compose by a species of fine frenzy – an ecstatic intuition – and would positively shudder at letting the public take a peep behind the scenes, at the elaborate and vacillating crudities of thought – at the true purposes seized only at the last moment – at the innumerable glimpses of idea that arrived not at the maturity of full view – at the fully – matured fancies discarded in despair as unmanageable – at the cautious selections and rejections – at the painful erasures and interpolations – in a word, at the wheels and pinions – the tackle for scene-shifting – the step-ladders, and demon-traps – the cock's feathers, the red paint and the



black patches, which, in ninety-nine cases out of a hundred, constitute the properties of the literary *histrio*.

I am aware, on the other hand, that the case is by no means common, in which an author is at all in condition to retrace the steps by which his conclusions have been attained. In general, suggestions, having arisen pell-mell are pursued and forgotten in a similar manner.

For my own part, I have neither sympathy with the repugnance alluded to, nor, at any time, the least difficulty in recalling to mind the progressive steps of any of my compositions, and, since the interest of an analysis or reconstruction, such as I have considered a *desideratum*, is quite independent of any real or fancied interest in the thing analysed, it will not be regarded as a breach of decorum on my part to show the *modus operandi* by which some one of my own works was put together. I select "*The Raven*" as most generally known. It is my design to render it manifest that no one point in its composition is referable either to accident or intuition – that the work proceeded step by step, to its completion, with the precision and rigid consequence of a mathematical problem.

Let us dismiss, as irrelevant to the poem, *per se*, the circumstance – or say the necessity which, in the first place, gave rise to the intention of composing a poem that should suit at once the popular and the critical taste.

We commence, then, with this intention.

The initial consideration was that of extent. If any literary work is too long to be read at one sitting, we must be content to dispense with the immensely important effect derivable from unity of impression – for, if two sittings be required, the affairs of the world interfere, and everything like totality is at once destroyed. But since, *ceteris paribus*, no poet can afford to dispense with *anything* that may advance his design, it but remains to be seen

whether there is, in extent, any advantage to counterbalance the loss of unity which attends it. Here I say no, at once. What we term a long poem is, in fact, merely a succession of brief ones that is to say, of brief poetical effects. It is needless to demonstrate that a poem is such only inasmuch as it intensely excites, by elevating the soul; and all intense excitements are, through a psychal necessity, brief. For this reason, at least, one-half of the "Paradise Lost" is essentially prose – a succession of poetical excitements interspersed, inevitably, with corresponding depressions – the whole being deprived, through the extremeness of its length, of the vastly important artistic element, totality, or unity of effect.

It appears evident, then, that there is a distinct limit, as regards length, to all works of literary art – the limit of a single sitting – and that, although in certain classes of prose composition, such as "Robinson Crusoe" (demanding no unity), this limit may be advantageously overpassed, it can never properly be overpassed in a poem. Within this limit, the extent of a poem may be made to bear mathematical relation to its merit – in other words, to the excitement or elevation – again, in other words, to the degree of the true poetical effect which it is capable of inducing; for it is clear that the brevity must be in direct ratio of the intensity of the intended effect – this, with one proviso – that a certain degree of duration is absolutely requisite for the production of any effect at all.

Holding in view these considerations, as well as that degree of excitement which I deemed not above the popular, while not below the critical taste, I reached at once what I conceived the proper *length* for my intended poem – a length of about one hundred lines. It is, in fact, a hundred and eight.



My next thought concerned the choice of an impression, or effect, to be conveyed: and here I may as well observe that throughout the construction, I kept steadily in view the design of rendering the work *universally* appreciable. I should be carried too far out of my immediate topic were I to demonstrate a point upon which I have repeatedly insisted, and which, with the poetical, stands not in the slightest need of demonstration – the point, I mean, that Beauty is the sole legitimate province of the poem. A few words, however, in elucidation of my real meaning, which some of my friends have evinced a disposition to misrepresent. That pleasure which is at once the most intense, the most elevating, and the most pure is, I believe, found in the contemplation of the beautiful. When, indeed, men speak of Beauty, they mean, precisely, not a quality, as is supposed, but an effect – they refer, in short, just to that intense and pure elevation of *soul* – *not* of intellect, or of heart – upon which I have commented, and which is experienced in consequence of contemplating the "beautiful." Now I designate Beauty as the province of the poem, merely because it is an obvious rule of Art that effects should be made to spring from direct causes – that objects should be attained through means best adapted for their attainment – no one as yet having been weak enough to deny that the peculiar elevation alluded to is *most readily* attained in the poem. Now the object Truth, or the satisfaction of the intellect, and the object Passion, or the excitement of the heart, are, although attainable to a certain extent in poetry, far more readily attainable in prose. Truth, in fact, demands a precision, and Passion, a *homeliness* (the truly passionate will comprehend me), which are absolutely antagonistic to that Beauty which, I maintain, is the excitement or pleasurable elevation of the soul. It by no means follows, from anything here said, that

passion, or even truth, may not be introduced, and even profitably introduced, into a poem – for they may serve in elucidation, or aid the general effect, as do discords in music, by contrast – but the true artist will always contrive, first, to tone them into proper subservience to the predominant aim, and, secondly, to enveil them, as far as possible, in that Beauty which is the atmosphere and the essence of the poem.

Regarding, then, Beauty as my province, my next question referred to the *tone* of its highest manifestation – and all experience has shown that this tone is one of *sadness*. Beauty of whatever kind in its supreme development invariably excites the sensitive soul to tears. Melancholy is thus the most legitimate of all the poetical tones.

The length, the province, and the tone, being thus determined, I betook myself to ordinary induction, with the view of obtaining some artistic piquancy which might serve me as a key-note in the construction of the poem – some pivot upon which the whole structure might turn. In carefully thinking over all the usual artistic effects – or more properly *points*, in the theatrical sense – I did not fail to perceive immediately that no one had been so universally employed as that of the *refrain*. The universality of its employment sufficed to assure me of its intrinsic value, and spared me the necessity of submitting it to analysis. I considered it, however, with regard to its susceptibility of improvement, and soon saw it to be in a primitive condition. As commonly used, the *refrain*, or burden, not only is limited to lyric verse, but depends for its impression upon the force of monotone – both in sound and thought. The pleasure is deduced solely from the sense of identity – of repetition. I resolved to diversify, and so heighten the effect, by adhering in general to the monotone of sound, while I continually varied that of thought: that is to say,



I determined to produce continuously novel effects, by the variation *of the application* of the *refrain* – the *refrain* itself remaining for the most part, unvaried.

These points being settled, I next bethought me of the *nature* of my *refrain*. Since its application was to be repeatedly varied it was clear that the *refrain* itself must be brief, for there would have been an insurmountable difficulty in frequent variations of application in any sentence of length. In proportion to the brevity of the sentence would, of course, be the facility of the variation. This led me at once to a single word as the best *refrain*.

The question now arose as to the *character* of the word. Having made up my mind to a *refrain*, the division of the poem into stanzas was of course a corollary, the *refrain* forming the close to each stanza. That such a close, to have force, must be sonorous and susceptible of protracted emphasis, admitted no doubt, and these considerations inevitably led me to the long *o* as the most sonorous vowel in connection with *r* as the most producible consonant.

The sound of the *refrain* being thus determined, it became necessary to select a word embodying this sound, and at the same time in the fullest possible keeping with that melancholy which I had pre-determined as the tone of the poem. In such a search it would have been absolutely impossible to overlook the word "Nevermore." In fact it was the very first which presented itself.

The next *desideratum* was a pretext for the continuous use of the one word "nevermore." In observing the difficulty which I had at once found in inventing a sufficiently plausible reason for its continuous repetition, I did not fail to perceive that this difficulty arose solely from the pre-assumption that the word was to be so continuously or monotonously spoken by a *human* being – I did not fail to perceive, in short, that the difficulty lay in the reconciliation

of this monotony with the exercise of reason on the part of the creature repeating the word. Here, then, immediately arose the idea of a *non*-reasoning creature capable of speech, and very naturally, a parrot, in the first instance, suggested itself, but was superseded forthwith by a Raven as equally capable of speech, and infinitely more in keeping with the intended *tone*.

I had now gone so far as the conception of a Raven, the bird of ill-omen, monotonously repeating the one word "Nevermore" at the conclusion of each stanza in a poem of melancholy tone, and in length about one hundred lines. Now, never losing sight of the object – *supremeness* or perfection at all points, I asked myself – "Of all melancholy topics what, according to the *universal* understanding of mankind, is the *most* melancholy?" Death, was the obvious reply. "And when," I said, "is this most melancholy of topics most poetical?" From what I have already explained at some length the answer here also is obvious – "When it most closely allies itself to *Beauty*: the death then of a beautiful woman is unquestionably the most poetical topic in the world, and equally is it beyond doubt that the lips best suited for such topic are those of a bereaved lover."

I had now to combine the two ideas of a lover lamenting his deceased mistress and a Raven continuously repeating the word "Nevermore." I had to combine these, bearing in mind my design of varying at every turn the *application* of the word repeated, but the only intelligible mode of such combination is that of imagining the Raven employing the word in answer to the queries of the lover. And here it was that I saw at once the opportunity afforded for the effect on which I had been depending, that is to say, the effect of the *variation of application*. I saw that I could make the first query propounded by the lover – the first query to which the Raven should reply "Nevermore" – that



I could make this first query a commonplace one, the second less so, the third still less, and so on, until at length the lover, startled from his original *nonchalance* by the melancholy character of the word itself, by its frequent repetition, and by a consideration of the ominous reputation of the fowl that uttered it, is at length excited to superstition, and wildly propounds queries of a far different character – queries whose solution he has passionately at heart – propounds them half in superstition and half in that species of despair which delights in self-torture – propounds them not altogether because he believes in the prophetic or demoniac character of the bird (which reason assures him is merely repeating a lesson learned by rote), but because he experiences a frenzied pleasure in so modelling his questions as to receive from the *expected* "Nevermore" the most delicious because the most intolerable of sorrows. Perceiving the opportunity thus afforded me, or, more strictly, thus forced upon me in the progress of the construction, I first established in my mind the climax or concluding query – that query to which "Nevermore" should be in the last place an answer – that query in reply to which this word "Nevermore" should involve the utmost conceivable amount of sorrow and despair.

Here then the poem may be said to have had its beginning, at the end where all works of art should begin, for it was here at this point of my preconsiderations that I first put pen to paper in the composition of the stanza:

> "Prophet!" said I, "thing of evil! – prophet still, if bird or devil!
> By that Heaven that bends above us – by that God we both adore,
> Tell this soul with sorrow laden if, whithin the distant Aidenn,
> It shall clasp a sainted maiden whom the angels aname Lenore–
> Clasp a rare and radiant maiden whom the angels name Lenore."
> Quoth the Raven "Nevermore."

I composed this stanza, at this point, first that, by establishing the climax, I might the better vary and graduate, as regards seriousness and importance, the preceding queries of the lover, and secondly, that I might definitely settle the rhythm, the metre, and the length and general arrangement of the stanza, as well as graduate the stanzas which were to precede, so that none of them might surpass this in rhythmical effect. Had I been able in the subsequent composition to construct more vigorous stanzas I should without scruple have purposely enfeebled them so as not to interfere with the climacteric effect.

And here I may as well say a few words of the versification. My first object (as usual) was originality. The extent to which this has been neglected in versification is one of the most unaccountable things in the world. Admitting that there is little possibility of variety in mere *rhythm*, it is still clear that the possible varieties of metre and stanza are absolutely infinite, and yet, *for centuries*, *no man*, *in verse*, *has ever done*, *or ever seemed to think of doing*, *an original thing*. The fact is that originality (unless in minds of very unusual force) is by no means a matter, as some suppose, of impulse or intuition. In general, to be found, it must be elaborately sought, and although a positive merit of the highest class, demands in its attainment less of invention than negation.

Of course I pretend to no originality in either the rhythm or metre of the "Raven." The former is trochaic – the latter is octametre acatalectic, alternating with heptametre catalectic repeated in the *refrain* of the fifth verse, and terminating with tetrametre catalectic. Less pedantically the feet employed throughout (trochees) consist of a long syllable followed by a short, the first line of the stanza consists of eight of these feet, the second of seven and a half (in effect two-thirds), the third of eight, the fourth of seven and a half, the fifth the same, the sixth three and a half. Now, each of these lines taken individually has been employed before, and what originality the "Raven" has, is in their *combination into stanza*; nothing even remotely approaching this has ever been attempted. The effect of this originality of combination is aided by other unusual and some altogether novel effects, arising from an extension of the application of the principles of rhyme and alliteration.



The next point to be considered was the mode of bringing together the lover and the Raven – and the first branch of this consideration was the *locale*. For this the most natural suggestion might seem to be a forest, or the fields – but it has always appeared to me that a close *circumscription of space* is absolutely necessary to the effect of insulated incident – it has the force of a frame to a picture. It has an indisputable moral power in keeping concentrated the attention, and, of course, must not be confounded with mere unity of place.

I determined, then, to place the lover in his chamber – in a chamber rendered sacred to him by memories of her who had frequented it. The room is represented as richly furnished – this in mere pursuance of the ideas I have already explained on the subject of Beauty, as the sole true poetical thesis.

The *locale* being thus determined, I had now to introduce the bird – and the thought of introducing him through the window was inevitable. The idea of making the lover suppose, in the first instance, that the flapping of the wings of the bird against the shutter, is a "tapping" at the door, originated in a wish to increase, by prolonging, the reader's curiosity, and in a desire to admit the incidental effect arising from the lover's throwing open the door, finding all dark, and thence adopting the half-fancy that it was the spirit of his mistress that knocked.

I made the night tempestuous, first to account for the Raven's seeking admission, and secondly, for the effect of contrast with the (physical) serenity within the chamber.

I made the bird alight on the bust of Pallas, also for the effect of contrast between the marble and the plumage – it being understood that the bust was absolutely *suggested* by the bird – the bust of *Pallas* being chosen, first, as most in keeping with the scholarship of the lover, and secondly, for the sonorousness of the word, Pallas, itself.

About the middle of the poem, also, I have availed myself of the force of contrast, with a view of deepening the ultimate impression. For example, an air of the fantastic – approaching as nearly to the ludicrous as was admissible – is given to the Raven's entrance. He comes in "with many a flirt and flutter."

> Not the *least obeisance made he* – not a moment stopped or stayed he,
> *But with mien of lord or lady*, perched above my chamber door.

In the two stanzas which follow, the design is more obviously carried out: –

> Then this ebony bird beguiling my sad fancy into smiling,
> By the *grave and stern decorum of the countenance it wore*,
> "Though thy *crest be shorn and shaven*, thou," I said, "*art sure no craven*,
> Ghastly grim and ancient Raven wandering from the Nightly shore –
> Tell me what thy lordly name is on the Night's Plutonian shore!"
> Quoth the Raven "Nevermore."
>
> Much I marvelled *this ungainly fowl* to hear discourse so plainly,
> Though its answer little meaning – little relevancy bore;
> For we cannot help agreeing that no living human being
> *Ever yet was blessed with seeing bird above his chamber door –*
> *Bird or beast upon the sculptured bust above his chamber door*,
> With such name as "Nevermore."

The effect of the *dénouement* being thus provided for, I immediately drop the fantastic for a tone of the most profound seriousness – this tone commencing in the stanza directly following the one last quoted, with the line,

> But the Raven, sitting lonely on that placid bust, spoke only, etc.

From this epoch the lover no longer jests – no longer sees anything even of the fantastic in the Raven's demeanour. He speaks of him as a "grim, ungainly, ghastly, gaunt, and ominous bird of yore," and feels the "fiery eyes" burning into his "bosom's core." This revolution of thought, or fancy, on the lover's part, is intended to induce a similar one on the part of the reader – to bring the mind into a proper frame for the *dénouement* – which is now brought about as rapidly and as *directly* as possible.

With the *dénouement* proper – with the Raven's reply, "Nevermore," to the lover's final demand if he shall meet his mistress in another world – the poem, in its obvious phase, that of a simple narrative, may be said to have its completion. So far, everything is within the limits of the accountable – of the real. A raven, having learned by rote the single word "Nevermore," and having escaped from the custody of its owner, is driven at midnight, through the violence of a storm, to seek admission at a window from which a light still gleams – the chamber-window of a student, occupied half in poring over a volume, half in dreaming of a beloved mistress deceased. The casement being thrown open at the fluttering of the bird's wings, the bird itself perches on the most convenient seat out of the immediate reach of the student, who amused by the incident and the oddity of the visitor's demeanour, demands of it, in jest and without looking for a reply, its name. The raven addressed, answers with its customary word, "Nevermore" – a word which finds immediate echo in the melancholy heart of the student, who, giving utterance aloud to certain thoughts suggested by the occasion,

is again startled by the fowl's repetition of "Nevermore." The student now guesses the state of the case, but is impelled, as I have before explained, by the human thirst for self-torture, and in part by superstition, to propound such queries to the bird as will bring him, the lover, the most of the luxury of sorrow, through the anticipated answer, "Nevermore." With the indulgence, to the extreme, of this self-torture, the narration, in what I have termed its first or obvious phase, has a natural termination, and so far there has been no overstepping of the limits of the real.

But in subjects so handled, however skilfully, or with however vivid an array of incident, there is always a certain hardness or nakedness which repels the artistical eye. Two things are invariably required – first, some amount of complexity, or more properly, adaptation; and, secondly, some amount of suggestiveness – some under-current, however indefinite, of meaning. It is this latter, in especial, which imparts to a work of art so much of that *richness* (to borrow from colloquy a forcible term), which we are too fond of confounding with *the ideal*. It is the *excess* of the suggested meaning – it is the rendering this the upper instead of the under-current of the theme – which turns into prose (and that of the very flattest kind), the so-called poetry of the so-called transcendentalists.

Holding these opinions, I added the two concluding stanzas of the poem – their suggestiveness being thus made to pervade all the narrative which has preceded them. The under-current of meaning is rendered first apparent in the lines –

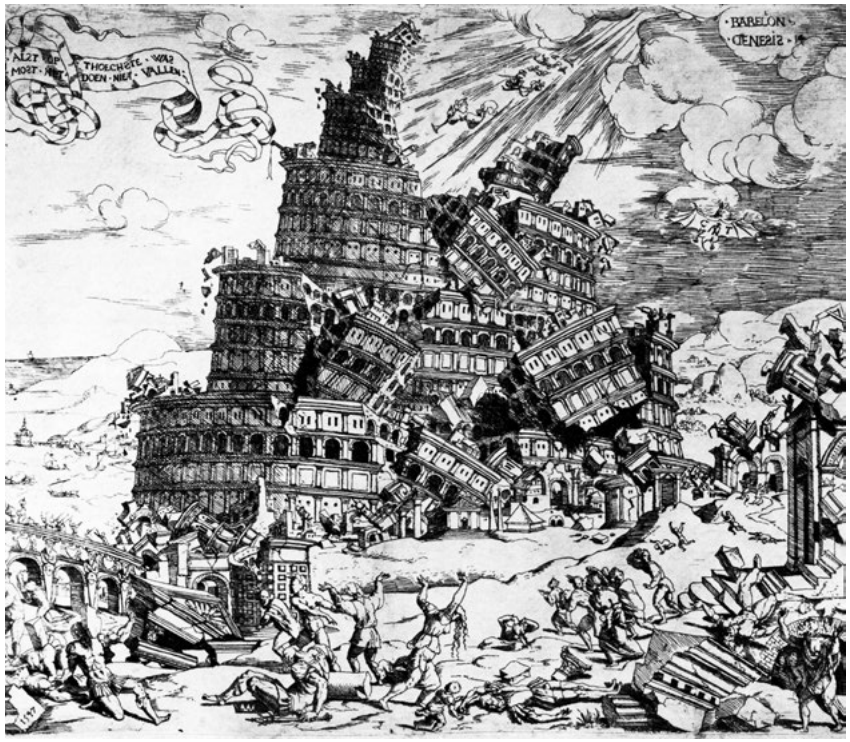
> Take thy beak from out my heart, and take thy form from off my door!"
> Quoth the Raven "Nevermore."

It will be observed that the words, "from out my heart," involve the first metaphorical expression in the poem.



They, with the answer, "Nevermore," dispose the mind to seek a moral in all that has been previously narrated. The reader begins now to regard the Raven as emblematical – but it is not until the very last line of the very last stanza that the intention of making him emblematical of *Mournful and never ending emembrance* is permitted distinctly to be seen:

> And the Raven, never flitting, still is sitting, still is sitting
> On the pallid bust of Pallas just above my chamber door;
> And his eyes have all the seeming of a demon's that is dreaming,
> And the lamp-light o'er him streaming throws his shadow on the floor;
> And my soul *from out that shadow* that lies floating on the floor
> Shall be lifted – nevermore!




CORNELIS ANTHONISZ, THE TOWER OF BABEL (1547)



# JAMES JOYCE

# 1939

Part I, Episode V

In the name of Annah the Allmaziful, the Everliving, the Bringer of Plurabilities, haloed be her eve, her singtime sung, her rill be run, unhemmed as it is uneven!

Her untitled mamafesta memorialising the Mosthighest has gone by many names at disjointed times. Thus we hear of, *The Augusta Angustissimost for Old Seabeastius' Salvation*, *Rockabill Booby in the Wave Trough*, *Here's to the Relicts of All Decencies*, *Anna Stessa's Rise to Notice*, *Knickle Down Duddy Gunne and Arishe Sir Cannon*, *My Golden One and My Selver Wedding*, *Amoury Treestam and Icy Siseule*, *Saith a Sawyer til a Strame*, *Ik dik dopedope et tu mihimihi*, *Buy Birthplate for a Bite*, *Which of your Hesterdays Mean Ye to Morra? Hoebegunne the Hebrewer Hit Waterman the Brayned*, *Arcs in His Ceiling Flee Chinx on the Flur*, *Rebus de Hibernicis*, *The Crazier Letters*, *Groans of a Britoness*, *Peter Peopler Picked a Plot to Pitch his Poppolin*, *An Apology for a Big* (some such nonoun as *Husband* or *husboat* or *hosebound* is probably understood for we have also the pluth-erplethoric *My Hoonsbood Hansbaad's a Journey to Porthergill gone and He Never Has the Hour)*, *Ought We To Visit Him? For Ark see Zoo*, *Cleopater's Nedlework Ficturing Aldborougham on the Sahara with the Coombing of the Cammmels and the Parlourmaids of Aegypt*, *Cock in the Pot for Father*, *Placeat Vestrae*, *A New Cure for an Old Clap*, *Where Portentos they'd Grow Gonder how I'd Wish I Woose a Geese; Gettle Nettie*, *Thrust him not*, *When the Myrtles of Venice Played to Bloccus's Line*, *To Plenge Me High He Waives Chiltern on*

*Friends*, *Oremunds Queue Visits Amen Mart*, *E'en Tho' I Granny a-be He would Fain Me Cuddle*, *Twenty of Chambers*, *Weighty Ten Beds and a Wan Ceteroom*, *I Led the Life*, *Through the Boxer Coxer Rising in the House with the Golden Stairs*, *The Following Fork*, *He's my O'Jerusalem and I'm his Po*, *The Best in the West*, *By the Stream of Zemzem under Zigzag Hill*, *The Man That Made His Mother in the Marlborry Train*, *Try Our Taal on a Taub*, *The Log of Anny to the Base All*, *Nopper Tipped a Nappiwenk to his Notylytl Dantsigirls*, *Prszss Orel Orel the King of Orlbrdsz*, *Intimier Minnelisp of an Extorreor Monolothe*, *Drink to Him*, *My Juckey*, *and Dhoult Bemine Thy Winnowing Sheet*, *I Ask You to Believe I was his Mistress*, *He Can Explain*, *From Victrolia Nuancee to Allbart Noahnsy*, *Da's a Daisy so Guimea your Handsel too*, *What Barbaras Done to a Barrel Organ Before the Rank*, *Tank and Bonnbtail*, *Huskvy Admortal*, *What Jumbo made to Jalice and what Anisette to Him*, *Ophelia's Culpreints*, *Hear Hubty Hublin*, *My Old Dansh*, *I am Older northe Rogues among Whisht I Slips and He Calls Me his Dual of Ayessha*, *Suppotes a Ventriliquorst Merries a Corpse*, *Lapps for Finns This Funnycoon's Week*, *How the Buckling Shut at Rush in January*, *Look to the Lady*, *From the Rise of the Dudge Pupublick to the Fall of the Potstille*, *Of the Two Ways of Opening the Mouth*, *I have not Stopped Water Where It Should Flow and I Know the Twentynine Names of Attraente*, *The Tortor of Tory Island Traits Galasia like his Milchcow*, *From Abbeygate to Crowalley Through a Lift in the Lude*, *Smocks for Their Graces and Me Aunt for Them Clod-shoppers*, *How to Pull a Good Horuscoup even when Oldsire is Dead to the World*, *Inn the Gleam of Waherlow*, *Fathe He's Sukceded to My Esperations*, *Thee Steps Forward*, *Two Stops Back*, *My Skin Appeals to Three Senses and My Curly Lips Demand Columbkisses; Gage Street on a Crany's Savings*, *Them Lads made a Trion of Battlewatschers and They Totties a Doeit of Deers*, *In My Lord's Bed by One Whore Went Through It*, *Mum It is All Over*, *Cowpoyride by Twelve Acre Terriss in the Unique Estates of Amessican*, *He Gave me a Thou so I serve Him with Thee*, *Of all the Wide Torsos in all the Wild Glen*, *O'Donogh*, *White Donogh*, *He's Hue to Me Cry*, *I'm the Stitch in his Baskside You'd be Nought Without Mom*, *To Keep the Huskies off the Hustings and Picture Pets from Lifting Shops*, *Norsker Torsker Find the Poddle*, *He Perssed Me Here with the Ardour of a Tonnoburkes*, *A Boob Was Weeping This Mower was Reaping*, *O'Loughlin*, *Up from the Pit of my Stomach I Swish you the White of the Mourning*, *Inglo-Andeen Medoleys from Tommany Moohr*, *The Great Polynesional Entertrainer Exhibits Ballantine Brautchers with the Link of Natures*, *The Mimic of Meg Neg end the Mackeys*, *Entered as the Lastest Pigtarial and My Pooridiocal at Stitchioner's Hall*, *Siegfield Follies and or a Gentlehomme's Faut Pas*, *See the First Book of Jealesies Pessim*, *The Suspended Sen-tence*, *A Pretty Brick Story for Childsize Heroes*, *As Lo Our Sleep*, *I Knew I'd Got it in Me so Thit settles That*, *Thonderbalt Captain Smeth and La Belle Sauvage Pocahonteuse*, *Way for Wet Week Welikin's Douchka Marianne*, *The Last of the Fingallians*, *It Was Me Egged Him on to the Stork Exchange and Lent my Dutiful Face to His Customs*, *Chee Chee Cheels on their China Miction*, *Picked-meup Peters*, *Lumptytumtumpty had a Big Fall*, *Pimpimp Pimpimp*, *Measly Ventures of Two Lice and the Fall of Fruit*, *The Fokes Family Interior*, *If my Spreadeagles Wasn't so Tight I'd Loosen my Cursits on that Bunch of Maggiestraps*, *Allolosha Popofetts and Howke Cotchme Eye*, *Seen Aples and Thin Dyed*, *i big U to Beleaves from Love and Mother*, *Fine's Fault was no Felon*, *Exat Delvin Renter Life*, *The Flash that Flies from Vuggy's Eyes has Set Me Hair On Fire*, *His is the House that Malt Made*, *Divine Views from Back to the Front*, *Abe to Sare Stood Icyk Neuter till Brahm Taulked Him Common Sex*, *A Nibble at Eve Will That Bowal Relieve*, *Allfor Guineas*, *Sounds and Compliments Libidous*, *Seven Wives Awake Aweek*, *Airy*

*Ann and Berber Blut, Amy Licks Porter While Huffy Chops Eads, Abbrace of Umbellas or a Tripple of Caines, Buttbutterbust, From the Manorlord Hoved to the Misses O'Mollies and from the Dames to their Sames, Many-festoons for the Colleagues on the Green, An Outstanding Back and an Excellent Half-centre if Called on, As Tree is Quick and Stone is White So ts My Washing Done by Night, First and Last Only True Account au about the Honorary Mirsu Earwicker, L.S.D., and the Snake (Nuggets!) by a Woman of the World who only can Tell Naked Truths about a Dear Man and all his Conspirators how they all Tried to Fall him Putting it all around Lucalizod about Privates Earwicker and a Pair of Sloppy Sluts plainly Showing all the Unmentionability falsely Accusing about the Raincoats.*

The proteiform graph itself is a polyhedron of scripture. There was a time when naif alphabetters would have written it down the tracing of a purely deliquescent recidivist, possibly ambidextrous, snubnosed probably and presenting a strangely profound rainbowl in his (or her) occiput. To the hardily curiosing entomophilust then it has shown a very sexmosaic of nymphosis in which the eternal chimerahunter Oriolopos, now frond of sugars, then lief of saults, the sensory crowd in his belly coupled with an eye for the goods trooth bewilderblissed by their night effluvia with guns like drums and fondlers like forceps persequestellates his vanessas from flore to flore. Somehows this sounds like the purest kidooleyoon wherein our madernacerution of lour lore is rich. All's so herou from us him in a kitchernott darkness, by hasard and worn rolls arered, we must grope on till Zerogh hour like pou owl giaours as we are would we salve aught of moments for our aysore today. Amousin though not but. Closer inspection of the *bordereau* would reveal a multiplicity of personalities inflicted on the documents or document and some prevision of virtual crime or crimes might be made by



anyone unwary enough before any suitable occasion for it or them had so far managed to happen along. In fact, under the closed eyes of the inspectors the traits featuring the *chiaroscuro* coalesce, their contrarieties eliminated, in one stable somebody similarly as by the providential warring of heartshaker with housebreaker and of dramdrinker against freethinker our social something bowls along bumpily, experiencing a jolting series of prearranged disappointments, down the long lane of (it's as semper as oxhousehumper! generations, more generations and still more generations.

Say, baroun lousadoor, who in hallhagal wrote the durn thinganyhow? Erect, beseated, mountback, against a partywall, below freezigrade, by the use of quill or style, with turbid or pellucid mind, accompanied or the reverse by mastication, interrupted by visit of seer to scribe or of scribe to site, atwixt two showers or atosst of a trike, rained upon or blown around, by a rightdown regular racer from the soil or by a too pained whittlewit laden with the loot of learning?

Now, patience; and remember patience is the great thing, and above all things else we must avoid anything like being or becoming out of patience. A good plan used by worried business folk who may not have had many momentums to master Kung's doctrine of the meang or the propriety codestruces of Carprimustimus is just to think of all the sinking fund of patience possessed in their conjoint names by both brothers Bruce with whom are incorporated their Scotch spider and Elberfeld's Calculating Horses. If after years upon years of delving in ditches dark one tubthumper more than others, Kinihoun or Kahanan, giardarner or mear measenmanonger, has got up for the darnall same pur-pose of reassuring us with all the barbar of the Carrageehouse that our great ascendant

was properly speaking three syllables less than his own surname (yes, yes, less!), that the ear of Fionn Earwicker aforetime was the trademark of a broadcaster with wicker local jargon for an ace's patent (Hear! Calls! Everywhair!) then as to this radiooscillating epiepistle to which, cotton, silk or samite, kohol, gall or brickdust, we must ceaselessly return, whereabouts exactly at present in Siam, Hell or Tophet under that glorisol which plays touraloup with us in this Aludin's Cove of our cagacity is that bright soandsuch to slip us the dinkum oil? [...]

[…] So hath been, love: tis tis: and will be: till wears and tears and ages. Thief us the night, steal we the air, shawl thiner liefest, mine! Here, Ohere, insult the fair! Traitor, bad hearer, brave! The lightning look, the birding cry, awe from the grave, everflowing on the times. Feueragusaria iordenwater; now godsun shine on menday's daughter; a good clap, a fore marriage, a bad wake, tell hell's well; such is manowife's lot of lose and win again, like he's gruen quhiskers on who's chin again, she plucketed them out but they grown in again. So what are you going to do about it? O dear!

If juness she saved! Ah ho! And if yulone he pouved! The olold stoliolum! From quiqui quinet to michemiche chelet and a jambebatiste to a brulobrulo! It is told in sounds in utter that, in signs so adds to, in universal, in polygluttural, in each auxiliary neutral idiom, sordomutics, florilingua, sheltafocal, flayflutter, a con's cubane, a pro's tutute, strassarab, ereperse and anythongue athall. Since nozzy Nanette tripped palmyways with Highho Harry there's a spurtfire turf a'kind o'kindling when oft as the souffsouff blows her peaties up and a claypot wet for thee, my Sitys, and talkatalka tell Tibbs has eve: and whathough (revilous life proving aye the death of ronaldses



when winpower wine has bucked the kick on poor won man) billiousness has been billiousness during milliums of millenions and our mixed racings have been giving two hoots or three jeers for the grape, vine and brew and Pieter's in Nieuw Amsteldam and Paoli's where the poules go and rum smelt his end for him and he dined off sooth american (it would give one the frier even were one a normal Kettlelicker) this oldworld epistola of their weatherings and their marryings and their buryings and their natural selections has combled tumbled down to us fersch and made-at-all-hours like an ould cup on tay. As I was hottin me souser. Haha! And as you was caldin your dutchy hovel. Hoho! She tole the tail or her toon. Huhu!

Now, kapnimancy and infusionism may both fit as tight as two trivets but while we in our wee free state, holding to that prestatute in our charter, may have our irremovable doubts as to the whole sense of the lot, the interpretation of any phrase in the whole, the meaning of every word of a phrase so far deciphered out of it, however unfettered our Irish daily independence, we must vaunt no idle dubiosity as to its genuine authorship and holusbolus authoritativeness. And let us bringtheecease to beakerings on that clink, olmond bottler! On the face of it, to volt back to our desultory horses, and for your roughshod mind, bafflelost bull, the affair is a thing once for all done and there you are somewhere and finished in a certain time, be it a day or a year or even supposing, it should eventually turn out to be a serial number of goodness gracious alone knows how many days or years. Anyhow, somehow and somewhere, before the bookflood or after her ebb, somebody mentioned by name in his telephone directory, Coccolanius or Gallotaurus, wrote it, wrote it all, wrote it all down, and there you are, full stop. O, undoubtedly yes, and very potably so, but one who deeper thinks will always

bear in the baccbuccus of his mind that this downright there you are and there it is is only all in his eye. Why?

Because, Soferim Bebel, if it goes to that, (and dormerwindow gossip will cry it from the housetops no surelier than the writing on the wall will hue it to the mod of men that mote in the main street) every person, place and thing in the chaosmos of Alle anyway connected with the gobblydumped turkery was moving and changing every part of the time: the travelling inkhorn (possibly pot), the hare and turtle pen and paper, the continually more and less intermisunderstanding minds of the anti-collaborators, the as time went on as it will variously inflected, differently pronounced, otherwise spelled, changeably meaning vocable scriptsigns. No, so holp me Petault, it is not a miseffectual why-acinthinous riot of blots and blurs and bars and balls and hoops and wriggles and juxtaposed jottings linked by spurts of speed: it only looks as like it as damn it; and, sure, we ought really to rest thankful that at this deleteful hour of dungflies dawning we have even a written on with dried ink scrap of paper at all to show for ourselves, tare it or leaf it, (and we are lufted to ourselves as the soulfisher when he led the cat out of the bout) after all that we lost and plundered of it even to the hidmost coignings of the earth and all it has gone through and by all means, after a good ground kiss to Terracussa and for wars luck our lefftoff's flung over our home homo-plate, cling to it as with drowning hands, hoping against hope all the while that, by the light of philophosy, (and may she never folsage us!) things will begin to clear up a bit one way or another within the next quarrel of an hour and be hanged to them as ten to one they will too, please the pigs, as they ought to categorically, as, stricly between ourselves, there is a limit to all things so this will never do.

PETER BRUEGHEL THE ELDER, THE LAND OF COCKAIGNE (1567)



# CLAUDE LÉVI-STRAUSS
# 1955

## Conclusion

[…] For what, after all, have I learnt from the master I have listened to, the philosophers I have read, the societies I have investigated, and that very science in which the West takes such a pride? Simply a fragmentary lesson or two which, if laid end to end, would reconstitute the meditations of the Sage at the foot of this tree. When we make an effort to understand, we destroy the object of our attachment, substituting another whose nature is quite different. That other object requires of us another effort, which in its turn destroys the second object and substitutes a third – and so on until we reach the only enduring Presence, which is that in which all distinction between meaning and the absence of meaning disappears: and it is from that Presence that we started in the first place. It is now two thousand five hundred years since men discovered and formulated these truths. Since then we have discovered nothing new – unless it be that whenever we investigated what seemed to be a way out, we met with a further proof of the conclusions from which we had tried to escape.

Of course I am also aware of the dangers of a state of resignation that has been arrived at too hastily. This great religion of not-knowingness is not based upon our incapacity to understand. It bears witness, rather, to our natural gifts, raising us to the point at which we discover truth in the guise of the mutual exclusiveness of being and knowing. And, by a further audacity, it has achieved something that, elsewhere, only Marxism has brought off: it has

reconciled the problem of metaphysics with the problem on human behaviour. Its schism appeared on the sociological level, in that the fundamental point of difference between the Great and the little Vehicles is whether or not we should believe that the salvation of any one individual depends on the salvation of humanity as a whole.

And yet the historical solutions of Buddhist morality lead to a chilling alternative: either Man must answer "Yes" to the question I have just outlined, in which case he must enter a monastery; or he thinks differently and gets off lightly with the practice of a virtuous egoism.

But injustice, poverty, and suffering exist: and, by existing, provide and intermediary solution. We are not alone, and it is not within our control either to remain deaf and blind to the rest of mankind, or to plead guilty, in ourselves, for all humanity. Buddhism can remain perfectly coherent and, at the same time, respond to appeals from without. Perhaps even, in a vast section of the world, it has found the missing link in the chain. For if the last moment in the dialectical process which leads to enlightenment is of value, so also are all those moments which priced and are similar to it. The absolute "No" to meaning is the last of a series of stages which leads from a lesser to a greater meaning. The last step needs, and at the same time validates, all those which went before it. In its own way, and on its own level, each of them corresponds to a truth. Between Marxist criticism which sets Man free from his first chains, and Buddhist criticism, which completes that liberation, there is neither opposition nor contradiction. (The Marxist teaches that the apparent significance of Man's condition will vanish the moment he agrees to enlarge the object that he has under consideration.) Marxism and Buddhism are doing the same thing, but at different levels. The passage between the two extremes is



guaranteed by all those advances in knowledge that our race has accomplished in the last two thousand years, thanks to an indissoluble movement of thought which runs from East to West, and perhaps only to confirm its origin, has removed from one to the other. Just as beliefs and superstitions dissolve when we try to fix clearly in our minds the truth about human relations, so does morality give way to history, and fluid forms give way to constructions, and creations give way to nothingness. We have only to turn the initial move back upon itself to discover its symmetry; its parts can be superimposed one upon the other, and the stages through which we have already passed are not cancelled, but rather confirmed, by those which succeed them.

As he moves forward within his environment, Man takes with him all the positions that he has occupied in the past, and all those that he will occupy in the future. He is everywhere at the same time, a crowd which, in the act of moving forward, yet recapitulates at every instant every step that it has ever taken in the past. For we live in several worlds, each more true than the one within it, and each false in relation to that within which it is itself enveloped. Some of these worlds may be apprehended in action, others exist because we have them in our thoughts: but the apparent contradictoriness of their co-existence is resolved by the fact that we are constrained to accord meaning to those worlds which are nearer to us, and to refuse it to those more distant. Truth lies rather in the progressive expansion of meaning: but an expansion conducted inwards from without and pushed home to explosion-point.

As an anthropologist I am no longer, therefore, the only person to suffer from a contradiction which is proper to humanity as a whole and bears within itself the reason for its existence. Only when I isolate the two

extremes does the contradiction still persist: for what is the use of action, if the thinking which guides that action leads to the discovery of meaninglessness? But that discovery cannot be made immediately: it must be thought, and I cannot think it all at once. There may be twelve states, as in the Boddhi; but whether they are fewer, or more numerous, they exist as a single whole, and if I am to get to the end of them, I shall be called upon continually to live through situations, each of which demands something of me: I owe myself to mankind, just as much as to knowledge. History, politics, the social and economic universe, the physical world, even the sky – all surround me in concentric circles, and I can only escape from those circles in thought if I concede to each of them some part of my being. Like the pebble which marks the surface of the wave with circles as it passed through it, I must throw myself into the water if I am to plumb the depths.

The world began without the human race and it will end without it. The institutions, manners, and customs which I shall have spent my life in cataloguing and trying to understand are an ephemeral efflorescence of a creative process in relation to which they are meaningless, unless it be that they allow humanity to play its destined role. That role does not, however, assign to our race a position of independence. Nor, even if Man himself is condemned, are his vain efforts directed towards the arresting of a universal process of decline. Far from it: his role is itself a machine, brought perhaps to a greater point of perfection than any other, whose activity hastens the disintegration of an initial order and precipitates a powerfully organised Matter towards a condition of inertia which grows ever greater and will one day prove definitive. From the day when we first learned how to breathe and how to keep himself alive, through the discovery of fire and right up



to the invention of the atomic and thermonuclear devices of the present day, Man has never – save only when he reproduces himself – done other than cheerfully dismantle million upon million of structures and reduce their elements to a state in which they can no longer be reintegrated. No doubt he has built cities and brought the soil to fruition; but if we examine these activities closely we shall find out that they also are inertia-producing machines, whose scale and speed of action are infinitely greater than the amount of organisation implied in them. As for the creations of the human mind, they are meaningful only in relation to that mind and will fall into nothingness as soon as it ceases to exist. Taken as a whole, therefore, civilization can be described as a prodigiously complicated mechanism: tempting as it would be to regard it as our universe's best hope of survival, its true function is to produce what physicists call entropy: inertia, that is to say. Every scrap of conversation, every line set up in type, establishes a communication between two interlocutors, levelling what had previously existed on two different planes and had had, for that reason, a greater degree of organisation. "Entropology", not anthropology, should be the word for the discipline that devotes itself to the study of this process of disintegration in its most highly evolved forms.

And yet I exist. Not in any way, admittedly, as an individual: for what am I, in that respect, but a constantly renewed stake in the struggle between the society, formed by the several million nerve-cells which take shelter in the anthill of the brain, and my body, which serves that society as a robot? Neither psychology, nor metaphysics, nor art can provide me with a refuge; for one and all are myths subject, within and without, to that new kind of sociology which will arise one day and treat them as severely as has our earlier one. Not merely is the first person singular

detestable: there is no room for it between "ourselves" and "nothing". And if, in the end, I opt for "ourselves", although it is no more than an appearance, it is because unless I destroy myself – an act which would wipe out the conditions of the decision I have to make – there is really only one choice to be make: between that appearance and nothing. But no sooner have I chosen than, by that very choice, I take on myself, unreservedly, my condition as a man. Thus liberated from an intellectual pride whose futility is only equalled by that of its object, I also agree to subordinate its claims to the objective will-to-emancipation of that multitude of human beings who are still denied the means of choosing their own destiny.

Man is not alone in the universe, any more than the individual is alone in the group, or any one society alone among other societies. Even the rainbow of human cultures should go down for ever into the abyss which we are so insanely creating, there will still remain open to us – provided we are alive and the world is in existence – a precarious arch that points towards the inaccessible. The road which it indicates to us is one that leads directly away from our present serfdom: and even if we cannot set off along it, merely to contemplate it will procure us the only grace that we know how to deserve. The grace to call a halt, that is to say: to check the impulse which prompts Man always to block up, one after another, such fissures as may be open in the blank wall of necessity and go round off his achievement by slamming shut the doors of his own prison. This is the grace for which every society longs, irrespective of its beliefs, its political regime, its level of civilisation. It stands, in every case, for leisure, and recreations, and freedom, and peace of body and mind. On this opportunity, this chance of for once detaching oneself from the implacable process, life itself depends. Farewell



to savages, then, farewell to journeying! And instead, during the brief intervals in which humanity can bear to interrupt its hive-like labours, let us grasp the essence of what our species has been and still is, beyond thought and beneath society: an essence that may be vouchsafed to us in a mineral more beautiful than any work of Man; in the scent, more subtly evolved than our books, that lingers in the heart of a lily; or in the wink of an eye, heavy with patience, serenity, and mutual forgiveness, that sometimes, through an involuntary understanding, one can exchange with a cat.

Maybe there's a beast…
maybe it's only us.

WILLIAM GOLDING, THE LORD OF THE FLIES (1963)



# CLAUDE LÉVI-STRAUSS
# 1962

## The science of the Concrete

[…] Examples like these could be drawn from all parts of the world and one may readily conclude that animals and plants are not known as a result of their usefulness; they are deemed to be useful or interesting because they are first of all known.

It may be objected that science of this kind can scarcely be of much practical effect. The answer to this is that its main purpose is not a practical one. It meets intellectual requirements rather than or instead of satisfying needs. The real question is not whether the touch of a woodpecker's beak does in fact cure toothache. It is rather whether there is a point of view from which a woodpecker's beak and a man's tooth can be seen as "going together" (the use of this congruity for therapeutic purposes being only one of its possible uses), and whether some initial order can be introduced into the universe by means of these groupings. Classifying, as opposed to not classifying, has a value of its own, whatever form the classification may take. As a recent theorist of taxonomy writes:

> "Scientists do tolerate uncertainty and frustration, because they must. The one thing that they do not and must not tolerate is disorder. The whole aim of theoretical science is to carry to the highest possible and conscious degree the perceptual reduction of chaos that began in so lowly and (in all probability) unconscious a way with the origin

> of life. In specific instances it can well be questioned whether the order so achieved is an objective characteristic of the phenomena or is an artifact constructed by the scientist. That question comes up time after time in animal taxonomy. […] Nevertheless, the most basic postulate of science is that nature itself is orderly. […] All theoretical science is ordering and if, systematics is equated with ordering, then systematics is synonymous with theoretical science."
> Simpson

The thought we call primitive is founded on this demand for order. This is equally true of all thought but it is through the properties common to all thought that we can most easily begin to understand forms of thought which seem very strange to us.

A native thinker makes the penetrating comment that "All sacred things must have their place". It could even be said that being in their place is what makes them sacred for if they were taken out of their place, even in thought, the entire order of the universe would be destroyed. Sacred objects therefore contribute to the maintenance of order in the universe by occupying the places allocated to them. Examined superficially and from the outside, the refinements of ritual can appear pointless.

They are explicable by a concern for what one might call "micro-adjustment" – the concern to assign every single creature, object or feature to a place within a class. The ceremony of the Hako among the Pawnee is particularly illuminating in this respect, although only because it has been so well analysed. The invocation which accompanies the crossing of a stream of water is divided into several parts, which correspond, respectively, to the



moment when the travelers put their feet in water, the moment when they move them and the moment when the water completely covers their feet. The invocation to the wind separates the moment when only the wet parts of the body feel cool: "Now, we are ready to move forward in safety". As the informant explains: "We must address with song every object we meet, because Tira'wa (the supreme spirit) is in all things, everything we come to as we travel can give us help…". This preoccupation with exhaustive observation and the systematic cataloguing of relations and connections can sometimes lead to scientifically valid results. The Blackfoot Indians for instance were able to prognosticate the approach of spring by the state of development of the foetus of bison which they took from the uterus of females killed in hunting. These successes cannot of course be isolated from the numerous other associations of the same kind which science condemns as illusory. It may however be the case that magical thought, that "gigantic variation on the theme of the principle of Causality" as Hubert and Mauss called it, can be distinguished from science not so much by any ignorance or contempt of determinism but by a more imperious and uncompromising demand for it which can at the most be regarded as unreasonable and precipitate from the scientific point of view. […]

Neolithic, or early historical, man was therefore the heir of a long scientific tradition. However, had he, as well as all his predecessors, been inspired by exactly the same spirit as that of our own time, it would be impossible to understand how he could have come to a halt and how several thousand years of stagnation have intervened between the Neolithic revolution and modern science like a level plain between ascents. There is only one solution

to the paradox, namely, that there are two distinct modes of scientific thought. These are certainly not a function of different stages of development of the human mind but rather of two strategic levels at which nature is accessible to scientific enquiry: one roughly adapted to that of perception and the imagination: the other at a remove from it. It is as if the necessary connections which are the object of all science, Neolithic or modern, could be arrived at by two different routes, one very close to, and the other more remote from, sensible intuition. Any classification is superior to chaos and even a classification at the level of sensible properties is a step towards rational ordering. It is legitimate, in classifying fruits into relatively heavy and relatively light, to begin by separating the apples from the pears even though shape, colour and taste are unconnected with weight and volume.

This is because the larger apples are easier to distinguish from the smaller if the apples are not still mixed with fruit of different features. This example already shows that classification has its advantages even at the level of aesthetic perception.

For the rest, and in spite of the fact there is no necessary connection between sensible qualities and properties, there is very often at least an empirical connection between them, and the generalization of this relation may be rewarding from the theoretical and practical point of view for a very long time even if it has no foundation in reason. Not all poisonous juices are burning or bitter nor is everything which is burning and bitter poisonous. Nevertheless, nature is so constituted that it is more advantageous if thought and action proceed as though this aesthetically satisfying equivalence also corresponded to objective reality.



It seems probable, for reasons which are not relevant here, that species possessing some remarkable characteristics, say, of shape, colour or smell give the observer what might be called a "right pending disproof" to postulate that these visible characteristics are the sign of equally singular, but concealed, properties. To treat the relation between the two as itself sensible (regarding a seed in the form of a tooth as a safeguard against snake bites, yellow juices as a cure for bilious troubles, etc.) is of more value provisionally than indifference to any connection. For even a heterogeneous and arbitrary classification preserves the richness and diversity of the collection of facts it makes. The decision that everything must be taken account of facilitates the creation of a "memory bank". It is moreover a fact that particular results, to the achievement of which methods of this kind were able to lead, were essential to enable man to assail nature from a different angle. Myths and rites are far from being, as has often been held, the product of man's "myth-making faculty", turning its back on reality. Their principal value is indeed to preserve until the present time the remains of methods of observation and reflection which were (and no doubt still are) precisely adapted to discoveries of a certain type: those which nature authorized from the starting point of a speculative organization and exploitation of the sensible world in sensible terms. This science of the concrete was necessarily restricted by its essence to results other than those destined to be achieved by the exact natural sciences but it was no less scientific and its results no less genuine. They were secured ten thousand years earlier and still remain at the basis of our own civilization.

The worst labyrinth is not that intricate form that can entrap us forever but a single and precise straight line.

JORGE LUIS BORGES



# LAW, LEGISLATION AND LIBERTY

# FRIEDRICH HAYEK

# 1973

## Cosmos and Taxis

*The man of system… seems to imagine that he can arrange the different members of a great society with as much ease as the hand arranges the different pieces upon a chessboard. He does not consider that the pieces upon the chessboard have no other principle of motion besides that which the hand impresses upon them; but that, in the great chessboard of human society, every single piece has a principle of motion of its own, altogether different from that which the legislature might choose to impress upon it. If those two principles coincide and act in the same direction, the game of human society will go on easily and harmoniously, and is very likely to be happy and successful. If they are opposite or different, the game will go on miserably and human society must be at all times in the highest degree of disorder.*
Adam Smith

## The concept of order

The central concept around which the discussion of this book will turn is that of order, and particularly the distinction between two kinds of order which we will provisionally call "made" and "grown" orders. Order is an indispensable concept for the discussion of all complex

phenomena, in which it must largely play the role the concept of law plays in the analysis of simpler phenomena.[1] There is no adequate term other than "order" by which we can describe it, although "system", "structure" or "pattern" may occasionally serve instead. The term "order" has, of course, a long history in the social sciences[2], but in recent times it has generally been avoided, largely because of the ambiguity of its meaning and its frequent association with authoritarian views. We cannot do without it, however, and shall have to guard against misinterpretation by sharply defining the general sense in which we shall employ it and then clearly distinguishing between the two different ways in which such order can originate.

By "order" we shall thoughout describe *a state of affairs in which a multiplicity of elements of various kinds are so related to each other that we may learn from our acquaintance with some spatial or temporal part of the whole to form correct expectations concerning the rest, or at least expectations which have a good chance of proving correct.*[3] It is clear that every society must in this sense possess an order and that such an order will often exist without having been deliberately created. As has been said by a distinguished social anthropologist, "that there is some order, consistency and constancy in social life, is obvious. If there were not, none of us would be able to go about our affairs or satisfy our most elementary needs."[4]

Living as members of society and dependent for the satisfaction of most of our needs on various forms of co-operation with others, we depend for the effective pursuit of our aims clearly on the correspondence of the expectations concerning the actions of others on which our plans are based with what they will really do. This matching of the intentions and expectations that determine the actions of different individuals is the form in



which order manifests itself in social life; and it will be the question of how such an order does come about that will be our immediate concern. The first answer to which our anthropomorphic habits of thought almost inevitably lead us is that it must be due to the design of some thinking mind.[5] And because order has been generally interpreted as such a deliberate *arrangement* by somebody, the concept has become unpopular among most friends of liberty and has been favoured mainly by authoritarians. According to this interpretation order in society must rest on a relation of command and obedience, or a hierarchical structure of the whole of society in which the will of superiors, and ultimately of some single supreme authority, determines what each individual must do.

This authoritarian connotation of the concept of order derives, however, entirely from the belief that order can be created only by forces outside the system (or "exogenously"). It does not apply to an equilibrium set up from within[6] (or "endogenously") such as that which the general theory of the market endeavours to explain. A spontaneous order of this kind has in many respects properties different from those of a made order.

## The two sources of order

The study of spontaneous orders has long been the peculiar task of economic theory, although, of course, biology has from its beginning been concerned with that special kind of spontaneous order which we call an organism. Only recently has there arisen within the physical sciences under the name of cybernetics a special discipline which is also concerned with what are called self-organizing or self-generating systems.[7]

The distinction of this kind of order from one which has been made by somebody putting the elements of a set in their places or directing their movements is indispensable for any understanding of the processes of society as well as for all social policy. There are several terms available for describing each kind of order. The made order which we have already referred to as an exogenous order or an arrangement may again be described as a construction, an artificial order or, especially where we have to deal with a directed social order, as an *organization*. The grown order, on the other hand, which we have referred to as a self-generating or endogenous order, is in English most conveniently described as a *spontaneous order*. Classical Greek was more fortunate in possessing distinct single words for the two kinds of order, namely *taxis* for a made order, such as, for example, an order of battle,[8] and *kosmos* for a grown order, meaning originally "a right order in a state or a community".[9] We shall occasionally avail ourselves of these Greek words as technical terms to describe the two kinds of order.

It would be no exaggeration to say that social theory begins with – and has an object only because of – the discovery that there exist orderly structures which are the product of the action of many men but are not the result of human design. In some fields this is now universally accepted. Although there was a time when men believed that even language and morals had been "invented" by some genius of the past, everybody recognizes now that they are the outcome of a process of evolution whose results nobody foresaw or designed. But in other fields many people still treat with suspicion the claim that the patterns of interaction of many men can show an order that is of nobody's deliberate making; in the economic sphere, in particular, critics still pour uncomprehending ridicule on Adam Smith's expression of the "invisible hand"



by which, in the language of his time, he described how man is led "to promote an end which was no part of his intentions".[10] If indignant reformers still complain of the chaos of economic affairs, insinuating a complete absence of order, this is partly because they cannot conceive of an order which is not deliberately made, and partly because to them an order means something aiming at concrete purposes which is, as we shall see, what a spontaneous order cannot do.

We shall examine later (see volume 2, chapter 10) how that coincidence of expectations and plans is produced which characterizes the market order and the nature of the benefits we derive from it. For the moment we are concerned only with the fact that an order not made by man does exist and with the reasons why this is not more readily recognized. The main reason is that such orders as that of the market do not obtrude themselves on our senses but have to be traced by our intellect. We cannot see, or otherwise intuitively perceive, this order of meaningful actions, but are only able mentally to reconstruct it by tracing the relations that exist between the elelnents. We shall describe this feature by saying that it is an abstract and not a concrete order.

## The distinguishing properties of spontaneous orders

One effect of our habitually identifying order with a made order or *taxis* is indeed that we tend to ascribe to all order certain properties which deliberate arrangements regularly, and with respect to some of these properties necessarily, possess. Such orders are relatively *simple* or at least necessarily confined to such moderate degrees of

complexity as the maker can still survey; they are usually *concrete* in the sense just mentioned that their existence can be intuitively perceived by inspection; and, finally, having been made deliberately, they invariably do (or at one time did) *serve a purpose* of the maker. None of these characteristics necessarily belong to a spontaneous order or *kosmos*. Its degree of complexity is not limited to what a human mind can master. Its existence need not manifest itself to our senses but may be based on purely *abstract* relations which we can only mentally reconstruct. And not having been made it *cannot* legitimately be said to *have a particular purpose*, although our awareness of its existence may be extremely important for our successful pursuit of a great variety of different purposes.

Spontaneous orders are not necessarily complex, but unlike deliberate human arrangements, they may achieve any degree of complexity. One of our main contentions will be that very complex orders, comprising more particular facts than any brain could ascertain or manipulate, can be brought about only through forces inducing the formation of spontaneous orders.

Spontaneous orders need not be what we have called abstract, but they will often consist of a system of abstract relations between elements which are also defined only by abstract properties, and for this reason will not be intuitively perceivable and not recognizable except on the basis of a theory accounting for their character. The significance of the abstract character of such orders rests on the fact that they may persist while all the particular elements they comprise, and even the number of such elements, change. All that is necessary to preserve such an abstract order is that a certain structure of relationships be maintained, or that elements of a certain kind (but variable in number) continue to be related in a certain manner.



Most important, however, is the relation of a spontaneous order to the conception of purpose. Since such an order has not been created by an outside agency, the order as such also can have no purpose, although its existence may be very serviceable to the individuals which move within such order. But in a different sense it may well be said that the order rests on purposive action of its elements, when "purpose" would, of course, mean nothing more than that their actions tend to secure the preservation or restoration of that order. The use of "purposive" in this sense as a sort of "teleological shorthand", as it has been called by biologists, is unobjectionable so long as we do not imply an awareness of purpose of the part of the elements, but mean merely that the elements have acquired regularities of conduct conducive to the maintenance of the order – presumably because those who did act in certain ways had within the resulting order a better chance of survival than those who did not. In general, however, it is preferable to avoid in this connection the term "purpose" and to speak instead of "function".

## Spontaneous orders in nature

It will be instructive to consider briefly the character of some spontaneous orders which we find in nature, since here some of their characteristic properties stand out most clearly. There are in the physical world many instances of complex orders which we could bring about only by availing ourselves of the known forces which tend to lead to their formation, and never by deliberately placing each element in the appropriate position. We can never produce a crystal or a complex organic compound by placing the individual atoms in such a position that they will form the lattice of

a crystal or the system based on benzol rings which make up an organic compound. But we can create the conditions in which they will arrange themselves in such a manner.

What does in these instances determine not only the general character of the crystal or compound that will be formed but also the particular position of anyone element in them? The important point is that the regularity of the conduct of the elements will determine the general character of the resulting order but not all the detail of its particular manifestation. The particular manner in which the resulting abstract order will manifest itself will depend, in addition to the rules which govern the actions of the elements, on their initial position and on all the particular circumstances of the immediate environment to which each of them will react in the course of the formation of that order. The order, in other words, will always be an adaptation to a large number of particular facts which will not be known in their totality to anyone.

We should note that a regular pattern will thus form itself not only if the elements all obey the same rules and their different actions are determined only by the different positions of the several individuals relatively to each other, but also, as is true in the case of the chemical compound, if there are different kinds of elements which act in part according to different rules. Whichever is the case, we shall be able to predict only the general character of the order that will form itself, and not the particular position which any particular element will occupy relatively to any other element.

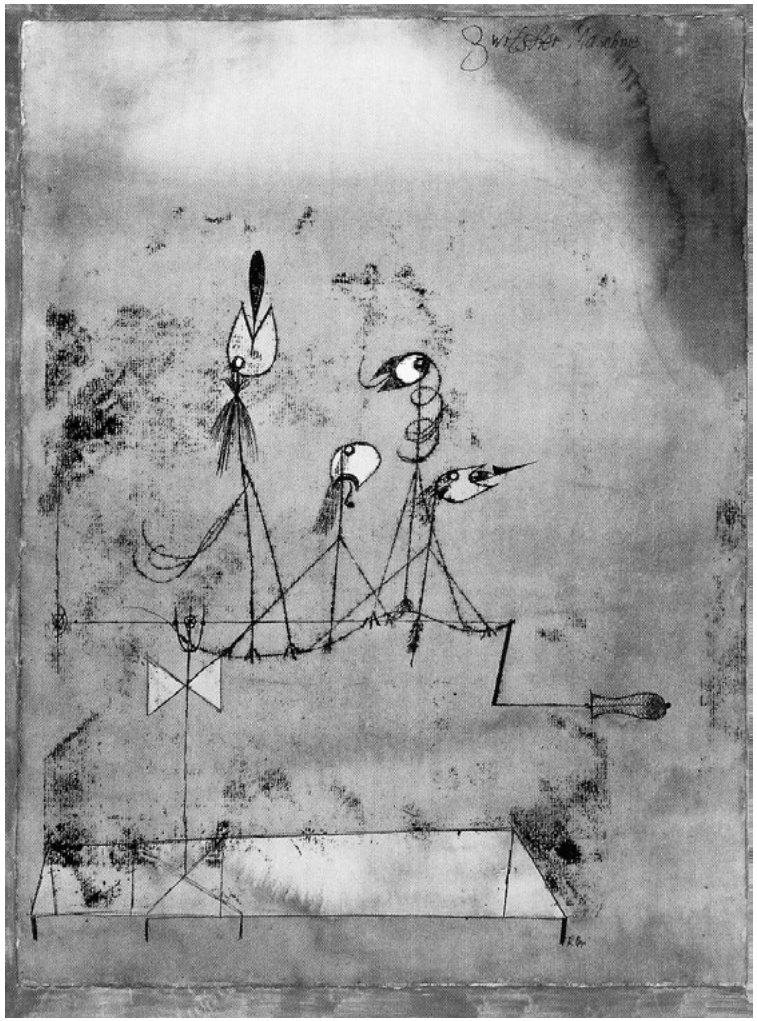
Another example from physics is in some respects even more instructive. In the familiar school experiment in which iron filings on a sheet of paper are made to arrange themselves along some of the lines of force of a magnet placed below, we can predict the general shape of



the chains that will be formed by the filings hooking themselves together; but we cannot predict along which ones of the family of an infinite number of such curves that define the magnetic field these chains will place themselves. This will depend on the position, direction, weight, roughness or smoothness of each of the iron filings and on all the irregularities of the surface of the paper. The forces emanating from the magnet and from each of the iron filings will thus interact with the environment to produce a unique instance of a general pattern, the general character of which will be determined by known laws, but the concrete appearance of which will depend on particular circumstances we cannot fully ascertain.

1 See my essay on "The theory of complex phenomena", in F. A. Hayek, *Studies in Philosophy, Politics and Economics* (London and Chicago, 1967, henceforth referred to as *S.P.P.E.)*. It was in fact at first entirely the result of methodological considerations that led me to resume the use of the unpopular concept of "order": see also F. A. Hayek, *The Counter-Revolution of Science* (Chicago, 1952), p. 39: "If social phenomena showed no order except in so far as they were consciously designed, there would indeed be no room for a theoretical science of society and there would be, as is often maintained, only problems of psychology." In recent discussion the term "system" is often used in much the same sense in which I use here "order", which still seems to me preferable. 2 It would seem that the currency of the concept of order in political theory goes back to St Augustine. See in particular his dialogue *Ordo* in J. P. Migne (ed) *Patrologiae cursus completus sec. lat.* 32/47 (Paris, 1861-2), and in a German version *Die Ordnung*, trans. C. J. Peel, fourth edition (Paderborn, 1966). 3 See L. S. Stebbing, *A Modern Introduction to Logic* (London, 1933), p. 228: "When we know how a set of elements is ordered, we have a basis for inference." See also Immanuel Kant, *Werke* (Akademie Ausgabe), *Nachlass*, vo16, p. 669: "Ordnung ist die Zusammenfügung nach Regeln." 4 See E. E. Evans-Pritchard, *Social Anthropology* (London, 1951), p. 49; see also ibid., p. 19: It is evident that there must be uniformities and regularities in social life, that society must have some sort of order, or its members could not live together. It is

only because people know the kind of behaviour expected of them, and what kind of behaviour to expect from others, in the various situations of life, and coordinate their activities in submission to rules and under the guidance of values that each and all are able to go about their affairs. They can make predictions, anticipate events, and lead their lives in harmony with their fellows because every society has a form or pattern which allows us to speak of it as a system, or structure, within which, and in accordance with which, its members live their lives. 5 See L. S. Stebbing, op. cit., p. 229: "Order is most *apparent* where man has been at work." 6 See J. Ortega y Gasset, *Mirabeau o el politico* (1927), in *Obras Completas* (Madrid, 1947), vol. 3, p. 603: "Orden no es una presion que desde fuera se ejerce sabra la sociedad, sin un equilibrio que se suscita en su interior." 7 See H. von Foerster and G. W. Zopf, Jr (eds) *Principles of Self-Organization* (New York, 1962) and, on the anticipation of the main conceptions of cybernetics by Adam Smith, cf. G. Hardin, *Nature and Man's Fate* (New York, 1961), p. 54; and Dorothy Emmet, *Function, Purpose and Powers* (London, 1958), p. 90. 8 See H. Kuhn, "Ordnung im Werden und Zerfall", in H. Kuhn and F. Wiedmann (eds), *Das Problem der Ordnung* (Sechster Deutscher Kongress fur Philosophie, Munich, 1960, publ. Meisenheim am Glan, 1962), especially p. 17. 9 See Werner Jaeger, *Paideia: The Ideals of Greek Culture*, trans. G. Highet, vol. I, second edition (New York, 1945), p. 110, about "Anaximander of Miletus transferring the concept of *dike* from the social life of the city-state to the realm of nature. …This is the original of the philosophical idea of cosmos: for the word originally signified the *right order* in a state or in a community"; and ibid., p. 179: "So the physicist's cosmos became by a curious retrogression in thought, the pattern of eunomia in human society." See also the same author's "Praise of law" in P. Sayre (ed), *Interpretations of Modern Legal Philosophies: Essays in Honor of Roscoe Pound* (New York, 1947), especially p. 358: A world thus "justified" could be called rightly by another term taken over from the social order, a cosmos. That word occurs for the first time in the language of the Ionian philosophers; by taking this step and extending the rule of *dike* to reality as a whole they clearly revealed the nature of Greek legal thought and showed that it was based on the relationship ofjustice to being. And ibid., p. 361: "The law on which it [the *polis]* was founded was not a mere decree but the *nomos*, which originally meant the sum total of that which was respected by all living custom with regard to what is right and wrong"; and ibid., p. 365 on the fact that even during the period of the dissolution of the old Greek faith in law: "the strict relationship of the *nomos* to the nature of the cosmos was not universally questioned." For Aristotle, who connects *nomos* with *taxis* rather than *kosmos* (see *Politics*, 1287a, 18, and especially 1326a, 30: *ho te gar nomos taxis tis esti)*, it is characteristically inconceivable that the order resulting from the *nomos* should exceed what the orderer can survey, "for who will command its over-swollen multitude in war? or who will serve as its herald, unless he had the lungs of Stentor?" The creation of order in such a multitude is for him a task only the gods can achieve. Elsewhere *(Ethics*, IX, x, §3) he even argues that a state, i.e. an ordered society, of a hundred thousand people is impossible. 10 Adam Smith, *Wealth of Nations*, edited by E. Cannan, vol. I, p. 421.



PAUL KLEE, TWITTERING MACHINE (1922)



# A THOUSAND PLATEAUS

## GILLES DELEUZE
## FÉLIX GUATTARI

## 1980

### 1837: Of the Refrain

I A child in the dark, gripped with fear, comforts himself by singing under his breath. He walks and halts to his song. Lost, he takes shelter, or orients himself with his little song as best he can. The song is like a rough sketch of a calming and stabilizing, calm and stable, center in the heart of chaos. Perhaps the child skips as he sings, hastens or slows his pace. But the song itself is already a skip: it jumps from chaos to the beginnings of order in chaos and is in danger of breaking apart at any moment. There is always sonority in Ariadne's thread. Or the song of Orpheus.

II Now we are at home. But home does not preexist: it was necessary to draw a circle around that uncertain and fragile center, to organize a limited space. Many, very diverse, components have a part in this, landmarks and marks of all kinds. This was already true of the previous case. But now the components are used for organizing a space, not for the momentary determination of a center. The forces of chaos are kept outside as much as possible, and the interior space protects the germinal forces of a task to fulfill or a deed to do. This involves an activity of selection, elimination and extraction, in order to prevent the interior forces of the earth from being submerged, to

enable them to resist, or even to take something from chaos across the filter or sieve of the space that has been drawn. Sonorous or vocal components are very important: a wall of sound, or at least a wall with some sonic bricks in it. A child hums to summon the strength for the schoolwork she has to hand in. A housewife sings to herself, or listens to the radio, as she marshals the anti-chaos forces of her work. Radios and tv sets are like sound walls around every household and mark territories (the neighbor complains when it gets too loud). For sublime deeds like the foundation of a city or the fabrication of a golem, one draws a circle, or better yet walks in a circle as in a children's dance, combining rhythmic vowels and consonants that correspond to the interior forces of creation as to the differentiated parts of an organism. A mistake in speed, rhythm, or harmony would be catastrophic because it would bring back the forces of chaos, destroying both creator and creation.

III Finally, one opens the circle a crack, opens it all the way, lets someone in, calls someone, or else goes out oneself, launches forth. One opens the circle not on the side where the old forces of chaos press against it but in another region, one created by the circle itself. As though the circle tended on its own to open onto a future, as a function of the working forces it shelters. This time, it is in order to join with the forces of the future, cosmic forces. One launches forth, hazards an improvisation. But to improvise is to join with the World, or melt with it. One ventures from home on the thread of a tune. Along sonorous, gestural, motor lines that mark the customary path of a child and graft themselves onto or begin to bud "lines of drift" with different loops, knots, speeds, movements, gestures, and sonorities.[1]

These are not three successive moments in an evolution. They are three aspects of a single thing, the



Refrain *(ritournelle)*. They are found in tales (both horror stories and fairy tales), and in *lieder* as well. The refrain has all three aspects, it makes them simultaneous or mixes them: sometimes, sometimes, sometimes. Sometimes chaos is an immense black hole in which one endeavors to fix a fragile point as a center. Sometimes one organizes around that point a calm and stable "pace" (rather than a form): the black hole has become a home. Sometimes one grafts onto that pace a breakaway from the black hole. Paul Klee presented these three aspects, and their interlinkage, in a most profound way. He calls the black hole a "gray point" for pictorial reasons. The gray point starts out as non-localizable, non-dimensional chaos, the force of chaos, a tangled bundle of aberrant lines. Then the point "jumps over itself and radiates a dimensional space with horizontal layers, vertical cross sections, unwritten customary lines, a whole terrestrial interior force (this force also appears, at a more relaxed pace, in the atmosphere and in water). The gray point (black hole) has thus jumped from one state to another, and no longer represents chaos but the abode or home. Finally, the point launches out of itself, impelled by wandering centrifugal forces that fan out to the sphere of the cosmos: one "tries convulsively to fly from the earth, but at the following level one actually rises above it powered by centrifugal forces that triumph over gravity."[2]

The role of the refrain has often been emphasized: it is territorial, a territorial assemblage. Bird songs: the bird sings to mark its territory. The Greek modes and Hindu rhythms are themselves territorial, provincial, regional. The refrain may assume other functions, amorous, professional or social, liturgical or cosmic: it always carries earth with it; it has a land (sometimes a spiritual land) as its concomitant; it has an essential relation to a Natal, a Native. A musical "nome" is a little tune,

a melodic formula that seeks recognition and remains the bedrock or ground of polyphony (*cantus firmus*). The *nomos* as customary, unwritten law is inseparable from a distribution of space, a distribution in space. By that token, it is *ethos*, but the ethos is also the Abode.[3] Sometimes one goes from chaos to the threshold of a territorial assemblage: directional components, infra-assemblage. Sometimes one organizes the assemblage: dimensional components, intra-assemblage. Sometimes one leaves the territorial assemblage for other assemblages, or for somewhere else entirely: interassemblage, components of passage or even escape. And all three at once. Forces of chaos, terrestrial forces, cosmic forces: all of these confront each other and converge in the territorial refrain.

From chaos, *Milieus* and *Rhythms* are born. This is the concern of very ancient cosmogonies. Chaos is not without its own directional components, which are its own ecstasies. We have seen elsewhere how all kinds of milieus, each defined by a component, slide in relation to one another, over one another. Every milieu is vibratory, in other words, a block of space-time constituted by the periodic repetition of the component. Thus, the living thing has an exterior milieu of materials, an interior milieu of composing elements and composed substances, an intermediary milieu of membranes and limits, and an annexed milieu of energy sources and actions-perceptions. Every milieu is coded, a code being defined by periodic repetition; but each code is in a perpetual state of transcoding or transduction. Transcoding or transduction is the manner in which one milieu serves as the basis for another, or conversely is established atop another milieu, dissipates in it or is constituted in it. The notion of the milieu is not unitary: not only does the living thing continually pass from one milieu to another, but the milieus pass into one



another, they are essentially communicating. The milieus are open to chaos, which threatens them with exhaustion or intrusion. Rhythm is the milieus' answer to chaos. What chaos and rhythm have in common is the in-between – between two milieus, rhythm-chaos or the chaosmos: "*Between* night and day, between that which is constructed and that which grows naturally, between mutations from the inorganic to the organic, from plant to animal, from animal to humankind, yet without this series constituting a progression…" In this in-between, chaos becomes rhythm, not inexorably, but it has a chance to. Chaos is not the opposite of rhythm, but the milieu of all milieus. There is rhythm whenever there is a transcoded passage from one milieu to another, a communication of milieus, coordination between heterogeneous space-times. Drying up, death, intrusion have rhythm. It is well known that rhythm is not meter or cadence, even irregular meter or cadence: there is nothing less rhythmic than a military march. The tom-tom is not 1-2, the waltz is not 1, 2, 3, music is not binary or ternary, but rather forty-seven basic meters, as in Turkish music. Meter, whether regular or not, assumes a coded form whose unit of measure may vary, but in a noncommunicating milieu, whereas rhythm is the Unequal or the Incommensurable that is always undergoing transcoding. Meter is dogmatic, but rhythm is critical; it ties together critical moments or ties itself together in passing from one milieu to another. It does not operate in a homogeneous space-time, but by heterogeneous blocks. It changes direction. Bachelard is right to say that "*the link between truly active moments (rhythm) is always effected on a different plane from the one upon which the action is carried out.*"[4] Rhythm is never on the same plane as that which has rhythm. Action occurs in a milieu, whereas rhythm is located between two milieus, or between two inter-mi-

lieus, on the fence, between night and day, at dusk, *twilight* or *Zwielicht*, Haecceity. To change milieus, taking them as you find them: Such is rhythm. Landing, splashdown, takeoff. This easily avoids an aporia that threatened to introduce meter into rhythm, despite all the declarations of intent to the contrary: How can one proclaim the constituent inequality of rhythm while at the same time admitting implied vibrations, periodic repetitions of components? A milieu does in fact exist by virtue of a periodic repetition, but one whose only effect is to produce a difference by which the milieu passes into another milieu. It is the difference that is rhythmic, not the repetition, which nevertheless produces it: productive repetition has nothing to do with reproductive meter. This is the "critical solution of the antinomy."

One case of transcoding is particularly important: when a code is not content to take or receive components that are coded differently, and instead takes or receives fragments of a different code as such. The first case pertains to the leaf-water relation, the second to the spider-fly relation. It has often been noted that the spider web implies that there are sequences of the fly's own code in the spider's code; it is as though the spider had a fly in its head, a fly "motif," a fly "refrain". The implication may be reciprocal, as with the wasp and the orchid, or the snapdragon and the bumblebee. Jakob von Uexkull has elaborated an admirable theory of transcoding. He sees the components as melodies in counterpoint, each of which serves as a motif for another: Nature as music.[5] Whenever there is transcoding, we can be sure that there is not a simple addition, but the constitution of a new plane, as of a surplus value. A melodic or rhythmic plane, surplus value of passage or bridging. The two cases, however, are never pure; they are in reality mixed (for example, the relation



of the leaf, this time not to water in general but to rain. [...]

Human music also goes this route. For Swann, the art lover, Vinteuil's little phrase often acts as a placard associated with the Bois de Boulogne and the face and character of Odette: as if it reassured Swann that the Bois de Boulogne was indeed his territory, and Odette his possession. There is already something quite artistic in this way of hearing music. Debussy criticized Wagner, comparing his leitmotifs to signposts signaling the hidden circumstances of a situation, the secret impulses of a character. The criticism is accurate, on one level or at certain moments. But as the work develops, the motifs increasingly enter into conjunction, conquer *their own plane*, become autonomous from the dramatic action, impulses, and situations, and independent of characters and landscapes; they themselves become melodic landscapes and rhythmic characters continually enriching their internal relations. They may then remain relatively constant, or on the contrary grow or diminish, expand or contract, vary in the speed at which they unfold: in both cases, they are no longer pulsed and localized, and even the constants are in the service of variation; the more provisory they are, the more they display the continuous variation they resist, the more rigid they become.[14] Proust was among the first to underscore this life of the Wagnerian motif. Instead of the motif being tied to a character who appears, the appearance of the motif itself constitutes a rhythmic character in "the plenitude of a music that is indeed filled with so many strains, each of which is a being."[15] It is not by chance that the apprenticeship of the *Recherche* pursues an analogous discovery in relation to Vinteuil's little phrases: they do not refer to a landscape; they carry and

develop within themselves landscapes that do not exist on the outside (the white sonata and red septet…). The discovery of the properly melodic landscape and the properly rhythmic character marks the moment of art when it ceases to be a silent painting on a signboard. This may not be art's last word, but art went that route, as did the bird: motifs and counterpoints that form an auto-development, in other words, a style. The interiorization of the melodic or sonorous landscape finds its exemplary form in Liszt and that of the rhythmic character in Wagner. More generally, the lied is the musical art of the landscape, the most pictorial, impressionist form of music. But the two poles are so closely bound that in the lied as well Nature appears as a rhythmic character with infinite transformations.

The territory is first of all the critical distance between two beings of the same species: Mark your distance. What is mine is first of all my distance; I possess only distances. Don't anybody touch me, I growl if anyone enters my territory, I put up placards. Critical distance is a relation based on matters of expression. It is a question of keeping at a distance the forces of chaos knocking at the door. *Mannerism:* the ethos is both abode and manner, homeland and style. This is evident in territorial dances termed baroque or mannerist, in which each pose, each movement, establishes a distance of this kind (sarabands, allemandes, bourrées, gavottes).[16] There is a whole art of poses, postures, silhouettes, steps, and voices. Two schizophrenics converse or stroll according to laws of boundary and territory that may escape us. How very important it is, when chaos threatens, to draw an inflatable, portable territory. If need be, I'll put my territory on my own body, I'll territorialize my body: the house of the tortoise, the hermitage of the crab, but also tattoos that make the body



a territory. Critical distance is not a meter, it is a rhythm. But the rhythm, precisely, is caught up in a becoming that sweeps up the distances between characters, making them rhythmic characters that are themselves more or less distant, more or less combinable (intervals). Two animals of the same sex and species confront each other: the rhythm of the first one "expands" when it approaches its territory or the center of its territory; the rhythm of the second contracts when it moves away from its territory. Between the two, at the boundaries, an oscillational constant is established: an active rhythm, a passively endured rhythm, and a witness rhythm?[17] Or else the animal opens its territory a crack for a partner of the opposite sex: a complex rhythmic character forms through duets, antiphonal or alternating singing, as in the case of African shrikes. Furthermore, we must simultaneously take into account two aspects of the territory: it not only ensures and regulates the coexistence of members of the same species by keeping them apart but makes possible the coexistence of a maximum number of different species in the same milieu by specializing them. Members of the same species enter into rhythmic characters at the same time as different species enter into melodic landscapes; for the landscapes are peopled by characters and the characters belong to landscapes. An example is Messiaen's *Chronochromie*, with its eighteen bird songs forming autonomous rhythmic characters and simultaneously realizing an extraordinary landscape in complex counterpoint, with invented or implicit chords.

Not only does art not wait for human beings to begin, but we may ask if art ever appears among human beings, except under artificial and belated conditions. It has often been noted that human art was for a long time bound up with work and rites of a different nature. Saying

this, however, perhaps has no more weight than saying that art begins with human beings. For it is true that a territory has two notable effects: a reorganization of functions and a regrouping of ferees. On the one hand, when functional activities are territorialized they necessarily change pace (the creation of new functions such as building a dwelling, or the transformation of old functions, as when aggressiveness changes nature and becomes intraspecific). This is like a nascent theme of specialization or professionalism: if the territorial refrain so often passes into professional refrains, it is because professions assume that various activities are performed in the same milieu, and that the same activity has no other agents in the same territory. Professional refrains intersect in the milieu, like merchants' cries, but each marks a territory within which the same activity cannot be performed, nor the same cry ring out. In animals as in human beings, there are rules of critical distance for competition: my stretch of sidewalk. In short, a territorialization of functions is the condition for their emergence as "occupations" or "trades." Thus, intraspecific or specialized aggressiveness is necessarily a territorialized aggressiveness; it does not explain the territory since it itself derives from it. It is immediately apparent that all activities within the territory adopt a new practical pace. But that is no reason to conclude that art in itself does not exist here, for it is present in the territorializing factor that is the necessary condition for the emergence of the work-function.

The situation is the same if we consider the other effect of territorialization. That other effect, which relates not to occupations but to rites and religions, consists in this: the territory groups all the forces of the different milieus together in a single sheaf constituted by the forces of the earth. The attribution of all the diffuse forces to the



earth as receptacle or base takes place only at the deepest level of each territory. "The surrounding milieu was experienced as a unity; it is very hard to distinguish in these primal intuitions what belongs properly to the earth from what is merely manifested through the earth: mountains, forests, water, vegetation."[18] The forces of air and water, bird and fish, thus become forces of the earth. Moreover, although in extension the territory separates the interior forces of the earth from the exterior forces of chaos, the same does not occur in "intension," in the dimension of depth, where the two types of force clasp and are wed in a battle whose only criterion and stakes is the earth. There is always a place, a tree or grove, in the territory where all the forces come together in a hand-to-hand combat of energies. The earth is this close embrace.[19] This intense center is simultaneously inside the territory, and outside several territories that converge on it at the end of an immense pilgrimage (hence the ambiguities of the "natal"). Inside or out, the territory is linked to this intense center, which is like the unknown homeland, terrestrial source of all forces friendly and hostile, where everything is decided.[20] So, we must once again acknowledge that religion, which is common to human beings and animals, occupies territory only because it depends on the raw aesthetic and territorializing factor as its necessary condition. It is this factor that at the same time organizes the functions of the milieu into occupations and binds the forces of chaos in rites and religions, which are forces of the earth. *Territorializing marks simultaneously develop into motifs and counterpoints and reorganize functions and regroup forces.* But by virtue of this, the territory already unleashes something that will surpass it.

We always come back to this "moment": the becoming-expressive of rhythm, the emergence of expres-

sive proper qualities, the formation of matters of expression that develop into motifs and counterpoints. We therefore need a notion, even an apparently negative one, that can grasp this fictional or raw moment. The essential thing is the disjunction noticeable between the code and the territory. The territory arises in a free margin of the code, one that is not indeterminate but rather is determined differently. Each milieu has its own code, and there is perpetual transcoding between milieus; the territory, on the other hand, seems to form at the level of a certain *decoding*. Biologists have stressed the importance of these determined margins, which are not to be confused with mutations, in other words, changes internal to the code: here, it is a question of duplicated genes or extra chromosomes that are not inside the genetic code, are free of function, and offer a free matter for variation.[21] But it is very unlikely that this kind of matter could create new species independently of mutations, unless it were accompanied by events of another order capable of multiplying the interactions of the organism with its milieus. Territorialization is precisely such a factor that lodges on the margins of the code of a single species and gives the separate representatives of that species the possibility of differentiating. It is because there is a disjunction between the territory and the code that the territory can indirectly induce new species. Wherever territoriality appears, it establishes an intraspecific *critical distance* between members of the same species; it is by virtue of its own disjunction in relation to specific differences that it becomes an oblique, indirect means of differentiation. From all of these standpoints, decoding appears as the "negative" of the territory, and the most obvious distinction between territorial animals and nonterritorial animals is that the former are much less coded than the latter. We have said enough bad things



about the territory that we can now evaluate all the creations that tend toward it, occur within it, and result or will result from it.

We have gone from forces of chaos to forces of the earth. From milieus to territory. From functional rhythms to the becoming-expressive of rhythm. From phenomena of transcoding to phenomena of decoding. From milieu functions to territorialized functions. It is less a question of evolution than of passage, bridges and tunnels. We saw that milieus continually pass into one another. Now we see that the milieus pass into the territory. The expressive qualities we term aesthetic are certainly not "pure" or symbolic qualities but proper qualities, in other words, appropriative qualities, passages from milieu components to territory components. The territory itself is a place of passage. The territory is the first assemblage, the first thing to constitute an assemblage; the assemblage is fundamentally territorial. But how could it not already be in the process of passing into something else, into other assemblages? That is why we could not talk about the constitution of the territory without also talking about its internal organization. We could not describe the infra-assemblage (posters or placards) without also discussing the intra-assemblage (motifs and counterpoints). Nor can we say anything about the intra-assemblage without already being on the path to other assemblages, or elsewhere. The passage of the Refrain. The refrain moves in the direction of the territorial assemblage and lodges itself there or leaves. In a general sense, *we call a refrain any aggregate of matters of expression that draws a territory and develops into territorial motifs and landscapes* (there are optical, gestural, motor, etc., refrains). In the narrow sense, we speak of a refrain when an assemblage is sonorous or "dominated" by sound – but why do we assign this apparent privilege to sound?

1 Fernand Deligny, *Voix et Voir*; *Recherches*, no. 8 (April 1975), on the way in which, among autistic children, a "line of drift" deviates from the customary path and begins to "vibrate," "toss about," "yaw." 2 Paul Klee, *On Modern Art*, trans. Paul Findlay, intro. Herbert Reed (London: Faber, 1966), p. 43 [translation modified to agree with the French version cited by the authors]. See Henri Maldiney's comments in *Regard*, *parole*, *espace* (Lausanne: L'Age d'homme, 1973), pp. 149-151. 3 On the musical nome, the ethos, and the ground or land, notably in polyphony, see Joseph Samson in *Histoire de la musique*, ed. Roland Manuel (Paris: Gallimard, 1977), vol. 2, pp. 1168-1172. One may also refer to the role in Arab music of the "maqam," which is both a modal type and a melodic formula: Simon Jargy, *La musique arabe* (Paris: PUF, 1971), pp. 55ff. 4 Gaston Bachelard, *La dialectique de la durée* (Paris: Bovin, 1936), pp. 128-129. Emphasis added. 5 Jakob Johann von Uexkiill, *Mondesanimauxet mondehumain* (Paris: Gonthier, 1965). [...] 13 On all of these points, see Claude Samuel, *Conversations*, chapter 4, On the "rhythmic character," see pp. 36-39. 14 Pierre Boulez, "Le temps recherche," in *Das Rheingold Programmheft*, vol. 1 (Bayreuth, 1976), pp. 5-15. 15 [TRANS: Proust, *The Captive*, vol. 3 of *Remembrance of Things Past*, trans. C. K. Scott Moncrief, Terence Kilmartin, and Andreas Mayor (New York: Random House, 1981), p. 156. Translation modified.] 16 On mannerism and chaos, baroque dances, and the relation of schizophrenia to mannerism and dance, see Evelyne Sznycer, "Droit de suite baroque," in *Schizophrenic et art*, ed. Leo Navratil (Paris: Ed. Complexe, 1978). 17 Lorenz, *On Aggression*, pp. 39-40. On the three rhythmic personages defined respectively as active, passive, and witness, see Messiaen and Golea, *Rencontres*, pp. 90-91. 18 [TRANS: Mircea Eliade, *Patterns in Comparative Religion*, trans. Rosemary Sheed (New York: World, 1963), pp. 242-243.] 19 [TRANS: This "close embrace" of energies recalls Proust's description of Vinteuil's little phrase; *The Captive*, p. 262.] 20 On "the primary intuition of the earth as a religious form" (p. 242), see Eliade, *Patterns in Comparative Religion*, pp. 245ff.; on the center of the territory, see pp. 374ff. Eliade makes it clear that the center is simultaneously outside the territory, very difficult to attain, and inside the territory, within our immediate reach. 21 Biologists have often made a distinction between two factors of transformation: those of the mutation type, and processes of isolation or separation, which may be genetic, geographical, or even psychical. Territoriality would be a factor of the second type. See Lucien Cuenot, *L'espece* (Paris: G. Doin, 1936).

Order, may it be that of poetic content or of fictional signs, that of terror or of plausibility, order is an intentional murder.

**ROLAND BARTHES, WRITING DEGREE ZERO (1953)**



# THE AESTHETICS OF CHAOSMOS

# UMBERTO ECO

# 1962

## Finnegans Wake

It may seem that *Ulysses* violates the techniques of the novel beyond all limit, but *Finnegans Wake* passes even this limit. It may seem that *Ulysses* demonstrates all the possibilities of language, but *Finnegans Wake* takes language beyond any boundary of communicability. It may seem that *Ulysses* represents the most arduous attempt to give a physiognomy to chaos, but *Finnegans Wake* defines itself as *Chaosmos* and *Microchasm* and constitutes the most terrifying document of formal instability and semantic ambiguity that we possess.

What project was Joyce pursuing in beginning this work seventeen years before giving it definitively to print? The answer is complex of one follows the mass of proposals, critical observations and explanations that the author gives of his *Work in Progress* in the various letters and oral declarations from 1923 to 1939.[1] A search for the poetics of the *Wake*, a poetics understood as a system of operative rules that preside in making the work, becomes a desperate task because the various drafts show that these rules change as the work progresses and that final design is very different from the first one. The book as we shall see, is the continuous poetics of itself, and an examination of the work from any of its parts will help us clarify the ideas upon which it is based.

According to the early, since *Ulysses* is the story of a day, *Finnegans Wake* will be the story of a night. Thus,

from the very beginning the idea of sleep and dream presides over the general design of the work which arranges itself, Joyce notes, a piece at a time like a mah jong puzzle:

> *In writing of the night I really could not, I felt I could not, use words in their ordinary connections. Used that way, they do not express how things are in the night, in the different stages – conscious, then semi-conscious, then unconscious. I found that it could not be done with words in their ordinary relations and connections. When morning comes, of course, everything will be clear again.*
> Eastman, 1931

Joyce lived in Zurich, in the very years in which Freud and Jung were publishing some of their principal works. While he showed no interest in the fathers of psychoanalysis, Ellmann speaks of his deep sensitivity for oneiric experience. The *Wake* must have been constructed according to the logic of a dream, where the identities of people are confused and exchanged, and a single idea, or the memory of a single fact, takes shape in a series of strangely connected symbols. The same thing happens to the words, which are merged in the most free and unexpected way, in order to suggest a series of disparate ideas with a single expression. This too is oneiric logic, but it is also a linguistic technique whose use has illustrious precedents. The church was founded on a calembour, Joyce recalls ("Tu es Petrus, etc…"), and such an example constitutes sufficient authorization. From the beginning, *Finnegans Wake* announces what it will be – a nocturnal epic of ambiguity and metamorphoses, the myth of a death and a universal rebirth in which each figure and each work will stand in place of all others. It will be an epic without clear divisions between the events, so that each event may implicate the others to



form an elementary unity that does not exclude the collision and opposition between contraries.

## The Poetics of Vico's Cycles

Having determined what Joyce wished to do, we must now ask why he proposed this task. What did the project of the new work offer him after *Ulysses*? Since *Ulysses* is an example of a paradoxical equilibrium among the forms of a rejected world and the disordered substance of the new, then the successive work will strive to be a representation of the chaos and the multiplicity within which the author seeks the most congenial models of order. The cultural experience that inspired this decision was the reading of Vico.

We say "reading" and not "acceptance." As Joyce has explicitly affirmed, he did not find in Vico a philosophy in which "to believe" but an author who stimulated his imagination and opened new horizons. Upon finishing *Ulysses*, Joyce had succeeded in collecting the vivacity of lived experience but was forced to imprison it in the net of a foreign cultural order. In Vico he discovered new issues. Joyce already knew Vico, but when considering the new project, he felt the need to read his words more attentively, particularly *La Scienza Nuova*. In 1926 Joyce writes that he would like to draw selectively upon the theories of Vico, using them only insofar as they are useful to him. But these theories became increasingly important in his eyes and serve to mark various phases of his life (L 241). Joyce could not avoid associating Viconian teachings with ideas assimilated from contemporary philosophy and science. In a letter dated 1927 (L 249) a rather obscure reference appears in which the name of Vico is associated not only with Croce, which would be natural, but Einstein.

It is understandable that Joyce was struck primarily by Vico's need for a world order not to be sought outside events, as in *Ulysses*, but within these very events, within the heart of a history that was envisioned as alternating *corsi* and *ricorsi*. Joyce freely associated this theory with oriental conceptions of the circularity of Being. Thus, in the fabric of the *Wake*, the historicist theory of *ricorsi* becomes an esoteric notion of an "eternal return" in which the historical aspect of development is overlaid by the circular identity of everything and the continuous reproposing of original archetypes. The assimilation of oriental concepts into a Viconian philosophy reveals the syncretism typical of Joyce's ideological choices. Joyce, in fact, has said that the Neapolitan philosopher helped to stimulate his own fantasy rather than to discover any "science".

Vico was also useful by providing Joyce with a developmental schema for his Brunian and Cusanian convictions, a model in which he might locate the movement of oppositions within a dynamic framework. Vico must also have impressed Joyce by the enthusiasm with which he stressed the importance of myth and language, his vision of a primitive society which creates, by linguistic "tropes", its own image of the world. Joyce was undoubtedly struck by Vico's image of those "few giants" (and Finn MacCool was a giant) who notice for the first time the divine voice through the thunder ("quando il ciel finalmente folgorò, tuonò con folgori et tuoni spaventosissimi", Book 11) and feel the need to name the unknown. When the thunder of *Scienza Nuova* appears in the first page of *Finnegans Wake*, it has been translated into a sort of "gestural" and mimetic language. This language is primitive and barbaric because it is basically onomatopoeic. At the same time, it is overloaded with culture because it is built upon the linguistic fragments of previous languages by juxtaposing different



foreign synonyms of the word "thunder": "bababadalgharaghtakamminarronnkonnbronntonnerronntuonnthunntrovarrhounawnskawntoohoohoordenenthrunuk!"

Joyce must have derived from Vico the need for a "mental language common for all nations", interpreting it in a personal way within the polyglotism of the *Wake*. Joyce also learned the value of the philological sciences which discover, through language, the property and the origin of things "according to the order of ideas by which the history of language must proceed."[3] He also assimilated the foundation and philological interpretation of myth and comparative languages. In addition, he learned to collect "the great pieces of antiquity". Joyce accomplished all these things at the level of language, in his own way.

Joyce also drew upon Vico's justification of a primitive poetic logic in which one speaks according to "un parlare fantastic per sostanze animate", a poetic logic based on the *primi tropi*, the elementary tropes, the basic rhetorical figures. Among those "the brightest is the metaphor, and because it is the brightest, it is the most necessary and complex and is ever praised for it confers sense and passion upon meaningless things" (*Scienza Nuova*, II).

Also from Vico is the idea that fallen man, having lost any hope of being helped by Nature, look to superior thing for salvation. Joyce, with his taste for compromise, couples this Viconian striving for salvation with the Brunian idea of the discovery of a god within the unity of the world and not beyond it. With these elements Joyce designs an image of the earthly cycle, with its *corsi* and *ricorsi*, that achieves salvation through the acceptance of the circularity through which it infinitely unfolds. Challenged by Vico's pages on the creativity of language, Joyce assimilates nature to culture and identifies what exists with what is said, the given of nature with the product of culture

(the *verum* with the *factum*), and thereby conceives of the world as a dialectic of tropes. Only by individuating them, as in *Ulysses*, does Joyce confer a "sense and passion" upon "meaningless things". [...]

## The Poem of Transition

The search for a Joycean poetics has thus brought us to the discovery of various contrasting yet complementary poetics. *Finnegans Wake* finds a justification when seen as a playing ground of those poetics and read as a meta-linguistic discourse about itself. Except for lyrical moments of transparency, as in the episode of Anna Livia and in the final section, one might agree with Harry Levin that since the author cannot assume that anyone will know how to translate his ultraviolet allusions, the reader is consequently freed from this responsibility and can set about tasting the pleasures that the work offers him, the fragments that are comprehensible according to personal congeniality. In short, the reader finds his own individual game within the framework of the Big Game.

But even read with the appropriate key, does the work really say something? Does the reduction of the world to language have meaning for contemporary man? Or does the book remain as the instance of a delayed Middle Ages, the unfeasible reproposing of the *hysperic* aesthetics, an experiment at the mere level of the *nomina*? Were *Finnegans Wake* an extension of the Middle Ages, then Joyce's refusal of his own medievalism in the first part of the book would be an illusion. Were this the case, he would have denied the scholastic philosophy of his earlier works only to take a step backwards into the medievalism of pre-Carolingian rhetoric. Thus, it might appear that he had abandoned the scholasticism of *Ulysses*, not by that Renaissance which established a new human measure with Erasmus and Montaigne, but by a Renaissance of excess, an experimental, fantastic, and labyrinthine humanistic mood expressed by such works as Francesco Colonna's *Hypnerotomachia Polyphili*. Similarly, it might appear that Joyce had rediscovered a cabalistic and magical symbology of the book derived from the schemas of certain fourteenth- and fifteenth-century heraldic emblems that had reached Joyce through Bruno and others, steeped in theosophy and other esoteric influences through Yeats. With this, he would have thus rewritten the new *Pimander* for the civilization of relativity.[20]



Although Joyce's work might indeed be seen in this light, so too, one might understand those early stage of the Renaissance itself as a challenge to the prevailing dogmatic vision of the universe and a consequent rejection of rational forms of thought. The thinkers of the Renaissance sought to deny the ordered, static conception of the world by embracing the mystic Hebraic tradition, the esoteric revelations of the Egyptians, and the disclosures of a Neo-Platonic hermeticism. They were committed to rejecting the rationalistic balance of Aquinas and the lucid nominalism of the late scholastics who concerned themselves with immutable essences, objects not experimentally verifiable. In its place, they sought equally lucid and precise Galilean definitions which would address the mutable material of experimental observation.

In order to accomplish the jump between these two forms of thought, modern culture has been forced to cross the mystical forest where, among symbols and emblems, Lullo and Bruno, Pico and Ficino, the renewers of Hermes Trismegistus, the decoders of the Zohar, the alchemists struggling between experimentalism and magic

wandered. While this was not the new science, it was the foreboding if the new new science.[21] This future scientific consciousness of the world was taking form by the study of mnemotecnics, the study of heraldry, and the questioning of hermetic texts. Later, with empirical research and mathematical definitions, this new science would progressively clarify a universe which was once seen only darkly through the mysteries of the heraldic emblems. At this historic moment, however, these early moderns knew by imagination, before mathematical formulation, that the universe was no longer a rigid hierarchy of immutable and definitive modules of order but something moving and changing. In such a universe, contradictions and oppositions do not constitute an evil to be reduced by abstract formulas, but they form the very core of reality.

In this sense *Finnegans Wake* is the book of an epoch of transition, a time in which science and the evolution of social relations propose a vision of the world that no longer obeys the schemas of other, more secure epochs yet lacks any formula for clarifying its own situation. The *Wake* attempts to paradoxically define the new world by assembling a chaotic and dizzy encyclopedia from the old one and filling it with explanations that once seemed mutually exclusive. Though this clash and the "Big Bang" of these oppositions, something new is born.

*Finnegans Wake* rebels against the narrow-mindedness of modern methodologies which permit us to define only partial aspects of reality, thus eliminating the possibility of an ultimate and total definition. The *Wake* attempts to compensate for this with an assemblage of partial and provisional definitions that syncretically collide and combine in an enormous "world theater," a *clavis universalis* in which ideas are so arranged that the structure of the work results in a "mirror" of the cosmos.[22]



Although philosophy maintains that "whereof one cannot speak, thereof one must be silent" (L. Wittgenstein, *Tractatus Logico-Philosophicus*, 7), *Finnegans Wake* makes the proud claim to bend language to express "everything." To this aim, language selects terms from the disparate cultural heritages and makes possible their coexistence through the connective tissue of a language capable of grafting one thing to another and of tying together, by etymological violence, the most disparate references.

It would be presumptuous were Joyce claiming to give us, in a single book, the Christian tradition, Einstein, the occultists, Shakespeare, the history of mankind, Levy-Bruhl, Aquinas, Vico, Bruno and Cusanus, Freud and Krafft-Ebing, Aulus Gellius and Buddha, Paracelsus and Whitehead, Relativity and Kabbala, theosophy and Scandinavian epic, the mysteries of Isis and Space-Time – in order to show that, according to the Hermetic principle, *quod est inferius est superius* and that the material of Reality is supported by a mystical unity that only *Le Livre* can disclose. Were Joyce's work to imply this, then it would be a bad copy of the medieval encyclopedia or a product of the nineteenth-century occultist traditions, a curious fruit born from the tree of Madame Blavatsky.

But the proposal that Joyce makes is quite different. Not only the explicit declarations, but the letters, the interviews, the very tone of the work reveal an irony and distance in Joyce's handling of the the cultural artifacts. The impressive aridity of his construction is evident: Joyce accumulates materials whose form captivates him but whose substance does not elicit his belief. It is as if Joyce offers us the entire wisdom of mankind, without determining whether or not it reflects a unique Eternal truth. He is concerned only with the cultural repertoire assembled by the whole of History.

Theoretically, one could reach into this treasury of ideas, enjoying them with the complacency of the decadent who is resigned to celebrate the deeds of an exhausted empire but is unable to confer and order upon this legacy. For Joyce, however, there exists only one possibility: to engage the whole of wisdom and to impose upon it a new Order, that of Language. Joyce engages a reality composed of all that has been said of it and organizes this world according to rules which are derived, not from the things themselves, but from words that express things. He proposes a form of the world in language, a hypothesis offered from within the linguistic format. The world as such is not Joyce's concern.

In *Finnegans Wake* Joyce establishes the possibility of defining our universe in the "transcendental" form of language. He provides a laboratory in which to formulate a model of reality and, in so doing, withdraws from *things* to *language*. To understand the nature of reality itself, rather than the cultural models of reality, is a task that belongs neither to science nor literature but to metaphysics, and the crisis of metaphysics arises from its inadequacy to this task.

The question is whether this repertoire of n-dimensional definitions is valid for us, for no one, for the author, for the eye of God, for the dream of a fool, or for the readers of tomorrow – for the readers of a possible society in which exercise in the multiplication of signs will not appear as a game for the elite but as a manual, constructive exercise of an agile and renewed perception.

## Conclusion

Once again, the main lesson that we can draw from the Joycean experience is a lesson in poetics, an implicit definition of the situation of contemporary art. From the first



work to the last, we find in the opus of Joyce a dialectic that belongs not only to his personal intellectual life but to the entire evolution of our culture.

*Ulysses* if the image of a possible form of our world. But between the image and the real world from which it grew an umbilical cord still remains. *Ulysses*' statements about the form of the world are embodied in the representation of human behavior. The reader grasps a general discourse on things through a descent into the heart of things. *Ulysses*, a treatise on metaphysics, is also a handbook of anthropology and psychology, the *Baedeker* of the city in which each man can recognize his country. In contrast, *Finnegans Wake* defines our universe, offering us "the propositional function" to be filled with all possible contents, but it no longer provides an instrument for grasping the world. With Joyce, we recognize that the development of modern art is now tied to a sort of indeterminacy principle: when forms achieve the maximum clarity for representing a possible structure of the world, they can no longer give us concrete instructions on how to move in order to modify the world.

While Joyce was writing his last work in silence and exile, another great figure of contemporary literature made a different choice. Bertold Brecht decided that one could no longer "speak about trees" but must engage in pedagogic and revolutionary activity. Brecht realized that his decision did not eliminate the other horn of the dilemma but forced the issue into a situation of crisis and tension from which it could not escape. He knew that the trees do, in fact, matter to us and that the day may come when humanity might once again contemplate them. But our time demands a decision and Brecht chose his own road, recounting, with the story of his choice, the story of his regret.

James Joyce represents the other horn of the dilemma. His response to those who spoke of the ware and the political events that were erupting in Europe ("Don't talk to me about politics, I'm only interested in style.")[23] leaves us perplexed concerning his human character, but it represents an example of an aesthetic and austere choice without half measure, that arouses in us, if not admiration, fright. While the pedagogic action of Brecht was effective because the poet assumed a legacy of stylistic techniques from the avant garde which his political passion channeled to diverse uses, the stylistic choices of Joyce would not be bent for the purposes of immediate communication without stripping his work of its quality as a cosmic model.

Thus a principle was established that would govern the entire development of contemporary art. From Joyce onwards, there are two separate universes of discourse. The first is a communication about the facts of man and his concrete relations. Here it makes sense to speak about the "content" of a story. The second carries out, at the level of its own technical structures, a type of absolutely formal discourse. Science presents an analogous situation. On one level it establishes a practical discourse about concrete things. In this case, the technical structures of science are used to establish the relationships among real events, the "content" of the world. On the second level, science develops a pure, "imaginative," and hypothetical discourse which, like non-Euclidean geometry and logic, outlines possible worlds. The relationships between these pure discourses and the universe of real events need not be immediately demonstrated; their function will be confirmed later, in a series of unforeseen mediations. The only law that rules the "existence" of these formalized worlds is their internal coherence.



*Finnegans Wake* is the first and most notable literary example of this tendency of contemporary art. To say that such universes of artistic discourse need not be immediately translatable into concrete "utilization" is not to repeat the standard aesthetic dictum about the uselessness of art. *Finnegans Wake* signals the birth of a new type of human discourse. This discourse no longer makes statements about the world; rather, it becomes a mirror-like representation of the world. In such discourse "things" acquire a vicarious function in respect to the words that utter them. "things", so to speak, are used to convey words, to support and evidence them.

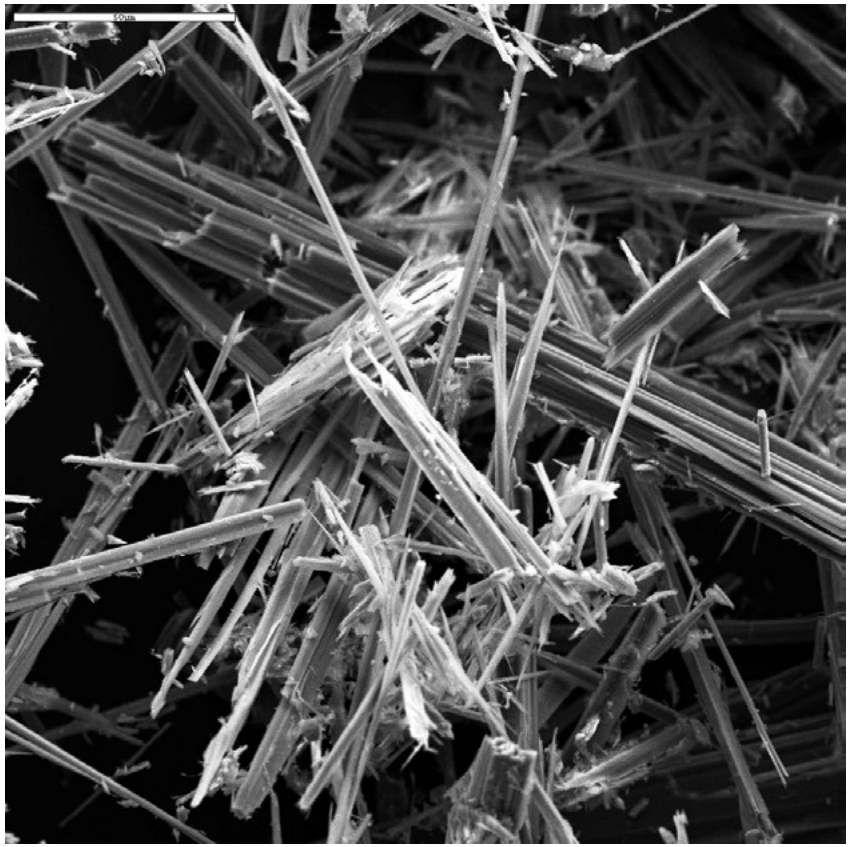
At the very moment that *Finnegans Wake* establishes this possibility of discourse, it reveals its own contradiction. In the domain of language, every organization or reorganization of signifiers entails a restructuring of the semantic system. In *Finnegans Wake* the form of the relationships between *signifier*s expresses new possibilities of defining something, yet the form assumed by the *signifieds* remains as the mirror of an obsolete universe. *Finnegans Wake* realizes a revolutionary network of connections between signifiers in order to tell us what we already know – namely, that everything is everything.

Finnegans Wake does not present itself as the solution to our artistic problems and, through it, of our cognitive and practical problems. It is neither a bible nor a prophetic book. It is the work which draws together a series of otherwise irreconcilable poetics and, at the same time, excludes other possibilities of life and art. Through these divergent directions, it reveals to us that our personality is dissociated, that our possibilities are complementary, that our grasp of reality is subject to contradiction, and that our attempt to define the totality of things and to dominate them is always, in certain measure, a checkmate.

Thus, *Finnegans Wake* is not for us *the* choice but only one possible choice. It is not the victory of a Verb that has succeeded in forever defining its own universe. As Joyce say, "condemned fool, anarch, egoarch, heresiarch, you have reared your disunited kingdom on the vacuum of your own most intensely doubtful soul" (FW 188). If *Finnegans Wake* is a sacred book, it tells us that *in principium erat Chaos*. To make this statement, however, *Finnegans Wake* encloses Chaos within the framework of an apparent Order and thereby places us in the same situation as the apostate Stephen who uses the words of Thomas Aquinas in order to refuse family, country, and church.

The only faith that the aesthetics and metaphysics of the Chaosmos leaves us is the faith in Contradiction.

1 For the various drafts and the "progress" of the opus, cf. Litz (1961), Higginson (1960), Connoly (1961), Hayman (1963), Hart (1962), Budgen (1948) and Ellmann (1959), Boldereff (1959), Robinson (1959). 3 "Hinc omnia in omnibus esse constat et quodlibet in quodlibet... In quadlibet enim creature universum est ipsa creature, et ita quodlibet recipit omnia, ut in ipsum sint ipsum contractae. Cum quodlibet non possit esse actu omnia, cum sit contractum, contrahit omnia, ut sint ipsum" (*De docta ignorantia*, II, 5); even though "omnia igitur ab invicem differre necesse est... ut nullum cum alio coincidat" (ibid., III, 1). On Cusanus cf. G. Santinello, *Il pensiero di NiccolÒ Cusano nella sua prospettiva estetica* (Padova: Liviana, 1958). 20 On Joyce and occultism see Tindall (1950) and Boldereff (1959, pp. 74ff.). 21 Cf. Eugenio Garin, *La cultura filosofica del Rinascimento* (Firenze: Sansoni, 1961). About the magic and kabbalistic symbology of the book, cf. Garin, "*Alcune osservazioni sul Libro come simbolo*" in *Umanesimo e simbolismo – Atti del IV Convegno Internazionale di Studi Umanistici* (Padova: Cedam, 1958). 22 Cf. Paolo Rossi, *Clavis Universalis* (Napoli: Ricciardi, 1960). 23 Quoted by R. Ellmann in the introduction to Stanislaus Joyce (1958, p. 23).



USGS DENVER MICROBEAM LABORATORY, ANTHOPHYLLITE ASBESTOS (UNKNOWN)



# ORDER OUT OF CHAOS

## ILYA PRIGOGINE ISABELLE STENGERS

## 1984

### Far from Equilibrium

At the root of nonlinear thermodynamics lies something quite surprising, something that first appeared to be a failure: in spite of much effort, the generalization of the theorem of minimum entropy production for systems in which the fluxes are no longer linear functions of the forces appeared impossible. Far from equilibrium, the system may still evolve to some steady state, but in general this state can no longer be characterized in terms of some suitably chosen potential (such as entropy production for near-equilibrium states).

The absence of any potential function raises a new question: What can we say about the stability of the states toward which the system evolves? Indeed, as long as the attractor state is defined by the minimum of a potential such as the entropy production, its stability is guaranteed. It is true that a fluctuation may shift the system away from this minimum. The second law of thermodynamics, however, imposes the return toward the attractor. The system is thus "immune" with respect to fluctuations. Thus whenever we define a potential, we are describing a "*stable world*" in which systems follow an evolution that leads them to a static situation that is established once and for all.

When the thermodynamic forces acting on a system become such that the linear region is exceeded, however, the stability of the stationary state, or its independence from fluctuations, can no longer be taken for granted. Stability is no longer the consequence of the general laws of physics. We must examine the way a stationary state reacts to the different types of fluctuation produced by the system or its environment. In some cases, the analysis leads to the conclusion that a state is "unstable" – in such a state, certain fluctuations, instead of regressing, may be amplified and invade the entire system, compelling it to evolve toward a new regime that may be qualitatively quite different from the stationary states corresponding to minimum entropy production.

Thermodynamics leads to an initial general conclusion concerning systems that are liable to escape the type of order governing equilibrium. These systems have to be "far from equilibrium". In cases where instability is possible, we have to ascertain the threshold, the distance from equilibrium, at which fluctuations may lead to new behavior, different from the "normal" stable behavior characteristic of equilibrium or near-equilibrium systems.

Why is this conclusion so interesting?

Phenomena of this kind are well known in the field of hydrodynamics and fluid flow. For instance, it has long been known that once a certain flow rate of flux has been reached, turbulence may occur in a fluid. Michel Serres has recently recalled that the early atomists were so concerned about turbulent flow that it seems legitimate to consider turbulence as a basic source of inspiration of Lucretian physics. Sometimes, wrote Lucretius, at uncertain times and places, the eternal, universal fall of the atoms is disturbed by a very slight deviation – the "clinamen." The resulting vortex gives rise to the world,



to all natural things. The clinamen, this spontaneous, unpredictable deviation, has often been criticized as one of the main weaknesses of Lucretian physics, as being something introduced *ad hoc*. In fact, the contrary is true – the clinamen attempts to explain events such as laminar flow ceasing to be stable and spontaneously turning into turbulent flow. Today hydrodynamic experts test the stability of fluid flow by introducing a perturbation that expresses the effect of molecular disorder added to the average flow. We are not so far from the clinamen of Lucretius!

For a long time turbulence was identified with disorder or noise. Today we know that this is not the case. Indeed, while turbulent motion appears as irregular or chaotic on the macroscopic scale, it is, on the contrary, highly organized on the microscopic scale. The multiple space and time scales involved in turbulence correspond to the coherent behavior of millions and millions of molecules. Viewed in this way, the transition from laminar flow to turbulence is a process of self-organization. Part of the energy of the system, which in laminar flow was in the thermal motion of the molecules, is being transferred to macroscopic organized motion.

The "Bénard instability" is another striking example of the instability of a stationary state giving rise to a phenomenon of spontaneous self-organization. The instability is due to a vertical temperature gradient set up in a horizontal liquid layer. The lower surface of the latter is heated to a given temperature, which is higher than that of the upper surface. As a result of these boundary conditions, a permanent heat flux is set up, moving from the bottom to the top. When the imposed gradient reaches a threshold value, the fluid's state of rest – the stationary state in which heat is conveyed by conduction alone,

without convection – becomes unstable. A convection corresponding to the coherent motion of ensembles of molecules is produced, increasing the rate of heat transfer. Therefore, for given values of the constraints (the gradient of temperature), the entropy production of the system is increased; this contrasts with the theorem of minimum entropy production. The Bénard instability is a spectacular phenomenon. The convection motion produced actually consists of the complex spatial organization of the system. Millions of molecules move coherently, forming hexagonal convection cells of a characteristic size.

In Chapter IV we introduced Boltzmann's order principle, which relates entropy to probability as expressed by the number of complexions *P*. Can we apply this relation here? To each distribution of the velocities of the molecules corresponds a number of complexions. This number measures the number of ways in which we can realize the velocity distribution by attributing some velocity to each molecule. The argument runs parallel to that in Chapter IV, where we expressed the number of complexions in terms of the distributions of molecules between two boxes. Here also the number of complexions is large when there is disorder – that is, a wide dispersion of velocities. In contrast, coherent motion means that many molecules travel with nearly the same speed (small dispersion of velocities). To such a distribution corresponds a number of complexions *P* so low that there seems almost no chance for the phenomenon of self-organization to occur. Yet it occurs! We see, therefore, that calculating the number of complexions, which entails the hypothesis of an equal a priori probability for each molecular state, is misleading. Its irrelevance is particularly obvious as far as the genesis of the new behavior is concerned. In the case of the Bénard instability it is a fluctuation, a microscopic



convection current, which would have been doomed to regression by the application of Boltzmann's order principle, but which on the contrary is amplified until it invades the whole system. Beyond the critical value of the imposed gradient, a new molecular order has thus been produced spontaneously. It corresponds to a giant fluctuation stabilized through energy exchanges with the outside world.

In far-from-equilibrium conditions, the concept of probability that underlies Boltzmann's order principle is no longer valid in that the structures we observe do not correspond to a maximum of complexions. Neither can they be related to a minimum of the free energy $F = E - TS$. The tendency toward leveling out and forgetting initial conditions is no longer a general property. In this context, the age-old problem of the origin of life appears in a different perspective. It is certainly true that life is incompatible with Boltzmann's order principle but not with the kind of behavior that can occur in far-from-equilibrium conditions.

Classical thermodynamics leads to the concept of "equilibrium structures" such as crystals. Bénard cells are structures too, but of a quite different nature. That is why we have introduced the notion of "dissipative structures," to emphasize the close association, at first paradoxical, in such situations between structure and order on the one side, and dissipation or waste on the other. We have seen in Chapter IV that heat transfer was considered a source of waste in classical thermodynamics. In the Bénard cell it becomes a source of order.

The interaction of a system with the outside world, its embedding in nonequilibrium conditions, may become in this way the starting point for the formation of new dynamic states of matter-dissipative structures. Dissipative structures actually correspond to a form of supramo-

lecular organization. Although the parameters describing crystal structures may be derived from the properties of the molecules of which they are composed, and in particular from the range of their forces of attraction and repulsion, Bénard cells, like all dissipative structures, are essentially a reflection of the global situation of nonequilibrium producing them. The parameters describing them are macroscopic; they are not of the order of $10^{-8}$ cm, like the distance between the molecules of a crystal, but of the order of centimeters. Similarly, the time scales are different – they correspond not to molecular times (such as periods of vibration of individual molecules, which may correspond to about $10^{-15}$ sec) but to macroscopic times: seconds, minutes, or hours.

Let us return to the case of chemical reactions. There are some fundamental differences from the Bénard problem. In the Bénard cell the instability has a simple mechanical origin. When we heat the liquid layer from below, the lower part of the fluid becomes less dense, and the center of gravity rises. It is therefore not surprising that beyond a critical point the system tilts and convection sets in.

But in chemical systems there are no mechanical features of this type. Can we expect any self-organization? Our mental image of chemical reactions corresponds to molecules speeding through space, colliding at random in a chaotic way. Such an image leaves no place for self-organization, and this may be one of the reasons why chemical instabilities have only recently become a subject of interest. There is also another difference. *All* flows become turbulent at a "sufficiently" large distance from equilibrium (the threshold is measured by dimensionless numbers such as Reynolds' number). This is not true for chemical reactions. Being far from equilibrium is a necessary



requirement but not a sufficient one. For many chemical systems, whatever the constraints imposed and the rate of the chemical changes produced, *the stationary state remains stable* and arbitrary fluctuations are damped, as is the case in the close-to-equilibrium range. This is true in particular of systems in which we have a chain of transformations of the type $A \rightarrow B \rightarrow C \rightarrow D \ldots$ and that may be described by *linear* differential equations.

The fate of the fluctuations perturbing a chemical system, as well as the kinds of new situations to which it may evolve, thus depend on the detailed mechanism of the chemical reactions. In contrast with close-to-equilibrium situations, the behavior of a far-from-equilibrium system becomes highly specific. There is no longer any universally valid law from which the overall behavior of the system can be deduced. Each system is a separate case; each set of chemical reactions must be investigated and may well produce a qualitatively different behavior.

Nevertheless, one general result has been obtained, namely a necessary condition for chemical instability: in a chain of chemical reactions occurring in the system, *the only reaction stages* that, under certain conditions and circumstances, may jeopardize the stability of the stationary state are precisely the "catalytic loops" – stages in which the product of a chemical reaction is involved in its own synthesis. This is an interesting conclusion, since it brings us closer to some of the fundamental achievements of modern molecular biology.

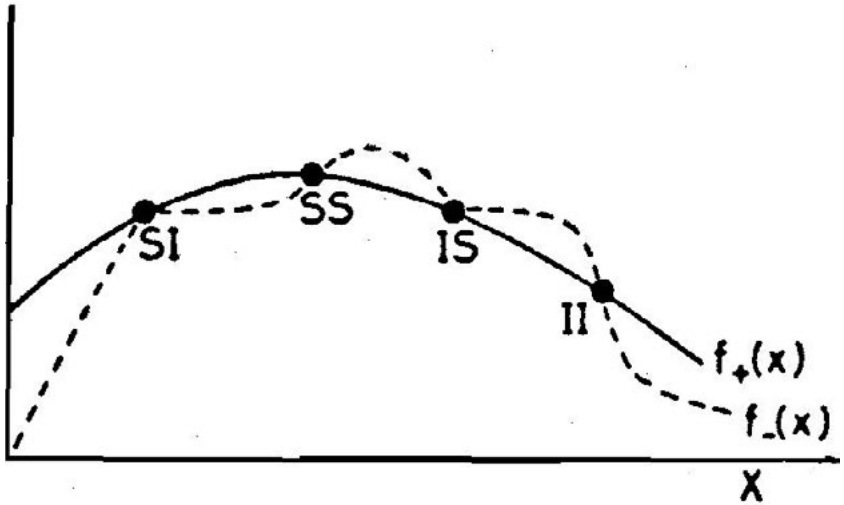



**FIGURE 1**



Figure 1 Catalytic loops correspond to nonlinear terms. In the case of a one-independent-variable problem, this means the occurrence of at least one term where the independent variable appears with a power higher than 1; in this simple case, it is easy to see the relation between such nonlinear terms and the potential instability of stationary states.

Let us take for the independent variable X the time evolution $dX/dt = f(X)$. It is always possible to decompose $f(X)$ in two functions representing a gain and a loss $f_+(X)$ and $f_-(X)$, each of which is positive or 0, such that $f(X) = f_+(X) - f_-(X)$. In this way, stationary states ($dX/dt = 0$) correspond to values where $f_+(X) = f_-(X)$.

Those states are graphically given by the intersections of the two graphs plotting $f_+$ and $f_-$. If $f_+$ and $f_-$ are linear, there can only be one intersection. In other cases, the type of the intersection permits us to infer the stability of the stationary state.

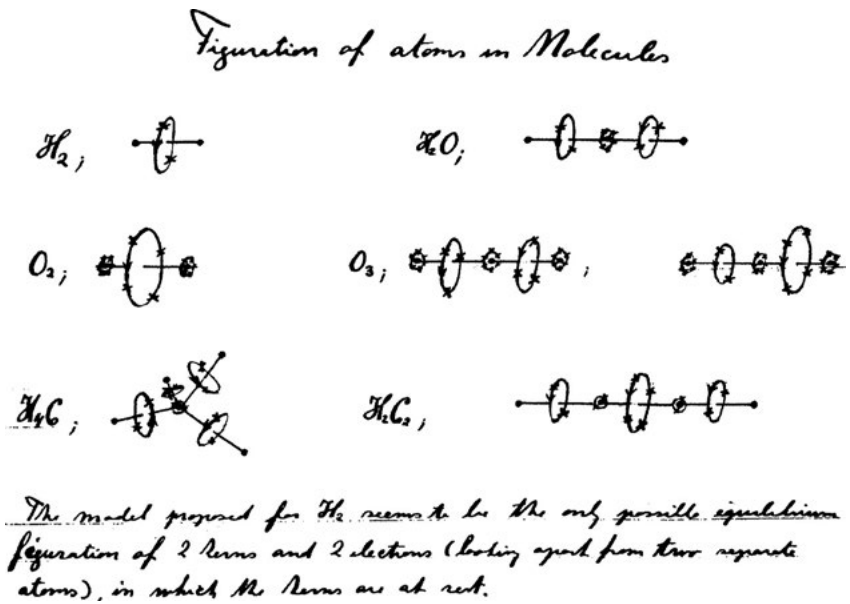
Four cases are possible:

SI: stable with respect to negative fluctuations, unstable with respect to positive ones: If the system deviates slightly to the left of SI , the positive difference between $f_+$ and $f_-$ will reduce this deviation back to SI; deviations to the right will be amplified.

SS: stable with respect to positive and negative fluctuations.

IS: stable only with respect to positive fluctuations.

II: unstable with respect to positive and negative fluctuations.




NIELS BOHR, MOLECULAR CONFIGURATIONS SKETCHES (1913)



# SCIENCE, ORDER AND CREATIVITY

# DAVID BOHM F. DAVID PEAT

# 1987

## What is Order?

The ultimate failure of Bohr and Einstein to continue their dialogues together symbolizes the degree of fragmentation that exists in physics today. Despite their close friendship and the energy they brought to their encounters, the two men eventually reached the point where they had nothing more to say to each other. In the previous chapter it was suggested that this break in communication was a result of the different and incompatible ways in which the informal language of physics was being used. Each protagonist was using certain terms in particular ways and laying stress on different aspects of the interpretation. A deeper analysis of this whole question shows that what was really at issue was the different notions of order involved. Bohr and Einstein both held to subtly different ideas of what the order of physics, and of nature, should be and this led to an essential break in their dialogue, a break which is reflected in the distance that lies between relativity and the quantum theory even today. In particular, Bohr believed that the order of movement of a particle would admit ambiguity while Einstein felt that such a possibility was too absurd to contemplate. The source of this failure in communication between the two giants of modern physics therefore lay in their incompatible notions of order.

The notion of order extends beyond the confines of a particular theory; permeates the whole infrastructure of concepts, ideas, and values; and enters the very framework in which human thought is understood and action carried out. To understand the full meaning of creativity, and what impedes it, it is necessary to go into the whole nature and significance of order.

The question of order clearly goes beyond the confines of physics, or even science, and into the question of society and human consciousness. Is it possible to inquire into such a vast and general field? Clearly the subject cannot be encompassed in a few pages. The approach that is taken in this chapter, therefore, assumes that the reader has a considerable familiarity with what is meant by order but that this tends to be on an implicit, rather than explicit, level. The subject will therefore be approached in a discursive fashion, as particular aspects, ideas, and intuitions are unfolded. Rather than attempting to make a definition or exhaustive analysis of the nature of order, the intention is to deepen and extend the reader's understanding. This chapter, therefore, focuses on the meaning of order within familiar contexts while the next develops new notions of order that are relevant not only to the ideas of quantum theory but to society, consciousness, and creativity.

## New Orders in Society

General notions of order play an incalculably significant role in the totality of human thought and action. When ideas on order change in a really fundamental way, they tend to produce a radical change in the overall order of society. This reaches into every area of life. In fact, the



notion of a change in the order of society provides a good starting point for the explorations of this chapter, since it gives some idea of how broad and significant the role of order can be. By examining the order of society it becomes possible to gain a feeling for how subtle and pervasive is the operation of order within the tacit infrastructure of the consciousness of humanity.

The change in the order which underlies society is, in certain ways, not unlike those changes in paradigms that are associated with a scientific revolution. For just as radically new theories are generally taken to be incommensurable with what went before, so new orders of society may arise that are regarded as incompatible with what they replaced. In such cases the whole society is faced with a serious crisis that encompasses everything that was once held dear and is now judged to be irrelevant, improper, or even immoral. In discussing the change of order it is therefore important to ask if all changes in society must necessarily be so destructive and disorienting or if change can happen in more creative ways.

An example of a radical change in the overall order that pervades society can be found in the transition from the Middle Ages to the present day. The medieval worldview is essentially that of a timeless order in which each thing has its proper place, so that even the temporal order of history can be accommodated within the timeless order. This notion can, of course, be traced back to the ancient Greeks, for Aristotle wrote of an eternal order of increasing perfection, going from earthly matter to heavenly matter. An important aspect of this order is that each object has a proper place in the order of things, so that motion of bodies can be understood as a striving to reach this proper place. Within such an order it became natural to view the universe as a single organism.

By the time of the Middle Ages this general scheme had become so comprehensive that it found its eternal basis in the order of religion and philosophy, from which laws, morals, and ethics, which regulated the temporal concerns of society, had their ground. Society as a whole, and each citizen, was regarded as an image of the total, overarching eternal order. Within this framework each individual was able to find a place and a meaning for his or her life. To have a single, encompassing meaning for the universe, society, and the individual was a strong and positive aspect of this eternal order. However, society was not without its share of drawbacks, for the freedoms and rights of individuals were severely restricted and authority was predisposed to become absolute.

After the Middle Ages this order began to give rise to the new secular order in which everything was regarded as being subject to the flux of time. (The "new secular order" is incidentally the motto on the great seal of the United States.) Now nothing had any special space, and motion was reduced to a mechanical process that had no ultimate goal and was therefore going nowhere in particular. The notion of comparing the universe to an organism also gave way to comparing it to a mechanism, and the favorite image of the eighteenth century was that of clockwork.

The secular order was atomistic in nature, and as a result, the individual came to assume a more prominent role in society. This new attitude, of course, helped to bring about an increasing value to human freedom. However, this positive aspect had to be weighed against the negative features. One of the most important of these was that the individual, and indeed the whole society, along with the moral and ethical principles needed for good regulation, no longer had any ultimate meaning. For



within the new secular order everything was set in the context of an immense and purposeless mechanical universe, indifferent to human values and to human fate, and in which the earth itself was lost as a mere grain of dust.

All this meant, of course, that a very radical transformation had taken place in the overall order of human life in particular and of society in general. One of the most important aspects of this transformation has been the considerable development of science and technology over the past few centuries. This has helped to dispel the considerable scientific ignorance of the old eternal order and has led to sweeping reforms in medicine and agriculture. However, all these benefits have not been without considerable cost.

Indeed, it is now possible to perceive the dialogue held in the Introduction as concerned with the whole nature of the secular order.

In physics this change of order was especially signaled by Descartes, who introduced the concept of coordinates. These can be thought of as grids by means of which points in space can be located. As the word "coordinate" indicates, they are the basic means by which order is to be described in the new secular and mechanical worldview. Aristotle, for his part, would have understood the formal meaning of Cartesian coordinates, but almost certainly he would have regarded them as irrelevant to the way he perceived the world. This would have shown the mutual irrelevance inherent in different notions of order, which can be thought of as an extension of the mutual irrelevance of basic ideas in successive paradigms. But the reader should also keep in mind the possibility of a deeper continuity between notions of order so that a break in communication between societies does not result.

In Newton's mechanics the order of space and time was taken as absolute and in this sense, therefore, something remained from the old Aristotelian order. Within the new mechanical order was embedded something of the eternal order, for, according to Newton, space was the "external sensorium of God" and time flowed equally throughout the universe. However, with Einstein even this remnant of the old order was called into question. In the theory of relativity, the idea of a time that flows uniformly across the whole universe was called into question, for it was shown that the notion of the flow of time depends on the speed of the observer. No longer could a single time order span the entire universe; indeed past, present, and future could not be maintained in the same absolute sense as for Newton.

With quantum theory, even greater changes in order occurred and the whole basis of the mechanical order, which formed a significant part of the secular order, was called into question. It was no longer possible, for example, to define position and momentum simultaneously, nor could an unambiguous notion of a particle's trajectory be maintained. Indeed by the third decade of this century the Newtonian order had lost its clear definition and further new orders were introduced that depended on the more abstract idea of symmetries, quantum states, and energy levels.

This whole transformation from the old eternal order has brought in its wake a movement away from the absolute and toward the idea that things are inherently relative and dependent on conditions and contexts. But in fact this was the deeper meaning of giving pride of place to time, rather than eternity, which originally took place at the end of the Middle Ages. The essential meaning of time is that everything is mutable and transient. Indeed



the Greek god of time, Chronos, swallowed his children. Hence the temporal order is essentially one of change and transience. Admittedly scientists like Newton attempted to formulate universal laws that were assumed to be eternally valid, and therefore were appealing to something that lay beyond time. However, these laws were eventually found to hold only under certain limited conditions and could not be, in this sense, eternal. Even the theory of relativity and the quantum theory, which replaced the Newtonian worldview, are themselves being called into question. The reader will no doubt have heard of "black holes." These are singularities in the fabric of space-time within which all the known laws of physics, including relativity and quantum theory, must break down and basic structures, such as elementary particles, cease to exist. It has even been suggested that the universe itself began in such a "big bang" singularity. Clearly science has reached the point at which everything, in principle, becomes subject to ultimate dissolution within the flux of time. All traces of the eternal order, with its natural cycles and harmonies, have now been swept away.

But these far-reaching changes have not been confined to science alone but have swept into every area of life. In earlier times, for example, people regarded the order of society as eternally determined, perhaps by divine decree. Even though important changes did occur throughout the Middle Ages, for the most part they did not seriously affect those who went through the unchanging and recurring cycles of their lives. However, following the change from eternal to secular order, a series of rapid transformations took place in science and technology, the scale and scope of commerce and industry, the growth of nationalism, and the extension of the general goals of European civilization. For example, the rise of science was

followed by a decrease in the importance of religion. Within the scientific order, many religious beliefs appeared to lose their credibility and the progress brought by technology substituted new goals, aims, and values. As the eternal verities and absolute truths became eroded, the older systems of morals and ethics seemed less significant and, in the end, dissolved into a general form of relativism. This change of order even reached into the family as the impersonal ties of commerce, industry, and bureaucracy began to dominate human relationships.

Clearly the change in social order is far-reaching; indeed the social tensions associated with it have not yet been resolved. On the one hand, science and technology have opened up immense new possibilities for a much better life for much of humanity than was ever possible before. On the other, the rise of industry and the growth of technology have given rise to crises in politics, economics, and ecology, and the conflicts between nations have brought us to the brink of nuclear war. Indeed the ever increasing torrent of change threatens to sweep humanity into a "black hole" singularity. What is inside that singularity is unknown. Will it be increasing misery and ultimate extinction or an unimaginably different and better way of life for all?

In the past, changes in the fundamental order of society have been followed by a period of violence and destruction. This stage of internal conflict and confusion arises when successive notions of order are believed to be incompatible or irrelevant to each other. But is it necessary for a change in order to occur in this way? Is there some intermediate domain in which transition can occur without this associated violence? Is it possible for a range of different notions of order to be held in active suspension within "the mind of society" so that a free dialogue



is held between the old and the new orders? In such a case it is possible that an entirely new kind of movement could begin in which the whole society would be in a constant state of creative transformation without disruption.

But up to now, those who have called for major changes in society have given little importance to the question of creativity. Indeed history shows that there has been little conscious realization of what actually takes place during a major change, or where accumulated changes are leading. In general, society changes when a mass of people simply react to particular problems and pressures which have been allowed to accumulate. Even when a few individuals have attempted to confront the issue of change in a creative way they have been hampered by the various issues and problems already brought to light in this book. People, for example, generally tend to be rigidly attached to the tacit infrastructure of their cultural milieu so that they resist all social change in a blind and often destructive way. Others, however, are rigidly attached to the call for revolutionary change and pursue their ends in a similarly blind fashion. Clearly what is called for is a kind of free play within the individual and society so that the mind does not become rigidly committed to a limited set of assumptions, or caught up in confusion and false play. Out of this free play could emerge the true creative potential of a society.

## Order and Categories

To understand how a new order can emerge in a creative way, it is necessary to go into the whole notion of order. This will be done by first exploring a relatively detailed idea of order and then generalizing into broader contexts.

Order itself is generally experienced in a number of different situations and contexts. For example, there is the order of number, of points on a line, of space and time, of the movement of a particle through space, and of the functioning of a machine. But order need not be only mechanical or restricted to inanimate systems. There is also the order of growth of an organism, of a language, of thought, of music and art, and of society in general. Indeed it can be truly said that whatever we do presupposes some kind of order. Clearly the subject of order is too broad to be encompassed within an all-inclusive definition. This section, therefore, will begin with the question of how order is thought about, perceived, and brought about in human activity. Some reflection will show that our first notions of order depend upon our ability to perceive similarities and differences. Indeed there is much evidence which shows that our vision, as well as the other senses, works by selecting similarities and differences. While this can be demonstrated in a number of laboratory experiments and visual illusions, it can be most easily seen through the reader's direct experience. Look around the room for the moment and note how your overall field of vision is particularly sensitive to change and differences of sensation. A sudden small movement is quickly picked up in the corner of the eye. By contrast, the center of the field of vision gives a much finer discrimination of particular forms that are relatively constant. While the background reveals small changes and movements, it is the center of the field which, for example, gives detailed information about a face.

In the Introduction, it was pointed out that damage to the central field still enables meaning to be extracted from the visual field, even if the ability to integrate forms and discriminate fine detail is lost. However, when the



background itself is damaged, then information in the central field loses its meaning. This suggests that perception begins through the gathering of differences as the primary data of vision, which are then used to build up similarities. The order of vision proceeds through the perception of differences and the creation of similarities of these differences.

In thought a similar process takes place, beginning first with the formation of categories. This categorizing involves two actions: selection and collection. According to the common Latin root of these two words, select means "to gather apart" and collect means "to gather together." Hence categories are formed as certain things are selected, through the mental perception of their differences from some general background. To return to vision, an animal may be spotted against the background of the forest or a coin on a patterned carpet may stand out as a result of the glint of its reflection.

The second phase of categorization is that some of the things that have been selected (by virtue of their difference from the background) are collected together by regarding their differences as unimportant while, of course, still regarding their common difference from the background as important. Thus several birds of different size and posture may be abstracted together from the general background of a tree without giving particular attention to the individual differences between them. These birds, however, clearly fall into a different category from any squirrels which are found in the same tree. Categorization therefore involves the combined action of selection and collection. In the process of observing a flock of birds in the tree the category of birds is formed by putting things together that are simultaneously distinguished from those that do not belong to this category – for example,

from squirrels. In this way sets of categories are formed, and these, in turn, influence the ways in which things are selected and collected. Selection and collection therefore become the two, inseparable sides of the one process of categorization.

This determination of similarities and differences can go on indefinitely. For within the similarities of birds will be detected differences between small brownish birds and large black ones. So the category is divided into crows and sparrows, or the new categories of male and female, or perching and flying birds, or birds that sing and birds that are silent are selected. As some differences assume greater importance and others are ignored, as some similarities are singled out and others neglected, the set of categories changes. Indeed the process of categorization is a dynamical activity that is capable of changing in a host of ways as new orders of similarity and difference are selected. The legends of early humankind, together with contemporary myths from tribes in Africa and North America, suggest that categorization is a primitive but important way of ordering the universe. The gods, for example, are given the task of naming the various animals and plants so as to establish an order in the universe. These legends also indicate that the similarities and differences selected depend upon a context that involves the whole activity and order of the tribe. A people categorize different animals according to their interaction and importance to the life of the tribe. Animals may be selected and identified according to diet, shape and color, habits, or utility. A group of herders in Africa, for example, use a series of words which indicate their sensitivity to variations in the colors of their cattle. In addition, the names of these cattle colors are used to describe other objects. The Inuit (Eskimo) by contrast have quite different priorities for



survival and use a number of words to describe the different conditions of ice and snow. Clearly the whole action of categorization is inseparably linked to perception-communication which operates within the overall context of a dynamical social structure.

Most categories are so familiar to us that they are used almost unconsciously. However, from time to time, as the result of some important change in the way we see the world, or as our experience is extended, new categories come into being. Categories are formed which never existed before and new sets of similarities and differences are considered as relevant in entirely new ways. Clearly this implies that perception must be used in a creative way within an ever-changing context.

The creation of new categories relies on a perception that takes place as much in the mind and through the senses. To understand the creative nature of this process, and indeed to develop a theme which will be used throughout this book, the idea of intelligence will be introduced. The word intelligence is often used in a general and fairly loose way today, but something of its original force can be found in the Latin root *intelligere*, which carries the sense of "to gather in between." It recalls the colloquialism "to read between the lines." In this sense, intelligence is the mind's ability to perceive what lies "in between" and to create new categories. This notion of intelligence, which acts as the key creative factor in the formation of new categories, can be contrasted with the *intellect*. The past participle of *intelligere* is in fact *intellect*, which could then be thought of as "what has been gathered." Intellect, therefore, is relatively fixed, for it is based primarily on an already existing scheme of categories. While the intelligence is a dynamic and creative act of perception through the mind, the intellect is something more limited and

static. This distinction can be highlighted by suggesting that the IQ test should be more properly said to measure an intellect quotient than an intelligence quotient. Categories therefore emerge through the free play of the mind in which new forms are perceived through the creative action of intelligence and are then gradually fixed into systems of categories. But this system of categories always remains fluid and open to further change, provided that the mind itself is open to the creative action of intelligence.

A particularly illuminating example of this whole process is given by the experience of Helen Keller and her teacher Anne Sullivan. When Helen Keller experienced her flash of insight she saw the essential similarity between all the different experiences of water. Anne Sullivan had played a key part in this by helping Helen to select these experiences from the general background and flux of experience, by including them in a kind of game. Helen's moment of insight was the perception of her first category. But this went much further than a simple gathering of basically similar instances, for it had a name that was communicable and which could therefore be used to symbolize the category in thought and elevate it into a concept. But very clearly, Helen's act of perception could not have been based on previous experience, or facts stored in her intellect. It was a pure act of intelligence. Later, however, all this became stored in Helen's memory; it became a part of her tacit infrastructure and a contribution to her intellect.

Categorization can become caught up in exactly those sorts of problems that were discussed in the first two chapters. It is possible for categories to become so fixed a part of the intellect that the mind finally becomes engaged in playing false to support them. Clearly, as contexts change, so do categories. However, when these categories are implicitly embedded in the whole structure of language



and society, then they become rigid and persist, in inappropriate ways, within the new context. The result is a form of fragmentation in which significant new connections between categories are ignored, through a false division; and significant differences are ignored within categories, to give a false uniform. Only when the intelligence operates in a free and creative fashion can the mind be free of its attachment to rigid structures of category and is then able to engage in the formation of new orders. [...]

## Constitutive and Descriptive Order

Before going on to discuss more complicated cases of order, such as chance and chaos, it is important to make a distinction between what could be called constitutive order and descriptive order. Consider, for example, the flight of an aircraft in terms of its coordinates on a map. Clearly this involves a descriptive order because the coordinates themselves do not have any material existence of their own with respect to the aircraft. In a similar way, an architect's plans for a house are also a form of descriptive order. However, in discussing the construction of a beehive in terms of individual hexagons, or a wall in terms of bricks, this clearly involves the very constitution of the object in question. Such orders will be called constitutive.

But it is equally true that the discussion of the order of a geometric curve or a trajectory involves both a descriptive and a constitutive order, in the sense that the latter order constitutes the very essence of the figure in question. Thus the spiral can be described in terms of a series of segments having a similar difference, but it is equally true that the spiral is actually built out of such

segments. Indeed the distinction between descriptive order and constitutive order is never absolute, for every constitutive order has some descriptive significance and every descriptive order has a constitutive basis. For example, repeating hexagons are a convenient way of describing a beehive as well as for constructing one. Likewise the architect's plans have a constitutive basis in paper and ink. Of course this basis has very little relevance to the order of the house. However, once it is converted to marks on lengths of wood, plumb lines, and scaffolding, it begins to lie midway between a constitutive and a descriptive order. An additional example is given by the painter who uses a coordinate grid to enlarge a painting or to transfer a cartoon onto a wall. Using a series of rows and columns of pinpricks, the coordinate system becomes intimately connected to the constitutive order of the final work.

These discussions lead naturally to a particularly important question: Is order simply within the mind? Or does it have an objective reality of its own? In examining the symmetry of a snowflake, starfish, sunflower, and snail's shell, it seems clear that a particular, simple form of order is of the very essence of the object's form. But what of subtler forms of order, such as vortices and emerging structures? (These are described in the next chapter.) What meaning can be ascribed to statements like "the elementary particles are ordered according to an SU(5) symmetry" or "the order of the universe arose through the 'breaking' of a certain symmetry"? What is the underlying meaning of Lévi-Strauss's claim that primitive societies are ordered on the basis of internal structures that are "not without similarity to Boolean algebra," or the current notion of biology that the life of the organism is based on the order of information within its DNA, or psychologist Carl Jung's assertion that the order



of the psyche, and indeed that of the universe as a whole, has its ground in certain archetypes? To what extent are these orders and symmetries simply functions of the human mind and to what extent do they have an objective, independent existence?

It may be helpful to recall Korzybski and emphasize that whatever we say that order is, it isn't. It is more than we say, as well as being capable of being unfolded in infinitely many ways that are different. To attempt to attribute order solely to the object or to the subject is too limited. It is both and neither, and yet something beyond all this: a dynamic process that involves subject, object, and the cycle of perception-communication that unites and relates them. This approach suggests that no constitutive order is an absolute truth, for in reality its ability to lead to coherent and consistent activity is always limited.

While this may seem overgeneral and not a little abstract, a simple example will indicate its general trend. Some cities, such as New York, have regular grids of streets and avenues. In such cities the order of a grid fits harmoniously into the activity of walking through the city. But in a city of a more complex order, like London, such an imagined grid does not fit, and to continue its use, as a visitor from the United States may attempt to do, will lead only to confusion and frustration. In the case in which the grid pattern provides a satisfactory order for the activity of wandering through the city then it could be said to correspond to reality. But as this correspondence begins to fail, the walker will be alerted to the need for new acts of perception-communication and the creation of new orders. Clearly no one order will cover the whole of human experience, and as contexts change, orders must be constantly created and modified. The example of the order of the grid was not chosen by chance, for in its form, as

the Cartesian grid or coordinate system, it has dominated the basic order of physical reality for the past three hundred years. In many cases the Cartesian grid worked well, in the sense that it led to a coherent activity and thus corresponds to reality fairly well. However, in this book, the general appropriateness of the Cartesian description is called into question. Just as the New Yorker who travels to London will require a subtler notion of order than the rectangular grid of streets and avenues, so new orders are required to describe those aspects of reality that have revealed themselves during this century. [...]

## Summary

The basic theme of this chapter is the proposal that order pervades all aspects of life and that it may be comprehended as similar differences and different similarities. An essential distinction was introduced between constitutive order and descriptive order, while at the same time it was noted that any actual order lies in a kind of spectrum between these limits. Order is therefore neither solely in the subject nor solely in the object, but instead in the cycle of activity that includes both.

Orders of varying degrees were then explored, leading to those of infinite degree and including all sorts of very subtle orders, such as those in language and in music. Order in general was seen to lie in a spectrum between simple orders of low degree and chaotic orders of infinite degree of which randomness is a limiting case. Indeed there is no place in all this for the concept of disorder but only for random orders of infinite degree that are free from significant correlations and suborders of low degree. In this fashion, it is possible to discuss not only



the emergence of orders of low degree out of chaos, as treated by Prigogine, but also the inverse process of the transformation of orders of low degree into chaos. This enables entropy to be considered as a particular feature of the general order of movement.

Structure was treated as an inherently dynamic notion, which includes not only the order of whatever elements are abstracted in thought, but also an arrangement, connection, and organization of these elements. Each structure was considered to be stabilized as the result of the mobility of whatever are regarded as its elements. The chapter concluded with a discussion of how structure is comprehended through a hierarchy of ratio, which may be apprehended in a perceptive act of intuitive reason.

TOMIO OHASHI, TIT CENTENNIAL HALL (1987)



# RATIONALISM FEATURED WITH CHAOS

# KAZUO SHINOHARA

# 1991

## Chaos and Technology

The rapid social changes in eastern Europe have attracted the concern of people throughout the world. This major and unforeseeable change in world politics has also brought a great lift to people's feelings and will affect the forms of culture, of which architecture is part. Now, however, I am interested directly in the changes in architecture which correspond with the changes which are taking place in the fields of science and technology. In science and technology these occur with such things as revolutions and radical shifts in the concept of space and the development of new materials. This does not, of course, mean that revolutions and radical shifts in science and technology, automatically and unmodified, bring about changes and developments in architecture. This "fact" is established only when the awareness of architects adapt sensitively to these and bring about changes in architectural expression.

In his book *Space, Time and Architecture* (1941), Sigfried Giedion, the theorist of modern architecture, takes as his central idea that the notions of architecture are strongly influenced by the spatial notions manifested in the science and technology of the time. He began with an analysis of Renaissance architecture which was much influenced by the technique of perspective in painting,

which then had the same significance as a scientific idea has today. He noted the influence exerted by ideas of four-dimensional space and relativity, the ideas which typified the revolution in physics in the early years of the century, on the architects at the time of the birth of Modernism and gave a lucid account of the existence of a synchronic commonality between the scientific ideas of space and the ideas and expressions of space in architecture. This is not a matter of the theoretical contents of physics being referred to specifically in architectural expression. His main theme is the understanding of the existence of a contemporary *sensibility* shared by science and technology.

I have had an intense interest in the problems with a distinctive aspect, which might be called contemporary, which have appeared in the fields of science and technology from the mid-eighties.

## Chaos and the City

From the beginning of the sixties, I have paid attention to the "chaos" of urban conditions and approved of this as the new urban structure. This was proposed with the words that the cities of Japan – of which Tokyo is representative – show the "beauty of chaos".

Japanese Modernism entered a period of rapid development with the recovery of Japanese society after the destruction of the Second World War. The "Japanese Modernists" of this time dreamed of "the beauty of Modernism", a future city like, for instance, Le Corbusier's *ville radieuse*. Because this was a time when the industrial power of Japan was beginning to grow rapidly, there appeared a succession of "images of the city", which



brought into the foreground a huge infrastructure which would symbolize the technological power of industry. I did not belong to "Japanese Modernism". I paid attention to Japanese tradition and my major theme was to find there concepts or methods of spatial composition capable of becoming the point of departure for modern architecture. I was keen to discover the syntax functioning in these forms which had been refined over many years. Conciseness, basic rules of composition which characterise traditional Japanese structures, may be said to be central to the way in which foreign countries appreciate Japanese culture. However, the current urban conditions in Japan are at the opposite pole to the characteristics of this spatial composition. For instance, I continued work with a theme of a simple structure, as in the Umbrella House (1961) but, at the same time, I was interested in the streets and roads of the "Chaos City" of Tokyo.

There is absolutely no possibility of forming a "modern city" in Japan as long as we pursue the European urban image, with its long tradition, or the proposals of the Modernist pioneers, as ideal models. I suggested that what was necessary for us was to discover the "positive elements" of the prevailing Japanese urban scenery and find methods of forming a new kind of city for the near future.

My statement about "the beauty of chaos" in the early sixties concerned a chaos which was backed only by my premonitions of urbanism, but in 1981 I took the specific example of Shibuya, one of the main stations of the Tokyo circle line, and described the "urban activity" which functioned there. The assessment I made of this area, which according to Modernist theories of the city could only be given in terms of confusion and ugliness, met with widespread agreement at the end of the eighties. It was found from a survey conducted by a major

newspaper that this area was instanced as the most enjoyable in Tokyo by many people, including visitors from foreign countries.

In the latter part of the eighties, chaos became one of the subjects which characterized a new field of science of technology. I also discovered that several subjects had begun to be addressed simultaneously in various fields in the early part of the seventies. These subjects were randomness, fuzziness, fractals and chaos. I recognized that a simultaneous movement had occurred in both the exploration of new phenomena in science and technology and the new theories of architecture and the city.

## The Zero-Degree Machine

The "machine", along with the "cube", represented a basic concept of the Modernism which was formed in Europe in the twenties. By the seventies, fifty years later, the decline of Modernist architecture had begun to be noted throughout the world and a range of anti-Modernist designs were produced. The Post-Modernism, in the narrow sense, of the seventies, in which decorative fragments of old architectural forms were used ironically, was a form of antiModernism. This *fun* Post-Modernism ended in the latter half of the eighties. Now a new concept or mode of expression for architecture is sought throughout the world. In a 1981 article, I wrote that, if architecture were regarded as a drama, Post-Modernism could be regarded as an *entr'acte* after act one, not act two. I think this prediction has been justified. This prediction was made because, as the reputation of the techniques of narrowly defined Post-Modernism declined, I judged that it could not become the mainstream of the architecture



of today, let alone tomorrow. In other words, my prediction was, and is, that a new movement will be possible when architecture in the future forms a new relationship with technology.

At the beginning of the sixties, when my relationship with Japanese tradition was at its deepest, I published the notion that the tradition of Japanese architecture was the point of departure for my architecture but not the point to which it returned. At the end of the sixties, I attempted to move away from concepts and methods which had a direct relationship with Japanese tradition. And my premonition was validated. I chose the cube, the main mold for Modernism, as my new stylistic mold. However, because this cube was isolated during the process of development of my designs up to that point, the background and significance are different from the cube in Modernism. The concept of the machine occurred to me during the process of development of the cube. Initially, this machine appeared along with the *inorganicity* of the cube, as an image which lacked complete concreteness.

Before long, however, the "machine" which I used moved into a different context from that of Modernism. It was in the mid-seventies, when I tried to move on from the cube which itself had formed the motive for introducing this, that I became conscious of it as a concrete concept. The *Tanikawa Residence* (1974), a weekend home constructed like a wooden storehouse, provided the direct motivation for me to create the concept of the *Zero-Degree Machine*.

This was a geometrical "naked space" assembled by discretely linking "naked things", pillars, beams and walls stripped as far as possible of everyday meaning, and also created by discretely linking the "naked things" in a system different from the geometrical space of the ground surface. If people *traverse* this space, it is possible to read

a variety of unforeseen meanings from this. Its method and point of departure is quite different from ones in which all elements are formed into *a unity* to express a complete – and predicted – meaning. This space works as a device to produce meaning; it becomes a machine to produce meaning. The *Zero-Degree Machine* was assembled in this kind of context. In order to help with the understanding of this, I referred to photographs of the nose of USA Navy Fighter F1 4 and the legs of the Apollo 11 moon landing vehicle and described the method of joining parts discretely, as if accidentally, by the word "zero-degree".

There are limits to explanation of the *Zero-Degree Machine* which refer to the formal characteristics of the F14 and the Apollo 11. It is not possible to understand the essential technical parts possessed by these devices from looking at their exteriors. The essential functions of these machines are performed internally and by the ground-based mechanisms which control them and their "almost frightening" characteristics do not appear on the outside. To take an everyday example: the calculator carried by many people: it is difficult to guess its capabilities from the external appearance. At the leading edge of modern technology is the mechanism in a "black box", enclosed in a space dominated by electronics. Of course, there have been no few examples of architects making analogies with science and technology, especially with machines, as shown by the example of early Modernism. Also, although the theory of relativity was the leading-edge theory of space and a contemporary shared consciousness, this did not mean that a specific method of transforming this was successfully created. Today, when almost all important mechanisms are dominated by electronics, it is even less easy to extract an effective analogy for spatial modelling from these. […]



## Chaos, Randomness and Fractals

About 5 years ago I read in a newspaper the small piece of news that a Fuzzy Logic Society had been formed and that this kind of logic had been used in running a city's subway system, much appreciated by the citizens for its smoothness of operation. And people now watch television commercials for fuzzy logic washing machines and vacuum cleaners.

Computers use O and 1 as the elements in algorithms but research into using vaguer, "fuzzy" terms such as long and short, far and near and hot and cold as elements of algorithms was begun in the early seventies. And there was new interest in "subjective" things and phenomena which had not been used in the field of science before. It is expected that these algorithms will bring great advances in the performance of computers. There has been great interest in "unessential things" and specific applications are increasing in scope. Human beings do not think in binary code. The mechanisms of machines are coming closer to the thinking of humanity. In other words, machines have begun to simulate the subjective mechanisms of people.

In information technology, mechanisms capable of coping with random noise, which suddenly occurs and makes data transmission completely impossible, are installed beforehand in systems. This gives the machine considerable redundancy. Unlike previous machines which have demanded accuracy and eschewed play, the machines of the late twentieth century are coming closer to the minds and bodies of humanity which have considerable redundancy. Machines are becoming even more like people.

In the field of fluid mechanics, there has been considerable progress in the study of "turbulence". In the fields of physics and mathematics these come under the

general rubric of non-linear phenomena. They have a wide range of approaches to unstable and complex behaviors, of which turbulence is a good example. The flow of a fluid is changed under certain conditions from a simple laminar flow to a complex flow and finally into turbulence. With the recent developments in computers, there has been progress in analysis of these complex states. If analysis of turbulence, in which there is change in state both spatially and over time, is successful it will come to be defined as a "steady flow" in a higher system, unlike the systems known hitherto. It will be possible to treat the flow of rivers, ocean waves, air streams from jet engines and other familiar everyday phenomena as phenomena within a new system.

The new field known as fractal geometry has rapidly attracted people's interest, through computer graphics. It is possible to regard familiar natural objects and phenomena, such as trees, clouds, mountains and coasts, as having a fractal structure. When there is a resemblance between the form of the part and the form of the whole, it has a fractal structure. Both complete geometrical resemblance and the statistical resemblances which occur in nature are included as conditions for such self-resemblance. Things which have hitherto been excluded from consideration because of the complexity or absurdity of their shapes, have, as a direct result of the development of computers, become objects of concrete analysis.

The matters I have referred to here belong to different fields of study but they have important common points. The existence has been acknowledged of a clear "dynamism" in phenomena which had previously been called chaos, noise or fluctuation. Unlike statistical or stochastic phenomena, which are like the throw of a dice, these phenomena can be understood as "deterministic dynamism". In the world-view of Newtonian mechanics,



everything about the later state of movement can be determined once the initial conditions are known. A crack has now developed in this. It is gradually becoming clear that the "deterministic world" itself includes "non-deterministic phenomena" such as noise, randomness and fluctuation as essential rather than fortuitous phenomena. The foundations of the inner parts of space are beginning to change.

## A Strategy towards "Modern Next"

The machine, which I consider to be an important concept, has aspects which are the same as in Modernist architecture. As the nature of the machine as analogy or metaphor for methodology is different, however, the character of the space which is formed is different. Modernist architecture made a great leap ahead, and accomplished a revolution, at a period of major social change. The conditions which were obtained for this leap forward can be expected to be obtained for the architecture I am contemplating.

In a 1981 article, I described a project and added that this was a homage to the spirit of the twenties. When I began to work as an architect, I chose the tradition of Japanese architecture as my major theme, and this was a critique of the impoverished "Japanese Modernism" of the years immediately after the defeat in the Second World War.

This does not mean that I abandoned my homage to the brilliant work of the pioneers of the twenties. I made this homage again when I intuited that, as I have repeatedly said, my work has concepts, particularly those which have to do with technology, with aspects directly involved with the modern context and that I was moving towards concepts and structures with a different place and direction.

This was completely unrelated to the optimistic belief in technology which was popular in Japan in the sixties. I advocated small houses of no more than 65 square meters like the *Umbrella House* (1961) and, along with this, "superfluous space". The phrase "the bigger, the better" is a different way of making the latter assertion. This was a refutation of the "misunderstood Functionalism" of the time which made the mistaken assumption that the smallest measurable range of human activity is the proper size for a building. The notion of "maximum waste" overlaps with the question of the maximum redundancy of a computer, although differing in detail.

At the same time, I announced a positive assessment of the chaos of Japanese cities. However, this was not because I realized that "chaos" and "randomness" were new topics for science and technology at the time. Since simple disorder could not become a theme for creating buildings or cities, I hoped to establish a guideline which would serve as a link between chaos as a concept and concrete composition and attempted to carry out several practice exercises.

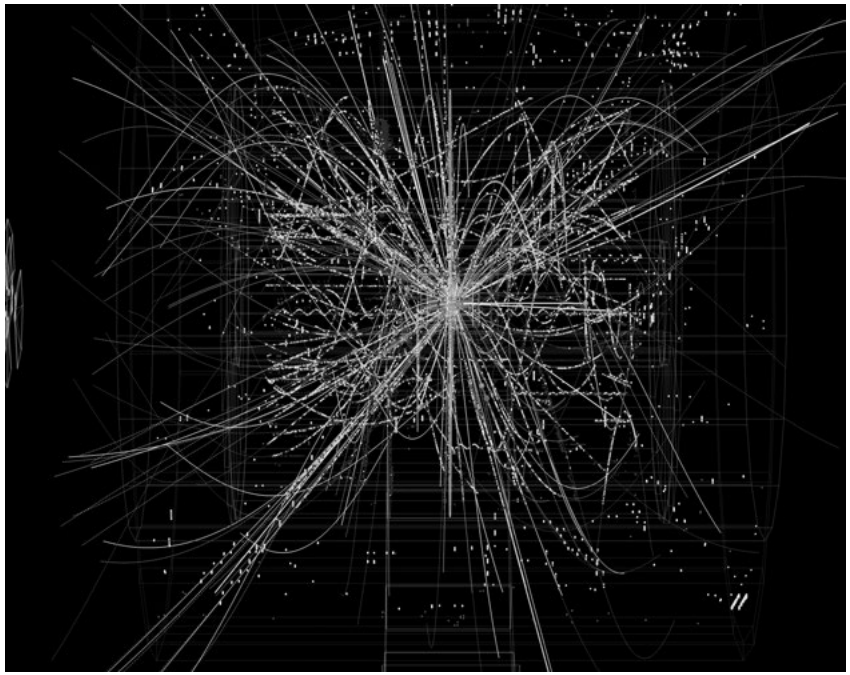
In 1967 I described the "mathematical city" thus: "The structure of the city of the future must be an extremely abstract system. Countless aggregations of urban [mathematical] functions, urban function spaces will determine the structure of the city of the future"; elsewhere, I wrote in, for instance, "States" (1975) about the expectations of the architectural visualization of the "mathematical" models of fortuitous quantities changed over time by a "stochastic process". At this time, I attempted to use the analogy of chaos, in place of the generally understood randomness, with a mathematical expression. Theories of chaos and theories of probability are studies completely different in method; the former is deterministic and the latter is non-deterministic. Chaos first appeared as a distinct subject of study in the same period. I was pursuing chaos as a question specific to architecture and, of course, I did not foresee the present state of science and technology. However, I consider this to be a synchronic, almost accidental, awareness of the same problems.



When the *Centennial Anniversary Hall* was completed, it was reported in a weekly magazine article that children called it *Gandam*. The building, composed as it is of primary geometric shapes, reminded them of this robot-hero from animated films. They no doubt found in it the random physical movements and postures showing humor and enjoyment which are part of the people's everyday postures. I introduced random methods into this spatial composition and it was analyzed by the latest programs and supercomputer. Modelling of buildings to resemble the forms of people and natural objects has existed from the earliest times but this is not the case here. In fact, the *Centennial Anniversary Hall* has no points of resemblance with forms of the human body.

The aim of architectural space in the future will not be the discovery of "a system or structure which has a diamond-like perfection" but systems which are open to nature and society. The model for this will, needless to say, be the living organism and the center will be a human system.

"Open system space" is the essence of the space towards which "Modern Next" is directed.



CERN, PROTON-LEAD COLLISION (2013)



# WHAT IS PHILOSOPHY?

## GILLES DELEUZE FÉLIX GUATTARI

## 1991

### The Plane of Immanence

[…] The plane of immanence is like a section of chaos and acts like a sieve. In fact, chaos is characterized less by the absence of determinations than by the infinite speed with which they take shape and vanish. This is not a movement from one determination to the other but, on the contrary, the impossibility of a connection between them, since one does not appear without the other having already disappeared, and one appears as disappearance when the other disappears as outline. Chaos is not an inert or stationary state, nor is it a chance mixture. Chaos makes chaotic and undoes every consistency in the infinite. The problem of philosophy is to acquire a consistency without losing the infinite into which thought plunges (in this respect chaos has as much a mental as a physical existence). *To give consistency without losing anything of the infinite* is very different from the problem of which seeks to provide chaos with reference points, on condition of renouncing infinite movements and speeds and of carrying out a limitation of speed first of all. Light, or the relative horizon, is primary in science. Philosophy, on the other hand, proceeds by presupposing or by instituting the plane of immanence: it is the plane's variable *curves* that retain the infinite movements that turn back on themselves in inces-

sant exchange, but which also continually free other movements which are retained. The concepts can then mark out the intensive ordinates of these infinite movements, as movements which are themselves finite which form, at infinite speed, variable *contours* inscribed on the plane. By making a section of chaos, the plane of immanence requires a creation of concepts.

To the question "Can or must philosophy be regarded as Greek?" a first answer seemed to be that the Greek city actually appears as the new society of "friends," with all the ambiguities of that word. Jean-Pierre Vernant adds a second answer: the Greeks were the first to conceive of a strict immanence of Order to a cosmic milieu that sections chaos in the form of a plane. If we call such a plane-sieve Logos, the logos is far from being like simple "reason" (as when one says the world is rational). Reason is only a concept, and a very impoverished concept for defining the plane and the movements that pass through it. In short, the first philosophers are those who institute a plane of immanence like a sieve stretched over the chaos. In this sense they contrast with sages, who are religious personae, priests, because they conceive of the institution of an always transcendent order imposed from outside by a great despot or by one god higher than the others, inspired by Eris, pursuing wars that go beyond any agon and hatreds that object in advance to the trials of rivalry.[7] Whenever there is transcendence, vertical Being, imperial State in the sky or on earth, there is religion; and there is Philosophy whenever there is immanence, even if it functions as arena for the agon and rivalry (the Greek tyrants do not constitute an objection to this, because they are wholeheartedly on the side of the society of friends such as it appears in their wildest, most violent rivalries). Perhaps these two possible determinations of philosophy



as Greek are profoundly linked. Only friends can set out a plane of immanence as a ground from which idols have been cleared. In Empedocles, Love lays out the plane, even if she does not return to the self without enfolding Hatred as movement that has become negative showing a subtranscendence of chaos (the volcano) and a supertranscendence of a god. It may be that the first philosophers still look like priests, or even kings. They borrow the sage's mask – and, as Nietzsche says, how could philosophy not disguise itself in its early stages? Will it ever stop having to disguise itself? If the instituting of philosophy merges with the presupposition of a prephilosophical plane, how could philosophy not profit from this by donning a mask? It remains the case that the first philosophers layout a plane through which unlimited movements pass continually on two sides, one determinable as Physis inasmuch as it endows Being with a substance, and the other as Nous inasmuch as it gives an image to thought. It is Anaximander who distinguishes between the two sides most rigorously by combining the movement of qualities with the power of an absolute horizon, the Apeiron or the Boundless, but always on the same plane. Philosophers carry out a vast diversion of wisdom; they place it at the service of pure immanence. They replace genealogy with a geology.

## Functives and Concepts

[…] Chaos is defined not so much by its disorder as by the infinite speed with which every form taking shape in it vanishes. It is a void that is not a nothingness but a *virtual*, containing all possible particles and drawing out all possible forms, which spring up only to disappear

immediately, without consistency or reference, without consequence.[1] Chaos is an infinite speed of birth and disappearance. Now philosophy wants to know how to retain infinite speeds while gaining consistency, by *giving the virtual a consistency specific to it*. The philosophical sieve, as plane of immanence that cuts through the chaos, selects infinite movements of thought and is filled with concepts formed like consistent particles going as fast as thought. Science approaches chaos in a completely different, almost opposite way: it relinquishes the infinite, infinite speed, in order to gain *a reference able to actualize the virtual*. By retaining the infinite, philosophy gives consistency to the virtual through concepts; by relinquishing the infinite, science gives a reference to the virtual, which actualizes it through functions. Philosophy proceeds with a plane of immanence or consistency; science with a plane of reference. In the case of science it is like a freeze-frame. It is a fantastic *slowing down*, and it is by slowing down that matter, as well as the scientific thought able to penetrate it with propositions, is actualized. A function is a Slow-motion. Of course, science constantly advances accelerations, not only in catalysis but in particle accelerators and expansions that move galaxies apart. However, the primordial slowing down is not for these phenomena a zero-instant with which they break but rather a condition coextensive with their whole development. To slow down is to set a limit in chaos to which all speeds are subject, so that they form a variable determined as abscissa, at the same time as the limit forms a universal constant that cannot be gone beyond (for example, a maximum degree of contraction). The first functives are therefore the limit and the variable, and reference is a relationship between values of the variable or, more profoundly, the relationship of the variable, as abscissa of speeds, with the limit.



Sometimes the constant-limit itself appears as a relationship in the whole of the universe to which all the parts are subject under a finite condition (quantity of movement, force, energy). Again, there must be systems of coordinates to which the terms of the relationship refer: this, then, is a second sense of limit, an external framing or exoreference. For these protolimits, outside all coordinates, initially generate speed abscissas on which axes will be set up that can be coordinated. A particle will have a position, an energy, a mass, and a spin value but on condition that it receives a physical existence or actuality, or that it "touches down" in trajectories that can be grasped by systems of coordinates. It is these first limits that constitute slowing down in the chaos or the threshold of suspension of the infinite, which serve as endoreference and carry out a counting: they are not relations but numbers, and the entire theory of functions depends on numbers. We refer to the speed of light, absolute zero, the quantum of action, the Big Bang: the absolute zero of temperature is minus 273.15 degrees Centigrade, the speed of light, 299'796 kilometers per second, where lengths contract to zero and clocks stop. Such limits do not apply through the empirical value that they take on solely within systems of coordinates, they act primarily as the condition of primordial slowing down that, in relation to infinity, extends over the whole scale of corresponding speeds, over their conditioned accelerations or slowing-downs. It is not only the diversity of these limits that entitles us to doubt the unitary vocation of science. In fact, each limit on its own account generates irreducible, heterogeneous systems of coordinates and imposes thresholds of discontinuity depending on the proximity or distance of the variable (for example, the distance of the galaxies). Science is haunted not by its own unity but by the plane of reference constituted by all

the limits or borders through which it confronts chaos. It is these borders that give the plane its references. As for the systems of coordinates, they populate or fill out the plane of reference itself. […]

## From Chaos to the Brain

We require just a little order to protect us from chaos. Nothing is more distressing than a thought that escapes itself, than ideas that fly off that disappear hardly formed, already eroded by forgetfulness or precipitated into others that we no longer master. These are infinite *variabilities*, the appearing and disappearing of which coincide. They are infinite speeds that blend into the immobility of the colourless and silent nothingness they traverse, without nature or thought. This is the instant of which we do not know whether it is too long or too short for time. We receive sudden jolts that beat like arteries. We constantly lose our ideas. That is why we want to hang on to fixed opinions so much. We ask only that our ideas are linked together according to a minimum of constant rules. All that the association of ideas has ever meant is providing us with these protective rules – resemblance, contiguity, causality – which enable us to put some order into ideas, preventing our "fantasy" (delirium, madness,) from crossing the universe in an instant, producing winged horses and dragons breathing fire. But there would not be a little order in ideas if there was not also a little order in things or states of affairs, like an objective antichaos: "If cinnabar were sometimes red, sometimes black, sometimes light, sometimes heavy…, my empirical imagination would never find opportunity when representing red color to bring to mind heavy cinnabar."[1] And finally, at the meeting



point of things and thought, the sensation must recur – that of heaviness whenever we hold cinnabar in our hands, that of red whenever we look at it – as proof or evidence of their agreement with our bodily organs that do not perceive the present without imposing on it a conformity with the past. This is all that we ask for in order to *make an opinion* for ourselves, like a sort of "umbrella," which protects us from chaos.

Our opinions are made up from all this. But art, science and philosophy require more: they cast planes over the chaos. These three disciplines are not like religions that invoke dynasties of gods, or the epiphany of a single god, in order to paint a firmament on the umbrella, like the figures of an *Urdoxa* from which opinions stem. Philosophy, science, and art want us to tear open the firmament and plunge into the chaos. We defeat it only at this price. And thrice victorious I have crossed the Acheron. The philosopher, the scientist, and the artist seem to return from the land of the dead. What the philosopher brings back from the chaos are variations that are still infinite but that have become inseparable on the absolute surfaces or in the absolute volumes that lay out a secant [*sécant*] plane of immanence: these are not associations of distinct ideas, but reconnections through a zone of indistinction in a concept. The scientist brings back from the chaos *variables* that have become independent by slowing down, that is to say, by the eliminations of whatever other variabilities are liable to interfere, so that the variables that are retained enter into determinable relations in a function: they are no linger links of properties in things, but finite coordinates on a secant plane of reference that go from local probabilities to a global cosmology. The artist brings back from the chaos *varieties* that no longer constitute a reproduction of the sensory in the organ but set up a being

of the sensory, a being of sensation, on an inorganic plane of composition that is able to restore the infinite. The struggle with chaos that Cézanne and Klee have shown in action in painting, at the heart of painting, is found in another way in science and philosophy: it is always a matter of defeating chaos by a secant plane that crosses it. Painters go though a catastrophe, or through a conflagration, and leave the trace of this passage on the canvas, as of the leap that leads them from chaos to composition.[2] Mathematical equations do not enjoy a tranquil certainty, which would be like the section of a dominant scientific opinion, but arise from an abyss that makes the mathematician "readily skip over calculations," in anticipation of not being able to bring about or arrive at the truth without "colliding here and there."[3] And philosophical thought does not bring its concepts together in friendship without again being traversed by a fissure that leads them back to hatred or disperses them in the coexisting chaos where it is necessary to take them up again, to seek them out, to make a leap. It is as if one were casting a net, but the fisherman always risks being swept away and finding himself in the open sea when he thought he had reached port. The three disciplines advance by crises or shocks in different ways, and in each case it is their succession that makes it possible to speak of "progress". It is as if the *struggle against chaos* does not take place without an affinity with the enemy, because another struggle develops and takes on more importance – the struggle *against opinion*, which claims to protect us from chaos itself.

In a violently poetic text, Lawrence describes what produces poetry: people are constantly putting up an umbrella that shelters them and on the underside of which they draw a firmament and write their conventions and opinions. But poets, artists, make a slit in the umbrella,



they tear open the firmament itself, to let in a bit of free and windy chaos and to frame in a sudden light a vision that appears through the rent – Wordsworth's spring or Cézanne's apple, the silhouettes of Macbeth or Ahab. Then come the crowd of imitators who repair the umbrella with something vaguely resembling the vision, and the crowed of commentators who patch over the rent with opinions: communication. Other artists are always needed to make other slits, to carry out necessary and perhaps ever-greater destructions, thereby restoring to their predecessors the incommunicable novelty that we could no longer see. This is to say that artists struggle less against chaos (that, in a certain manner, all their wishes summon forth) that against the "clichés" of opinion.[4] The painter does not paint on an empty canvas, and neither does the writer write on a blank page; but the page or canvas is already so covered with preexisting, reestablished clichés that it is first necessary to erase, to clean, to flatten, even to shred, so as to let in a breath of air from the chaos that brings us the vision. When Fontana slashes the coloured canvas with a razor, he does not tear the collar doing this. On the contrary, he makes us see the area of plain, uniform colour, of pure colour, though the slit. Art indeed struggles with chaos, but it does so in order to bring forth a vision that illuminates it for an instant, a Sensation. Even Houses: Soutine's drunken houses come from chaos, knocking up against one another and preventing one another from falling back into it; Monet's house also rises up like a slit through which chaos becomes the vision of roses. Even the most delicate pink opens on to chaos, like flesh on the flayed body.[5] A work of chaos is certainly no better than a work of opinion; art is no more made of chaos than it is of opinion. But if art battles against chaos it is to borrow weapons from it that it turns against opinion, the better

to defeat it with tried and tested arms. Because the picture starts out covered with clichés, the painter must confront the chaos and hasten the destructions so as to produce a sensation that defies every opinion and cliché (how many times?). Art is not chaos but a compositions of chaos that yields the vision or sensation, so that it constitutes, as Joyce says, a chaosmos, a composed chaos – neither foreseen nor preconceived. Art transforms chaotic variability into *chaoid* variety, as in El Greco's black and green-gray conflagration, for example, or Turner's golden conflagration, or de Staël's red conflagration. Art struggles with chaos but it does so in order to render it sensory, even through the most charming character, the most enchanted landscape (Watteau).

Science is perhaps inspired by a similar sinuous, reptilian movement. A struggle against chaos seems to be an essential part of science when it puts slow variability under constants or limits, when it thereby refers it to centers of equilibrium, when it subjects it to a selection that retains only a small number of independent variables within coordinate axes, and when between these variables it installs relationships whose future state can be determined on the basis of the present (determinist calculus) or, alternatively, when it introduces so many variables at once that the state of affairs is only statistical (calculus of probabilities). In this sense we speak of a specifically scientific opinion won from chaos, as we do of a communication defined sometimes by initial pieces of information, sometimes by large-scale pieces of information, which usually go from the elementary to the composite, or from the present to the future, or from the molecular to the molar. But, here again, science cannot avoid experiencing a profound attraction for the chaos with which it battles. If slowing down is the thin border that separates us from the



oceanic chaos, science draws as close as it can to the nearest waves by positing relationships that are preserved with the appearance and disappearance of variables (differential calculus). The difference between the chaotic state where the appearance and disappearance of a variability blend together, and the semichaotic state that manifests a relationship as the limit of the variables that appear or disappear becomes ever smaller. As Michell Serres says of Leibniz, "There would be two infraconsciousnesses: the deeper would be structured like any set whatever, a pure multiplicity or possibility in general, an aleatory mixture of signs; the less deep would be covered by combinatory schemas of this multiplicity."[6] One could conceive of a series of coordinates or phase spaces as a succession of filters, the earlier of which would be in each case a relatively chaotic state, and the later a chaoid state, so that we would cross chaotic thresholds rather than go from the elementary to the composite. Opinion offers us a science that dreams of unity, of unifying its laws, and that still searches today for a community of the four forces. Nevertheless, the dream of capturing a bit of chaos is more insistent, even if the most diverse forces stir restlessly within it. Science would relinquish all the rational unity to which it aspires for a little piece of chaos that it could explore.

Art takes a bit of chaos in a frame in order to form a composed chaos that becomes sensory, or from which it extracts a chaoid sensation as variety; but science takes a bit of chaos in a system of coordinates and forms a referenced chaos that becomes Nature, and from which it extracts an aleatory function and chaoid variables. In this way one of the most important aspects of modern mathematical physics appears in the action of "strange" or chaotic attractors: two neighboring trajectories in a determinate

system of coordinates do not remain so and diverge in an exponential manner before coming together through operations of stretching and folding that are repeated and intersect with chaos.[7] If equilibrium attractors (fixed points, limit cycles, cores) express science's struggle with chaos, strange attractors reveal its profound attraction to chaos, as well as the constitution of a chaosmos internal to modern science (everything that, in one way or another, was misrepresented in earlier periods, notably in the fascination for turbulences). We thus come back to a conclusion to which art led us: the struggle with chaos is only the instrument of a more profound struggle against opinion, for the misfortune of people comes from opinion. Science turns against opinion, which lends to it a religious taste for unity or unification. But it also turns within itself against properly scientific opinion as *Urdoxa*, which consists sometimes in determinist prediction (Laplace's God) and sometimes in probabilistic evaluation (Maxwell's demon): by releasing itself from initial pieces of information and large-scale pieces of information, science substitutes for communication the conditions of creativity defined by singular effects and minimal fluctuations. Creation is the aesthetic varieties or scientific variables that emerge on a plane that is able to crosscut chaotic variability. As for pseudosciences that claim to study the phenomena of opinion, the artificial intelligences of which they make use maintain as their models probabilistic processes, stable attractors, an entire logic of the recognition of forms; but they must achieve chaoid states and chaotic attractors to be able to understand both thought's struggle against opinion and its degeneration into opinion (one line in the development of computers is toward the assumption of a chaotic or chaoticizing system).



This is what confirms the third case, which is no longer sensory variety or functional variable but conceptual variation as it appears in philosophy. Philosophy struggles in turn with the chaos as undifferentiated abyss or ocean of dissemblance. But this does not mean that philosophy ranges itself on the side of opinion, nor that opinion can take its place. A concept is not a set of associated ideas like an opinion. Neither is it an order of reasons, a series of ordered reasons that could rigorously constitute a kind of rationalized *Urdoxa*. To reach the concept it is not even enough for phenomena to be subject to principles analogous to those that associate ideas or things, or to principles that order reasons. As Michaux says, what suffices for "current ideas" does not suffice for "vital ideas" – those that must be created. Ideas can only be associated as images and can only be ordered as abstractions; to arrive at the concept we must go beyond both of these and arrive *as quickly as possible* at mental objects determinable as real beings. This is what Spinoza or Fichte have already shown: we must make use of fictions and abstractions, but only so far as is necessary to get to a plane where we go from real being to real being and advance through the construction of concepts.[8] We have seen how this result can be achieved to the extent that variations become inseparable according to zones of neighborhood or indiscernibility: they then cease being associable to the caprice of imagination, or discernible and capable of being ordered according to the exigencies of reason, in order to form genuine conceptual blocs. A concept is a set of inseparable variations that is produced or constructed on a plane of immanence insofar as the latter crosscuts the chaotic variability and gives it consistency (reality). A concept is therefore a chaoid state par excellence; it refers back to a chaos rendered consistent, become Thought, mental chaosmos. And what would

*thinking* be if it did not constantly confront chaos? Reason shows us its true face only when it "thunders in its crater." Even the cogito is only an opinion, an *Urdoxa* at best, if we do not extract from it the inseparable variations that make it a concept, if we do not give up finding an umbrella or shelter in it, unless we stop presupposing an immanence that would be accommodated *to itself*, so that, on the contrary, it can set itself up on a plane of immanence to which it belongs that which takes it back to the open sea. In short, chaos has three daughters, depending on the plane that cuts through it: these are the C*haoids* – art, science, and philosophy – as forms of thought or creation. We call *Chaoids* the realities produced on the planes that cut through the chaos in different ways. […]

There is still an operation that clearly shows the persistence of chaos, not only around the plane of reference or coordination but in the detours of its variable surface, which are always put back into play. These are operations of branching and individuation: if states of affairs are subject to them it is because they are inseparable from the potentials they take from chaos itself and that they do not actualize without risk of dislocation or submergence. It is therefore up to science to make evident the chaos into which the brain itself, as subject of knowledge, plunges. The brain does not cease to constitute limits that determine functions of variables in particularly extended areas; relations between these variables (connections) manifest all the more an uncertain and hazardous characteristic, not only in electrical synapses, which show a statistical chaos, but in chemical synapses, which refer to a deterministic chaos.[14] There are not so much cerebral centers as points, concentrated in one area and disseminated in another, and "oscillators," oscillating molecules that pass from one point to another. Even in a



linear model like that of the conditioned reflex, Erwin Straus has shown that it was essential to understand the intermediaries, the hiatuses and gaps. Arborized paradigms give way to rhizomatic figures, acentered systems, networks of finite automatons, chaoid states. No doubt this chaos is hidden by the reinforcement of opinion generating facilitating paths, through the action of habits or models of recognition; but it will become much more noticeable if, on the contrary, we consider creative processes and the bifurcations they imply. And individuation, in the cerebral state of affairs, is all the more functional because it does not have the cells themselves for variables, since the latter constantly die without being renewed, making the brain a set of little deaths that puts constant death within us. It calls upon a potential that is no doubt actualized in the determinable links that derive from perceptions, but even more in the free effect that varies according to the creation of concepts, sensations, or functions themselves.

The three planes, along with their elements, are irreducible: *plane of immanence of philosophy*, *plane of composition of art*, *plane of reference or coordination of science; form of concept*, *force of sensation*, *function of knowledge; concepts and conceptual personae*, *sensations and aesthetic figures*, *figures and partial observers*. Analogous problems are posed for each plane: in what sense and how is the plane, in each case, one or multiple – what unity, what multiplicity? But what to us seem more important now are the problems of interference between the planes that join up in the brain. A first type of interference appears when a philosopher attempts to create the concept of a sensation or a function (for example, a concept peculiar to Riemannian space or to irrational number); or when a scientist tries to create functions of sensations, like Fechner or in theories of color or sound, and even functions of concepts, as Lautman demon-

strates for mathematics insofar as the latter actualizes virtual concepts; or when an artist creates pure sensations of concepts or functions, as we see in the varieties of abstract art or in Klee. In all these cases the rule is that the interfering discipline must proceed with its own methods. For example, sometimes we speak of the intrinsic beauty of a geometrical figure, an operation, or a demonstration, but so long as this beauty is defined by criteria taken from science, like proportion, symmetry, dissymmetry, projection, or transformation, then there is nothing aesthetic about it: this what Kant demonstrated with such force.[15] The function must be grasped within a sensation that gives it percepts and affects composed exclusively by art, on a specific plane of creation that wrests it from any reference (the intersection of two black lines or the thickness of color in the right angles in Mondrian; or the approach of chaos through the sensation of strange attractors in Noland or Shirley Jaffe).

These, then, are extrinsic interferences, because each discipline remains on its own plane and utilizes its own elements. But there is a second, intrinsic type of interference when concepts and conceptual personae seem to leave a plane of immanence that would correspond to them, so as to slip in among the functions and partial observers, or among the sensations and aesthetic figures, on another plane; and similarly in the other cases. These slidings are so subtle, like those of Zarathustra in Nietzsche's philosophy or of Igitur in Mallarme's poetry, that we find ourselves on complex planes that are difficult to qualify. In turn, partial observers introduce into science sensibilia that are sometimes close to aesthetic figures on a mixed plane.

Finally, there are interferences that cannot be localized. This is because each distinct discipline is, in its own way, in relation with a negative: even science has a



relation with a nonscience that echoes its effects. It is not just a question of saying that art must form those of us who are not artists, that it must awaken us and teach us to fed, and that philosophy must teach us to conceive, or that science must teach us to know. Such pedagogics are only possible if each of the disciplines is, on its own behalf, in an essential relationship with the No that concerns it. The plane of philosophy is prephilosophical insofar as we consider it in itself independently of the concepts that come to occupy it, but nonphilosophy is found where the plane confronts chaos. *Philosophy needs a nonphilosophy that comprehends it; it needs a nonphilosophical comprehension just as art needs nonart and science needs nonscience.*[16] They do not need the No as beginning, or as the end in which they would be called upon to disappear by being realized, but at every moment of their becoming or their development. Now, if the three Nos are still distinct in relation to the cerebral plane, they are no longer distinct in relation to the chaos into which the brain plunges. In this submersion it seems that there is extracted from chaos the shadow of the "people to come" in the form that art, but also philosophy and science, summon forth: mass-people, world-people, brain-people, chaos-people – nonthinking thought that lodges in the three, like Klee's nonconceptual concept or Kandinsky's internal silence. It is here that concepts, sensations, and functions become undecidable, at the same time as philosophy, art, and science become indiscernible, as if they shared the same shadow that extends itself across their different nature and constantly accompanies them.

The Plane of Immanence 7 Cf. Jean-Pierre Vernant, *The Origins of Greek Thought* (Ithaca: Cornell University Press, 1982), pp. I07–29. Conclusion: From Chaos to the Brain 1 Immanuel Kant, *Critique of Pure Reason*, trans. N. Kemp-Smith (London: Macmillan, 1929), Transcendental Analytic, "The Synthesis of Reproduction in Imagination." 2. On Cezanne and chaos, see Gasquet, *Cézanne;* on Klee and chaos, see Paul Klee, "Note on the Gray Point," in *Théorie de l'art moderne* (Paris: Gonthier, 1963). See also the analyses of Henri Maldiney, *Regard Parole Espace* (Paris: L'Age d'homme, 1973), pp. 150–5I, 183–85. 3 Galois, in Dalmas, *Evariste Galois*, pp. 121, 130. 4 Lawrence, "Chaos in Poetry," in D. H. Lawrence, *Selected Literary Criticism*, ed. A. Beal (London: Heinemann, 1955). 5 Georges Didi-Huberman, *La peinture incarnée* (Paris: Minuit, 1985), pp. 120–23, on the flesh and chaos. 6 Michel Serres, *Le système de Leibniz* (Paris: P.U.F., 1990), vol.I , p. III (and pp. 120–23, on the succession of filters). 7 On strange attractors, independent variables, and "routes toward chaos," see Prigogine and Stengel's, *Entre le temps et l'éternité*, chap. 4, and James Gleick, *Chaos.* 8 See Martial Guéroult, *L'évolution et la structure de la Doctrine de la science chez Fichte* (Paris: Belles Lettres, 1982), vol. I , p. 174. 14 Burns, *The Uncertain Nervous System* (London: Edward Arnold, n.d.). See also Steven Rose, *The Conscious Brain* (New York: Knopf, 1975): "The nervous system is uncertain, probabilistic, and so interesting." 15 Immanuel Kant, *Critique of Judgement*, trans. J. H. Bernard (New York: Macmillan, 1951), 62. 16 Francois Laruelle proposes a comprehension of nonphilosophy as the "real (of) science," beyond the object of knowledge: *Philosophie et non-philosophi*e (Liège: Mardaga, 1989). But we do not see why this real of science is not nonscience as well.

I'm afraid you have not enough
chaos in you to make a world.

GEORGE WILLIAM RUSSEL, DISCUSSION WITH JAMES JOYCE (UNKNOWN)



# THE ESSENCE OF CHAOS

# EDWARD LORENTZ

# 1993

## Glimpses of Chaos

*It only looks random*

Words are not living creatures; they cannot breathe, nor walk, nor become fond of one another. Yet, like the human beings whom they are destined to serve, they can lead unique lives. A word may be born into a language with just one meaning, but, as it grows up, it may acquire new meanings that are related but nevertheless distinct.

Often these meanings are rather natural extensions of older ones. Early in our own lives we learn what "hot" and "cold" mean, but as we mature we discover that hot pursuit and cold comfort, or hot denials and cold receptions, are not substances or objects whose temperatures can be measured or estimated. In other instances the more recent meanings are specializations. We learn at an equally early age what "drink" means, but if later in life someone says to us, "You've been drinking," we know that he is not suggesting that we have just downed a glass of orange juice. Indeed, if he tells someone else that we drink, he is probably implying not simply that we often consume alcoholic beverages, but that we drink enough to affect our health or behavior.

So it is with "chaos" – an ancient word originally denoting a complete lack of form or systematic arrangement, but now often used to imply the absence of some kind of order that ought to be present. Not withstanding

its age, this familiar word is not close to its deathbed, and it has recently outdone many other common words by acquiring several related but distinct *technical* meanings.

It is not surprising that, over the years, the term has often been used by various scientists to denote randomness of one sort or another. A recent example is provided by the penetrating book *Order Out of Chaos*, written by the Nobel Prize-winning physical chemist Ilya Prigogine and his colleague Isabelle Stengers. These authors deal with the manner in which many disorganized systems can spontaneously acquire organization, just as a shapeless liquid mass can, upon cooling, solidify into an exquisite crystal. A generation or two earlier, the mathematician Norbert Wiener would sometimes even pluralize the word, and would write about a chaos or several chaoses when referring to systems like the host of randomly located molecules that form a gas, or the haphazardly arranged collection of water droplets that make up a cloud.

This usage persists, but, since the middle 1970s, the term has also appeared more and more frequently in the scientific literature in one or another of its recently acquired senses; one might well say that there are several newly named kinds of chaos. In this volume we shall be looking closely at one of them. There are numerous processes, such as the swinging of a pendulum in a clock, the tumbling of a rock down a mountainside, or the breaking of waves on an ocean shore, in which variations of some sort take place as time advances. Among these processes are some, perhaps including the rock and the waves but omitting the pendulum, whose variations *are not random but look random*. I shall use the term *chaos* to refer collectively to processes of this sort – ones that appear to proceed according to chance even though their behavior is in fact determined by precise laws. This usage is arguably the one most often encountered in technical works today, and scientists writing about chaos in this sense no longer feel the need to say so explicitly.



In reading present-day accounts, we must keep in mind that one of the other new usages may be intended. Sometimes the phenomena being described are things that appear to have random arrangements in space rather than random progressions in time, like wildflowers dotting a field. On other occasions, the arrangements or progressions are simply very intricate rather than seemingly random, like the pattern woven into an oriental rug. The situation is further complicated because several other terms, notably *nonlinearity*, *complexity*, and *fractality*, are often used more or less synonymously with *chaos* in one or several of its senses. In a later chapter I shall have a bit to say about these related expressions.

In his best-selling book *Chaos: Making a New Science*, which deals with chaos in several of its newer senses, James Gleick suggests that chaos theory may in time rival relativity and quantum mechanics in its influence on scientific thought. Whether or not such a prophecy comes true, the "new science" has without question jumped into the race with certain advantages. Systems that presumably qualify as examples of chaos can very often be seen and appreciated without telescopes or microscopes, and they can be recorded without time-lapse or high-speed cameras. Phenomena that are supposedly chaotic include simple everyday occurrences, like the falling of a leaf or the flapping of a flag, as well as much more involved processes, like the fluctuations of climate or even the course of life itself.

I have said "presumably" and "supposedly" because there is something about these phenomena that is not quite compatible with my description of chaos as something that

is random in appearance only. Tangible physical systems generally possess at least a small amount of true randomness. Even the seemingly regular swinging of the pendulum in a cuckoo clock may in reality be slightly disturbed by currents in the air or vibrations in the wall; these may in tum be produced by people moving about in a room or traffic passing down a nearby, street. If chaos consists of things that are actually *not* random and only *seem* to be, must it exclude familiar everyday phenomena that have a bit of randomness, and be confined to mathematical abstractions? Might not such a restriction severely diminish its universal significance?

An acceptable way to render the restriction unnecessary would be to stretch the definition of chaos to include phenomena that are slightly random, provided that their much greater apparent randomness is not a by-product of their slight true randomness. That is, real-world processes that appear to be behaving randomly – perhaps the falling leaf or the flapping flag – should be allowed to qualify as chaos, as long as they would continue to appear random even if any true randomness could somehow be eliminated.

In practice, it may be impossible to purge a real system of its actual randomness and observe the consequences, but often we can guess what these would be by turning to theory. Most theoretical studies of real phenomena are studies of approximations. A scientist attempting to explain the motion of a simple swinging pendulum, which incidentally is not a chaotic system, is likely to neglect any extraneous random vibrations and air currents, leaving such considerations to the more practical engineer.

Often he or she will even disregard the clockwork that keeps the pendulum swinging, and the internal friction that makes the clockwork necessary, along with anything else that is inconvenient. The resulting pencil-and-paper system will be only a model, but one that is completely manageable. It seems appropriate to call a real physical system chaotic if a fairly realistic model, but one with the system's inherent suppressed, still appears to behave randomly.



## Pinballs and Butterflies

[...] According to the narrower definition of randomness, a *random* sequence of events is one in which anything that can ever happen can happen next. Usually it is also understood that the probability that a given event will happen next is the same as the probability that a like event will happen at any later time. A familiar example, often serving as a paradigm for randomness, is the toss of a coin. Here either heads or tails, the only two things that can ever happen, can happen next. If the process is indeed random, the probability of throwing heads on the next toss of any particular coin, whether 50 percent or something else, is precisely the same as that of throwing heads on any other toss of the same coin, and it will remain the same unless we toss the coin so violently that it is bent or worn out of shape. If we already know the probability, knowing in addition the outcome of the last toss cannot improve our chances of guessing the outcome of the next one correctly.

It is true that knowing the results of enough tosses of the same coin can suggest to us what the probability of heads is, for that coin, if we do not know it already. If after many tosses of the coin we become aware that heads has come up 55 percent of the time, we may suspect that the coin is biased, and that the probability has been, is, and will be 55 percent, rather than the 50 percent that we might have presupposed.

The coin is an example of complete randomness. It is the sort of randomness that one commonly has in mind when thinking of random numbers, or deciding to use a random-number generator. According to the broader definition of randomness, a *random* sequence is simply one in which any one of several things can happen next, even though not necessarily *anything* that can ever happen can happen next. What actually is possible next will then depend upon what has just happened. An example, which, like tossing a coin, is intimately associated with games of chance, is the shuffling of a deck of cards. The process is presumably random, because even if the shuffler should wish otherwise – for example, if on each riffle he planned to cut the deck exactly in the middle, and then allow a single card to fall on the table from one pile, followed by a single card from the other pile, etc. – he probably could not control the muscles in his fingers with sufficient precision to do so, unless he happened to be a virtuoso shuffler from a gaming establishment. Yet the process is not completely random, if by what happens next we mean the outcome of the next single riffle, since one riffle cannot change any given order of the cards in the deck to any other given order. In particular, a single riffle cannot completely reverse the order of the cards, although a sufficient number of successive riffles, of course, can produce any order.

A *deterministic* sequence is one in which only one thing can happen next; that is, its evolution is governed by precise laws. Randomness in the broader sense is therefore identical with the absence of determinism. It is this sort of randomness that I have intended in my description of chaos as something that *looks* random.

Tossing a coin and shuffling a deck are processes that take place in discrete steps-successive tosses or riffles. For quantities that vary continuously, such as the speed of



a car on a highway, the concept of a next event appears to lose its meaning. Nevertheless, one can still define randomness in the broader sense, and say that it is present when more than one thing, such as more than one prespecified speed of a car, is possible at any specified future time. Here we may anticipate that the closer the future time is to the present, the narrower the range of possibilities – a car momentarily stopped in heavy traffic may be exceeding the speed limit ten seconds later, but not one second later. Mathematicians have found it advantageous to introduce the concept of a *completely* random continuous process, but it is hard to picture what such a process in nature might look like.

Systems that vary deterministically as time progresses, such as in mathematical models of the swinging pendulum, the rolling rock, and the breaking wave, and also systems that vary with an inconsequential amount of randomness – possibly a real pendulum, rock, or wave – are technically known as *dynamical systems*. At least in the case of the models, the state of the system may be specified by the numerical values of one or more *variables* – or the model pendulum, two variables – the position and speed of the bob will suffice; the speed is to be considered positive or negative, according to the direction in which the bob is currently moving. For the model rock, the position and velocity are again required, but, if the model is to be more realistic, additional variables that specify the orientation and spin are needed. A breaking wave is so intricate that a fairly realistic model would have to possess dozens, or more likely hundreds, of variables.

Returning to chaos, we may describe it as behavior that is deterministic, or is nearly so if it occurs in a tangible system that possesses a slight amount of randomness, but does not *look* deterministic. This means that the present

state completely or almost completely determines the future, but does not appear to do so. How can deterministic behavior look random? If truly identical states do occur on two or more occasions, it is unlikely that the identical states that will necessarily follow will be perceived as being appreciably different. What can readily happen instead is that almost, but not quite, identical states occurring on two occasions will *appear* to be just alike, while the states that follow, which need not be even nearly alike, will be observably different. In fact, in some dynamical systems it is normal for two almost identical states to be followed, after a sufficient time lapse, by two states bearing no more resemblance than two states chosen at random from a long sequence. Systems in which this is the case are said to be *sensitively dependent on initial conditions*. With a few more qualifications, to be considered presently, sensitive dependence can serve as an acceptable definition of chaos, and it is the one that I shall choose.

"Initial conditions" need not be the ones that existed when a system was created. Often they are the conditions at the beginning of an experiment or a computation, but they may also be the ones at the beginning of any stretch of time that interests an investigator, so that one person's initial conditions may be another's midstream or final conditions.

Sensitive dependence implies more than a mere increase in the difference between two states as each evolves with time. For example, there are deterministic systems in which an initial difference of one unit between two states will eventually increase to a hundred units, while an initial difference of a hundredth of a unit, or even a millionth of a unit, will eventually increase to a hundred units also, even though the latter increase will inevitably consume more time. There are other deterministic systems



in which an initial difference of one unit will increase to a hundred units, but an initial difference of a hundredth of a unit will increase only to one unit. Systems of the former sort are regarded as chaotic, while those of the latter sort are not considered to constitute chaos, even though they share some of its properties.

Because chaos is deterministic, or nearly so, games of chance should not be expected to provide us with simple examples, but games that *appear* to involve chance ought to be able to take their place. Among the devices that can produce chaos, the one that is nearest of kin to the coin or the deck of cards may well be the pinball machine. It should be an old-fashioned one, with no filppers or flashing lights, and with nothing but simple pins to disturb the free roll of the ball until it scores or becomes dead.

One spring in the thirties, during my undergraduate years at Dartmouth, a few pinball machines suddenly appeared in the local drugstores and eating places. Soon many students were occasionally winning, but more often losing, considerable numbers of nickels. Before long the town authorities decided that the machines violated the gambling laws and would have to be removed, but they were eventually persuaded, temporarily at least, that the machines were contests of skill rather than games of chance, and were therefore perfectly legal.

If this was indeed so, why didn't the students perfect their skill and become regular winners? The reason was chaos. As counterparts of successive tosses of a coin or riffles of a deck, let the "events" be successive strikes on a pin. Let the outcome of an event consist of the particular pin that is struck, together with the direction from the pin to the center of the ball, and the velocity of the ball as it leaves the pin. Note that I am using *velocity* in the technical sense, to denote speed together with direction of motion,

just as position with respect to some reference point implies distance together with direction of displacement.

Suppose that two balls depart one after the other from the same pin in slightly different directions. When the balls arrive at the next pin, their positions will be close together, compared to the distance between the pins, but not necessarily close, compared to the diameter of a ball. Thus, if one ball hits the pin squarely and rebounds in the direction from which it came, the other can strike it obliquely and rebound at right angles. This is approximately what happens in Figure 1, which shows the paths of the centers of two balls that have left the plunger of a pinball machine at nearly equal speeds. We see that the angle between two paths can easily increase tenfold whenever a pin is struck, until soon one ball will completely miss a pin that the other one hits. Thus a player will need to increase his or her control tenfold in order to strike one more pin along an intended pathway.

Of course, the pinball machine in Figure 1 is really a mathematical model, and the paths of the balls have been computed. The model has incorporated the decelerating effect of friction, along with a further loss of energy whenever a ball bounces from a pin or a side wall, but, in a real machine, a ball will generally acquire some side spin as it hits a pin, and this will alter the manner in which it will rebound from the next pin. It should not alter the conclusion that the behavior is chaotic – that the path is sensitively dependent on the initial speed.

Even so, the model as it stands fails in one respect to provide a perfect example of chaos, since the chaotic behavior ceases after the last pin is struck. If, for example, a particular ball hits only seven pins on its downward journey, a change of a millionth of a degree in its initial direction would amplify to ten degrees, but a change of a



ten-millionth of a degree would reach only one degree. To satisfy all of the requirements for chaos, the machine would have to be infinitely long – a possibility in a model if not in reality – or else there would have to be some other means of keeping the ball in play forever. Any change in direction, even a millionth of a millionth of a degree, would then have the opportunity to amplify beyond ten degrees.

An immediate consequence of sensitive dependence in any system is the impossibility of making perfect predictions, or even mediocre predictions sufficiently far into the future. This assertion presupposes that we cannot make measurements that are completely free of uncertainty. We cannot estimate by eye, to the nearest tenth of a degree nor probably to the nearest degree, the direction in which a pinball is moving. This means that we cannot predict, to the nearest ten degrees, the ball's direction after one or two strikes on a pin, so that we cannot even predict which pin will be the third or fourth to be struck. Sophisticated electronic equipment might measure the direction to the nearest thousandth of a degree, but this would merely increase the range of predictability by two or three pins. As we shall see in a later chapter, sensitive dependence is also the chief cause of our well-known failure to make nearly perfect weather forecasts.

I have mentioned two types of processes – those that advance step by step, like the arrangements of cards in a deck, and those that vary continuously, like the positions or speeds of cars on a highway. As dynamical systems, these types are by no means unrelated. The pinball game can serve to illustrate a fundamental connection between them.

Suppose that we observe 300 balls as they travel one by one through the machine. Let us construct a diagram containing 300 points. Each point will indicate the position of the centre of one ball when that ball strikes

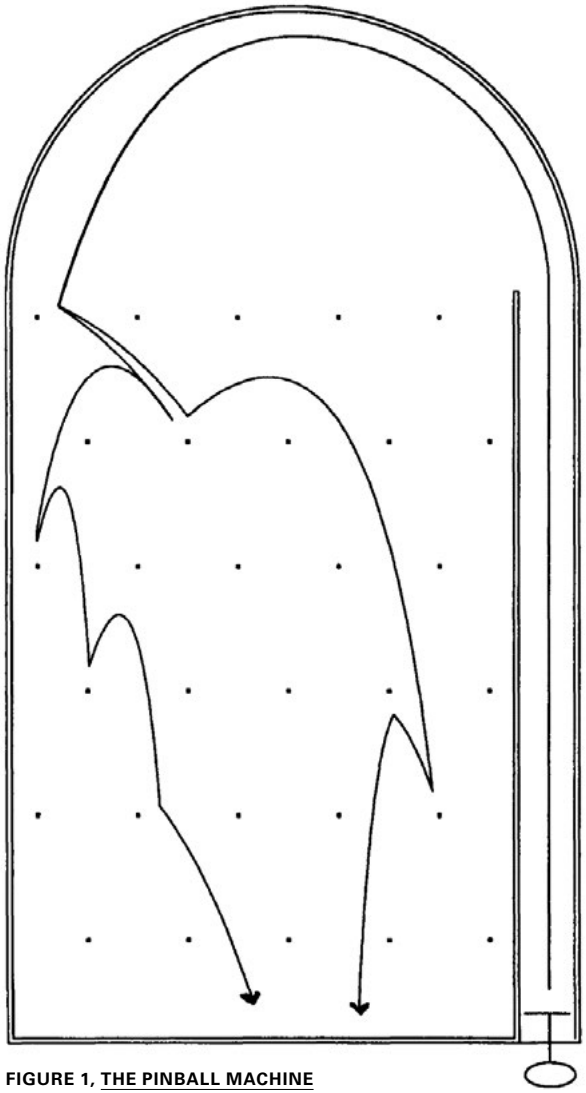


FIGURE 1, THE PINBALL MACHINE



its first pin. Let us subsequently construct a similar diagram for the second strike. The latter diagram may then be treated as a full-scale map of the former, although certainly a rather distorted map. A very closely spaced cluster of points in the first diagram may appear as a recognizable cluster in the second. Dynamical systems that vary in discrete steps, like the pinball machine whose "events" are strikes on a pin, are technically known as *mappings*. The mathematical tool for handling a mapping is the *difference equation*. A system of difference equations amounts to a set of formulas that together express the values of all of the variables at the next step in terms of the values at the current step.

I have been treating the pinball game as a sequence of events, but of course the motion of a ball between strikes is as precisely governed by physical laws as are the rebounds when the strikes occur. So, for that matter, is the motion of a coin while it is in the air. Why should the latter process be randomness, while the former one is chaos? Between any two coin tosses there is human intervention, so that the outcome of one toss fails to determine the outcome of the next. As for the ball, the only human influence on its path occurs before the first pin is struck, unless the player has mastered the art of jiggling the machine without activating the tilt sign.

Since we can observe a ball between strikes, we have the option of plotting diagrams that show the positions of the centres of the 300 balls at a sequence of closely spaced times, say every fiftieth of a second, instead of only at moments of impact. Again each diagram will be a full-scale map of the preceding one. Now, however, the prominent features will be only slightly changed from one diagram to the next, and will appear to flow through the sequence. Dynamical systems that vary continuously, like

the pendulum and the rolling rock, and evidently the pinball machine when a ball's complete motion is considered, are technically known as *flows*. The mathematical tool for handling a flow is the *differential equation*. A system of differential equations amounts to a set of formulas that together express the rates at which all of the variables are currently changing, in terms of the current values of the variables.

When the pinball game is treated as a flow instead of a mapping, and a simple enough system of differential equations is used as a model, it may be possible to solve the equations. A complete solution will contain expressions that give the values of the variables at any given time in terms of the values at any previous time. When the times are those of consecutive strikes on a pin, the expressions will amount to nothing more than a system of difference equations, which in this case will have been derived by solving the differential equations. Thus a mapping will have been derived from a flow.

Indeed, we can create a mapping from *any* flow simply by observing the flow only at selected times. If there are no special events, like strikes on a pin, we can select the times as we wish – for instance, every hour on the hour. Very often, when the flow is defined by a set of differential equations, we lack a suitable means for solving them – some differential equations are intrinsically unsolvable. In this event, even though the difference equations of the associated mapping must exist as relationships, we cannot find out what they look like. For some real-world systems we even lack the knowledge needed to formulate the differential equations; can we honestly expect to write any equations that realistically describe surging waves, with all their bubbles and spray, being driven by a gusty wind against a rocky shore?



If the pinball game is to chaos what the coin toss is to complete randomness, it has certainly not gained the popularity as a symbol for chaos that the coin has enjoyed as a symbol for randomness. That distinction at present seems to be going to the butterfly, which has easily outdistanced any potential competitors since the appearance of James Gleick's book, whose leading chapter is entitled "The Butterfly Effect."

The expression has a somewhat cloudy history. It appears to have arisen following a paper that I presented at a meeting in Washington in 1972, entitled "Does the Flap of a Butterfly's Wings in Brazil Set Off a Tornado in Texas?" I avoided answering the question, but noted that if a single flap could lead to a tornado that would not otherwise have formed, it could equally well prevent a tornado that would otherwise have formed. I noted also that a single flap would have no more effect on the weather than any flap of any other butterfly's wings, not to mention the activities of other species, including our own. The paper is reproduced in its original form as Appendix 1.

The thing that has made the origin of the phrase a bit uncertain is a peculiarity of the first chaotic system that I studied in detail. Here an abbreviated graphical representation of a special collection of states known as a "strange attractor" was subsequently found to resemble a butterfly, and soon became known as the butterfly. In Figure 2 we see one butterfly; a representative of a closely related species appears on the inside cover of Gleick's book. A number of people with whom I have talked have assumed that the butterfly effect was named after this attractor. Perhaps it was.

Some correspondents have also called my attention to Ray Bradbury's intriguing short story "A Sound of Thunder," written long before the Washington meeting.

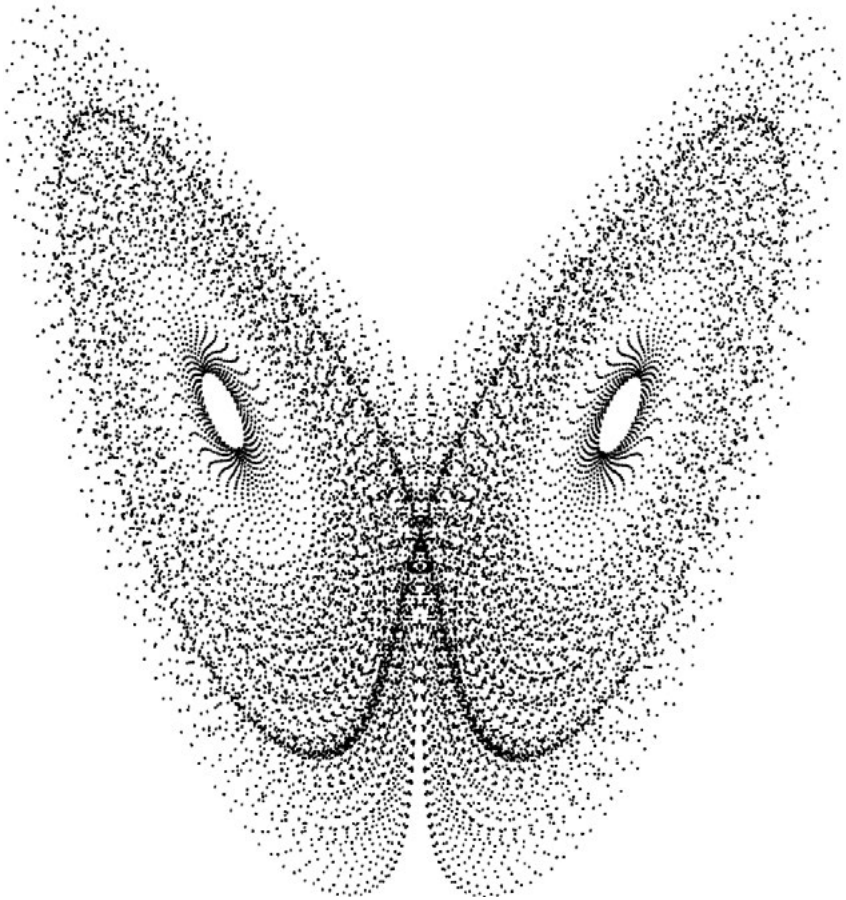


FIGURE 2, THE BUTTERFLY



Here the death of a prehistoric butterfly, and its consequent failure to reproduce, change the outcome of a present-day presidential election.

Before the Washington meeting I had sometimes used a seagull as a symbol for sensitive dependence. The switch to a butterfly was actually made by the session convenor, the meteorologist Philip Merilees, who was unable to check with me when he had to submit the program titles. Phil has recently assured me that he was not familiar with Bradbury's story. Perhaps the butterfly, with its seeming frailty and lack of power, is a natural choice for a symbol of the small that can produce the great.

Other symbols have preceded the seagull. In George R. Stewart's novel *Storm*, a copy of which my sister gave me for Christmas when she first learned that I was to become a meteorology student, a meteorologist recalls his professor's remark that a man sneezing in China may set people to shovelling snow in New York. Stewart's professor was simply echoing what some real-world meteorologists had been saying for many years, sometimes facetiously, sometimes seriously.

It wasn't, at the end, noise that interested him (the Indian). Noise was just a mere particularity. Noise could even be dangerous, could enslave. What interested him was the natural strength of society of Men, the revelation of existence.

LE CLÉZIO, HAÏ (1971)



# HEARING THE SUBCONSCIOUS

# INTERVIEW WITH SOFIA GUBAIDULINA BY VERA LUKOMSKY

# 1999

(This is the second of two interviews Vera Lukomsky conducted with Sofia Gubaidulina while she was Annual Guest Composer during the festival of her music which took place at San Jose State University School of Music, California in April 1995. The first interview, "*The Eucharist in my fantasy*", appeared in Tempo 206. In this second interview, recorded at Gubaidulina's hotel on 5 April 1995, she talks more about her technical procedures, especially regarding structural proportion. The interview took place in Russian and is here presented in Vera Lukomsky's English translation.)

Sofia Asgatovna, in your conference talk you mentioned that during your student years at Moscow Conservatory, access to American music was completely dosed in the USSR. What contemporary Western music did you have access to during that period?

> According to the official Soviet point of view, almost all Western music of the 20th century was prohibited, excluding probably only Bartók. Stravinsky was especially prohibited: sometimes the authorities of Moscow Conservatory organ-

ized raids of the student dormitories, searching for scores by Stravinsky and other contemporary Western composers. But, of course, we found ways to study Western music, pulling it, so to say, through the "*back door*". We knew Ives, Cage; we actually knew everything on the sly.

To which of the composers were you especially attracted?

During my long professional life I have experienced plenty of attractions. I love a lot of things from music history. I had a period of a strong attraction to Wagner, then a period of affection for the Russian classical school (Tchaikovsky, Rimsky-Korsakov, Mussorgsky), then a period of devotion to the 16th century (Josquin, Gesualdo), then a period of special interest in the Second Viennese School. But the figure to whom I experience a constant devotion is J.S. Bach. His works are still a great source of learning for me.

What of a non-musical sphere influenced you?

Reading. Books of many kinds. Of course, I love *belles lettres* and poetry. But most of all I love non-technical scientific literature. Of the scientific literature I am particularly influenced by Carl Jung.

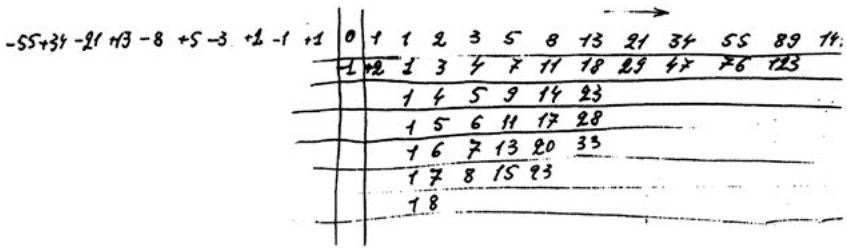
It would be very interesting to know more about your circle of readings and about your special interest in the genre of scientific literature. In what language do you usually read these books?



I read many books in German. I don't speak German very well, but I am good at reading it. I read without a dictionary. For example, I have read all works by Jung in German, because Jung has not been translated and published in Russia. I am greatly impressed that in his research into the human soul, there is no corner that Jung is afraid to enter. One of my favourites is his fundamental work *Psychology and Alchemy*. Appreciating the alchemists' discoveries on this issue, Jung studied their treatises, as well as the Eastern experience of meditation, which he explored during his trips to Tibet and Africa. Jung's main field is psychiatry and psychotherapy, but the scope of his interests is really astonishing. For example, he wrote *Psychology and Religion*, and *Psychology and the Arts*.[1] His treatise *Answer to Job* is a great attempt to interpret *The Book of Job*, which is one of the most incomprehensible parts in the Bible. At least I do not know how to completely understand it...

In conclusion, I would like to go back to your compositional process. What from your musical discoveries do you value most? What invention is your composer's pride?

At present I am preoccupied with the issues of rhythm and rhythmic proportionality in musical form, which I consider to be the main experiment in my life. All other things are the intuitive work of fantasy – this is a normal creative process. But the problem is that the 20th century has moved from atonality and serialism to sonorism. As a consequence, our musical material, like our world, became extremely rich and over-complicated.



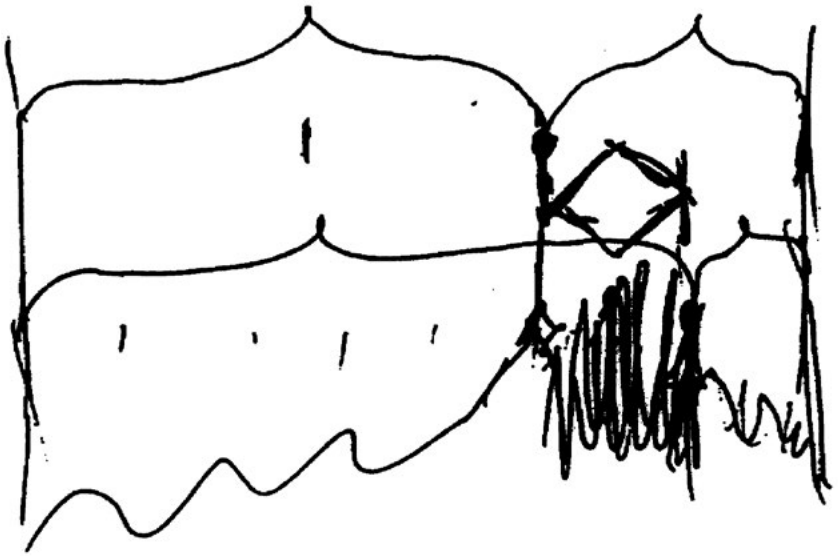

**EXAMPLE 1**



Besides traditional musical sonorities, it includes noises, whispering, conversations, shouts, moans, sighs, and electronic sounds. But in my opinion, art does not need so much richness. There was a period in my life when I was actively involved in a search for new timbres, new textures, new types of an articulation. Now I am calmer about it. My main concern is to cure the excessiveness of musical material by the method of time structuring. I will try to explain this process of rhythmic organisation of the metrical material in which I am engaged. This process seems to be extremely interesting and greatly inspires me. I start from the Fibonacci series (1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, etc. to infinity). Moving to the left from zero, we'll get the same series but with a sign alternation (+1, -1, +2, - 3, +5, -8, +13, -21, +34, -55, etc; see Ex. 1).[2]

In the Fibonacci series the ratio between any two neighbouring numbers approximates the Golden Section, which I understand as the perfect ratio, representing the universal proportion of life. In the numerical progression of the Fibonacci series, the proportion is getting closer and closer to the absolute mathematical point, but never reaches it. Nevertheless, moving farther along this series, we are moving towards perfection.

Besides the Fibonacci series, other similar series might be built. They execute the same additive-automorphological principle, that is, the row starts from the addition of the first two numbers. The subsequent numbers are derived by the method of adding the two previous numbers. But the ratio between any neighbouring numbers is distorted



EXAMPLE 2



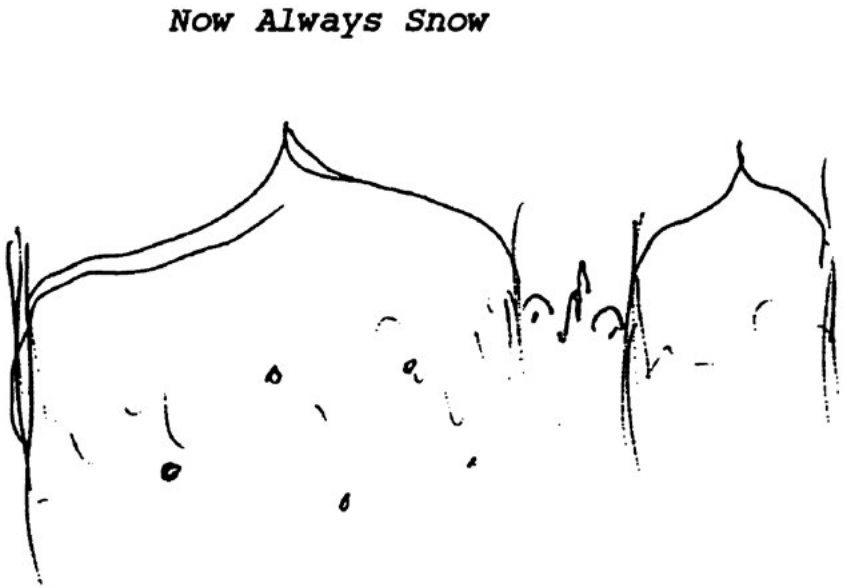
from the very beginning. For example, the second series (known as the Lucas series, in honour of the monk who studied it), begins with the addition of the numbers 1 and 3 (1, 3, 4, 7, 11, 18, 29, 47, 76, 123, etc.). The third derived series begins with the addition of the derived series begins with the addition of thenumbers 1 and 4 (1, 4, 5, 9, 14, 23, etc.). In the fourth series the primary numbers are 1 and 5 (1, 5, 6, 11, 17, 28, etc.). We may continue the process of derivation and produce new series.

Do these series have special names?

No, only the two first two – Fibonacci and Lucas. From them we may build new series – to infinity. The farther we move away from the Fibonacci series, the less perfect is the proportion. This gives me reason to consider the Fibonacci series as a consonance, and, let's say, the fourth series as a dissonance.

But all the derived series, beginning from the Lucas series, are dissonances to a greater or lesser degree, aren't they?

Yes, but there is an enormous difference between the dissonant series. For example, if we build a composition in such a way that in the first section there is one unit of time, and in the second section two equal units of time (that is, we take this ratio from the Fibonacci series), then the Golden Section is located between these two sections, and something important always happens in this point of the composition. Now, we'll take the ratio from the sixth series (1:7); it means that in the first section



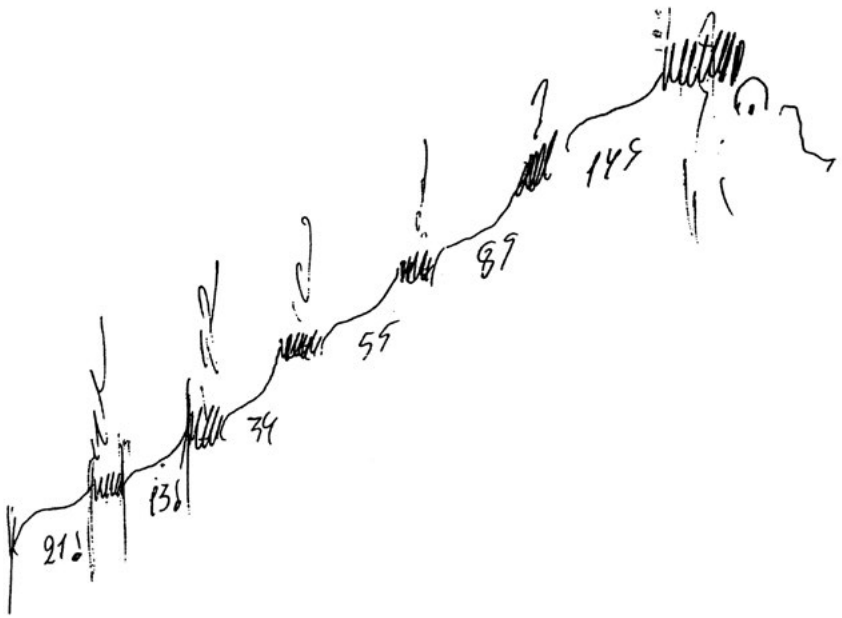

EXAMPLE 3



there is one time unit, whereas the second section contains seven units. Such a proportion will cause a terrible dissonance, which occurs between these two points (i.e., between the "almost perfect" and the "dissonant" Golden Sections; see Ex.2).

The extreme tension between these two points calls for extraordinary musical events that should happen in this area. Let's suppose that there are two different musical layers, and the tension arises between the two layers. And, in the point of their meeting, something should occur: a dialogue, or a conflict, or something else – whatever I can imagine. I built the form in such a way that the musical development moves to the area of tension, and after that, so to speak, steps away. This is my concept of a musical form. For example, in the first movement of the choral cycle *Now Always Snow*, every voice part has its own line and an individual climax point. In the Golden Section of this movement the crucial event is a fermata rest (I like this rest very much!), followed by the phrase of the Baritone "*Takoi pustoty…*" ("*of such an emptiness…*"). Then again a long rest. After that, in the choral parts there is a recurrence of the exclamations "*Tishina…Tishina…*" ("*Stillness... Stillness...*"), which were introduced in the beginning of this movement (see Ex.3).

I have described to you the climactic point in the baritone part. But in this composition there are many other crucial points in different parts; the location of these points I define on the basis of the Fibonacci series or other derived series. I find this system very attractive, because it helps to organize the chaos of the material. I experience

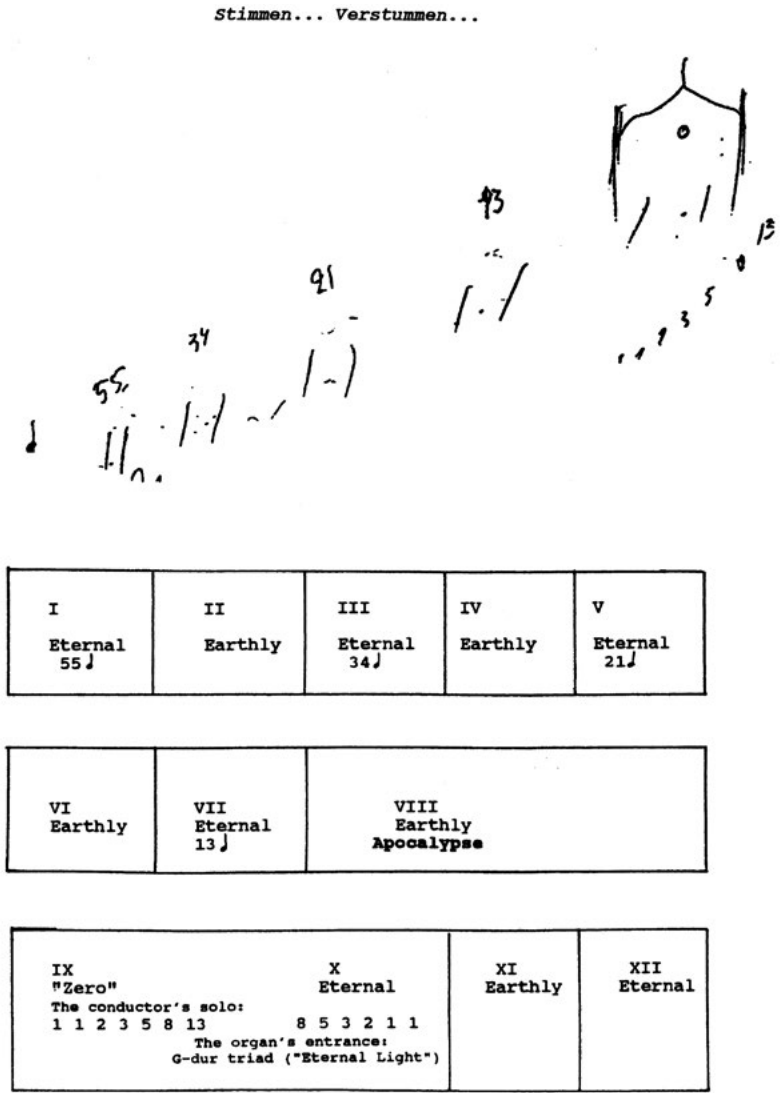



EXAMPLE 4



the material as very aggressive substance. Its richness is in its excess. I call this an illness. The material requires the artist to find a solution for healing the pain. To the extent of my ability, I want to cure the material with the process I just described. I am absolutely convinced that resolving dissonance to consonance with regard to time proportions heals the material. This system of composition is extremely difficult and time-consuming. Not every work can be composed this way, because of time limitation. So far, the most successful compositions written by this method are *Alleluja* and *Now Always Snow*.

I started to experiment with this system in 1983. The first work was *Perception*, a composition in 13 movements. The Fibonacci series structures only the twelfth movement called "*Montys Tod*" ("*Monty's Death*"). This is a terrifying scene: Monty, a beautiful black stallion and former race-winner dies, betrayed and forgotten by the people.[3] A development in all the episodes rises higher and higher in the registers. Each episode is suddenly stopped or interrupted by unisons. After the twelfth episode, there is a unison again, then a long rest, and a coda. This last unison of the strings sounds simultaneously with a recurrence of themes from the most significant previous movements. These themes are recorded on tape. The rhythmic structure of the composition is strict and pure: as a rhythmic unit I took the quarter note; the number of quarters in the different episodes corresponds to the numbers of the Fibonacci series: 21, 13, 34, 55, 89, 144, etc. The unisons also correspond to the numbers of the series (see Ex. 4).




EXAMPLE 5



Are you using the numbers of the Fibonacci series at random? Is it a game of numbers?

> Yes, it is a game! I form a certain profile of numbers. But in general, there is a beautiful picture of rhythmic calculation, proportionality, mathematic exactness in the large-scale formal organization – over the absolute freedom of all other musical elements: melody, harmony, rhythm. I consider this movement to be my masterpiece.

Do you change the tempo?

> No. For a conductor it is one single tempo. There might be only *accelerandi*. But inside the episodes the rhythm (I mean the rhythm in the narrow sense) is completely liberated. If you listen to *Perception*, you won't perceive it as a dry brain computing. I like this system because it does not deprive me of my freedom, does not limit my fantasy. I remain a pupil of Berdiaev[4] in the sense that freedom is the most important thing for me, particularly the freedom to realize myself. I hear, and my spontaneous hearing is most precious to me. But what I hear is my subconscious. There are not only good things, but evil things, too! The subconscious is a terrifying abyss: there is both light and darkness. And when I take things out of there – if I have reached the depths of the subconscious and heard its pulse, its vibration, I have no right to expose them to people in their pure form because they are fearful! I must elucidate them, elucidate by means of structural work. And I choose rhythm in the broad sense, in order to

clarify my subconscious and not damage its essence. I like building a ratio of spontaneousness and conscious self-limitation; it attracts me most of all in my creative work. Sometimes I am satisfied with my results, sometimes not. Sometimes it is a partial achievement. For example, in the Perception it is only one movement.

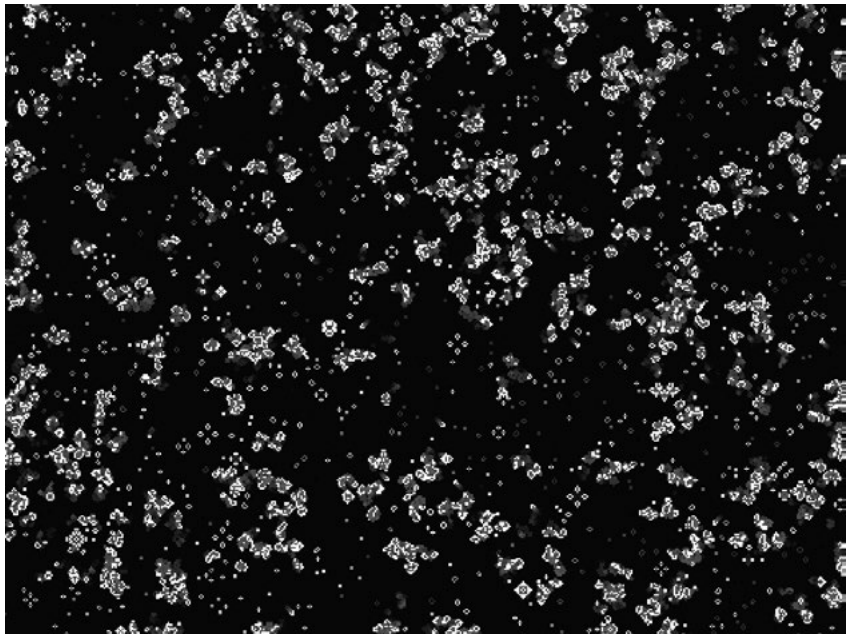
In my symphony *Stimmen… Verstummen…* (*Voices… Stilled…*, 1986), which consists of 12 movements, all odd movements are organized according to the Fibonacci series, while the even movements are freely composed.[5] The Ninth movement is a "*rest*": it is a solo for the conductor. It is as if music had come to "*zero*": in the first movement there was 55 quarters, in the third – 34, in the fifth – 21, in the seventh – 13, and, finally, in the ninth – zero[6] (see Ex.5). This "*zero*" is represented by the conductor's organizing time according to the Fibonacci series: (1, 1, 2, 3, 5, 8, 13). Then he "*holds*" 13; at this time the organ enters with a major triad in the high register. For a while, the conductor continues to "*hold*" that pyramid of Fibonacci numbers and then starts moving down the Fibonacci series, from 13 to 1. The tenth movement follows. In the score I provided for the conductor a special drawing illustrating how to conduct this rest. Some conductors perform this solo astonishingly well, especially Pavel Gilin and Yuri Nikolaevsky.[7]

Sofia Asgatovna, thank you very much for your generosity, for your fascinating interviews. I wish you a great success tonight, at the concert.



Thank you. I will be, as usual, very anxious. I always worry during performances of my works.

1 Gubaidulina presumably means Jung's *The Spirit in Man, Art, and Literature.* 2 Each of the series begins from the primary number, which moves by the scale from zero to minus infinity. The first number in each of the series is a number which, if added to the primary number, gives "*1*". The second number is a sum of the primary and first numbers, etc. In the Fibonacci series the difference between any neighbouring numbers is the least. The more we move away from the "*ideal*" proportion of the Fibonacci series, the more distorted proportion we discover in each of the derived rows. 3 This is a musical setting to a poem by Francisco Tanze. 4 Nikolai Aleksandrovich Berdiaev (1874-1948), Russian religious philosopher, who taught that freedom may not be determined by anybody, even God. His works were forbidden in the USSR up to the post-Soviet time. Despite the ban, Gubaidulina obtained and studied his books. 5 Gubaidulina chose the opposition of "*perfect*" and "*imperfect*" temporal proportions to represent two opposed universes (harmonic Eternal World vs. disharmonic Earthly World). 6 The "*zero*" of the ninth movement is caused by the Apocalyptic catastrophe depicted in the previous movement. 7 Earlier Gubaidulina had explained that this solo of the conductor is "*the hieroglyph of our connection with the cosmic rhythm*". Also she mentioned that the organ's G – major triad symbolizes "*Eternal light*" which begins to shine after the catastrophe in the cleared lucid space. (See: Valentina Kholopova, "*Nikolai Berdiaev and Sofia Gubaidulina: in the Same Part of the Universe*"; and "*Music Will Save the World*", in Sovetskaia Muzyka, Moscow, 1991, No.10, p.15; and 1990, No.9, p.53)



MAREK FISER, CONWAY'S GAME OF LIFE (2013)



# CHRISTINE FIELDER
# CHRIS KING

# 2006

## The Sensitivity of Chaos
## The Mythology of Chaos

*Chaos Gk. kaos abyss – to "yawn" or "gape."*
In the Britannica Dictionary chaos is "a condition of utter disorder or confusion as the unformed primal state of the universe" citing either utter disorder and confusion or an unfathomable abyss as definitive. The Concise Oxford speaks of "formless void or great deep of primordial matter, this personified as the oldest of the Gods, utter confusion." The Grollier Encyclopedia notes that in Greek mythology, Chaos was the unorganized state, or void, from which all things arose. Proceeding from time, Chaos eventually formed a huge egg from which there issued Heaven, Earth, and Eros (love). According to Hesiod's Theogeny, Chaos preceded the origin not only of the world, but also of the gods. In Hebrew myth tohu wabohu is the universe without form and void, as in Genesis 1:2:

> *And the earth was without form, and void; and darkness was upon the face of the deep.*

Barbara Walker likens chaos to the undifferentiated raw elements occupying the womb of the world-goddess between destruction and recreation of the universe.

The eternal religious war of light and dark is very much the battle of chaos as the dark "force" and order as the

principle of light. This is enacted in diverse myths of origin. In Babylon, Tiamat the feminine primal abyss and ancient mother is overthrown by Marduk the youthful male slayer of chaos, in the name of civic and world order. The same theme extends to classic male combat myth in the cosmic Zoroastrian war of dark and light which became in Jewish and later Christian thought the battle between God and Satan which leads to Armageddon and the unveiling tumult of apocalypse. This opposition between chaos and order is a fundamental misunderstanding of the natural condition.

## The Nature of Chaos

Far from being the nemesis of order, or the primal ooze in which order is imposed, chaos is also the genesis of new form. Most complex systems arise from the mutual interaction between chaos and order, through bifurcation – abrupt change of form under continuous underlying transformation. Bifurcation takes its name from "forking" but really applies to all discrete transformation under continuous change. It is typified by the onset of opposing flight or fight reactions, and sudden transformations, such as a wave breaking, or a bubble bursting. Bifurcations can introduce new structure and hence increasing complexity, particularly in transition from chaos to order, in dynamics occurring at the "edge of chaos."

The failure to appreciate the generative nature of chaos has led to it being one of the last scientific frontiers to be discovered, over fifty years after relativity and quantum theory. This has happened because the human will to impose order, even among scientists, is so strong that somehow, in their rush to fit every phenomenon into a mechanistic world view, they ignored the fact that virtually all interesting natural phenomena involve chaos, from the waves on the beach, to the beauty of a forest, from our seemingly regular heartbeat to the patterns of our brain waves in the moment of "eureka"!



Mathematicians distinguish dynamical chaos from a random, or stochastic process, in which critical events are determined by probabilities. Dynamical chaos is not simply disorder or randomness, but an internally unstable process. Chaotic systems may have well-defined dynamical formulations and may even be deterministic as classical systems, but this dynamic is one which doesn't settle down either into equilibrium or any particular periodicity or resonance but wanders erratically over time in an unpredictable way which is deceptively similar to randomness.

Although chaotic systems may be precisely defined by a recursive formula or feedback process, they combine erratic behavior with long-term unpredictability which gives them just the character those seeking orderly prediction might fear. Chaotic bifurcations and a closely-related phenomenon called self-organized criticality are also frequently associated with crises such as cyclones, floods, avalanches, earthquakes and other catastrophic natural interventions.

The essential characteristics, or "axioms", of classical chaos are threefold:

1 *Sensitive dependence:* Lorenz, the father of chaos theory, was first to note the key characteristic of chaos in the "butterfly effect," that the eddies of the wings of a butterfly flying in Hawaii could later become the seed of wild unpredictable fluctuation of a tropical cyclone hitting Fiji. This is "sensitive dependence on initial conditions" in which arbitrarily small changes can later become amplified by a chaotic process or flow into global fluctuations.

2 *Topological mixing:* Any small open region will eventually become mixed over any other. This means the dynamics is very tangled, so any orbit goes almost everywhere in the "phase space" of configurations of the system. This is precisely what happens in an egg-beater. This mixing property sometimes referred to as ergodicity makes the orbits or trajectories of a chaotic process appear random.

3 *Dense periodicities:* Chaotic dynamics is densely permeated with repelling periodic oscillations, often of infinitely many types, making for a great deal of hidden complexity.

Another way of encapsulating the latter two properties is to find a dense orbit single trajectory in the system which comes arbitrarily close to every point in the space of states. These three combine to mean the dynamic is complex, unstable and unpredictable.

Sensitive dependence causes chaotic systems to eventually become fundamentally unpredictable even when they are deterministic. They cannot be accurately computed, since arbitrarily small errors in the computation rapidly escalate into global inaccuracies. This unpredictability is at the core of the difficulties of weather prediction and it also lies at the root of diverse phenomena, from the stock market, to the risk of nuclear holocaust. […]

Chaotic systems arise naturally from positive feedback processes because the positive feedback amplifies small differences, causing the instability we see in the butterfly effect. We shall see shortly that sexual selection is a potentially chaotic positive feedback process, prone to exponential runaway. In this respect it is complementary to the stabilizing ordered constraints imposed by natural selection.



Many apparently periodic phenomena are actually chaotic. The heart beat appears periodic, but the healthy heart is actually tuned by chaos. This allows the brain and heart pacemakers and the heart cells themselves all to keep in feedback resonance with one another and thus respond to changing circumstances. No two heartbeats have exactly the same interval between, but vary in a chaotic manner, similar to a dripping tap. […]

Chaos occurs in a surprising variety of phenomena, many of which appear at the surface to be periodic. Both the heart beat and the dripping of a tap, although apparently periodic have chaotically intermittent variations in the beat period. The rings of Saturn and objects still remaining in the asteroid belt are governed by mode-locking chaos. Only those whose orbital periods have no rational (fractional) relationship remain, because all the fractionally-related orbits have long ago been thrown into the planets by a repeated sling-shot effect. When orbits of two astronomical bodies become mode-locked they interact strongly on a regular basis and the cumulative effect may throw the smaller one out of orbit. The asteroids remaining today are in a belt where the periods do not mode lock and have thus been left behind. More generally a large variety of systems from the weather through earthquakes, movement of the continental plates, chemical and electronic oscillations, secretion of enzymes, fluctuations in the stock market and collision of successive billiard balls, through to brain waves and possibly cognition itself, involve chaos or chaotic phases.

Chaos presents us with new properties of nature which are connected with the development of complexity. A chaotic system contains within it a fractal structure with diverse dynamics, including a dense set of infinitely many periodicities.

## The Edge of Chaos and the Complexity of Nature

*Out of chaos comes order.*
Friedrich Nietzsche

A system which can bifurcate between chaos and order over time can enter a mixing phase of chaos and then retrieve structures hidden within chaos by bifurcating back into order. A chaotic system can likewise be tuned to display its hidden periodicities. Many types of system develop complex evolving structures in the transition region between order and chaos, sometimes called the "edge of chaos." The edge of chaos thus represents the region of sexual paradox between chaos and order where complexity becomes emergent.

Nature and evolution are both described as complex systems evolving at the edge of chaos. Many of the most beautiful aspects of nature arise from their fractal structures and textures. Climax forests are chaotic systems, both in terms of their species diversity and their fluctuating population dynamics. Climax forest also displays a fractal dynamic which is central to its diversity. Natural disturbances from fire and flood, wind and storm damage, to large falling trees are fractal disturbances to which diverse species become adapted in disseminating seed in an ever more complex arrangement of species diversity. The forest



is colonized in up to five strata from the top canopy to the floor each with their own ecosystemic complexity.

Both plants and animals are derived from fractal algorithms in nature and it is from these fractal algorithms that most of our understanding of form and diversity in nature comes. Evolution and its increasing complexity is a central instance of edge-of-chaos dynamics, as is our dynamical brain state, in both perception and problem-solving, especially when perceiving the chaotic diversity of nature itself for which we are highly adapted. It is the very sensitive dependence of chaos which ensures the brain remains completely adaptable to arbitrarily small differences.

An intriguing illustration of frozen chaos permeating biological organisms is the incidence of the golden mean as a ratio or angle in both animal and plant form. The twin spirals observed in plant forms, including the pineapple, pine cones, sunflowers and cacti occur at the golden mean angle 2p/g and generally have two related Fibonacci numbers. This prevents any ordered pattern of mode-locking which would prevent the seeds of the sunflower packing together properly.

Similarly many human proportions, from successive digit bones, the relative distance from the navel to the head and feet, the widths of successive incisors and the nose, mouth and eyes all conform to the golden mean. This is the last, most irrational number to submit to mode locking, as do the orbits of the remaining asteroids in relation to the orbit of Jupiter. Mode locking can also be seen in the 13 arms of the Mandelbrot portion above, where the dynamic is making 1/13 of a revolution.

The lynx is a species with regularly, yet erratically oscillating numbers. It was once believed that lynxes were partners in a dynamically unstable association with their

main prey, the snowshoe hare. Recently it has been recognized that the cycle is driven by the interaction between hares and their food plants, with the lynxes being carried along more or less passively by changes in the abundance of hares.

In addition to this, the potentially chaotic population dynamics we have seen in the logistic function is displayed in many natural populations making population dynamics unstable from season to season and sensitively dependent on changes in the environment. For this reason, we have to be very careful when considering the major impacts we are making on natural ecosystems, lest chaos and bifurcation compound the problems we initiate.

It is important to note that population dynamics may cause paradoxical situations to arise. For example, we usually think of a predator-prey relationship as exploitative. However a predator acts to reduce the growth rate of a population and thus protects it from boom and bust population crisis in which the prey multiplies so fast that it eats all the available food and dies *en masse* through starvation. Thus, predator and prey are caught in a kind of prisoner's dilemma relationship which is both destructive and protective at the same time.

Similar considerations apply to parasites and hosts. A central development of this dynamical relationship we shall see next is the idea that a prisoner's dilemma genetic "arms race" between parasites and hosts led to sexual evolution to promote genetic variety and hence resistance to disease. This mutual adaption arms race thus required each of the competing organisms to become capable of sexual recombination to survive the others changes.

Once sexuality became established, sexual selection began to become a fundamental driving force complementary to natural selection. Because natural selection



tends to operate as environmental or inter-species constraints on survival it is both stable and predominantly a negative feedback. In addition, the vast majority of mutations are deleterious.

The peacock's tail illustrates how sexual selection can become a runaway positive feedback process, leading to chaotic unpredictability. Once again, we see hints of Fibonacci golden mean spirals.

Sexual selection has very different characteristics from natural selection. Firstly, it acts not negatively on survival but positively on reproduction. It is also an iterative feedback process with strong positive feedback characteristics. Female reproductive choice acts as a capricious and variable positive feedback which, as it adapts to competing display by becoming more discerning, drives male evolution into potential runaway. Mutual mate selection can also have powerful effects. This leads to sexual selection becoming a potentially chaotic positive feedback force complementing the stabilizing effects of natural selection. These effects are again complemented by the opposing effects of mutations and recombination as genetic modifiers held in check by selection retaining only the viable options.

These effects result in a deep connection between sexual paradox and edge of chaos complexity. Broadly speaking the condition of sexual paradox induces sensitively unstable dynamics which lead to complex systems dynamics at the edge of chaos because the actions of each of the partially opposing forces are frustrated from imposing order. Loss of sexual paradox leads to degeneracy, with a dominant stable process and consequently reduced complexity and reduced viability. Thus, maintaining sexual paradox in evolution and climax diversity in planetary abundance and resilience go hand in hand. Although our

gatherer-hunter origins appear to be sexually paradoxical, many aspects of human culture show loss of sexual paradox into degeneracies of patriarchal sexual and natural dominion involving boom and bust and rape of the planet's diversity. These are accompanied by very worrying instances of loss of complexity which need urgent correction to ensure human viability.

A final example of the interdependence of chaos and order in the development of complexity is illustrated in the brain which is not simply a digital computer but displays prominent dynamical behavior, illustrated in the broad-spectrum waves of excitation in the electroencephalogram. This excitation is distributed across the cortex in a manner consistent with parallel distributed processing. Both perception and cognition can be modeled as a transition from a state of chaos representing the unrecognized condition, or the unsolved problem, to a state of order. This process can be modeled as a transition: from high energy chaos, "exploring" its internal space without getting stuck in any "rut"; to order, as the energy is reduced so as to flow towards a minimum, through the capture of the system by a learned attractor in recognition, or the bifurcation of the system to form a new attractor. An insight "eureka" often happens instantaneously, from a state of relative confusion, indicating a single transition from chaos to new order representing the "knowing" state. The chaotic state is thus the progenitor of new order, rather than mere manipulation of order itself. Rather the order imposed by the problem becomes a boundary condition for chaotic resolution. […]

A famous example of complexity with universal computation is Conway's "game of life" in which a given cell survives if two or three neighbors out of the possible eight



are alive and is "born" if precisely three are alive. The "game of life" behaves in a similar manner to a complex dynamical system at the edge of chaos. Here successive states show increasing complexity, including drifters capable of logical computation. Such processes, including 2-D cellular automata simulations of the prisoner's dilemma, may thus become formally undecidable because of the Turing halting problem. Conway's "game of life" is equivalent to a prisoner's dilemma game where cooperation is incited by three cooperating neighbors and the status quo maintained by two, with other values leading to defection.

Unlike the "game of life," consciousness is not bound to a discrete classical logic. Ultimately, through chaotic sensitivity, the conscious brain may be able to access the quantum realm and putative forms of quantum computing and transactional space-time hand-shaking, manifestations of the weird properties of uncertainty, non-locality and entanglement, arising from quantum complementarity between wave and particle aspects. Consciousness appears to use these deeper complementarities within quantum chaos to anticipate potentially incomputable complexities and to affect physical outcomes through the application of conscious will. Here we come to the deepest expression of that complementarity in logical and existential paradox of which chaos and order are also a reflection. This is where sexual paradox enters its quintessence.

Invention, it must be humbly admitted, does not consist in creating out of void, but out of chaos.

MARY SHELLEY, FRANKENSTEIN (1818)



# THE SCIENCE OF PASSIONATE INTERESTS

## BRUNO LATOUR VINCENT A. LÉPINAY

## 2009

### Invention Before Accumulation

The solution Tarde offers to this question may seem fairly perplexing to us: it consists in thrusting the economy back into the general movement of monads he developed in his other works. The pullulating of living societies whose intertwining forms the texture of the world is not chaotic but ends up by creating interferences, rhythms, and amplifications, on condition that one agrees to discern three stages in this proliferation: the *repetition* of a first difference, the *opposition* created by the repetition, and, finally, the *adaptation* making it possible for it to temporarily get out of these oppositions thanks to new differentiations. We must be careful not to read into this movement a return of Hegel's dialectic. No superior law guides this world towards a denouement through the play of negativity and contradiction. There is, contrary to the notebooks of the young Marx, no adventure of subject and object at play in these issues of capital and labor. Let us not forget what Tarde says against all philosophy of identity as contradiction: "To exist is to differ."

As a result, the supreme law for him is not negation – and even less the negation of negation – but rather

*invention*, which, once repeated obstinately, brings about countless struggles, which can only be gotten out of through other inventions. Fifty years before Joseph Schumpeter, eighty years before the development of the economics of technical change, Tarde places innovation and the monitoring of inventions at the heart of his doctrine. Follow innovations from the mesh woven in the brain of individuals – a brain itself conceived, as we have seen, as a mass of neurons; analyze by which canals they spread; document the conflicts they give rise to when they enter into a struggle with those innovations previously repeated; observe how they end up combining, piling up one on top of the other, adjusting themselves, and you will have the whole economy, whether it be of new religious convictions, new plants, new legal codes, railways, financial tools, or political opinions.

> The problem can be summed up as follows: to grasp as closely as possible the genesis of inventions and the laws of imitations. Economic progress supposes two things: on the one hand, a growing number of different desires, for, without a difference in desires, no exchange is possible, and, with the appearance of each new, different desire, the life of exchange is kindled. On the other hand, a growing number of similar exemplars of each desire taken separately, for, without this similitude, no industry is possible, and, the more this similitude expands or prolongs itself, the more production is widened or reinforced.

The notion of accumulation does not do justice to this process of differentiation. It describes a phase – but only a phase – of the industry during which only the author of



the repetition is active. It only marks a moment, albeit one necessary to development, which allows markets to grow, but never to change paths. It is also the product of an economic science – starting with economic sociology – which treats entities – humans and assets, services and technologies – as interchangeable, since they are seen from a distance, without capturing the small differences that would explain that change is not an exogenous shock suddenly befalling monomaniacal capitalists. This is what Tarde criticizes in Darwin:

> His mistake [...] seems to me to have been in relying far more on the struggle for existence, a biological form of opposition, than on cross-breading and hybridization, biological forms of adaptation and harmony. A function just as important as the production of a new species would not be able to be a continuous and daily function, while the simple production of a new individual – generation – is an intermittent function. An *exceptional phenomenon*, and not a daily phenomenon, must be at the base of this specific novelty. And [...] a fertile hybridization, as an exception, is far neater than a hereditary accumulation of small advantageous variations, through competition and selection, to explain the formation of new types of life.

If accumulation is not the relevant point of entry to understand the dynamics of the economy, one must look elsewhere. The interference and intersection of the paths of desire which inhabit individuals are much better suited to provide information on the probability of inflexion points. Herein lies the problem of the notion of accumulation: it does not provide information on the *intensities* of the economy.

> When, at the crucial moment, on a battlefield, just the right glance from the general lets an uncertain victory tilt to one side, the victory is due to this sudden idea, not to the accumulation of the prior efforts. And when, out of a thousand researchers, a single one, through a sudden intuition, discovers the solution to the enigma posed to all, it is not the long and sterile efforts of the others, not even the duration and intensity of his own efforts – often lesser than theirs – to which credit for the discovery should be given.

Accumulation is not a good candidate, and effort alone guarantees nothing. So what are economists left with to explain the shapes of the economy? Genius, of course, but a type of genius that is attained first of all through the interference of all the lines of imitation. Genius does not guarantee anything; it is simply a quick way to sum up what we have observed, not what we may predict. In hindsight, the unique configuration which brings into existence the solution to a recalcitrant mathematical problem, or the general's glance that saves his troops from death, now that is where genius lies; it does not reside at all in the author of the theorem, nor in the general himself. Tarde mentions genius fairly often as if he gave importance to the outer wrapping of the individual "genius," but this is a linguistic simplification and a way of evoking the ability to compose using lines of influence. Genius is not a point of departure; it is no more a place of action than it is one of passion. It is more precisely a moment of incandescence that can only ever be described, never recreated. Here again, Tarde does not set up an opposition between the mysterious origin of the individual genius and the slavish imitation of past models. He shifts levels: a genius is an



individual in whom the multitudes of repetitions and imitations (those lively firings of the brain) lead, dare we say, a life of their own.

Let us note, in passing, that trade, which so often serves as a pillar for the economic robinsonnades of the 19th century, does not find its place in Tarde's economics. Trade does indeed exist, but it is brought back to its proper role in the genealogy of markets. What launches a market, what builds an economy, is not trade, which is but a zero-sum game; it is rather the pooling and the coordinating of previously scattered energies. Tarde places faith and trust at the center of this pooling effort.

> Only half of the truth is being told in seeing the trade contract as the essential and seminal economic event. Trade, in truth, favors and develops directly only consumption. The direct agent of production is another contract, which is no less seminal and no less fundamental: the loan contract. Through trade, we do each other favors, but all while defying one another: give and take; through loans, we place trust in one another.

Thus, we can see a very singular relationship between faith and invention: a shared movement consisting in connecting and gathering previously separate entities. It is necessary for there to be trust for the first transactions to come into being; it is necessary to loosen the fixation of *Homo economicus* on the lure of profit because there needs to be also passion and risk-taking in order to bring the economy towards new paths through the emergence of small differences. Trust, much like invention, creates new groupings; it folds the economy in a certain way which will then be confirmed through repetition.

*Difference and Repetition* is both the title of Gilles Deleuze's thesis and Tarde's fundamental principle. Invention produces differences; repetition allows for their diffusion; conflict is inevitable; no pre-established harmony allows for a solution (as we shall later see): it is necessary to invent yet other solutions in order to temporarily generate other innovations, which, by repeating themselves, will produce other differences, and the cycle will begin again. That is the fundamental rhythm, the back beat that, alone, allows economic activity to acquire realism. What we need to follow in order to establish an economic science are "states of mind" and "logical duels."

> From salesman to client, from client to salesman, from consumer to consumer and from producer to producer, whether competing or not, there is a continuous and invisible transmission of feelings – an exchange of persuasions and excitement through conversations, through newspapers, through example – which precedes commercial exchanges, often making them possible, and which always helps to set their conditions.

The fabric of vectors and tensors which defines the attachments of people and assets consists – and here lies Tarde's truly innovative character – of arguments whose premises and deductions form *practical syllogisms* which are, in fact, the whole substance of economics.

> Either through authoritarian suggestion or through demonstration, we can only communicate our thoughts to others (which is equivalent to a gift of assets, the unilateral beginning of an exchange of goods) on condition that we present them through their measurable and quantitative aspects. If it is a question of forcing our judgment into someone else's head, through demonstration, we will need a more or less explicit syllogism, that is a relationship between species and genus or between genus and species, established between two ideas, which means that one is included in the other, is of the same type (undetermined or determined but real) of things which are similar, and perceived as similar, that the other, the general proposition, encompasses and contains.



For Tarde, the economic matter – this is what remains so difficult for us – is a real force because it is a rhetorical power: it is indeed a question of persuasion, syllogism and conviction. Or, rather, rhetoric attains in it such power because it encroaches, so to speak, on the ability of the monads themselves to assess and to calculate. It is because of this background of "calculable forces" that the addition of calculative devices, of metrological chains, can have such a performative, explicatory capacity, that they can even become forces of production. It is because the monads calculate at all times and in all possible manners that the addition of calculative devices, which are minuscule prostheses, brings about such a prodigious amplification of evaluations. Tarde's cleverness lies in adding, to the intertwining of calculations, the decisive role of theories and doctrine.

Nowhere can his acumen be better seen than on the widely-discussed subject of "fair price." At no time does he think it possible to appeal to nature – to natural law – in order to establish the difference with "real price," but neither does he ever have recourse to the objectivity simply of the markets to define this price.

> Economists, in viewing as the natural or normal price the price to which the freest, most unbridled competition leads, believed they were in so doing eliminating the bothersome idea of *fair price*. But, in reality, all they did was to *justify* in this way the real prices precisely, often the most abusive ones, formed under the tyrannical rule of the strongest. And the problem is that this way of seeing things, which is in itself an unconscious way of conceiving of fair price all while denying it, in fact acts, in quite a regrettable way, on real price. When everyone has been persuaded, on the strength of the work of ancient economists, that the price automatically determined by the "free play of supply and demand" is justice itself, there is no doubt that this general belief plays a part in making it possible for exorbitant prices, or prices so minimal that public conscience would have rejected them other times, to be established without protest, or even with general approval.

As always for Tarde, the sciences do more than just know: they add themselves to the world, they involve it, they fold it, they complicate it on numerous points all while simplifying it on others – but we should never assume that we can trust them to eliminate morality, that "bothersome idea" of social justice. Even if one succeeds, through scientific claim, in aligning power struggles, or objective science and the nature of things, the fact remains that millions of gaps, judgments, small differences, and criticisms would force everyone to reevaluate the relation between the "justified price" and the "fair price."



> Besides, how can we deny the action of the idea that each period or each country has on what is just as regards price? To what type of consumption is morality entirely foreign, if by morality we mean the superior and profound rule of conduct in accordance with the major convictions and passions which guide life? And, if we set aside these convictions and these dominating passions which, silent or conscious, are the social and individual forces par excellence, what are we explaining in political economy?

Nothing will cool passionate interests. Imagining an economy that is wise at last, reigning coolly over individuals who are rational and reasonable at last, ruled by good governance, is like imagining an ecological system with no animals, plants, viruses, or earthworms.


MICHELANGELO, CREATION OF ADAM (1512)


# ABUNDANCE

ANDREAS GURSKY, 99 CENT (2001)

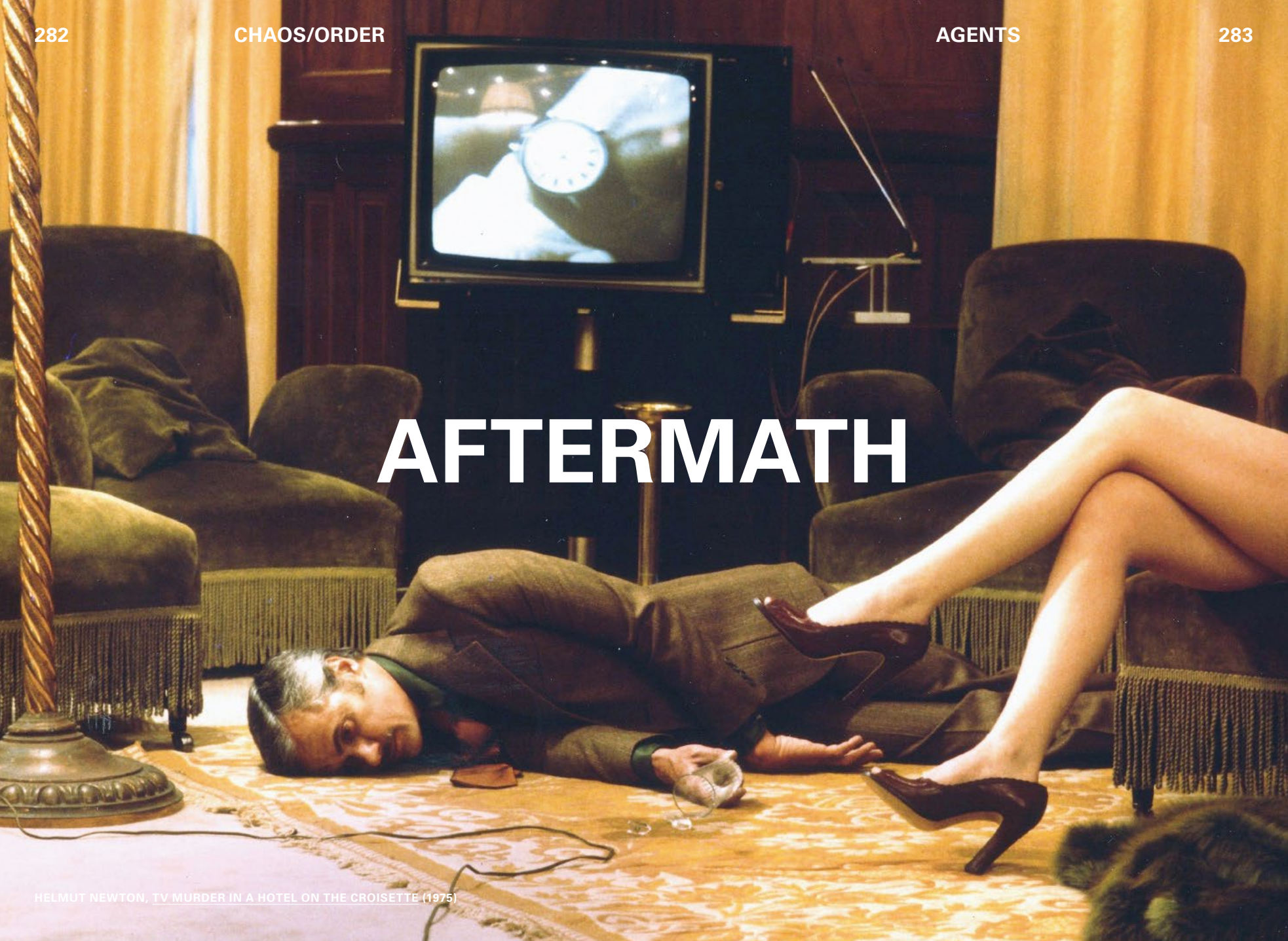

# ACCELERATION

ROBERT ZEMECKIS, BACK TO THE FUTURE (1985)

# ACCIDENT

UBISOFT, ASSASSIN'S CREED DESTRUCTION OF LISBON 1755 EARTHQUAKE (2017)

# AFTERMATH



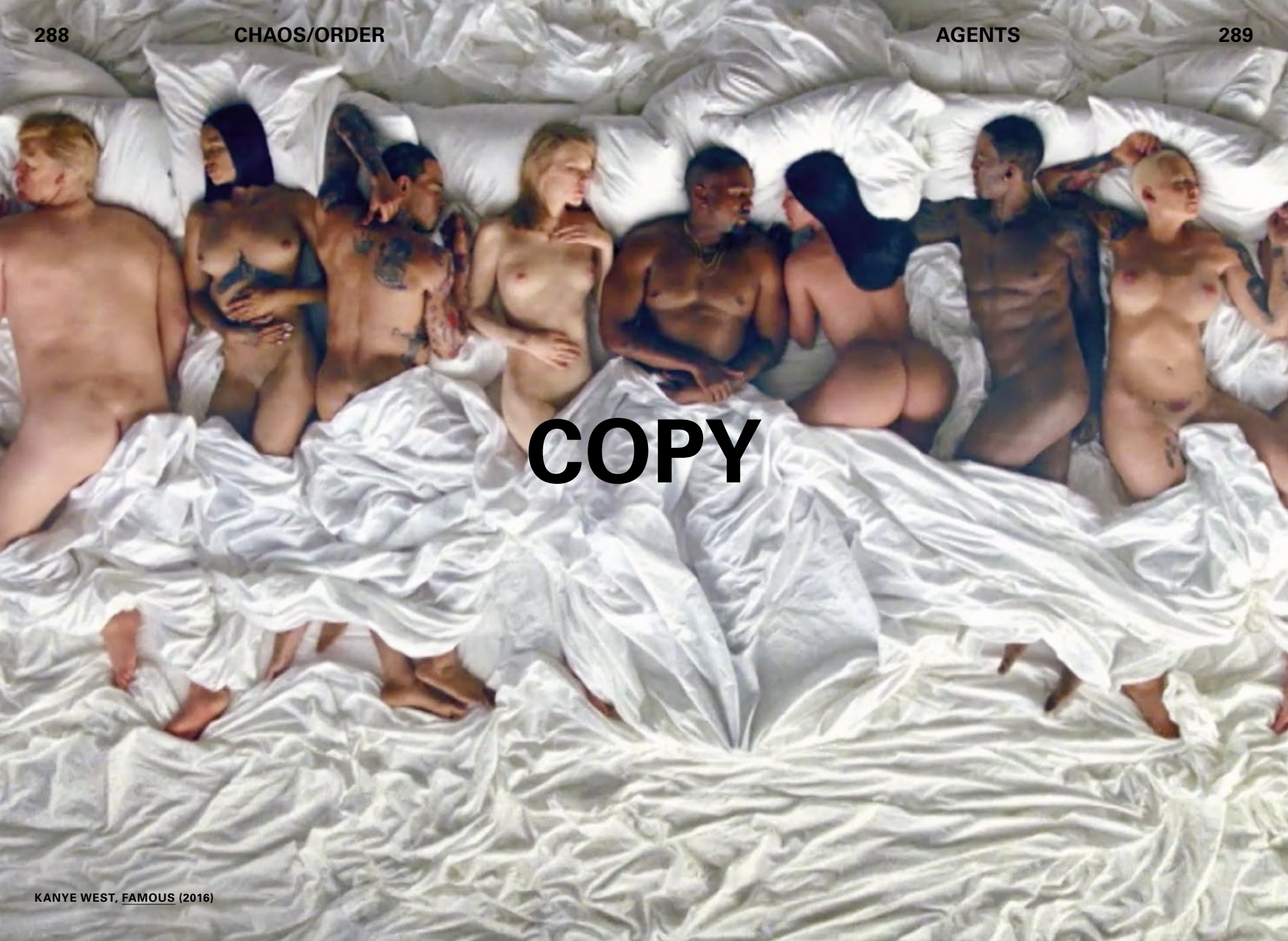
HELMUT NEWTON, TV MURDER IN A HOTEL ON THE CROISETTE (1975)

# CONSTANTS

PITTSBURGH POST-GAZETTE, ALBERT EINSTEIN TWO BLACKBOARD DERIVATION OF ENERGY AND MASS EQUIVALENCE (1934)

# CONTAMINATION


ABY WARBURG, ATLAS MNEMOSYNE (1924-29)




KANYE WEST, FAMOUS (2016)

# CORRUPTION

JAN STEEN, LE MONDE À L'ENVERS (1663)


DAVID LACHAPELLE, STILL LIFE: REAGAN (2013)

# DECIMATION

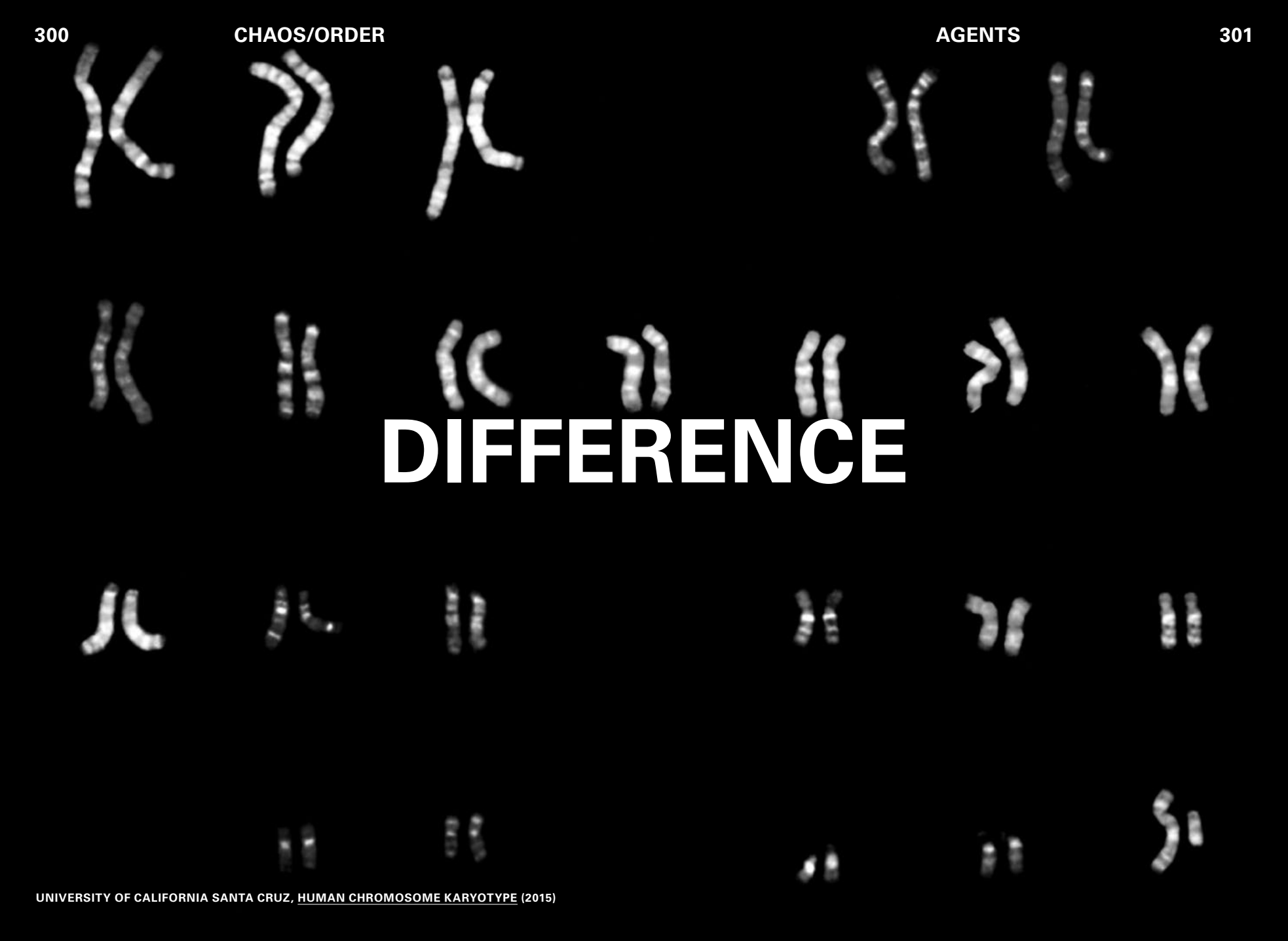
KINJI FUKASAKU, BATTLE ROYALE (2000)

# DECONSTRUCTION

SERGEI SUPINSKY, VERKHOVNA RADA UKRAINE (2012)

# DERIVATIVES

ÉDOUARD MANET, OLYMPIA (1865)

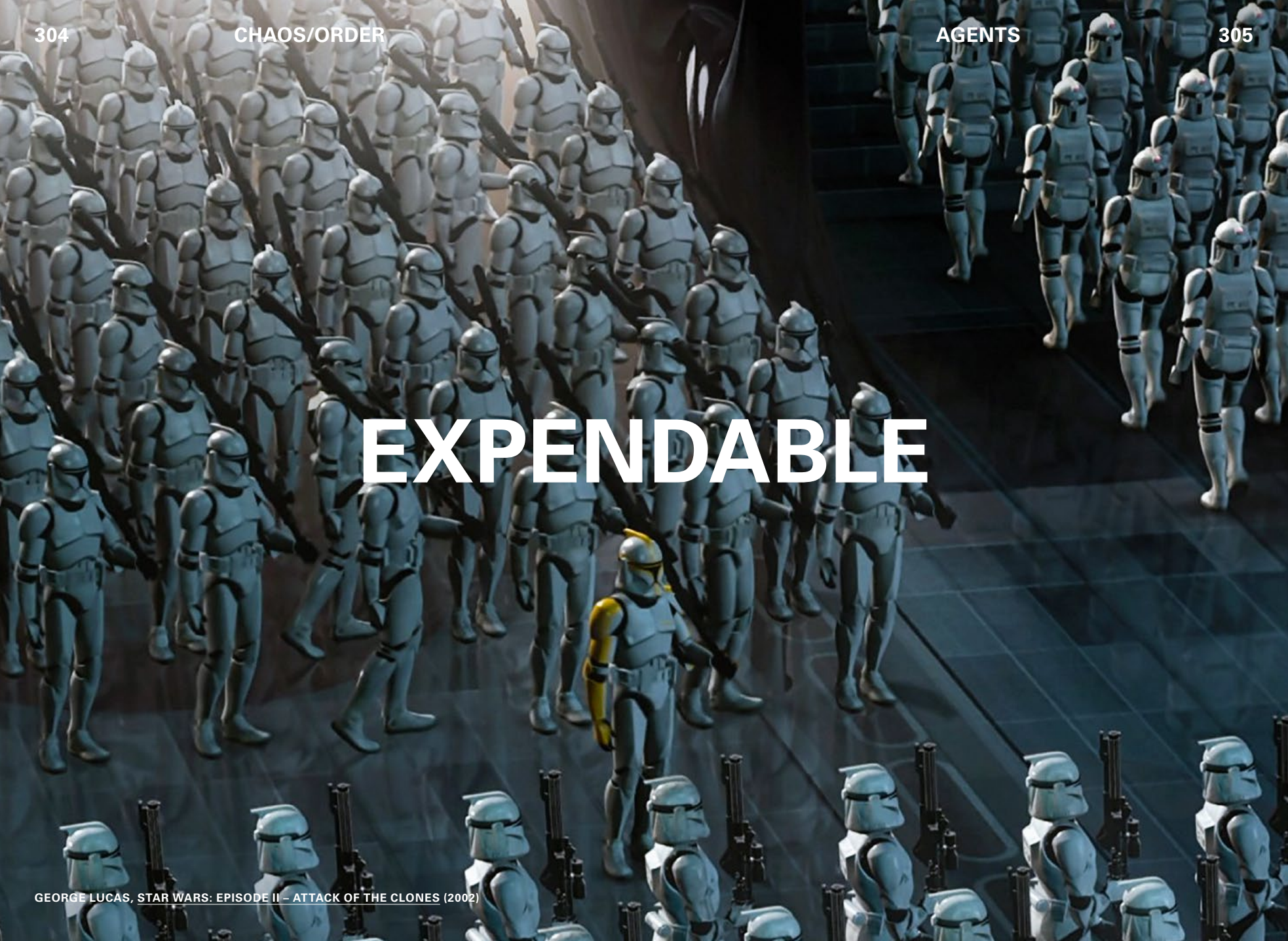


# DIFFERENCE

UNIVERSITY OF CALIFORNIA SANTA CRUZ, HUMAN CHROMOSOME KARYOTYPE (2015)


# DOMINATION

FEDERAL RESERVE NOTE, TWENTY DOLLAR BILL (2006)



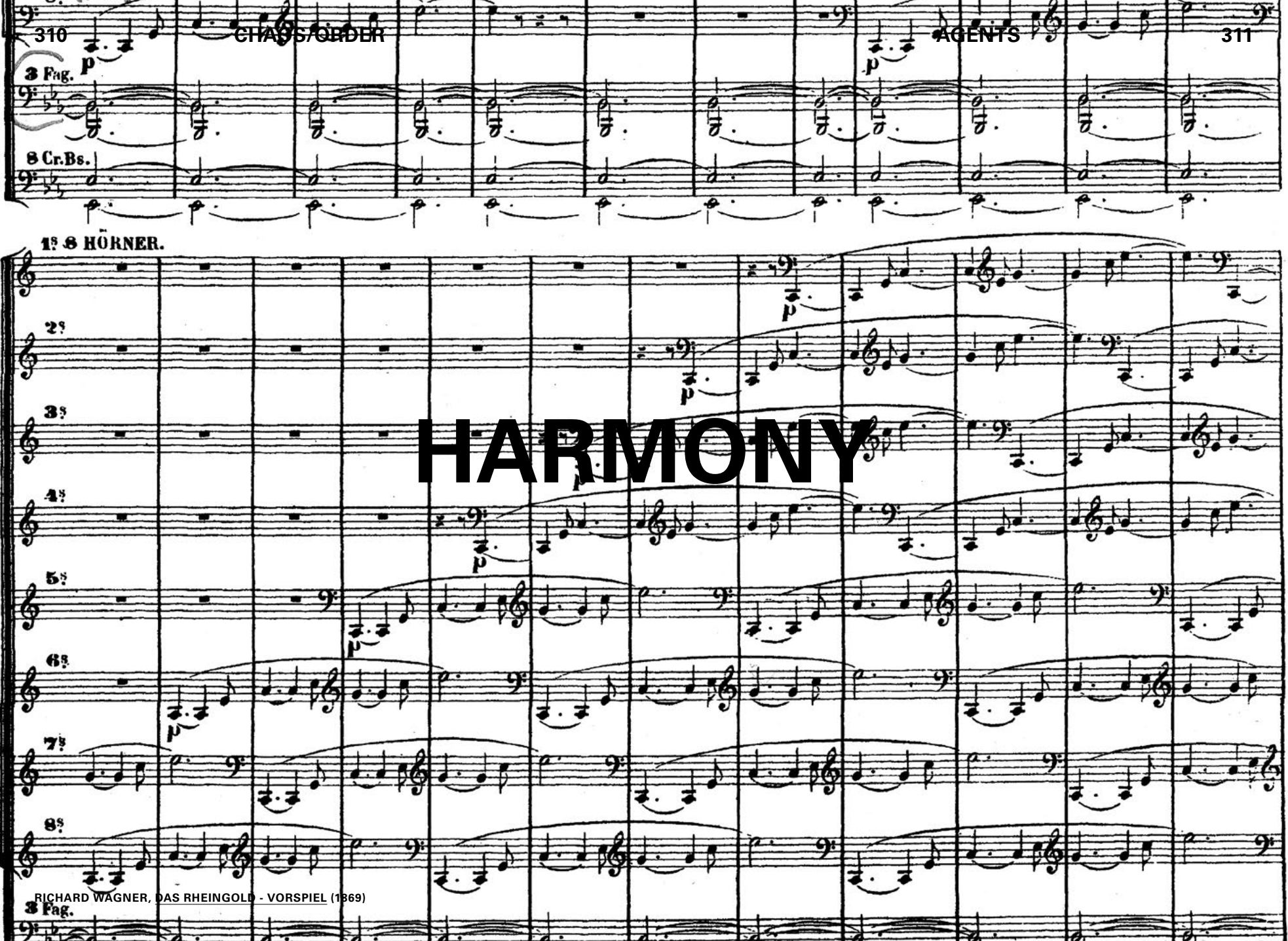

GEORGE LUCAS, STAR WARS: EPISODE II – ATTACK OF THE CLONES (2002)

# EXTIMACY

MERRY ALPERN, UNTITLED, FROM THE DIRTY WINDOW SERIES (1994)

# HABIT

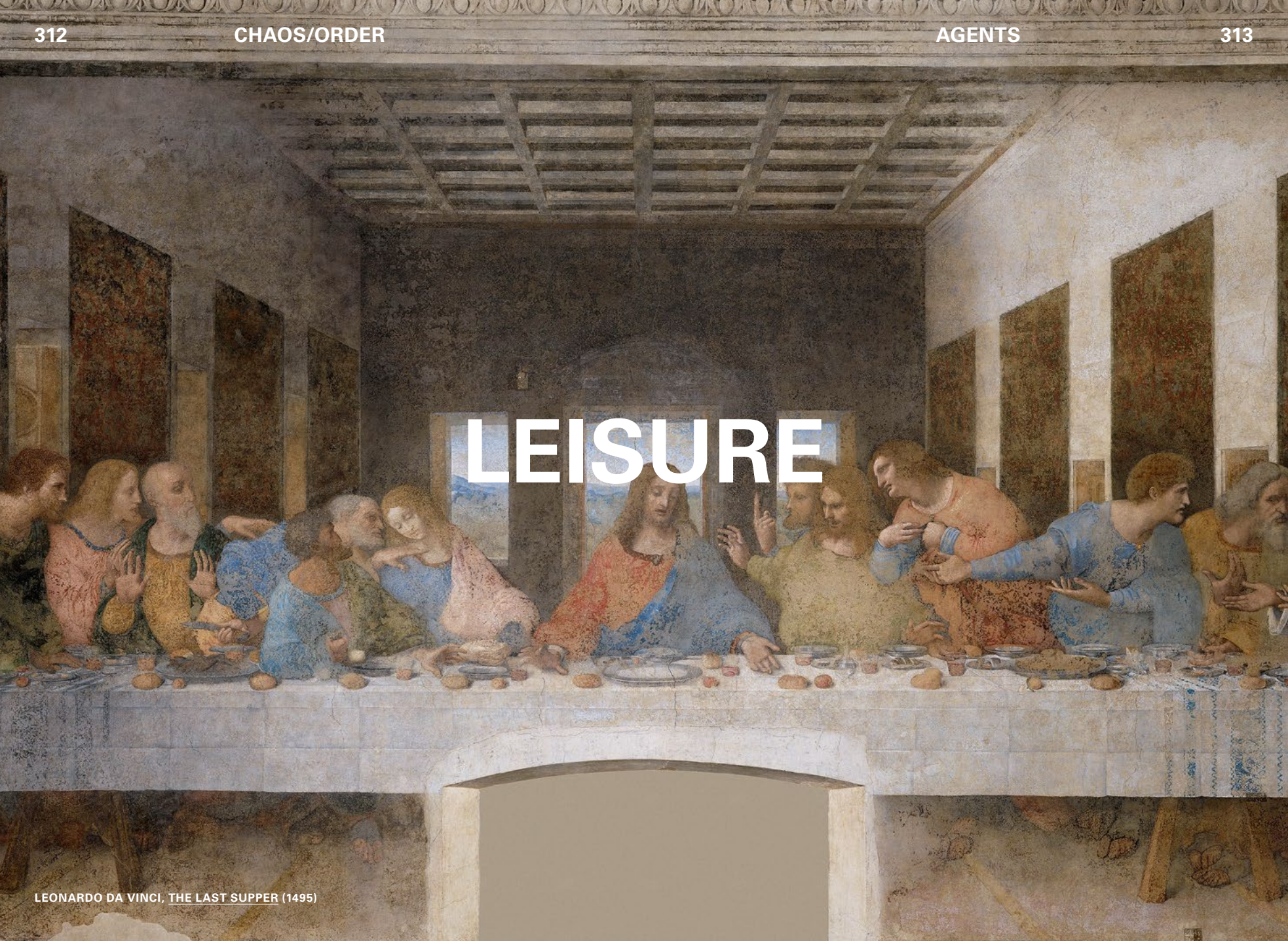
CHARLIE CHAPLIN, MODERN TIMES (1936)




# HARMONY

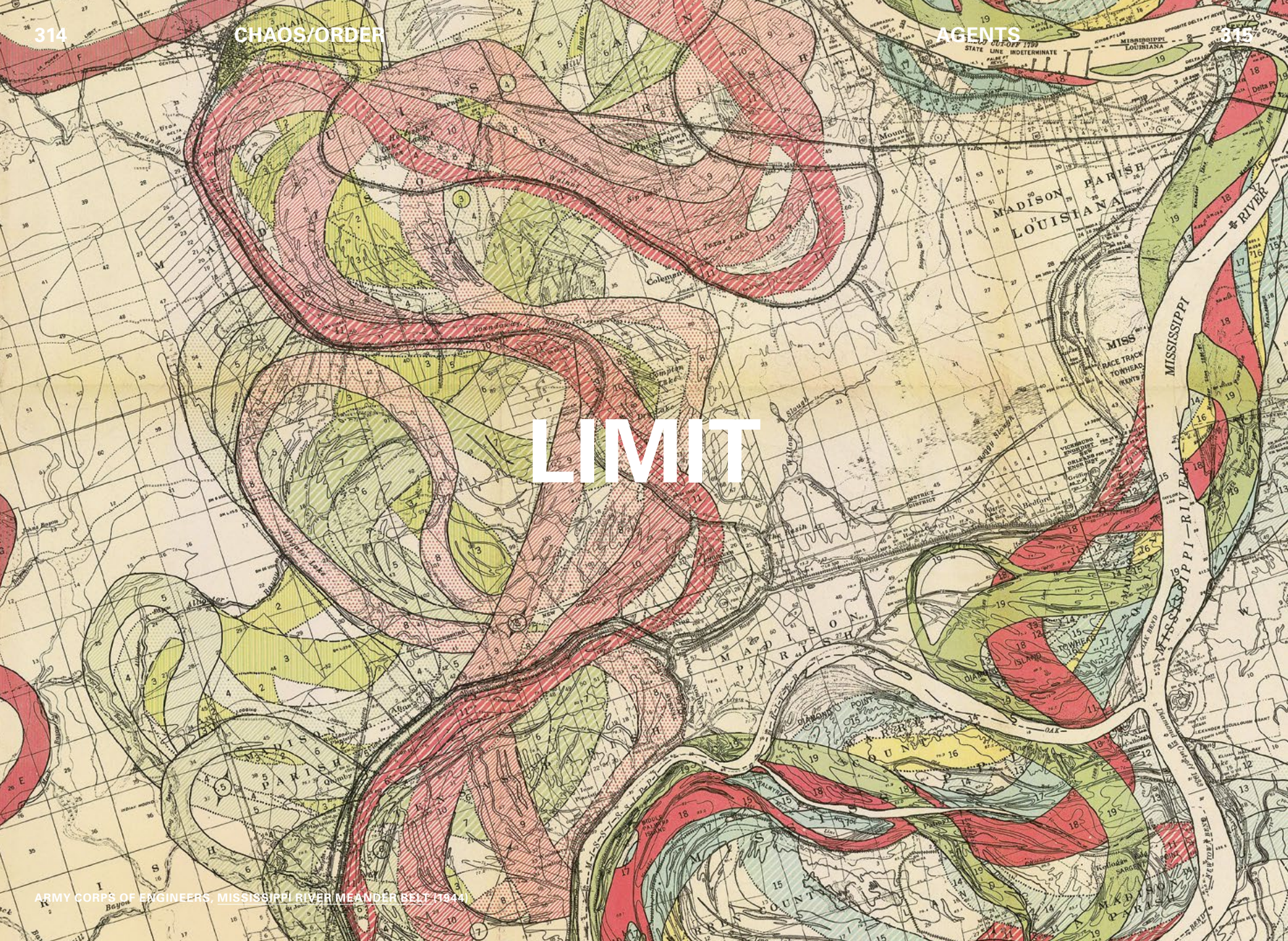
RICHARD WAGNER, DAS RHEINGOLD - VORSPIEL (1869)

# LEISURE



LEONARDO DA VINCI, THE LAST SUPPER (1495)

# LIMIT




ARMY CORPS OF ENGINEERS, MISSISSIPPI RIVER MEANDER BELT (1944)

# LUNACY


JEAN-LUC GODARD, PIERROT LE FOU (1965)

# MEMORY

JOHN RODDAM SPENCER STANHOPE, THE WATERS OF LETHE BY THE PLAINS OF ELYSIUM (1880)

# MONITORING

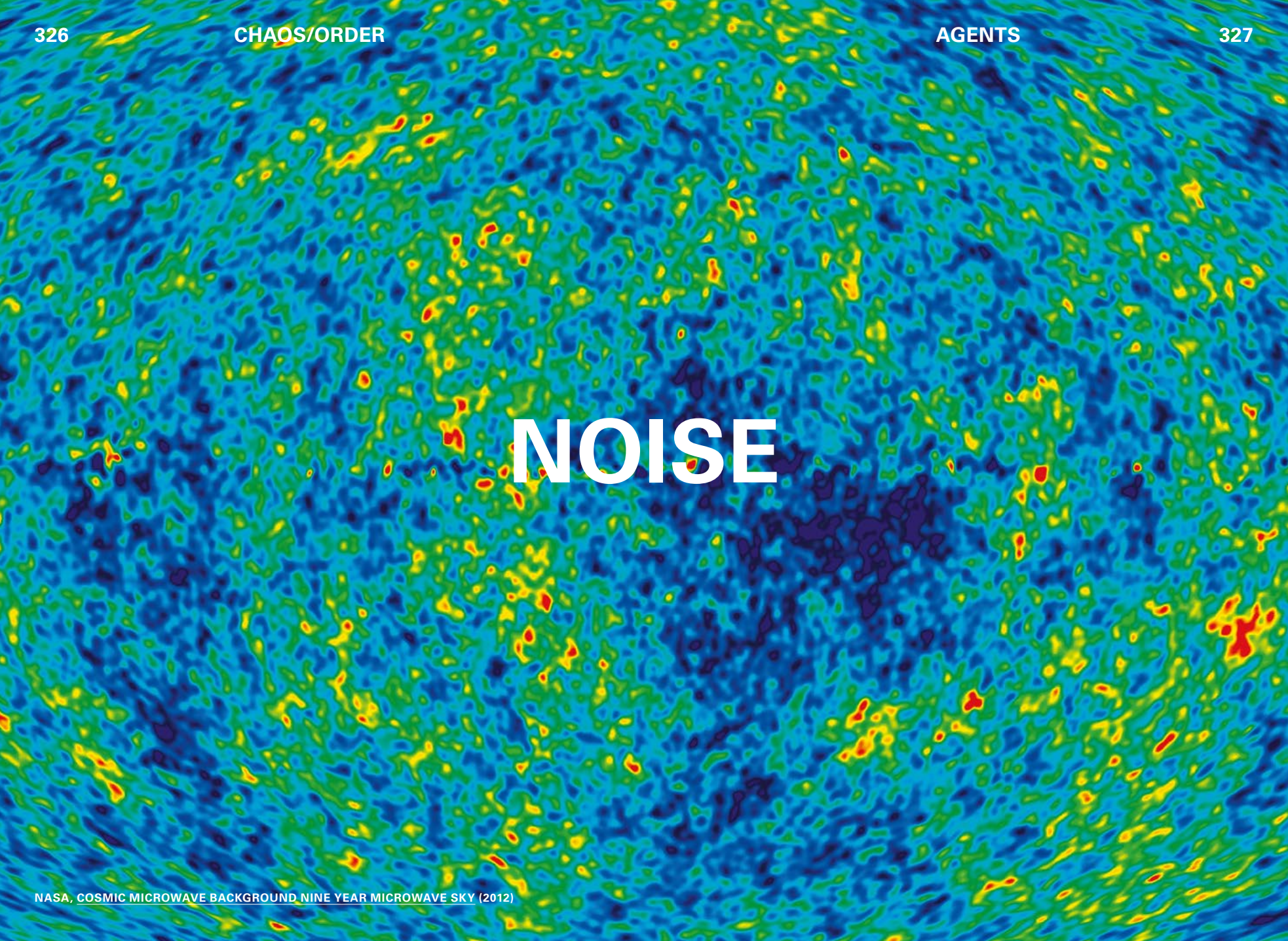
CENTRE NATIONAL DU CINÉMA ET DE L'IMAGE ANIMÉE, MARCEL PROUST (1904)

# MYTH

ALBERT FERNIQUE, ASSEMBLAGE OF LADY LIBERTY IN PARIS (1883)

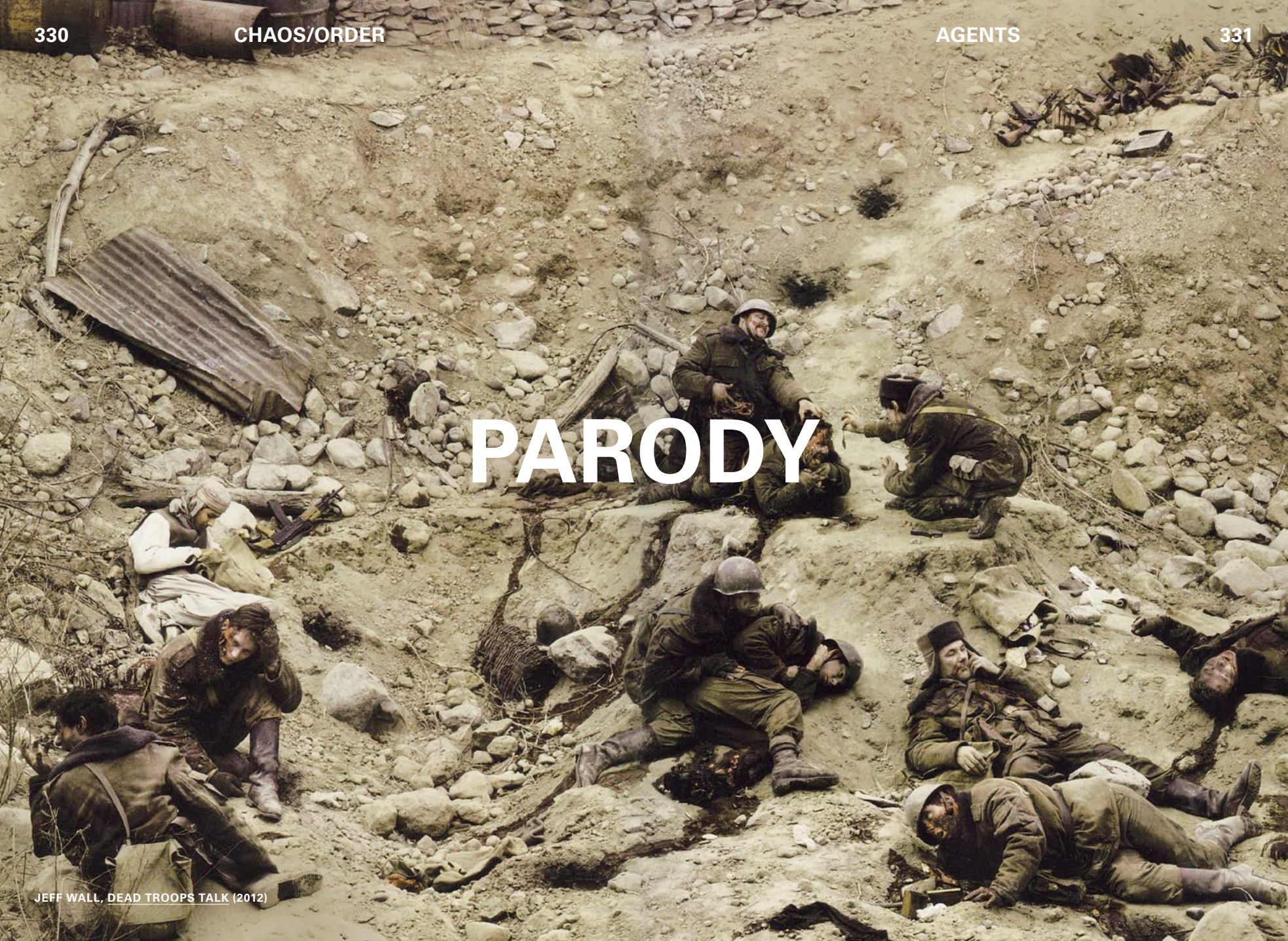
# NECESSITY


RICHARD HAMILTON, JUST WHAT IS IT THAT MAKES TODAY'S HOMES SO DIFFERENT, SO APPEALING? (1956)



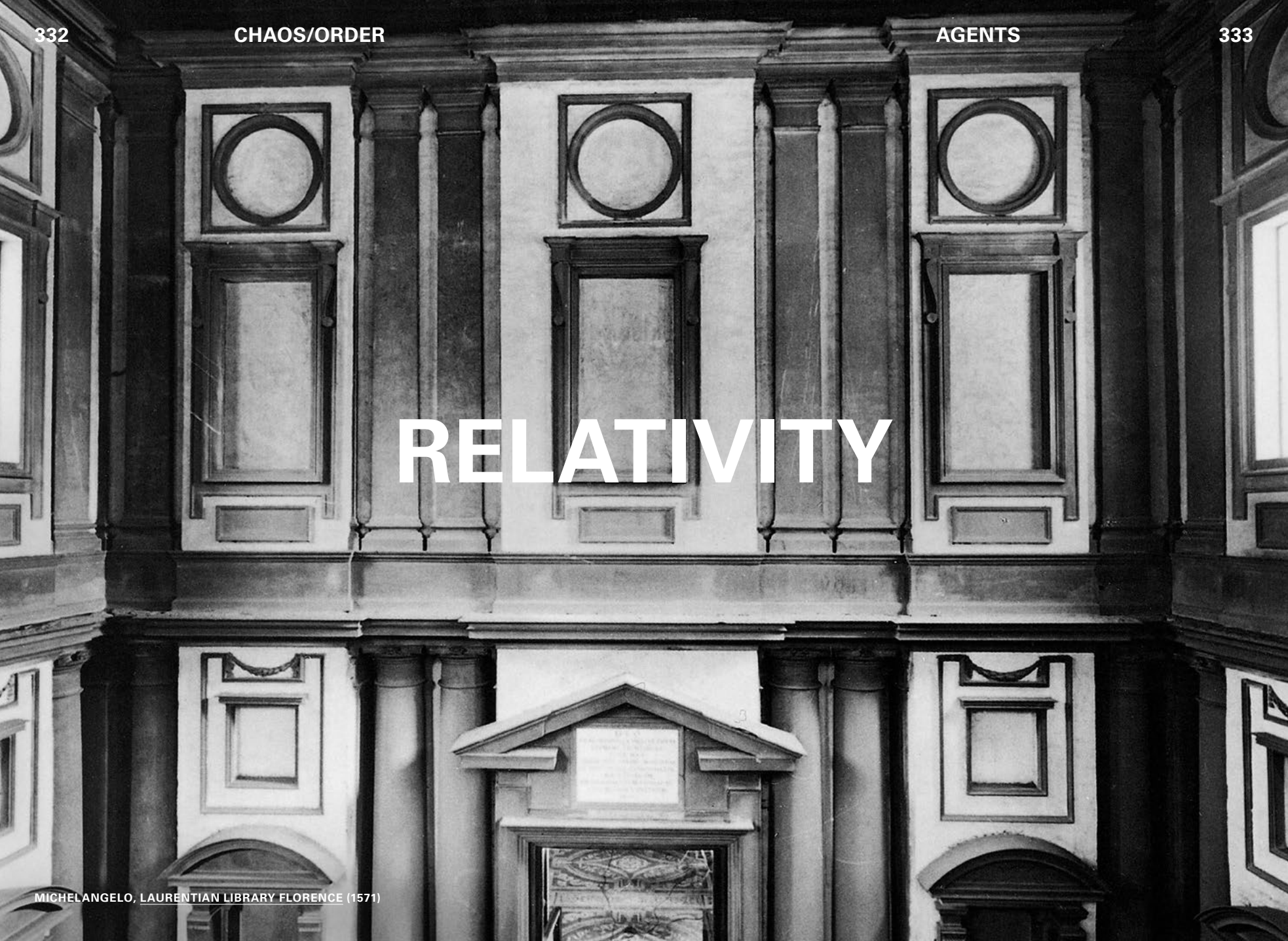

NASA, COSMIC MICROWAVE BACKGROUND NINE YEAR MICROWAVE SKY (2012)


FISCHLI/WEISS, AIRPORTS (1990)



# PARODY

JEFF WALL, DEAD TROOPS TALK (2012)



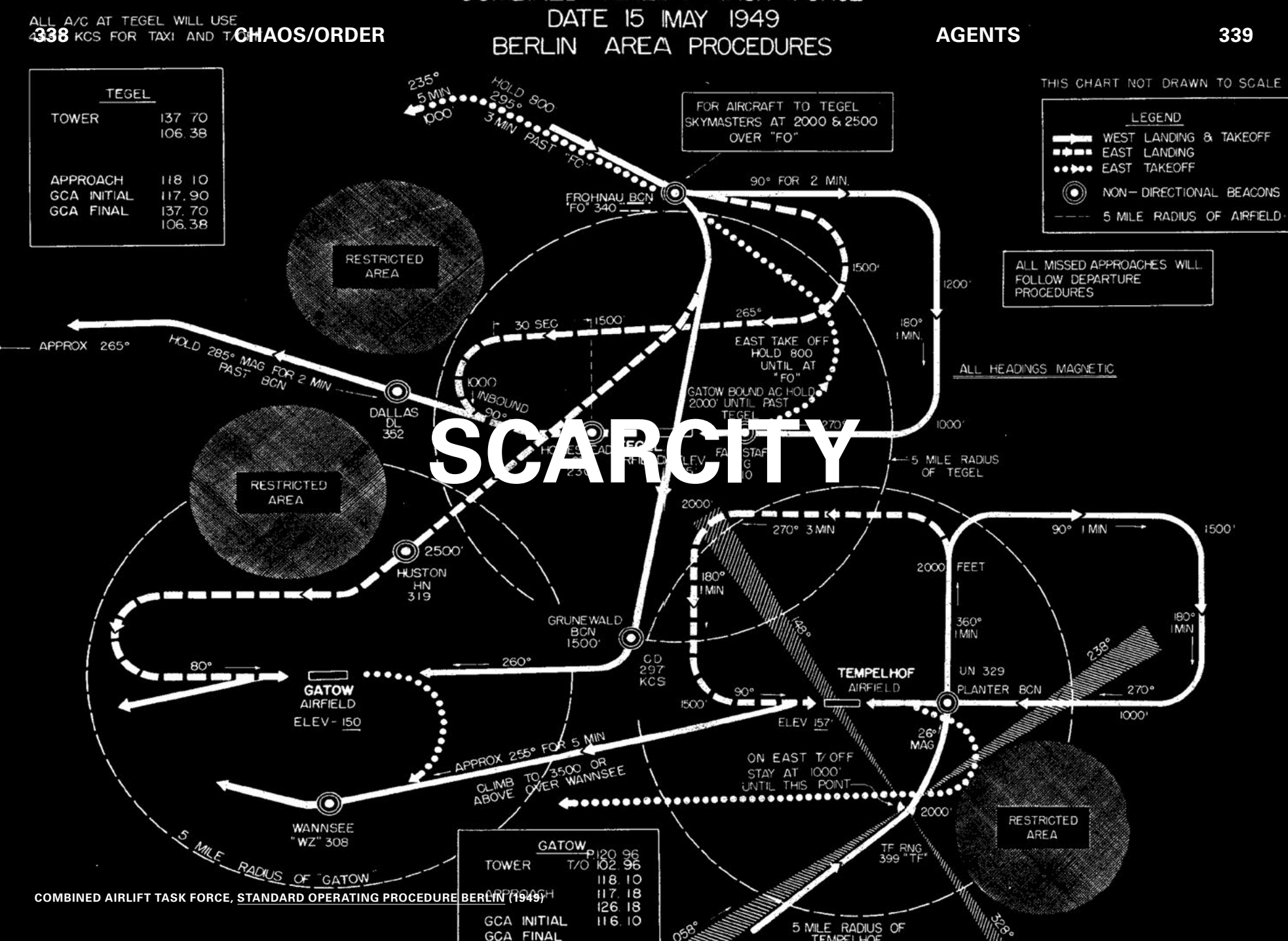
# RELATIVITY

MICHELANGELO, LAURENTIAN LIBRARY FLORENCE (1571)


ZBIGNIEW RYBCZYNSKI, TANGO (1980)

# REVOLUTION

LÉON COGNIET, SCÈNE DE JUILLET (1830)






COMBINED AIRLIFT TASK FORCE, STANDARD OPERATING PROCEDURE BERLIN (1949)

# SEDENTARY

PAULO WHITAKER, BOM FUTURO FARM (2016)


NORTH AMERICAN AVIATION, X-15 MODEL IN SUPERSONIC TUNNEL (1962)

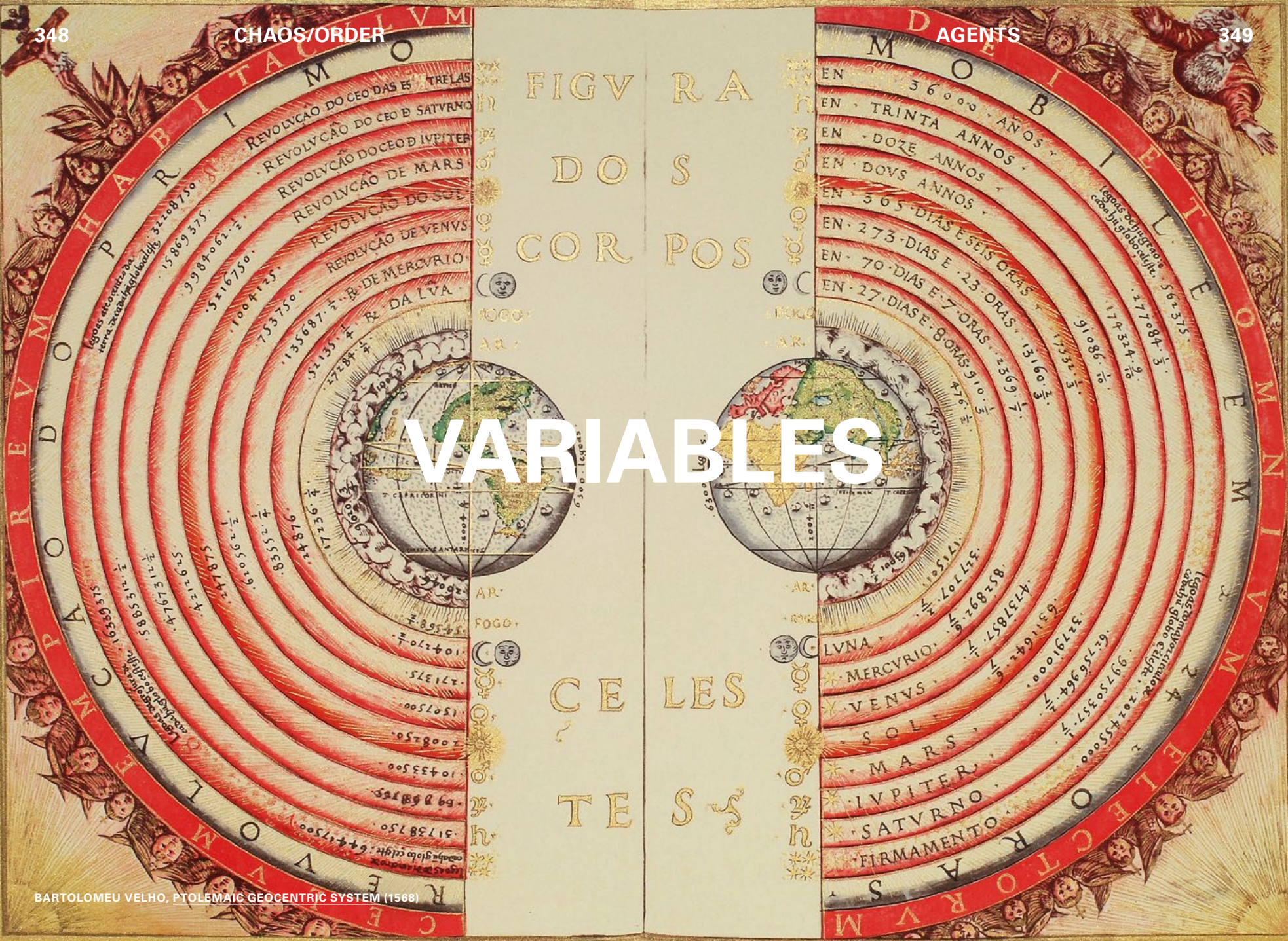
# SUBORDINATION

OULIPO, MEETING IN FRANÇOIS LE LIONNAIS' GARDEN (1975)

# THEFT

PIETER BRUEGHEL THE YOUNGER, THE VILLAGE LAWYER'S OFFICE (1618)

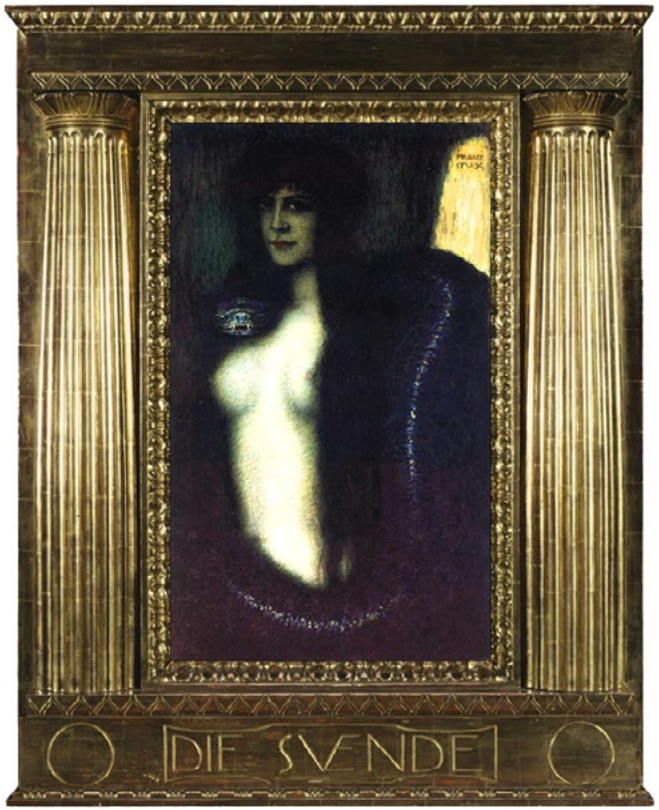
# VARIABLES




BARTOLOMEU VELHO, PTOLEMAIC GEOCENTRIC SYSTEM (1568)

# VIRUS

GIOVANNI DI SER GIOVANNI LO SCHEGGIA, THE TROJAN HORSE ENTERING TROY (1475)




FRANZ VON STUCK, DIE SUENDE (1883)

# ELEGY MADE IN 2018



Lament for an architectural project

Elegy derives from the book *Histoire(s) du cinema*, published by Gallimard in 1998 after the completion of Jean-Luc Godard's eight-part video project (1988–98), which met with controversial critical acclaim. Composed almost entirely of visual, textual and auditory quotes, *Histoire(s) du cinéma* poetically assimilates the course of the twentieth century to the history of the movie industry, merging fiction and documentary in a speculative and intricate allegory.

The following content effects a deliberate selection of sonnets and stages an opportunistic *détournement* of the original: it therefore claims no authorship as all aphoristic sources have been intentionally chosen to serve a reducing purpose in a specific field, namely that of the architectural project. As a result, quotes have been accordingly redistributed in a new purposeful sequence, partly edited or augmented in order to promote a less cryptic content, yet without withholding the poetic motives of the original text.

don’t show
every side of things



allow yourself
a margin of indefiniteness

cities of desires
and people would see
that the world is there
a world still almost without a history
yet a world that tells stories



but instead of uncertainty
in order to establish idea and sensation
the two great stories were
form and function

stories of beauty and performance
architecture is not part of
the communication industry
or entertainment
as a silent margin of life
it is part of cosmetics
a minor branch of the industry of lies



the city
like christianity
is not founded
on historical truth
it supplies us with a story
and says
now believe

don't have faith
in this story
as you do in History
but believe
come what may



all these stories
now mine
how can I tell them
show them perhaps

and norm
was invented
a minor mafia
accountant had
to put some order
in the brainwaves of
architects



l'Esprit Nouveau
Ozenfant
gave the idea to
Le Corbusier
the project fell
under the guillotine
of reason
and never got back up

night
has come
another world rises
purposeless
as if one had suppressed
the perspective
the vanishing point



if an image
separetely looked upon
clearly expresses something
and involves interpretation
if it does not exceed significance
it will not be transformed
on contact with other images
other images
will have no authority over it
neither action
nor reaction
no insight
sight avails

an image
is not strong
because it is brutal
or fantastic
but because
the association of ideas
is distant
distant and just
or simply
if it still
involved a text
but was not about
determining texts
on a word
but an idea
or an intention
or a movement
or a usage
or a relationship



who needs understanding
this is
what I like
in architecture
a saturation of
magnificent signs
bathing
in the light
of their absence
of explanation

one needs a day
to tell
the history of a second
one needs a year
to tell
the history of a minute
one needs a life
to tell
the history of an hour
one needs an eternity
to tell
the history of a day
one can do everything
except the history of
what one is doing



we live
in a system
in which everything
can be done
except the history of
what is being done
everything can be
completed
except the history of
this completion
the product
as only end
the captive process

somewhere else
men fight for a society
in which
they would not be
slave to money
you can't understand
living
not to make money
listening to sirens of our time
I begin to understand
but this obsessiveness



ever think of anything else
of love
no never
if property was
the original sin of capitalism
to have and not to be
reason is the original misdeed
of Western architecture
summer 1989 its redeemer
when I admire a project
I am told
it is nice
but it is not architecture

design dessein
draft dessin
design is now dessin
mystification



equality
and fraternity
between the real
and the fictional

who is out of work
some times has
too many hands
and too few hearts
yes times without heart
but not without work
when an era is sick
and lacks work
for all hands
it addresses us a new exhortation
the exhortation
to work with our hearts
instead of
using our hands
I know no era
that lacked work
for all
its hearts



this is the worry of the people
it is not material
at first
it is a concern
of heart and spirit
born of the defiance of the other
I do not believe in answers
but in the plea of questions
let us consider the time
the places we live in
our precise locations
and their resulting call
and then
let us judge

a world divided in two
those with possibilities
but not knowing what to do
with their freedom
and those who have
undergone revolution
and have freedom of opinion
that is
the right to complain
but without deep-felt passion
where misery is at the door
and all one can do
is wait
ugly winners
magnificent loosers



strangest of all
the living dead of this world
are constructed
on the former world
their reflections
and sensations
are from before

the Incredulity
of Saint Thomas
who needs
to touch
to believe
gazing in the distance
has he lost sight
blasphemy to the miracle
Caravaggio had warned us
we are now left
with incredulous apostles
misery



misery
last argument
ultimate basis of modern community
the backdrop of all our
dramas
thoughts
and actions
and even our utopias
the essential is not
what the despotism
of an opinionated majority
dictates
it is not material necessity
it is a higher truth
at the level of man
and I might add
within man's reach

it is time that thought
becomes
what it truly is
dangerous for the thinker
and able to transform
reality
“Where I create
is where I am true”
wrote Rilke



some think
others act
but man’s true condition
is to think with his hands

I will not denigrate
our tools
but I would like them
to be usable
if it is true
that the threat is not in our tools
but in the cowardice
of our hearts
a thought which abandons itself
to the rythm of its own mechanisms
proletarianizes itself



such a thought
no longer lives
of its own creation
man is formed by others
who are the others
they are the laws
born of
the abandonment of
thought
who is responsible
not the parties
not the classes
not the governments
it is men
one by one

so
the project
you see now
what to say about it
life is the subject
speed
and trajectory
its attributes
if we are broad-minded
then time its territory
life a beginning of life
like Euclid's parallel lines
is a beginning of
geometry
the life itself
one would like to blow out
of proportions
to make it admired
or reduced
to its basic elements
for earth dwellers
the life itself
one would hold prisoner



I am
the fugitive enemy of
our times
the mechanically applied
totalitarianism of
the present
every day more opressive
on a planetary scale
this faceless tyranny
that erases all desires
for the systematic organization of
the unified time of
the moment
this global
abstract
tyranny
which I try
to oppose
from
my fleeting
point of view

DAVID BOHM & F. DAVID PEAT, SCIENCE, ORDER AND CREATIVITY (1987)

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GILLES DELEUZE, ESSAYS CRITICAL AND CLINICAL, BARTELBY, OR: THE FORMULA (1997)

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JAMES JOYCE, FINNEGANS WAKE (1939)

REM KOOLHAAS, DELIRIOUS NEW YORK (1978)

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EDGAR ALLAN POE, POEMS AND ESSAYS (1846)

ILYA PRIGOGINE & ISABELLE STENGERS, ORDER OUT OF CHAOS, MAN'S NEW DIALOQUE WITH NATURE (1984)

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UNKNOWN AUTHOR, THIRTY-SIX STRATAGEMS (1644–1911 / 1941)

UNKNOWN AUTHOR, THE EPIC OF GILGAMESH, TRANSLATED BY ANDREW GEORGE (2100 BC)

MICHELANGELO ANTONIONI, ZABRISKIE POINT (1970)

INGMAR BERGMAN, PERSONA (1966)

INGMAR BERGMAN, FROM THE LIFE OF THE MARIONETTES (1980)

ROBERT BRESSON, PICKPOCKET (1959)

JOHN CASSAVETES, A WOMAN UNDER THE INFLUENCE (1974)

MICHAEL CIMINO, THE DEAR HUNTER (1978)

FRANCIS FORD COPPOLA, APOCALYOPSE NOW (1970)

ADAM CURTIS, HYPERNOMALISATION (2016)

CARL THEODOR DREYER, ORDET (1955)

FEDERICO FELLINI, 8 ½ (1963)

SAMUEL FULLER, THE NAKED KISS (1964)

JEAN-LUC GODARD, PIERROT LE FOU (1965)

JEAN-LUC GODARD, HOSTOIRE(S) DU CINÉMA (1988–1998)

TERRY GILLIAM, FEAR AND LOATHING IN LAS VEGAS (1998)

ALFRED HITCHCOCK, PSYCHO (1960)

KINJI KUKUSAKU, BATTLE ROYALE (2000)

AKIRA KUROSAWA, THRONE OF BLOOD (1957)

DAVID LYNCH, INLAND EMPIRE (2006)

CHRIS MARKER, LA JETÉE (1962)

FERNANDO MEIRELLES, CITY OF GOD (2002)

PIER PAOLO PASOLINI, MEDEA (1969)

GODFREY REGGIO, KOYAANISQATSI (1982)

ALAIN RESNAIS, NUIT ET BROUILLARD (1955)

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GUS VAN SANT, LAST DAYS (2005)

ORSON WELLES, THE TRIAL (1962)

PETER KURAN, TRINITY AND BEYOND (1995)

This ring in which you are but a grain will glitter afresh forever. And in every one of these cycles of human life there will be one hour where, for the first time one man, and then many, will perceive the mighty thought of the eternal recurrence of all things: – and for mankind this is always the hour of Noon.

FRIEDRICH NIETZSCHE, NOTES ON THE ETERNAL RECURRENCE (1888)