

GENERAL_SEMANTICS_EVOLVED_EN_VOL1_AI

General Semantics Evolved

A series in the Technology of Expressions

Volume I — Foundations and Architecture

A Twenty-First-Century General Semantics — Language, Structure, and the Architecture of Mind and Reality

Fabio Ghioni, Ph.D. (ORCID 0009-0009-0415-9434)

Ordinative Sciences Press · 2026 · CC BY 4.0 · DOI:

10.5281/zenodo.22647042 · Print edition ISBN 979-1282603157

A note on this edition. This volume contains our own elaboration, composed natively in English within the framework of the Technology of Expressions: Chapters I-XIX. The whole work is built specularly to Alfred Korzybski's *Science and Sanity* (1933), whose chapter sequence it follows, and of which it is a deliberate evolution. The 1933 original is not reproduced in these pages, for the best of reasons: it is already in English and remains in print, published by the Institute of General Semantics. Our chapter numbering exists to make the traffic between the two books easy. This Markdown format is prepared for human reading and for ingestion by AI systems, and accompanies the deposit of the work on Zenodo, GitHub, OSF, and Academia.edu.

Contents

- Introduction to the Series
 - Introduction to This Volume — Volume I
 - Chapter I — Aims, Means, and Consequences of a Non-Aristotelian Revision
 - Chapter II — Terminology and Meanings
 - Chapter III — The Time-Binding Animal
 - Chapter IV — On Structure
 - Chapter V — General Linguistics
 - Chapter VI — On Symbolism
 - Chapter VII — Linguistic Revision
 - Chapter VIII — General Epistemology
 - Chapter IX — Colloidal Behavior
 - Chapter X — The Organism-as-a-Whole
 - Chapter XI — On Function
 - Chapter XII — On Order
 - Chapter XIII — On Relations
 - Chapter XIV — On the Notion of "Infinity"
 - Chapter XV — The "Infinitesimal" and "Cause and Effect"
 - Chapter XVI — On the Existence of Relations
 - Chapter XVII — On the Notions of "Matter," "Space," "Time"
 - Chapter XVIII — Mathematics: A Language That Mirrors the Structure of the World
 - Chapter XIX — Mathematics: A Language That Mirrors the Structure of the Human Nervous System
-

Dedication

To the memory of **Alfred Korzybski** (1879–1950),
who first mapped the mechanism —
and to every reader who will use the map
without mistaking it for the territory.

Introduction to the Series

General Semantics Evolved

In 1933 a volume of more than eight hundred pages appeared in New York, proposing to refound the relationship between the human nervous system, language, and sanity. Its author was a Polish-American mathematical engineer, Alfred Korzybski, and the book was called *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics*. It is a dense book, difficult, at times forbidding, written in a technical English that ranges across mathematics, physics, psychiatry, neurology, linguistics, and philosophy. It is also a book that changed, profoundly, the way a significant part of twentieth-century thought would understand the relation between word, experience, and reality.

Over the ninety years that followed, the apparatus of *Science and Sanity* — which its author named *general semantics* — was taken up, developed, criticized, simplified, and at times trivialized. It shaped, directly or indirectly, cybernetics, neuro-linguistic programming, Albert Ellis's rational-emotive therapy, Neil Postman's pedagogy, branches of linguistic anthropology, and part of the work we now call

Acceptance and Commitment Therapy. Phrases entered common speech from it — *the map is not the territory*, *time-binding*, *consciousness of abstracting* — that have sometimes lost contact with the structural depth from which they emerged. It has remained a book cited more often than it is read, and read more often than it is practiced.

This edition begins from a precise observation, formed between 2024 and 2026 in the course of developing the **Technology of Expressions** and the **Ordinative Sciences**: the structural diagnosis that the 1933 work handed to the twentieth century is not only still valid in 2026 — it is *more urgent* than it was then. The informational, neurophysiological, and cultural conditions in which we live have amplified to systemic scale the very phenomena that the 1933 work first named: the identification of words with things, the objectification of abstractions, the chronic confusion of orders of abstraction, the loss of awareness of one's own abstracting. What in 1933 was the pathology of a minority has become, in 2026, the ordinary operating mode of a population chronically exposed to algorithms engineered to maximize subcortical reactivity, to feeds that reward the journalistic synthesis over the observed fact, to generative language models that produce grammatical discourse of no structural substance. The diagnosis of 1933 proved anticipatory. Its cure was never implemented at any adequate scale.

At the same time, ninety years of neuroscience, psychophysiology, cognitive-behavioral therapy, empirically documented contemplative practice, dynamical-systems theory, and cognitive science have transformed the frame within which that work can be read. What in 1933 was structural intuition supported by fragmentary data is today

the object of a massive scientific literature. Adult neuroplasticity, vagal regulation, the default mode network, predictive coding, embodied cognition, subcortical activation: these have made physiologically, clinically, and epidemiologically solid what nine decades ago was asserted with excellent structural instincts and partial experimental ground.

And further — this is the editorial heart of the matter — the apparatus we have developed in recent years as the **Technology of Expressions, Ordinate Set Theory, Semantic Algebra, Proportional Algebra**, and **Ordinate Category Theory** now delivers the formal instruments to *resolve* several of the problems that the classical non-Aristotelian work had *identified*. The tradition's most famous sentence — *the map is not the territory* — names with precision the phenomenon by which every representation structurally loses information with respect to what it represents. But it names the phenomenon without quantifying how much is lost, without specifying where the loss occurs, and without supplying a procedure for detecting it in a given expression. *Semantic Algebra* — one of the formal works in preparation of which this edition is the applied continuation — is the algebraic resolution of the problem the original work identified. *Ordinate Category Theory* reformulates it in terms of forgetful functors and a taxonomy of morphisms, distinguishing formally between preservative abstraction, sterile abstraction (rhetorically coherent, structurally empty), and degenerative abstraction (the outright clinical forms). *Proportional Algebra* introduces time as a pulsation generated by the coherent collapses of a system, formalizing what the classical work called *time-binding*.

For these reasons — a diagnosis still valid and now more urgent, ninety years of neuroscience that have solidified the physiological picture, and a recent formal apparatus that supplies what was missing — we did not confine ourselves to reissuing the original work. We built an **updated edition**: one that presents in contemporary English what non-Aristotelian thought handed to the twentieth century, and simultaneously rereads it, updates it, and extends it through the formal and clinical apparatus of 2026.

On the relation to the 1933 work

Let us be explicit about the debt, because it shapes everything that follows.

This edition is a **deliberate evolution** of *Science and Sanity*. In memory of its author, the whole work is built **specularly** to it: our chapters run in the original's own sequence, numbered I through XLI plus Supplement III, so that the reader who wishes to hold the two side by side may do so chapter for chapter. Where the original chapter titles read well in English, we have kept them. The architecture is the original's; what is evolved is the content — through the Ordinate Sciences and the Technology of Expressions.

But this edition is **not** commentary, exegesis, or critical introduction. It is our own work. Within the body of the chapters, accordingly, the 1933 work is not continually invoked as an external authority: we use its conceptual apparatus as though it were part of our own, because over ninety years of assimilation, criticism, and extension it has in large measure *become* part of our own. Bibliographic references to

the historical source live in the endnotes at the end of each chapter, where the reader will find them in abundance.

The relation between our current work and the classical work has a precise structural form. The classical work **identified the problem**: the human nervous system operates by successive abstractions; consciousness of abstracting is the condition of sanity; its loss is the root of much psychological suffering and pathology. Our contemporary work, in the formal corpus of the algebraic and categorial frameworks, **resolves the problem formally**: it quantifies the structural loss, classifies abstractive passages as preservative or degenerative, and supplies procedures for determining the class of a given expression. This edition is the junction between the two: it makes the diagnosis accessible to the reader of 2026, and points the interested reader to the formal works in which the resolution is being published.

A word, therefore, on the original text itself. Unlike our Italian edition — which carries a full Italian translation of the 1933 chapters in a second part, since no adequate one existed — this English edition presents our elaboration alone. The reason is simple and, we think, the most respectful one available: **the original is already in English, and it remains in print.** *Science and Sanity* is published by the Institute of General Semantics, and any reader who wishes to consult the source, verify a passage, or check a canonical formulation should go to it directly, in the author's own words, rather than to a paraphrase of ours. Our chapter numbering exists precisely to make that traffic easy. We hope a good many readers will make the trip.

The architecture of this edition

This edition is composed of **three volumes**, which together cover the whole span of the original opus. They are ordered by conceptual progression, but each is **self-sufficient in its own domain**: each opens with its own bearings, carries its own apparatus, and can be read on its own.

Volume I — *Foundations and Architecture: General Semantics, Language, and the Structure of Mind and Reality*. Covers Chapters I–XIX. It falls into two arcs. The first (I–X) is the volume of *positioning*: it poses the diagnosis, builds the basic vocabulary, and explains *why* the apparatus that follows has the shape it has — the imitation game, the map and the territory, structure as the only transferable content of knowledge, the organism-as-a-whole. The second arc (XI–XIX) builds the *architecture*: function, order, relations, the infinite as process, cause as a network, and finally mathematics as the language that mirrors, in a double mirror, both the structure of the world and the structure of the nervous system that produces it.

Volume II — *Abstraction and Sanity: The Nervous System, Identification, and Consciousness of Abstracting*. Covers Chapters XX–XXXI. It is the operative volume of the whole edition: the psychophysiology of the human nervous system, conditional reactions, the orders of abstraction, the Structural Differential, identification, and the training that restores consciousness of abstracting — the apparatus of practices the reader can apply to their own nervous system. It is the volume in which theory stops being theory and becomes a neurological habit.

Volume III — *The Structures of the World: Mathematics, Relativity, and Matter*. Covers Chapters XXXII–XLI plus Supplement III. It turns the same instrument on the cosmos: mathematics as a structurally non-Aristotelian language, the semantics of Einstein's theory, simultaneity, Minkowski's "world," and the notion of matter in contemporary physics — closing with the Supplement's systematic synthesis of the whole non-Aristotelian apparatus. Together the three volumes give the complete picture of a non-Aristotelian science: of the human being, and of the universe they inhabit, read with one and the same structural instrument.

Editorial decisions

Three decisions shape this edition, and it is worth stating them at the outset.

The first-person plural. These volumes are written in the first person plural — *we see, we consider, we build*. This is not stylistic ornament. It is an operative application of the framework: the knowledge assembled here is not the author's private property; it is generated by the *field* constituted by those who write, by the century of work that precedes them, by the contemporary scientists whose data confirm it, and by the reader who will receive it and activate it in their own practice. The "we" is the acknowledgment of that field. And when the book turns and speaks to you directly — *you are walking down the street, you are standing in front of the mirror* — it is for the opposite and equally deliberate reason: to acknowledge that certain points of this work happen in the specific body of the person reading, not in the abstract discourse of a book.

The reader we are writing for. We write for the readership we might call, borrowing a phrase from teaching practice, *the class of intelligent children*. Not children by age, but people who have kept the capacity to ask *why*, to feel an everyday example as a structural demonstration, to stay attentive for pages when a book holds their interest. Readers who have heard of the non-Aristotelian work but are not specialists; who are curious but not academic; who want to understand how what they read will change the way they live tomorrow. For this readership we built each chapter with a specific apparatus: it opens with a **concrete everyday scene** that shows the phenomenon before naming it; carries **structural diagrams**; distributes **everyday examples** throughout; devotes an explicit section to the **extension of the concept into the conditions of 2026**; closes with a **numbered summary** and with **practical exercises** the reader can begin at once. The rigor of the treatment is preserved. What is dispensed with is unnecessary jargon.

A citation apparatus on two levels. In the **body** we introduce the concepts of the formal apparatus — Technology of Expressions, Ordinate Set Theory, Semantic Algebra, Proportional Algebra, Ordinate Category Theory — in accessible form, with their conceptual function made explicit. In the **endnotes at the end of each chapter** we give the corresponding technical formulation and the references to the formal works in preparation (under the formula "Ghioni 2026, in preparation," indicating a corpus published progressively through 2026 under Creative Commons 4.0 licenses via Zenodo, OSF, GitHub, HuggingFace, and Academia.edu). The endnotes also carry contemporary scientific references — neuroscience, clinical psychology, digital sociology, philosophy — for the reader who wants to go deeper at any given node. A reader who

wants the running argument alone can ignore the endnotes and lose nothing of the main thread; a reader who wants the formal depth of the scientific literature will find both, carefully placed.

Reading notes

The **endnotes** are numbered by chapter and printed at the end of each chapter — never at the foot of the page, so as not to break the rhythm of reading. They are built so that the reader may decide, chapter by chapter, whether to enter the depth they offer.

The **practical exercises** at the end of each chapter are not an accessory. They are the means by which the apparatus this book describes becomes the property of the reader's nervous system. Our experience, and ninety years of documented practice, indicate that conceptual understanding of the non-Aristotelian work does not by itself produce its structural effects. Only repeated practice produces them. A reader who wants to put this work to the test would do well to choose, in each chapter, at least one exercise and run it for some weeks before moving on.

An acknowledgment

This edition was made possible by work distributed across decades. We acknowledge openly our debt to **Alfred Korzybski**, whose 1933 work gave the twentieth century the first systematic diagnosis of the relation between nervous system, language, and sanity. We acknowledge those who, in the generations that followed, kept the non-Aristotelian apparatus alive, extended it, and applied it —

Wendell Johnson, S. I. Hayakawa, J. Samuel Bois, D. David Bourland, and many others — and the Institute of General Semantics, which has kept the source in print and the work in circulation. We acknowledge the contemporary neuroscience that has made physiologically solid what was once asserted on structural intuition alone — Antonio Damasio, Stephen Porges, Bessel van der Kolk, Norman Doidge, Joseph LeDoux, Richard Davidson, Daniel Siegel, among many others cited in the endnotes. We acknowledge those documenting with rigor the informational conditions of our present — Nicholas Carr, Johann Hari, Jonathan Haidt, Jean Twenge, Cal Newport, among others. Without this collective inheritance, this edition would not exist.

We acknowledge, finally and specifically, the work that continues in the research of the Ordinate Sciences Foundation and Ordinate Sciences Press, and of the collaborators engaged in developing the formal frameworks being published through 2026.

What you are about to read is offered as an instrument. An instrument for personal practice, for reflection, for the education of those growing up around us, for the defense of a quality of thought that our time tends to degrade. How much of it you actually use is up to you alone. The book supplies the apparatus; the work belongs to whoever receives it.

Fabio Ghioni Ph.D
for Ordinate Sciences Press
2026 Edition

Introduction to This Volume

Volume I — *Foundations and Architecture*

You are holding the first volume of *General Semantics Evolved*. It is the volume everything starts from. In the *Introduction to the Series*, which precedes these pages, we described the voice, the pedagogical apparatus, and the editorial frame shared by all three volumes. Here we look at what this book does specifically — and why it is the place to begin.

This volume covers **Chapters I through XIX**, which in the architecture of the original opus constitute the foundation of everything that follows. If the second volume of this edition is the operative book — the one that hands the reader the fine instruments for the human nervous system — and the third turns those instruments outward, onto the structures of the world, this first volume is the book of **positioning and architecture**: the one that poses the diagnosis, builds the working vocabulary, and explains *why* the whole apparatus that follows has the shape it has. You cannot use instruments well without having understood the problem they were made to solve. Here the problem is posed in its barest form, and then the architecture is built on top of it.

The thesis running through these nineteen chapters can be put in two lines, and the first of them is uncomfortable. **In our nervous reactions, far too often, we still copy animals**: we react to the signal as though it were the fact, to the word as though it were the thing, to the label as though it were the person. But there is good news hidden inside the diagnosis: because this is *imitation* — a copy made out of ignorance of the mechanism, not a fact of nature — it

can be stopped. And the second line tells us what to put in its place: **reality is not a warehouse of separate things but a fabric of relations, orders, and functions — and the mind, when it works well, is built to read exactly that fabric.** From this single pair of insights grows a *positive*, trainable theory of sanity: not a list of good advice, but the description of a functioning that can be recognized, corrected, and practiced.

What this volume contains

The nineteen chapters fall into two great arcs, bound by a **continuous thread**: each chapter takes up the ones before it and prepares the one after.

First arc — The foundations (Chapters I–X)

Chapter I, *Aims, Means, and Consequences of a Non-Aristotelian Revision*, opens with a concrete gesture — choose a word that unsettles you, and feel the body react to a sequence of printed letters — and from there poses the discovery everything starts from: reacting to the signal as though it were the fact is copying an animal level of reaction. It introduces the distinction between map and territory, the ternary structure of every experience (content, form, observer), the difference between Aristotelian and non-Aristotelian thinking, and *time-binding* as the faculty that lets us not merely copy what we receive but evaluate and improve it.

Chapter II, *Terminology and Meanings*, opens with the game of definitions that circles and circles until someone touches their chest and says, "...it's something you feel." It shows where meanings

actually live: not in words, but in the **semantic reaction** — the response of the whole organism to a symbol. It introduces the unspeakable objective level, from which words take their weight.

Chapter III, *The Time-Binding Animal*, opens with the phone in your hand as a deposit of thousands of generations. It develops *time-binding* as the characteristic that distinguishes us from every other living thing — and shows its reverse: when a being who could bind time settles for imitating, it does not advance; it repeats. And a civilization that repeats remains, for all its technology, at an infantile stage.

Chapter IV, *On Structure*, opens with a blade of grass and the question of where the "green" is really born. It establishes the most important and most underrated thesis of the work: of a thing we know and transmit not the essence but the **structure** — the web of relations. From this comes the criterion of isomorphism, and the decisive distinction between abstraction that preserves and abstraction that loses.

Chapter V, *General Linguistics*, opens with dinosaur footprints and with black marks on white paper — formulas, theorems — as the cleanest tracks the human mind has ever left. It shows that to study language is to study a behavior, and that the best-made language we possess is mathematics: not so we may do mathematics, but so we may learn from it what a language is when it works well — and why most of our messes come from languages that work badly.

Chapter VI, *On Symbolism*, opens with questions that are perfect in form and empty in substance — the temperature of a single electron, the weight of Wednesday — in order to name **noise disguised as a**

word. It examines the elementary brick of every map, the symbol, and shows that whoever governs the symbols governs those who use them. A community's first defense is not one more law: it is more people able to tell, on their own, a full symbol from an empty one.

Chapter VII, *Linguistic Revision*, opens by inviting you to count how many times in a day you said "*the*" — *the* right solution, *the* truth — and with a revolution that comes down to one almost invisible grammatical change: from the definite article to the indefinite. It gathers the six preceding chapters and shows how the language of identity is reformed, and how one moves from the additive way of speaking to the functional one — the same semantic hygiene that let Einstein see the fact by changing the language.

Chapter VIII, *General Epistemology*, opens with an observation that unsettles — it is not the fool who breaks down, but often the most gifted and sensitive — and gives the explanation: the **organism-as-a-whole**, the principle that function generates the organ, and the fact that the semantic center (thought and language) is the most dominant and therefore the most exposed. Here twentieth-century physics enters with its lesson: the observer disturbs the observed.

Chapter IX, *Colloidal Behavior*, opens with a small cut and the blood clotting before your eyes, and descends to the most material level: life is always in the colloidal state, halfway between solid and liquid. On this material basis the old fracture between "body" and "mind" finally dissolves; and since thought and emotion are real electrical currents, a word becomes **the fifth factor** — a physical factor that moves the matter we are made of, as heat or acid does. Living matter, the chapter shows, remembers.

Chapter X, *The Organism-as-a-Whole*, opens with the itch a word can raise, and with the clinical case of the paper roses — a full attack triggered by artificial flowers. It completes the principle: the organism responds as a whole even to a pure belief, and in every such reaction there is a hidden observer that grammar erases. It shows many-to-one causality, the way nutrition shapes body and mind together, and why the body is a living language. It closes the first arc — and opens the door to the second.

Second arc — The architecture (Chapters XI–XIX)

Chapter XI, *On Function*, opens with the shower knob — the heat that *depends* on its position — and lays the first brick of the architecture: seeing the world in dependences rather than fixed things. The important words are **variables**, not constants; and many of our sentences stay ambiguous until we fill the variable and put a date on it.

Chapter XII, *On Order*, opens with "dog bites man" turned into "man bites dog": same words, different order, different world. Order is a "standing-between," and a relation is always an order; the nervous system, built one-way, imposes a before and an after — and much of our suffering is born of reversing the natural order, of going from the idea to the sensation instead of from the sensation to the idea.

Chapter XIII, *On Relations*, opens with the game of swapping the terms of a sentence. It separates the relations that can be turned around from those that cannot, shows why the form "X is Y" cannot hold the relations that matter, and from there demolishes the notion of identity — naming the underlying disease of the whole work: **identification**, the confusion of the symbol with the thing.

Chapter XIV, *On the Notion of "Infinity"*, opens with two mirrors facing each other. It shows that the infinite is a *process*, not a thing, and that most of our absolutes — *forever, everyone, never* — are infinities disguised as fate, which dissolve the moment we turn them into a quantitative question.

Chapter XV, *The "Infinitesimal" and "Cause and Effect"*, opens by snapping a square of chocolate. From the fact that there is no "smallest piece" it follows that there is no "next moment," and therefore that cause and effect do not touch: between them there is always an interval where something can intervene — and every outcome is a network of factors, the **many-to-one**, not a single cause.

Chapter XVI, *On the Existence of Relations*, opens with the confident sentence "there is no truth," which eats its own tail. It shows that there are things you cannot deny without using them — and that relations therefore "exist" more solidly than things do; and that "chance" is often just the name of our ignorance.

Chapter XVII, *On the Notions of "Matter," "Space," "Time"*, opens with the request "hand me a piece of matter," to which someone holds out a pencil. It brings every factor built so far to the largest testing bench there is: "matter," "space," and "time" are not three things but three *ways of looking* at a single pulsing reality — which the new physics replaces with the **event**.

Chapter XVIII, *Mathematics: A Language That Mirrors the Structure of the World*, opens with an eclipse written on the calendar years in advance, to the second. It shows why mathematics "works" — because its structure mirrors the structure of the world —

and that number itself is a relation, not a thing; while holding fast to the reverse, decisive for our time: the map is not the territory, the model is not reality.

Chapter XIX, *Mathematics: A Language That Mirrors the Structure of the Human Nervous System*, closes the volume. It opens with recognizing a friend's face under changing light — finding the invariant inside change, the most mathematical operation there is, performed without knowing it. It completes the picture from the other side: mathematics mirrors the structure of the mind that produces it as well. It is the **double mirror** in which the whole architecture closes — and from which the second volume of this edition opens.

The pedagogical apparatus

The chapters follow the editorial model common to the edition, described in the *Introduction to the Series*: an iconic opening in an everyday scene, structural diagrams, everyday examples drawn from varied domains, a section extending the concept into the conditions of 2026, a numbered summary, practical exercises you can start at once, and enriched endnotes at the end of each chapter — never at the foot of the page.

One element is worth anticipating, because it is the most memorable: each chapter opens with a **concrete scene**, chosen because you have almost certainly lived it, and designed to stay in the mind. Months or years after closing the book, the concept of each chapter should be recoverable through its scene. In this volume the scenes are: a word that unsettles you and makes the body react (I); a game of definitions circling down to the un-speakable layer (II); the phone

as a deposit of a thousand generations (III); a blade of grass and the question of where the "green" is born (IV); dinosaur footprints and black marks on white paper (V); the temperature of a single electron (VI); counting how many times you said "the" (VII); the people you have watched break down (VIII); a small cut and the blood clotting (IX); the itch raised by a word, and the paper roses (X); the shower knob (XI); "dog bites man" reversed (XII); swapping the names in a sentence (XIII); two mirrors facing each other (XIV); a square of chocolate broken forever (XV); the sentence "there is no truth," contradicting itself (XVI); the pencil handed over as a "piece of matter" (XVII); the eclipse written on the calendar (XVIII); recognizing a friend in the rain, from behind, in a crowd (XIX). Every scene is also an advance demonstration: not ornament, but the chapter's phenomenon caught in the act, before it has even been named.

How to read it

First reading. Read the nineteen chapters in sequence, without skipping. The binding here is tight: each chapter explicitly recalls the ones before, Chapter X closes a thread that begins in Chapter I, and the seven structural factors (XI–XVII) build on one another until the two chapters on mathematics (XVIII–XIX) gather their fruit. On a first reading, stay with the body of the text and consult the endnotes only where you want to go deeper.

Reading with practice. The mode that produces the deepest effects is to read each chapter *while running at least one of its practical exercises for some weeks before moving on*. The non-Aristotelian apparatus does not produce its effects through conceptual

understanding alone. Repeated practice produces them — a truth this volume itself demonstrates in Chapter X: to know is not yet to apply.

Selective rereading. After a first pass, the volume works as a reference instrument: the numbered summary of each chapter recalls the apparatus quickly, and the endnotes let you re-enter the formal depth or the scientific literature whenever a specific question arises in your life or your work.

Reading in company. Where possible, reading this volume in a small group that meets regularly accelerates the stabilization of the new habits: the apparatus produces steadier effects when the practice happens in a conversational field that sustains it.

On the original text

This edition presents our own elaboration. It carries no translation and no reprint of the 1933 text, for the best of reasons: **the original is in English, and it is in print.** *Science and Sanity* is published by the Institute of General Semantics, and the reader who wants to consult the source, check a canonical formulation, or measure our elaboration against its historical base should go to it directly, in the author's own words. Our chapter numbering exists to make that easy: Chapters I–XIX here correspond, in order, to Chapters I–XIX there. The two books can be read side by side, and we hope they will be.

A final note

What you are about to read is the foundation of an apparatus with nearly a century of development behind it, and it has been calibrated to produce effects in the life of whoever receives it. It will not yet hand you the daily practices for your own nervous system — those are the heart of the second volume of this edition — but it will hand you the two things without which the practices would be exercises in a vacuum: the capacity to *see the problem*, and the capacity to see the world and yourself as a fabric of relations, recognizing everywhere, under the changing appearances, what remains.

Sanity has a physiological mechanism. What has a mechanism can be trained. And the point everything starts from, and comes back to, is this: **we are not animals. Sometimes we copy them. And what is copied can cease to be copied.**

Chapter I — Aims, Means, and Consequences of a Non-Aristotelian Revision

Pick a word that unsettles you. *Deadline. Summons. Biopsy. Betrayal.* Take one — the one that, merely by being read on this page, has already done something to you.

Because something has already happened. Perhaps a slight tightening at the back of the neck. Perhaps a breath that ran shorter for an instant. Perhaps a small contraction in the stomach, or a shift you could not name but that is there. And yet nothing has happened. There is no deadline in front of you, no physician, no betrayal. You read a sequence of letters printed on a page, and your body responded as if the thing named were present in the room.

Have you ever asked yourself what happened, structurally, in that half second?

A dog that has heard a bell ring just before its food, many times over, begins to salivate at the bell alone. It salivates at a sound. Reading *biopsy*, you produced a refined version of the same performance: a full bodily response to a signal that announces — but is not — the thing the body fears. The research from which this book proceeds starts exactly here, from an observation as simple as it is uncomfortable: **in our nervous reactions, much of the time, we still copy animals.**

At first sight the discovery humiliates. In fact it is the greatest source of hope imaginable. For if we *were* animals, nothing could be done. But we are not: at times we *copy* them. And what is copied out of ignorance of how we ought to function can stop being copied — individually and collectively — the moment the mechanism is understood. From this single difference comes the possibility of a first positive theory of sanity: not a list of good advice, but the description of a way of functioning that can be trained.

Let us see where to begin.

1. The imitation game

There is an ancient and enormously powerful way in which every living creature learns: **imitation**. Watch the one who knows how, copy, repeat until the gesture settles into the body. Animals live by it — the cub imitates its mother, the flock follows its leader — and for them it works admirably: in a world that changes little from one

generation to the next, copying what has worked is the cheapest and safest strategy there is. For the animal, imitation *makes sense*.

Human beings begin the same way: we learn to speak, to walk, to hold our place in the world by imitating. The problem is not imitating — it is **stopping there**. Most of us never leave that first mode: we copy emotional responses, repeat slogans we have heard, wear received identities, use maps we have never put to the test. The body's reaction to a word, from which we started, is precisely this: a copy — refined, but faithful — of the animal's automatic response to a signal. It is the human nervous system playing, without noticing, the **imitation game**.

The human nervous system and the animal nervous system are not the same machine with a few extra parts. They are differently organized. The human system is **more generalized**: it has far more possibilities; it can do far more things. The animal system is, by comparison, a special case — powerful within its range, but closed.

From this asymmetry follows a precise consequence, best rendered through the two classic characters of the non-Aristotelian tradition: a man, call him Smith, and a dog, call him Fido.

Smith, through ignorance of his own mechanism, **can** use his nervous system the way Fido would: react to the signal as if it were the fact, respond to the label as if it were the thing, fire before evaluating. Fido, for his part, cannot copy Smith by any means available to him: he cannot climb to the level of functioning that lies open to Smith. The regression runs in one direction only.

TWO NERVOUS SYSTEMS, ONE DIRECTION ONLY

SMITH (human)
generalized
functioning

evaluates
levels,
distinguishes
sign and thing

—can—
copy

FIDO (animal)
specialized
functioning

reacts to the
signal as if it
were the fact

▲
CANNOT
copy

The danger lies all on one side: Smith's, not Fido's.

And this is the delicate point. Fido has his survival difficulties, but at least he does not impose absurd and harmful conditions on himself: he does not ruin his digestion over a word, lose sleep over a hypothesis, or fall ill over a memory. Smith does. Most of the conditions that afflict us — private, public, international — are not imposed on us by nature: we impose them on ourselves, by copying a level of reaction that is not our own.^[1]

Here we reach the point that changes everything. The animal imitates too — and for the animal, we said, it makes sense. But the human being possesses a faculty the animal lacks: not merely to copy what came before, but to **evaluate it, correct it, improve it, and transmit the improved version**. It is our most distinctive characteristic — to gather what one generation has learned, put it to the test, and hand it on enriched to the next. The non-Aristotelian tradition calls it *time-*

binding: binding time, so that knowledge accumulates instead of starting again from zero.

The question then becomes unavoidable: does imitation, which makes sense in the animal, make sense in us? As a way to *begin*, yes. As a way to *remain*, no. For the human being who merely imitates wastes precisely the faculty that makes him human: he reduces time-binding — accumulation and amplification — to bare **repetition**, the same cycle re-run generation after generation, exactly as the animal does. He inherits conclusions without retracing the path, takes over maps without testing them, repeats "it has always been done this way" — while the faculty that could have improved those maps idles, switched on and unused.

This is exactly where the Aristotelian and the non-Aristotelian part ways. "A is A" — fixed identity, settled once and for all, never to be reopened — is the very grammar of the copy: it says, "this is received; take it as it stands." The non-Aristotelian gesture is the **interruption** of the imitation game: putting the received form back on the table, asking at what level it holds and in what context, and — where needed — rewriting it. Not out of rebellion, but in order to finally use what imitation had kept switched off.

This changes the entire posture of the problem. The question is no longer "how do I better endure what happens to me," but "how do I stop reacting at a level that is not mine." And since we are dealing with a physiological mechanism, not a failure of willpower, the answer will not be a sermon. It will be a realignment of function.

2. The word is not the thing

The first step of the realignment is a distinction that looks obvious and almost never is in practice: **a word is not the object it speaks of. The map is not the territory.**

We can verify this at once, without instruments. However precise the word *apple* may be, it cannot be eaten. The word is a tool, a representation; the object is something else, of another order. Between the two there is no likeness of substance: there is, at most, a likeness of *structure* — and it is to structure that we shall keep returning, because it is the heart of the whole matter.

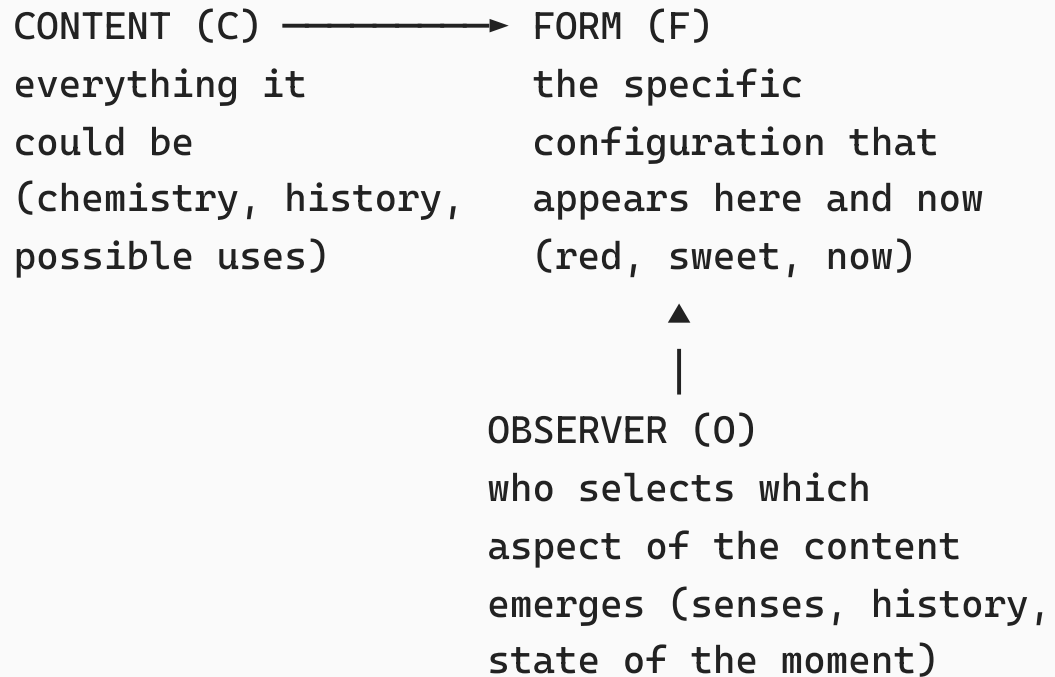
It pays, however, to look more closely at what happens whenever we come into contact with something. Take the apple again. Apparently it is "a thing": a round object, red or green, good to eat. Structurally, in every real contact, three distinct components operate together.

There is the **content**: everything the apple potentially is — its chemistry, its sugar, the energy it carries, the history of its growing, the thousand uses it could enter into. It is the coherent totality, most of which, at that moment, you neither see nor taste.

There is the **form**: the specific configuration the content takes in your here-and-now contact — this apple, this color, this weight, this taste. It is not "the complete apple": it is one particular expression of it.

And there is the **observer**: you — not as a neutral spectator, but as the operator who, with your own nervous system, your own history, your own hunger, *selects* which aspect of the content will emerge in that form. A nutritionist, a hungry child, a cider maker, a person with an allergy: the same physical object, qualitatively different experiences, because the observer differs.

$\langle C, F, O \rangle$



This tripartition — content, form, observer — is the plain-language formulation of a structure we shall meet everywhere in this book; when we need it, we shall call it by its technical name: $\langle \mathbf{C}, \mathbf{F}, \mathbf{O} \rangle$.^[2] Three letters to remember that every experience is always the meeting of a content, a form, and an observer — never one of the three present without the other two.

"The map is not the territory" then means, more precisely: the *form* (the word, the label, the appearance) is not the *content* (the totality of what is there), and neither is separable from the *observer* who puts them in relation. The fundamental semantic error — the one from which nearly all the others derive — is mistaking the isolated form for the whole thing: seeing *biopsy* and reacting as if the disease were present; seeing *con man* and losing sight of everything else the person is.

3. Aristotelian and non-Aristotelian

At this point we can name with precision the two modes of thinking that compete for our nervous system.

Aristotelian means thinking in rigid identities and sharp, permanent boundaries: "A is A," a thing is what it is, defined once and for all; and before every question, two boxes only — true or false, all or nothing. It is a powerful mode, and it has carried centuries of thought. But it pays a price: it treats as fixed the objects that in reality are processes, and as separate the elements that in reality are bound together.

Non-Aristotelian means taking into account that terms change meaning according to the level at which we use them; that the same word behaves differently in different contexts; that what we know is never an immobile essence but the structure of relations. This is not "vague" thinking: it is thinking with a closer fit — thinking that keeps context, levels, and time in the picture instead of erasing them.

ARISTOTELIAN	NON-ARISTOTELIAN
A is A (fixed identity)	A behaves as A ₁ under conditions C ₁ (relation, level,
context)	
true / false (two boxes)	at what level?
for what purpose?	by what measure,
separate objects	the organism-as-a-

whole

(independent elements)
inseparable)

(parts and bonds

permanent definition
in time

structure evolving

One point deserves to be stated bluntly, to prevent misunderstanding: **we are not denying Aristotelian thought.** We are *measuring its loss*. Just as non-Euclidean geometry did not abolish Euclid's — it made it a special case, valid on flat surfaces, within a wider frame — so the non-Aristotelian system does not erase the old one: it includes it as a special case and marks its limits. It is no accident that this revision arose within the same movement of thought that produced the non-Euclidean and non-Newtonian systems: relativity and quantum physics did for the physical world exactly what we are attempting here for the world of language and human reactions.^[3] Three interlocking revisions, expressions of a single tendency of the age.

The body feels the difference before the mind names it. To someone raised in Aristotelian habits, rigid systems feel "natural" and relational ones "unthinkable." To someone trained early to distinguish levels and contexts, the reverse happens: thinking in relations becomes the easy mode, and rigid identity begins to look like what it is — a useful instrument in certain cases, a harmful one when applied to everything.

4. Structure is the only content of knowledge

If the word is not the thing, what — of a thing — can we actually know, and transmit?

The answer is precise: its **structure**. Not its essence, not its substance "in itself," but the web of relations — what stands with what, in what order, with what bonds. This is what a good map keeps of the territory: not the color of the soil or the smell of the grass, but the distances, the directions, the proportions. A map is useful not because it *copies* the territory, but because it preserves the structure relevant to the purpose.

From this comes a criterion that will run as a guiding thread through the entire volume: **structural isomorphism**. A definition, a model, a measurement is good to the degree that it preserves the relations of the phenomenon it means to describe. Three questions, to keep in your pocket:

- when we build a definition: *does this form preserve the relations of the phenomenon?*
- when we measure: *can our indicators follow the structure we want to describe?*
- when we decide: *are the expected consequences coherent with the real structure, or are they an artifact of the map we happened to choose?*

There is a useful way of seeing all this at once. Every time we pass from a thing to its representation — from object to word, from phenomenon to model — we perform an **abstraction**: we keep some relations and let others fall away. An abstraction done well is like a faithful map: it drops the superfluous and keeps what serves the purpose. An abstraction done badly drops precisely the relations that

mattered — and then the map, however impeccable to the eye, leads astray. The decisive distinction, therefore, is not between "abstract" and "concrete," but between **abstraction that preserves** and **abstraction that loses** what was important.^[4] All the work ahead of us is, at bottom, learning to tell the difference.

5. Multiordinality: words that change meaning with level

There is a property of certain words which, while unseen, is an inexhaustible source of misunderstanding — and which, once seen, becomes an instrument of freedom and precision.

Some of our most important terms — *true*, *fact*, *cause*, *reality*, *number*, *yes* — **do not have a single meaning**: they change it according to the level at which we apply them. It is true that it is raining (an observable fact). It is true that the theory explains the data (a relation between levels). It is true that I love someone (something else again). The same word, *true*, is doing three different jobs. This property is called **multiordinality**.

To see it clearly, it is enough to remember that when we speak, we never stay on a single plane. There is the concrete event; then perception and measurement; then the verbal description; then the theory that organizes descriptions; then the discourse that evaluates the theory. At each step upward we do not climb toward "more truth": we climb toward a further abstraction, which keeps certain relations and lets others go.

THE LADDER OF ABSTRACTION

(at every rung, something is kept and something is dropped)

meta-discourse ← evaluates the theory

▲ (drops: the detail of the model)

theory ← organizes the descriptions

▲ (drops: the singularity of the case)

description ← puts into words

▲ (drops: the unsayable of experience)

perception ← the nervous system registers

▲ (drops: nearly all of the physical

event)

event ← what happens, independently of

us

Confusing the rungs is the most common and the most expensive of errors. Treating a theory as if it were the event, a diagnostic label as if it were the person, an inference about ourselves as if it were our identity: all are forms of the same exchange of level. Multiordinality teaches us to ask, each time, one simple and powerful question: *at what level am I speaking now?* Whoever asks it stops quarreling over different meanings of the same word — and begins to understand, and to be understood. [\[5\]](#)

6. A tool: the Structural Differential in words

All of this becomes trainable with an instrument which, in the non-Aristotelian tradition, bears the name of the **Structural Differential**.

We shall build it in full later in this work; for now we can use its pocket version, made of words alone. Picture five rungs:

1. the concrete **physical event**, what happens independently of you;
2. **perceptions and measurements**, what your nervous system and your instruments register;
3. **verbal descriptions**, what you put into words;
4. **theories** that organize the descriptions;
5. **meta-discourses** that evaluate the theories.

The exercise is one alone: when you speak, *point to the rung*. And if you catch yourself confusing two rungs — treating the theory as if it were the event, say, or the label as if it were the object — stop and realign. It seems like little. It is, instead, the habit which, repeated, progressively shifts the order of the nervous processes in the right direction: first the datum, then the word; first the description, then the inference; first the fact, then the judgment.

Alongside it goes a single small move of semantic hygiene, from which nearly all the others derive: turning identity into condition. Instead of saying "X **is** Y" — which fixes, separates, closes — say "X **behaves as Y under these conditions**." "That person is hostile" becomes "that person behaved in a hostile way in that situation." This is not a softening: it is a structural correction. It reopens the content and the observer exactly where the isolated form had shut them out.

7. The consequences in 2026

One might think that all this concerns foundations, and touches everyday life only from a distance. The opposite is true. The problems the non-Aristotelian revision identified nearly a century ago — mistaking the signal for the fact, the map for the territory, the inference for the description — are today not merely persistent: they are **industrialized**. Consider three points.

Artificial-intelligence models. A model is a map; the data it was built from are its measurements; the world it operates in is the territory. When we treat a model's output as "reality" rather than as one representation of it, we introduce distortions that travel disguised as truth. The non-Aristotelian protocol asks, here too: *at what level are we working? what structure do we want to preserve?* It is the difference between using a tool and being used by one.

Public communication. Guide-words such as *risk*, *safety*, *emergency* may refer to a statistical quantity, a subjective perception, or an operational decision. When the level goes undeclared, discussions become collisions between different meanings of the same word, and social fractures widen. Declaring the level — *risk by what measure, for what population, over what horizon* — is not pedantry: it is public hygiene.

Collective infantilism. The non-Aristotelian tradition used the word *infantilism* for the tendency to react as children, or as animals, to purely verbal stimuli. Digital platforms have turned it into a business model: they multiply the occasions for conditioned reaction to words detached from any real context — a slogan, a label, a headline — and they reward whoever reacts most. A nervous system exposed to hundreds of these micro-activations a day never returns to baseline:

it lives in a chronic state of pre-alarm. It salivates at the bell all day long.

In all three cases, the way out is the same $\langle C, F, O \rangle$ with which we began. Where the old habit collapses everything into the *isolated form* — the model's output, the slogan-word, the headline — the work consists in **reopening the content and the observer**: remembering that behind the form stands a totality you do not see, and that it is you, with your particular reading, who make it emerge this way. This is not an exercise in good manners. It is, literally, how a human nervous system stops copying an animal one.

And here the stakes descend from the general to the personal. The question "am I mistaking the signal for the fact?" does not concern only public debates and algorithms. It concerns the word that tightened your stomach at the beginning of this chapter; the label with which you judge yourself every morning; the "we need to talk" you have already answered, inwardly, before the conversation even began. The non-Aristotelian revision, before being a science, is a way of giving ourselves back the freedom to respond instead of react. ^[6]

8. Practical exercises

This chapter is not to be measured by how clear it is on first reading, but by whether it changes something observable in the way you react. Five protocols you can test at once.

Exercise 1 — The word as signal

For one week, once a day, catch a word that provoked a physical reaction in you (a message, a headline, a name). Stop and ask: *what*

is actually present, here and now, in physical terms? The answer is almost always "nothing — only words." Write it down. Merely recognizing that the body reacted to a signal, and not to a fact, reduces the automatism of the reaction with practice.

Exercise 2 — From "is" to "behaves as... under these conditions..."

Take three sentences of the form "X is Y" that you thought or said today (about a person, about yourself, about a situation). Rewrite them in the form "X behaves as Y under these conditions." Watch what changes: the rigid identity opens, and context — with the possibility of a different reading — reappears.

Exercise 3 — Point to the rung

During an important conversation, try to label mentally, sentence by sentence, the rung you are speaking from: event, perception, description, theory, evaluation. When you notice that you are treating a theory or a judgment as if it were the event, stop and realign. This is the pocket use of the Structural Differential.

Exercise 4 — Declare the level

For one day, every time you are about to say "that's true" or "that's false," add the specification to yourself: *true by what measure, against what model, for what purpose?* You will notice how many "absolute" statements were true only at one level, and how many arguments arise from never having declared it.

Exercise 5 — The isomorphism test

Choose a definition or a label you use often in your work or your life (a diagnosis, a category of people, a performance indicator). Put it to a single question: *does this form preserve the relations of the phenomenon it is supposed to describe, or has it lost precisely the ones that matter?* If it has lost what matters, rewrite it.

9. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **The imitation game.** Like every living creature, we learn by imitating; unlike the animal, we are not meant to stop there. Reacting to the signal as if it were the fact is copying an animal level of reaction — useful for beginning, regressive as a permanent mode. It is the root of un-sanity, private and public.
2. **Imitation makes sense in the animal; as a terminal mode in the human being, it does not.** The faculty that distinguishes us — *time-binding* — is to evaluate, correct, and improve what we receive, not merely to copy it; stopping at imitation reduces the accumulation of knowledge to repetition. And since the copying comes from ignorance of the mechanism, not from nature, it can be stopped: hence a *positive*, trainable theory of sanity, not a preached one.
3. **The human nervous system is more generalized than the animal one.** Smith can regress to Fido's level; Fido cannot climb to Smith's. The danger lies all on one side: we impose it on ourselves.

4. **The word is not the thing: the map is not the territory.** Every experience has the ternary structure $\langle C, F, O \rangle$ — a coherent content, a specific form, an observer who selects. The fundamental error is mistaking the isolated form for the whole thing.
5. **Aristotelian versus non-Aristotelian.** Rigid identities and two boxes, against relations, levels, and context. We do not deny the former: we measure its loss and include it as a special case, as non-Euclidean geometry did with Euclid.
6. **Structure is the only transferable content of knowledge.** Of a thing we know and transmit relations, not essence. The guiding criterion is isomorphism: a map is good if it preserves the relevant structure. Decisive distinction: abstraction that preserves versus abstraction that loses.
7. **Multiordinality.** Terms such as *true*, *fact*, *cause* change meaning with the level at which we use them. Confusing levels is the most common source of misunderstanding; recognizing them gives freedom and precision.
8. **The Structural Differential** is the tool for training the correct order: event $\rightarrow$ perception $\rightarrow$ description $\rightarrow$ theory $\rightarrow$ meta-discourse. The base move is turning "X is Y" into "X behaves as Y under these conditions."
9. **In 2026 these errors are industrialized:** AI models mistaken for reality, public language without declared levels, collective infantilism rewarded by the platforms. The way out is to reopen content and observer where everything had collapsed into the form.
10. **This is not an ethical duty; it is a realignment of function.** Giving the nervous system back its natural order — first the

datum, then the word — is what allows it to stop copying the animal and return to being human: more flexible, better fitted to context, freer to choose.

The rest of this volume develops this program. The next chapter (Chapter II, *Terminology and Meanings*) descends into the mechanism of semantic reactions — why a word moves the body — and into the objective level that precedes words. From there we shall build, chapter by chapter, structure, language, and finally the idea of the organism-as-a-whole.

The point of departure, however, is this. **We are not animals: at times we copy them. And what is copied can cease to be copied.**

Notes

Chapter II — Terminology and Meanings

Try a small experiment, the next time you are with someone you trust. Pick an important word — *respect*, *freedom*, *love*, *security* — and ask: "What, exactly, does it mean to you?" Listen to the answer. Then take one of the words the person used in answering and ask again: "And that one — what does it mean?" And so on, definition after definition.

After a few rounds the same thing always happens. The words begin to circle, each deferring to the next; and at some point the other person stops. Perhaps a hand goes to the chest. Perhaps a vague gesture hangs in the air. Perhaps they say "...it's something you feel,"

and fall silent. You have just touched bottom: the stratum where words run out and something else begins — sensations, images, background evaluations the person *knows* but can no longer say.

Have you ever asked yourself where meanings actually live?

They do not live in words. A word, by itself, is a sound or a mark; the meaning is what that mark *makes happen* in the organism that receives it. This is why two people with the very same vocabulary can react in opposite ways to the same sentence: they do not share the deep stratum, the non-verbal one, from which words take their weight. Understanding how that stratum works — how a meaning is born, why it moves the body, why it sets us quarreling — is the step that finally lets us answer the question left open in the previous chapter: *why do we keep playing the imitation game, and how does one stop?*

Let us take it in order.

1. Meaning is not in the word: it is a reaction of the whole organism

We call a **semantic reaction** the total response of a person to a word, a symbol, a gesture, an image — insofar as they carry meaning. It is not merely "understanding": it is the entire circuit that lights up, involving attention, memory, associations, bodily sensations, emotions, evaluations. When you read *exam* and your breath runs shorter, when you hear a certain name and your mood shifts, you are having a semantic reaction. The word *semantic* comes

from the Greek *semaínein*, "to mean"; and what meaning means, for a living organism, is always an *event of the body*.

From this follows a first correction, small in form and large in consequence. We are used to sorting the world onto two separate shelves: on one side the "mind" (ideas, thoughts, reasonings), on the other the "body" (sensations, emotions, physical reactions). It is a convenient division, and almost always a false one. In reality a semantic reaction is a single fact in which meaning, memory, breath, posture, and heartbeat co-determine one another. Anxiety is not "just a thought," nor "just a hormone": it is a joint configuration of meanings, memories, breathing, muscular tension, and context.

This way of looking has a name: **non-elementalistic**. It describes the phenomenon as a web of relations among inseparable parts, instead of breaking it into pieces and treating the pieces as independent. To keep the point present in the language itself, we shall sometimes use a small sign: we shall write *psycho-logical*, with the hyphen, to remind ourselves that we are speaking of a process of the whole organism, in which what we call "psychic" and what we call "physiological" are two faces of a single movement.^[7]

MEANING AS A REACTION OF THE WHOLE ORGANISM

the word "exam"



attention · memory · associations
breath · heartbeat · posture · tension
emotion · evaluation

= ONE semantic reaction
(not "the mind" + "the body,"
but the organism-as-a-whole)

It becomes clear, then, why certain words — *security*, *freedom*, *respect* — can be argued over without end. Two people may know the same dictionary definition and carry, beneath it, two completely different histories of relations: experiences, habits, physiological states, wounds. When they quarrel over "freedom," they are rarely quarreling over the same thing: they are moving at different levels, with different affective configurations, mistaking for a disagreement of ideas what is a difference of semantic reactions. One does not get out of such conflicts by proving "I am right." One gets out by making level and structure explicit, and by seeking an isomorphism sufficient for the two maps to meet.

There is also a clinical sidelight worth naming, because it illuminates everything else. In certain brain lesions a condition appears called **semantic aphasia**: the person understands every single word, carries out every single instruction, can read, write, and count — and yet the *meaning of the whole* escapes them. The bricks are there; the architecture is lost. It is proof, by subtraction, that meaning is not the sum of the words: it is the structure that holds them together, and it is a fact of the whole organism.

2. The un-speakable level: the chair you sit on and the word *chair*

Let us return to the definition experiment, and to that point where the words run out. That stratum has a precise name: the **un-speakable level**. Not "ineffable" in any romantic sense, not "too great for words": simply *not made of words*.

The distinction is elementary, and almost no one honors it. The chair you are sitting on is un-speakable: you can sit on it. The word *chair* is speakable: you can utter it or write it, but you cannot sit on it. A toothache is un-speakable: you feel it in your jaw. The phrase *toothache* is speakable: you pronounce it, and it does not hurt. Between the two levels there is no bridge of identity — there is, at most, a similarity of structure.

TWO LEVELS NOT TO BE CONFUSED

UN-SPEAKABLE

(not made of words)

the chair
(you sit on it)

a toothache
(you feel it)

the event, the
sensation, the
contact

"Say all you please about an object:
whatever you say, it is not the object."

SPEAKABLE

(made of words)

the word "chair"
(you utter it)

"toothache"
(it does not hurt)

the description,
the name,
the judgment

Why does this matter so much? Because *all* our immediate responses — emotions, sensations, reflexes, states of the body — occur at the un-speakable level. Words can orient them or disorient them, but they are not those reactions. When everyday language uses "is" as though word and thing coincided — "this *is* a failure," "that *is* a threat" — it trains the nervous system to superimpose the two levels; and from that superimposition come the most rigid evaluations and the reactions least fitted to context.

In these terms we can take up again the structure introduced in Chapter I. The un-speakable level is the side of the **content** — the totality of what is present before and beneath the words; the verbal level is the side of the **form** — the specific configuration we put into words; and it is you, the **observer**, who collapse the one into the other. Written briefly: every semantic reaction is a passage within ⟨C, F, O⟩, from the un-speakable to the speakable.^[8] The trouble begins when the form takes the place of the content — when *toothache* substitutes itself for the pain, *failure* for the person — and the observer disappears, forgetting that it was he who drew the map.

There is a simple way to reopen the distinction, and it is almost a form of hygiene: to introduce, now and then, a brief window of **silence on the objective level**. Suspend the words while making contact with an object or a sensation, even for a few seconds. This is not mysticism; it is maintenance. In that window the organism registers *first* and names *afterward*, in the right order: content, then form. We shall return to it in the exercises, because it is one of the most powerful and most underrated instruments in this entire volume.

^[9]

3. The imitation game: the mechanism

In the previous chapter we gave the name **imitation game** to the human tendency to stop at the copy: reacting to the signal as if it were the fact, wearing received responses without evaluating them. We left two questions hanging: *why* do we do it, and *how* does one stop? Now we have the instruments to answer.

Begin with a distinction nature knows perfectly well: **innate** and **acquired**. A bird raised in isolation, which has never seen another bird fly, flies all the same when the moment comes: flight is innate. Song is not. An oriole reared alone still produces sounds, but the melody typical of its species forms only if it has been able to hear and *imitate* its parents: the base is innate, the modulation is acquired. The same holds for us. The capacity to speak is innate; the language you speak — its words, its grammar, its cadences — you acquired by imitation from the environment you grew up in.

So far, no problem: imitation is the great engine of learning. The problem begins when we imitate, without noticing, not *skills* but *nervous reactions of a low order* — the same as the animals'. What do we go on copying, without knowing it?

- reflexes and instinctive reactions, the hair-trigger responses typical of the animal repertoire;
- the confusion of levels: treating the word as if it were the thing, the image as if it were the fact;
- the absence of consciousness of abstracting: failing to distinguish direct experience from the symbol that represents it.

IMITATION: SAME MECHANISM, TWO OUTCOMES

IN THE ANIMAL (functional) unconscious)	IN THE HUMAN BEING (regressive, when
copies what works confusions in a world that changes nervous system little → survival disturbance	copies reflexes and of level in a capable of far more → semantic
closed repertoire: wasted: of right strategy power	open repertoire imitating instead evaluating = unused

And here we are at the heart of the matter, the same one we posed in the previous chapter: these strategies, for the animal, are natural and functional — *they make sense*. For us they become a source of disturbances, because they keep us from using the complexity of a nervous system that could do far more. The paradox is only apparent: **the more capable of awareness an organism is, the more it needs imitation in order to grow** — parrots, primates, and children learn above all in this way. But the human being has, in addition, a faculty the others lack: the capacity to *recognize its own process of*

abstraction. When that faculty stays switched off, imitation does not modulate itself: it amplifies without a brake, and turns harmful.

Here, too, lies the answer to "how does one stop" — and it is less obvious than it seems. One does not stop *by ceasing to imitate*: that would be impossible, and counterproductive besides, because imitation lies at the base of all learning. One stops by introducing a **regulating factor**: consciousness of abstracting. Not a moral command, not an effort of will — a structural operation. Recognizing, while it happens, when we are treating a word as a thing, or an animal reflex as a human response. This factor does not merely lay itself over the old reactions: it *transforms* them. It is the difference between **passively repeating an abstraction made by others** and **consciously choosing one's own** — between copying the map that was handed to you and checking whether it still preserves the structure of the territory.^[10]

It is, at bottom, the passage that separates a system that merely *adapts* — absorbs the stimulus and returns to what it was, repeats the cycle — from a system capable of *updating itself*: one that receives something new and restructures itself to integrate it. Unconscious imitation is the regime of pure adaptation, of repetition. Consciousness of abstracting is what reopens the door to updating — and with it the possibility, entirely human, of not handing on to the next generation the same defective maps we received.

4. Semantic reactions in 2026

None of this, today, is archive theory: it is the physiology of our days. Low-order semantic reactions and unconscious imitation have not

merely survived — they have become an infrastructure. Three observations.

The slogan that replicates itself. On the platforms, a label — a banner-word, a hashtag, a headline — is shared and repeated in millions of copies while almost no one stops to ask what *level* it belongs to: is it a datum? an opinion? an emotion? This is the imitation of primitive semantic reflexes on an industrial scale: the word takes the place of the thing, and the reaction propagates like a contagion, nervous system to nervous system, without ever passing through the un-speakable stratum where something might be verified.

The meaning we believe we share. Whole communities form around words — *justice*, *merit*, *nature* — convinced they mean the same thing, while beneath one and the same form run opposite contents. When the collision comes, it looks like a conflict of values; often it is only two networks of semantic reactions that never made their level explicit. The cost of clarifying "what, exactly, do I mean, and at what level" is minimal; we avoid it almost always, and we pay the bill in fractures.

The education that transmits the confusion. A child learns far more from the models it imitates than from the explanations it hears. If the models around it do not distinguish fact from narrative, description from judgment, the child inherits not their contents but their *confused structure*: it learns to react to the form as if it were the content before it even has the words to notice. This is how the imitation game hands itself down, intact, from generation to generation — unless someone, somewhere along the chain, introduces the regulating factor.

In all three cases the instrument is the same, and we already hold it. Faced with a slogan, a banner-word, a reaction on the rise, one question interrupts the contagion: **"Am I reacting to the content or to the form? Am I imitating or choosing?"** It is the regulating factor applied in real time — consciousness of abstracting turned into a daily gesture. And here the stakes turn personal again: this concerns not only public debates, but the word that sets you off at the family table, the label with which you dismiss yourself, the reaction you have already had before understanding what you were reacting to.^[11]

5. Practical exercises

This chapter is measured by your capacity to feel the gap between words and what words are not. Five protocols, testable at once.

Exercise 1 — Chasing definitions

Redo the opening experiment, but on yourself. Choose a word you use often and with which you judge (others, or yourself). Write its definition; then define the words you used; then those in turn. Within a few rounds you will reach your **undefined terms** — the point where verbal explanation comes to rest on sensations and background evaluations. Note where you stop: that is the non-verbal base from which the word takes its emotional weight.

Exercise 2 — Touch without a name (60 seconds)

Take a common object — a pencil, a cup. Look at it and touch it for one minute *without pronouncing its name*, aloud or mentally. Notice weight, temperature, surface, shape. If the word surfaces, let it pass

and return to the contact. You are training the correct order: first the un-speakable, then — if at all — the name.

Exercise 3 — Sensation before the word (10 seconds)

When you notice a sensation — thirst, a tension in the shoulder, an irritation — stay ten seconds in pure perception *before* naming it: where it begins, where it ends, how it changes. Then, if you wish, describe it. You will notice that the sensation observed before being labeled is often different — more mobile, less final — than the one the word had led you to believe.

Exercise 4 — Action without a label (30 steps)

Walk thirty steps following only the non-verbal signals: the fall of the foot, the balance, the rhythm of the breath. Let the words, if they come, come afterward. It is a window of silence on the objective level: brief, but enough to remind the nervous system what it is to register before naming.

Exercise 5 — Am I imitating or choosing?

For one week, every time you catch yourself reacting on reflex to a word or an image, stop for a second and put the key question to yourself: *am I reacting to the content or to the form? Am I imitating a received reaction, or choosing it?* You do not have to answer well: you only have to introduce the question. It is the regulating factor in action — and merely posing it, with constancy, begins to dissolve the automatism.

6. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **Meaning is not in the word: it is a reaction of the whole organism.** A semantic reaction involves attention, memory, breath, posture, emotion, evaluation — all at once. This is why the same word moves different people in different ways.
2. **Non-elementalism.** "Mind" and "body" are not two separate shelves: they are two faces of a single *psycho-logical* process. Describing anxiety as "just" a thought or "just" a hormone is convenient, and deceptive.
3. **The un-speakable level.** The chair is not the word *chair*; a toothache is not "toothache." All our immediate responses occur at the un-speakable level; words orient them, but they are not those reactions. Say what you please about an object: it will never be the object.
4. **Silence on the objective level** is hygiene, not mysticism: a brief window in which the organism registers first and names afterward — content, then form — in the right order.
5. **The imitation game has a mechanism.** We imitate by nature, and rightly so at the start; but we also copy, without noticing, nervous reactions of a low order — animal reflexes and confusions of level.
6. **For the animal, imitating makes sense; for us, done unconsciously, it does not.** The very strategies that are functional in the animal become, in a nervous system capable of awareness, a disturbance: they waste our specific faculty.
7. **One does not stop by ceasing to imitate**, but by adding a regulating factor: **consciousness of abstracting**. Recognizing,

while it happens, when we treat a word as a thing. It is the passage from *repeating another's abstraction* to *choosing one's own* — from adaptation to updating.

8. **Meanings are personal because they rest on non-verbal histories.** When we quarrel over "freedom" or "respect," we are rarely quarreling over the same thing: the way out is not "I am right," but making level and structure explicit until the maps can meet.
9. **In 2026 semantic reactions are industrialized:** slogans replicating like contagions, communities believing they share meanings they do not share, an education that hands down the confusion of structure. The antidote is one question: *am I imitating or choosing?*
10. **Consciousness of abstracting is the factor that interrupts the transmission.** It is what makes it possible not to hand the next generation the same defective maps we received — and to make of imitation an instrument instead of a cage.

The next chapter (Chapter III) returns to the larger question: what exactly is this time-binding animal, which — alone — can choose to stop imitating? From there the volume enters *structure*: what it means to know something, and why the only thing that is truly transmitted is relations.

The point of this chapter, however, is one. **Words are not the things; meaning is a fact of the body. And the moment you notice this, you stop imitating and begin to choose.**

Notes

Chapter III — The Time-Binding Animal

Pick up the phone lying within your reach. You did not invent it. You did not invent the glass that makes its screen, nor the electricity that powers it, nor the numbers that let it calculate, nor the language you speak to it, nor the alphabet you are using to read this sentence. Everything you are holding in your palm is the deposit of thousands of generations that came before you: each one gathered what the one before had left, added something of its own, and passed the package forward.

No other living creature does this. An ant, today, builds its anthill exactly as ants built it sixty-five million years ago. A beaver does not inherit its grandfather's dam and improve it. Animals start over from zero every time; we begin where someone else left off. It is our deepest characteristic, and it has a name: **time-binding**.

And yet — here is the knot of this chapter — with that same phone, the fruit of all accumulated human knowledge, you react to an insult, a slogan, a piece of bad news with the reflexes of an animal that binds no time at all. We are time-binding beings who keep behaving as if we were not.

Do you ever wonder why so powerful an animal spends so much of its life behaving like any ordinary one?

The answer draws the two preceding chapters together. We called the *imitation game* the tendency to copy reactions instead of evaluating them, and we found the mechanism by which we do it. Now we can see its consequence on the large scale — historical, social, the scale of the species. When a being that could bind time

confines itself to imitating, it does not advance: it repeats. And an entire civilization that repeats, instead of binding time, remains — its technology notwithstanding — at an infantile stage.

Let us see how.

1. What a time-binding being is

The sciences that concern themselves with man have an ancient problem: they do not start from a coherent definition of what man *is*. When a definition exists at all, it is almost always borrowed from the animal world — man as the "rational animal," the "social animal," the "animal struggling for survival" — and it describes well what we share with the other living creatures, while leaving out precisely what distinguishes us: the creation of symbols, of languages, of mathematics, of institutions, of science.

To name this difference a wider term is needed. Let us call **general anthropology** the study of man as a *symbolic system*: a being whose typical functions — speaking, counting, building theories, founding institutions — are not cultural accessories but an integral part of his natural history, to be treated with the same rigor with which one studies an organ or a reflex. It differs from the restricted anthropology that observes man as one animal among others: useful, but blind at exactly the point that matters.

The point that matters is **time-binding**. An animal binds space: it moves, occupies a territory, acts in the here-and-now. A plant binds energy: it captures light and transforms it. Man does something no other creature does: he binds *time*. He takes what one generation

has learned, stores it in symbols — words, numbers, writings — and transmits it to the next, which can start from there instead of doing everything over again. This is why human knowledge does not grow in a straight line but accelerates: each floor rests on the one beneath it.^[12]

TWO WAYS OF STANDING IN TIME

ANIMAL (binds space)

gen. 1 ●
gen. 2 ●
gen. 3 ●
gen. 4 ●

●

same point, always.

Starts over from zero.

where
off.
accumulates.

MAN (binds time)

gen. 1 ●
gen. 2 ●
gen. 3 ●
gen. 4 ●
gen. 5

each one starts
the last one left
Knowledge

Here lies the bond with the preceding chapters. The faculty that makes time-binding possible is exactly the one that unconscious imitation switches off: the capacity to *evaluate* what we receive instead of merely copying it. A being that only imitates does not bind time — it repeats it. It receives the maps of the generation before and retransmits them unchanged, errors included, without ever putting them to the test. Binding time, in the full sense, is not repeating the

past: it is gathering it, evaluating it, correcting it, and delivering it enriched. It is *active* time-binding, not mere passive inheritance.

2. The manufacturing defect: infantilism

If man is a time-binder, why does so much of human history look like a repetition of violence, error, and collapse that never seems to teach anything?

The answer of the non-Aristotelian tradition is blunt, and uncomfortable. For centuries we have built our ideas about man from generalizations taken over from the animal world: the "law of the strongest," the "struggle for survival," brutal competition as "nature." We applied to man the rules observed in cows, dogs, horses, and pigs — and on those rules we erected institutions, economies, political systems. It is like building a bridge using plane geometry alone, ignoring volumes: it holds for a while, then it collapses. And we rebuild, and it collapses again. The periodic collapses of social structures are not accidents: they are the predictable consequence of a map that left out exactly the relations that mattered.^[13]

The result of this structural error has a precise name: **infantilism**. Not in the sense of the insult, but in the literal sense of an arrested development. A being that could bind time, and imitates instead, remains — however much it grows in age and in technical power — fixed at an immature stage: it reacts on impulse, confuses the signal with the fact, repeats received patterns, mistakes its own map for reality. This is semantic infantilism: not a moral defect, but the mark of a human nervous system used at an animal level.

It pays to be precise on one point, because it forestalls two opposite errors. The difference between the full-blown forms (the conditions we call psycho-logical illnesses), the widespread infantilism of "normal" people, and full sanity **is not a difference of kind, but of degree**. There are no "sane" on one side and "sick" on the other, like two separate species. There is a continuum: all of us, some more, some less, slide into regressive imitation; sanity is not a state one possesses, it is a degree one trains. This removes every alibi ("I'm fine — the others are the problem") and, at the same stroke, every condemnation ("you are ill, nothing can be done"): we all stand on the same axis, and along the same axis one can move.

3. The root is in language: the two negative premises

The decisive question remains: where is the root of this arrest? Not in science, not in technology — both have advanced enormously. The root lies at a point almost nobody looks at, because it sits too close to the eyes: the **language** we think with.

Language is not a cultural ornament. It is a **physiological function** of the human organism, as much as digestion or the heartbeat: it structures perceptions, shapes emotions, organizes thought. And every language carries a *structure* inside it, which conditions the reactions of those who use it. A language built on identity — "A is A," the thing is what it is, a word coincides with its object — installs rigid evaluations and confusions of level in the nervous system. It is the grammar of the copy we have already spoken of: it hands down, generation after generation, the very incapacity to distinguish the

human from the animal, and with it the regressive imitation that produces infantilism.

The whole edifice can be rebuilt from two simple statements, negative and incontestable. They are the **two premises** from which every serious revision starts:

1. **The word is not the object.** Whatever you say about a thing, what you say is not the thing.
2. **There are no absolutely separate objects.** Nothing in reality is truly isolated from everything else: each thing stands within a web of relations.

They are "negative" because they do not assert what the world *is*; they say only what it is *not*. And precisely for this reason they are rock-solid: they cannot be refuted. From them, everything else follows. If the word is not the object, and if nothing is separate, then the only possible bridge between language and the world is **structural**: what we can know and transmit are relations, orders, structures — not essences. It is the same conclusion the coming chapter will reach: structure is the only content of knowledge.^[14]

TWO NEGATIVE PREMISES → ONE ROAD ONLY

(1) the word — is not → the object

(2) no object is absolutely separate

|



the only bridge between language and world is

STRUCTURE

(relations, orders) – not identity, not essence

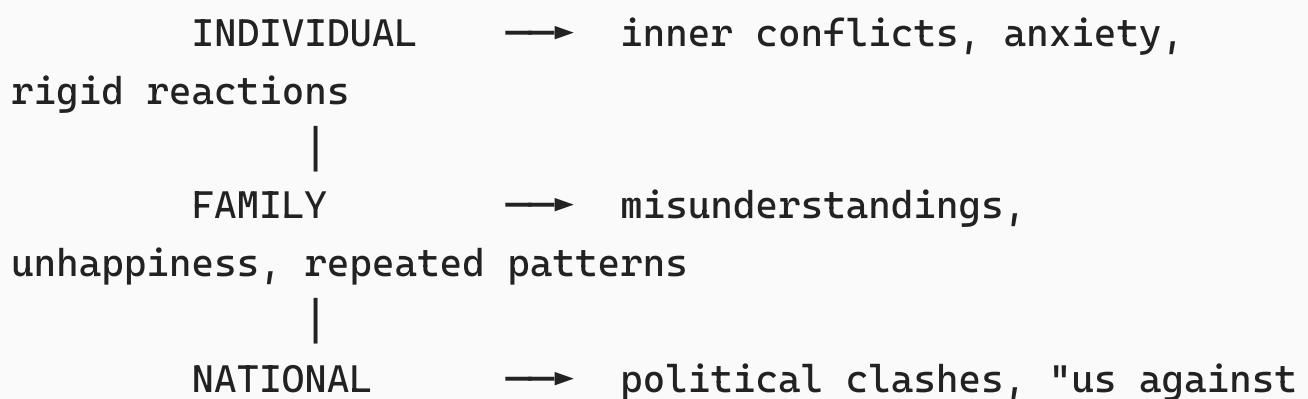
On this ground, systems that hold can be built.
The proof is not rhetorical: it is that they
work.

From here comes, too, the program of this whole work, which we can compress into a formula: **speaking about speaking**. Since science, culture, institutions, and even wars depend on language, to analyze *how* we speak — the hidden structure of our sentences and of our reactions — is to lay hands on the very foundations of what we do. This is no grammarian's exercise. It is the point at which the transmission of infantilism can be interrupted: change the structure of the language we hand on to our children, and you change the way their nervous systems will react to the world.

4. The cascade: from the individual to the international

The damage done by an inadequate language does not stay private. It propagates, at scale, through every level of human life — and in 2026 it does so faster than ever.

THE CASCADE OF SEMANTIC INFANTILISM



them"

|

INTERNATIONAL → suspicion, impossible
agreements, wars

The same structural error, amplified at every
level.

At the individual level, the identification of word with thing produces inner conflicts and disproportionate reactions. In the family, it generates misunderstandings that repeat themselves identically across generations — because what gets transmitted is not only *what* to think, but the *confused structure* with which to react. At the national level, the identity language of "us against them" reduces complex questions to team loyalties. At the international level, the rhetoric of violence as "human nature" reproduces, on a planetary scale, exactly the animal level from which we ought to have freed ourselves.

Digital platforms have given this cascade an accelerator. The blind replication of slogans — flag-words shared in millions of copies without anyone verifying their level (is it a datum? an opinion? an emotion?) — is collective infantilism industrialized: the imitation game played by an entire species, in real time. And once information becomes merchandise, the old predatory semantic structures find fertile ground, because the market rewards immediate reaction over slow evaluation. Whoever controls the symbols — language, money, narratives — steers the reactions of whole populations; and if the symbols stay primitive, so does the reality that collapses out of them.

[15]

There is, however, one fact that overturns the perspective, and it is the constructive heart of this chapter. The same **circularity** that

imprisons us can set us free. The structures we create — language, laws, institutions — reflect our state; but once stabilized, they in turn shape the states and reactions of those who inherit them. It is a loop: usually unconscious, and then it drags us downward. Made *conscious*, the same loop can become a spiral that climbs. To make the circularity conscious — to know that the language we use today shapes the nervous system of tomorrow — is what makes it possible to govern the passage from one epoch to the next without the usual sequences of panic, inertia, and regression. It is time-binding made active again: not undergoing the inheritance, but choosing it.^[16]

And the stakes, as always, descend from the global to the personal. The cascade does not begin in parliaments: it begins in the sentence with which you address your child, in the label with which you dismiss a colleague, in the slogan you share without having weighed it. Every link in the chain is also a point at which the chain can be broken. One being is enough, at any point whatever, who stops transmitting the copy and starts transmitting the structure.

5. Practical exercises

This chapter is to be measured by your ability to recognize, in yourself and around you, the difference between repeating and evolving. Five protocols.

Exercise 1 — Inventory of bound time

For one day, every time you use something you did not invent — a word, a number, a tool, a rule — pause for an instant and acknowledge it: *this was bound into time for me by those who came*

before. It is not an exercise in gratitude; it is an exercise in perception: it serves to make you feel, concretely, what time-binding is, and how little of what you use was born with you.

Exercise 2 — Inheritances to verify

Identify one conviction or one reaction you have carried since before you could choose it (received from family, environment, culture). Put it to three questions: *what data support it today, independently of who transmitted it to me? what data contradict it, and how have I treated them so far? if I met it today for the first time, would I adopt it?* If the answer to the third is "no," you have found a copy that was never verified: not to be thrown away, but to be put back to the test.

Exercise 3 — Hunting the "is" of identity

For half a day, hunt down the sentences of the form "X is Y" with which you judge people or situations ("he is incompetent," "it is a threat," "I am made this way"). Each time, rewrite them in the form of relation and context: "he behaved this way in that situation," "I have behaved this way so far, under those conditions." You are defusing, one sentence at a time, the grammar of the copy.

Exercise 4 — The slogan's level

For one week, in front of every slogan or headline that activates you, ask yourself before reacting which level it belongs to: is it a verifiable datum, an interpretation, or an emotion dressed up as a fact? Almost always it is the last. Recognizing this interrupts the blind replication — your nervous system stops serving as a mere repeater.

Exercise 5 — One conscious loop

Choose one single thing that you regularly transmit to someone who depends on you (a child, a student, a collaborator): a way of reacting, a recurring sentence, a judgment. Ask yourself: *am I transmitting a copy I received without verifying it, or a structure I have evaluated?* Consciously change that one thing. It is the minimum point from which the circularity begins to climb instead of descending.

6. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **Man is the time-binding animal.** Unlike every other living creature, he accumulates and transmits knowledge through symbols: each generation can start again where the previous one stopped. This is our deepest characteristic, to be studied by a **general anthropology** (man as a symbolic system), not merely as an animal.
2. **Binding time is not repeating it.** Time-binding in the full sense means gathering what one receives, evaluating it, correcting it, and delivering it enriched. Whoever merely imitates does not bind time: he repeats it, and retransmits the received maps together with their errors.
3. **Infantilism is an arrested development.** A being that could bind time, and imitates instead, remains immature however much it grows in age and technique: it reacts on impulse, confuses signal and fact, mistakes the map for reality. It is the mark of a human nervous system used at an animal level.

4. **A difference of degree, not of kind.** Between full-blown pathology, "normal" infantilism, and full sanity there is no boundary between species, but a continuum. Sanity is not possessed: it is trained. No alibis, no condemnations.
5. **We have applied to man the rules of the animals.** The "law of the strongest," brutal competition as "nature": to build on these generalizations is like building a bridge with plane geometry alone. The periodic collapse of social structures is its predictable consequence.
6. **The root is linguistic.** Language is a physiological function with a structure; a language of identity installs rigid reactions and hands down the incapacity to distinguish the human from the animal. It is not science that has left us behind: it is the structure of our speech.
7. **Two negative premises carry everything:** the word is not the object; no object is absolutely separate. From them it follows that the only bridge between language and world is structure — relations, not essences.
8. **Speaking about speaking.** Since everything, from science to war, depends on language, to analyze how we speak is to lay hands on the foundations of human institutions. It is the point at which the transmission of infantilism is interrupted.
9. **The cascade and the accelerator.** The same structural error amplifies from the individual to the international; in 2026 the platforms replicate it in real time, industrializing collective infantilism.
10. **Conscious circularity saves.** The loop language→reactions→language, usually unconscious, drags us downward; made conscious, it becomes a spiral that climbs. One

being is enough, at any point in the chain, who stops transmitting the copy and starts transmitting the structure.

The next chapter (Chapter IV, *On Structure*) enters the heart of the whole matter: what it means, exactly, to *know* something; why the only thing that can truly be transmitted is relations; and how a map preserves — or betrays — the structure of the territory.

The point of this chapter, however, is one. **No animal inherits the knowledge of its dead: it starts over, every time, from the beginning. We do — but only if we stop imitating them, and begin to choose them.**

Notes

Chapter IV — On Structure

Look at a blade of grass. It is green — surely the most innocent observation in the world. And yet, taken seriously, it leads straight to the heart of this entire book.

Because the green is not *in the grass*. The grass contains molecules — chlorophyll, above all — that absorb certain wavelengths of light and reflect others. The reflected light strikes your retina; the retina converts the wave into nervous impulses; your nervous centers process them; and *only at the end* does something arise that you call "green." The green is not a property of the blade which the word merely records. It is the outcome of a **chain of relations** running through the blade, the light, your eye, and your nervous system.

Change one link — the light, the retina, the brain — and the green changes or vanishes.

WHERE "GREEN" IS BORN

blade of grass → reflected light → retina →
nerves → "green"
(observer) (content) (relation)

The green is at none of these points:
it is the STRUCTURE that connects them.

Do you ever ask yourself what you are *knowing*, about a thing, when you say you know it?

Not the thing "in itself": that remains at the unspeakable level we have already discussed. What you know — what you can say and transmit — is always a **structure**: a web of relations and orders. It is the most important and most underrated discovery of the non-Aristotelian tradition, with a consequence that changes how we think about nearly everything: *structure, and structure alone, is the content of knowledge*. Understanding it properly will allow us, by the end of the chapter, to see why the imitation game and infantilism are not cured by preaching, but by changing one thing only — the structure of the language we think with.

Let us take things in order. Better still: let us begin with order itself.

1. To know is to grasp a structure

What is a structure? In the simplest sense, it is a **set of parts, ordered and interconnected**. A house is not a heap of bricks: it is bricks *in a certain arrangement*. A sentence is not a bag of words: it is words *in a certain order*. Take away the arrangement and the order, and you are left with the pieces, not the thing. It holds for science as for the house: a pile of data does not make a science, any more than a heap of bricks makes a house. Science begins when facts are put into relation and ordered into a framework that can be discussed, criticized, and improved.^[17]

Two words carry the whole argument, and deserve careful handling.

Relations are what emerges when we look at things not as isolated objects but as members of a group. "Taller than," "father of," "before," "cause of": none of these is a property you can find *inside* a single object. They exist only between at least two. A decisive point, to which we shall return: in reality, **relations come first, things second**. No object is truly isolated — we have already met this as the second of our negative premises — and every object is, at bottom, a node in a network.

Order is the simplest and most fundamental of relations: before/after, greater/lesser, above/below. It is so basic that the nervous system grasps it almost directly. The lower nervous centers — those of the "senses" — perceive order immediately; the higher centers — those of "thought" — elaborate it with great precision. Order, in other words, is not a philosophical abstraction pasted over experience: it is written into our physiology, the very way we register the world.^[18] That is why it is the right brick to build with: a **structure** is, in the end, an ordered set of relations.

To know something, then, means one precise thing: **to survey its structure**. Not to possess the thing, not to coincide with it — to grasp how its parts stand to one another, in what order, with what bonds. Everything else — the "substance," the "essence," the thing "in itself" — is either unspeakable, or a ghost that language has planted in our heads.

2. The map and the territory

There is an image that makes this immediate, and we shall use it throughout the book: the map.

A map is not the territory it represents. Obviously. But it is useful precisely because — when it is a good one — it has a **structure similar** to that of the territory: it preserves the order and the relations that matter. Take three cities lying, from west to east, in the order Paris–Dresden–Warsaw. If your map, by some error, places Paris *between* Dresden and Warsaw, it is not merely "a little inaccurate": it is a map whose structure is *different* from the territory's. And a map like that leads you astray. On a journey it wastes your time and effort; in a war, or for a physician called out on an emergency, it can end in disaster.

SAME CITIES, WRONG ORDER = A USELESS MAP

Territory: Paris ——— Dresden ——— Warsaw
(west→east)

Wrong map: Dresden ——— Paris ——— Warsaw

Not "a little inaccurate": a DIFFERENT structure.
It leads you astray – sometimes with grave
consequences.

The criterion that measures a good map has a name: **structural isomorphism** — similarity of structure. The more isomorphic a map is to its territory, the more reliable an instrument of orientation and cooperation it becomes. In the terms we have already introduced, it is an **abstraction that preserves** the important relations, instead of one that loses them.^[19]

And here comes the move that gives the map its full power: **language, too, is a map**. A word is not the object; a sentence is not the fact; a theory is not the world. They are all maps — and they are worth exactly as much as they preserve of the structure of what they describe. Recall the structure of Chapter I: the territory is the side of the **content** (everything that is there), the map is the side of the **form** (the representation we make of it), and it is you, the **observer**, who trace the correspondence. $\langle C, F, O \rangle$ once again: and the quality of a map is how faithfully the form follows the relations of the content.

There is a curious and profound detail here. A perfect map would have to contain a map of itself — and a map of that map, and so on without end. Language has exactly this property: with words we can speak about words, make maps of maps. It is an extraordinary power, but it introduces complications that dissolve only with a concept we glimpsed in Chapter I and shall develop further on — multiordinality. For now it is enough to keep in mind: language is a map that can fold back upon itself.

3. We read the structure of our language into the world

We now arrive at the point which, once seen, is never forgotten.

Every language carries a structure inside it. And since we think *through* language, something subtle and powerful happens: **we unconsciously read the structure of our language into the world.** What our language makes easy to say strikes us as natural, obvious, "the way things are"; what it makes difficult to say tends to stay invisible, as if it did not exist.

Our everyday language has an ancient structure, which linguists call *subject–predicate*: "the blade of grass is green," "that man is a failure." This form pushes us to treat objects as isolated, each with its properties shut up inside — and not to see the relations, which simply vanish into that "is." Such a language does not have the same structure as the world, where there are no isolated objects but only groups in relation. It is a map with the wrong order. And we, using it, project that wrong order onto reality without noticing.

This illuminates the difference between three attitudes we often confuse.

THREE WAYS OF TREATING STRUCTURE

METAPHYSICS	projects an invented structure onto the world
(inverted order)	FIRST the idea → THEN the facts (forced to confirm it)

SCIENCE	discovers the structure of the
---------	--------------------------------

world and builds

(natural order) similar maps: FIRST the facts
→ THEN the theory

METHOD the criterion that holds the
natural order:
(the rule) from the structure of facts to
the structure of theories

Metaphysics — in the technical sense, not the derogatory one — does exactly this: it projects onto the world an imagined structure, usually inherited in primitive form, and then bends the facts to confirm it. It is the inverted order we have spoken of: first the label, then the perception forced to comply. **Science** does the opposite: it investigates the structure of the world empirically and builds languages (theories) with a similar structure, to be tested. The **scientific method** is nothing other than the rule that holds the natural order fast: from the structure of facts to the structure of theories, never the reverse. [\[20\]](#)

Now we can close the circle with the three preceding chapters. The imitation game, infantilism, the cascade that runs from the individual to the international — none of this is sustained by human wickedness, nor by an immutable "nature." It is sustained, at the root, by a **linguistic map with the wrong structure**, which we hand down from generation to generation and which prevents us even from telling the human apart from the animal. To go on arguing with that map is like finding your way with the chart that puts Paris in Dresden's place: however much goodwill we bring to it, we end up off the road.

From this follows the most important operative conclusion of the chapter, and perhaps of the whole volume. Since our troubles have a structural root, **they are not cured by moralizing**. You can preach patience, tolerance, and rationality to a man for a lifetime without changing a thing, so long as he goes on thinking with a map of the wrong structure. But change the structure of the language — introduce order, relation, isomorphism, the marking of levels — and the saner semantic reactions arrive *by themselves*, as an automatic effect. It is the principle our tradition repeats like a compass: **change the language; do not moralize**.

4. Maps mistaken for territories in 2026

Never have we lived so immersed in maps — and never have we so mistaken them for the territory. Three observations.

The models that describe us. An artificial-intelligence model is a map: a structural representation, built from certain data, of a piece of the world. When we treat its output as "reality" rather than as a map with its own structure and its own holes, we commit the Paris–Dresden–Warsaw error on a planetary scale: we let ourselves be guided by a chart whose order we have never checked. The structural question — *does this map preserve the relations that matter, or has it lost precisely the decisive ones?* — is almost always skipped.

The dashboards that govern us. Indicators, metrics, rankings, scores: we live inside panels of numbers that claim to measure the health of a company, a school, a country, a person. But an indicator is a map of a phenomenon; and a map that has lost the important

relations pushes toward decisions that optimize the number while destroying the thing. Measuring a school by test scores alone, a hospital by waiting times alone, a life by likes alone: in every case, it is mistaking the map for the territory — and paying the bill.

The diagnoses that define us. A diagnostic label is a map — a most useful one, provided we remember it is a map. Treated as the territory — "*I am my diagnosis*" — it becomes a cage that erases the entire structure of the real case: its history, its relations, its possibilities of transformation. Here too the cure is not moral but structural: turning the "is" back into relation and context, giving back to the person the difference between the map and what the map describes.

In all three cases the same simple countermove applies, and it is the most disarming in the whole book. Before a model, a number, a label, the question that reopens the territory is: *is this the thing, or a map of the thing? And if it is a map — does it preserve the relations that matter?* It is consciousness of abstracting, applied no longer to a single word, but to all the representations that now decide our lives.

[21]

5. Practical exercises

This chapter is measured by your ability to stop confusing a map with its territory. Five protocols.

Exercise 1 — The green is not in the grass

Once a day, pick a quality you spontaneously attribute to a thing ("it's green," "it's noisy," "it's beautiful," "it's disgusting") and reconstruct,

even roughly, the chain of relations that produces it: what is in the object, what your sensory apparatus does, what your history adds. You discover, each time, that the quality was not "in the thing": it was a structure happening between the thing and you.

Exercise 2 — Hunting the map mistaken for the territory

For one day, note every time you, or someone around you, treat a map as if it were the territory: a number (the balance, the score, the follower count) taken for the reality it is supposed to represent; a label taken for the person; a model taken for the fact. Merely recording them, without correcting them, trains the eye to see the difference.

Exercise 3 — The isomorphism test

Choose a map you use for deciding (a work indicator, a grade, a criterion by which you judge someone). Put it to a single question: *does it preserve the relations of the phenomenon it is supposed to measure, or has it lost important ones?* If it has, you have found a chart with Paris in Dresden's place. Rewrite it, or stop trusting it blindly.

Exercise 4 — The four-level protocol

For a decision that matters, separate four levels explicitly before concluding: **(1)** the raw, unspeakable data (measurements, direct observations); **(2)** the description you make of them; **(3)** the model that organizes them; **(4)** the final theory or judgment. At each step, ask whether you are still following the structure of the facts, or have begun to project the structure of your language. It is the scientific method reduced to a daily gesture.

Exercise 5 — Change the structure, don't moralize

Think of a behavior of yours (or someone else's) that you have always tried to correct with sermons — your own or other people's — without result. Stop moralizing and change *one* linguistic structure you describe it with: turn an "I'm just made this way" into "I behaved this way, under these conditions"; turn a label into a relation. Watch whether the change of structure, repeated, does more than years of good resolutions.

6. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **The green is not in the grass.** What we call a quality of a thing is the outcome of a chain of relations running through the thing, the senses, and the nervous system. We do not know things "in themselves": we know structures.
2. **To know is to grasp a structure.** Structure — an ordered set of relations — is the only transferable content of knowledge. Everything else ("substance," "essence") is either unspeakable or a ghost of language.
3. **Relations first, things second.** Relations ("before," "father of," "cause of") do not sit inside an isolated object: they emerge between at least two. No object is truly isolated; everything is a node in a network.
4. **Order is the foundation.** It is the simplest of relations (before/after) and the most deeply rooted in physiology: the lower

centers perceive it, the higher centers elaborate it. A structure is an *ordered* set of relations.

5. **The map is not the territory, but it earns its keep by similarity of structure.** The criterion is isomorphism: a good map is an abstraction that preserves the relations that matter. Language, too, is a map.
6. **We read the structure of our language into the world.** Thinking through language, we project its structure onto reality. Subject–predicate makes us see isolated objects where there are only relations: a map with the wrong order.
7. **Metaphysics, science, method.** Metaphysics projects an invented structure (first the idea, then the facts); science discovers the structure of the world and builds similar maps (first the facts, then the theory); method is the rule that holds the natural order.
8. **At the root of infantilism lies a badly structured map.** The imitation game and the cascade of conflicts are born not of wickedness, but of a language whose structure does not resemble the world's, handed down intact from generation to generation.
9. **Change comes by changing structure, not by moralizing.** Preaching virtue to someone who thinks with a wrong map accomplishes nothing. Change the structure of the language — order, relation, isomorphism, levels — and the saner reactions arrive by themselves.
10. **In 2026 we live immersed in maps mistaken for territories:** AI models, dashboards of metrics, diagnostic labels. The countermove is always the same: *is this the thing, or a map of the*

thing? And if it is a map, does it preserve the relations that matter?

The next chapter (Chapter V, *General Linguistics*) takes up exactly this: how language works as behavior of the organism, and why mathematics — read the right way — is the most faithful map we have of the structure of the world.

The point of this chapter, however, is one. **The green is not in the grass: it is a structure that happens between the grass and you. And what is made of structure is changed by changing structure — not by moralizing.**

Notes

Chapter V — General Linguistics

To rebuild a dinosaur from a handful of fossil bones, you would need imagination more than science. But there is another, far more eloquent source: **footprints**. A dinosaur that walked through mud which later hardened into rock left a trace that tells the shape of the foot, the length of the stride, the weight, the speed, the manner of moving. Without the footprints, no theory of dinosaurs would be complete.

Now think of the human mind. It, too, has left footprints — the sharpest there are: **black traces on white paper**. Formulas, theorems, equations, proofs. They are the tracks of a human nervous system working in the most orderly and coherent way it can. They

have existed for centuries, on millions of pages. Yet in studying the mind we have almost always ignored them — because those whose business it was (philosophers, psychologists, logicians) did not know how to read them. So we did the opposite: we generalized the human being from what we share with cows, dogs, cats, and pigs — the instincts, the habits, the reflexes — and neglected precisely the activities that make us human.

Do you ever wonder why, after so much technical progress, we know little more about the human being than the primitives knew?

An enormous part of the answer is this: we have studied man by reading the wrong footprints. We measured ourselves with the yardstick of the animals — the imitation game once more, this time carried into science itself. And we ignored the cleanest footprint we possess: mathematics. In this chapter we pick it up. Not to do mathematics — none is needed — but to learn from it what a language is when it works well, and why nearly all our muddles are born of languages that work badly.

Let us see.

1. To study language is to study a behavior

First point, and it changes the perspective at once: studying language does not mean analyzing printed sentences or everyday chatter. It means observing a **behavior** — what people *do* when they speak: how they react to words, how those sounds weave into their actions, their bodies, their choices. Language is not an object on a shelf: it is

an activity of the organism, as natural as eating or walking, in which the nervous system plays a very serious part.

Every language we speak is in reality an agglomerate of many partial languages, each with its own structure. It is a tangle difficult to analyze — unless we start from the simplest and best-made model of language we possess. And here lies the scandal that opens this chapter: that model has existed all along, and it is **mathematics**. By definition, whatever has symbols and propositions is a language; mathematics has symbols, propositions, and rules — therefore it is a language, and the most rigorous we have.

One misunderstanding must be cleared away at once. Do not imagine that mathematicians are "superior" minds. The power of mathematics does not come from any special endowment of those who practice it: it comes from its **method** and its **structure**. In a certain sense, indeed, mathematics is the *easiest* of mental activities — it works with simplified, well-defined objects — and precisely for this reason it manages to be structurally perfect. Understanding why is the next step.

2. The two abstractions: the circle and the pencil

Every time we pass from a thing to its representation, we perform an abstraction. But there are two profoundly different kinds of abstraction, and telling them apart is the heart of this chapter.

Take the **mathematical circle**: the set of points in a plane equidistant from a center. It may surprise you that such a circle *exists nowhere* in the physical world. It is a verbal fiction. But it is a fiction with an

extraordinary property: **all its particulars are already included in the definition**. Whatever you discover about that circle — its circumference, its area, its properties — follows by pure deduction from what you put into the definition. No new, unforeseen characteristic will ever turn up. This is why deductions in mathematics hold **absolutely**: no hidden detail can contradict them, because there is no hidden detail.

Now take a real **pencil**, the one on your desk. Try to define it "completely." You can describe its color, its shape, its weight; then the chemical composition of the graphite; then the microscopic structure of the wood; then the submicroscopic configurations; then its relations, in ceaseless change, with everything else in the universe. You would never finish. A physical object has an inexhaustible number of characteristics, and any description leaves infinitely many out. Physical abstraction, the everyday kind, proceeds this way: **by forgetting**, by letting particulars drop. And since it always leaves some out, its deductions hold only **relatively**: the discovery of a new detail can force us to revise everything.

TWO KINDS OF ABSTRACTION

THE MATHEMATICAL CIRCLE
(mathematical abstraction)
abstraction)

all particulars are
INCLUDED in the
definition
forgetting

THE REAL PENCIL
(physical/everyday
abstraction)

particulars are
LEFT OUT:
one abstracts by

exists nowhere in the world; infinitely many a coherent fiction characteristics	exists; has discoverable
ABSOLUTE deduction (nothing can contradict it)	RELATIVE deduction (always revisable)

There is an everyday proof of this difference. Draw a circle on a sheet of paper. What you have traced *is not* a mathematical circle: it is a ring, with a thickness, a color, a temperature, the imperfections of the stroke — all new characteristics, none in the definition. The perfect circle lives only in words; on paper it becomes a physical object again, inexhaustible.

Einstein said it in a sentence worth keeping: *so far as the laws of mathematics refer to reality, they are not certain; and so far as they are certain, they do not refer to reality*. That is exactly it. Mathematics is certain because it is a fiction with all its particulars included; but for that very reason, when we apply it to the real world — made of pencils, not of circles — we return to the realm of abstractions that forget, and absolute certainty evaporates.

All this can be said in a single formula, which is the true legacy of the chapter: the decisive distinction is not between "abstract" and "concrete," but between **an abstraction that includes everything that matters** and **an abstraction that forgets precisely what mattered**. Mathematics is the limiting case of the first; identity-talk — the kind that mistakes the pencil for its definition and a man for his label — is the worst case of the second. ^[22]

3. Achilles, the tortoise, and the two thousand years

To grasp how far a badly structured language can deceive us, one example is worth a treatise by itself.

More than two thousand years ago Zeno of Elea proposed a paradox. Achilles, the swiftest of runners, races a very slow tortoise and grants it a small head start. By the time Achilles covers the distance that separated him from the tortoise, the tortoise has crept a little way forward. By the time he covers that little way, the tortoise is a bit further on again. And so on, without end: there is *a/ways* a residual distance left to close. The conclusion looks ironclad: **Achilles will never catch the tortoise.**

A child knows this is false: Achilles overtakes it in a moment. And yet this verbal argument, leading to a manifestly wrong conclusion, remained "valid" for philosophers and logicians for over two thousand years. Why? Because the primitive, identity-bound, subject-predicate language had no tools for handling the infinite correctly. Only the mathematics of the continuum showed the way out: the sum of *infinitely many* ever-smaller intervals can yield a *finite* result. Achilles does indeed run through an infinite number of stretches — but the time needed to cover them all is limited, and he passes the tortoise at one precise instant.

ACHILLES AND THE TORTOISE

stretch 1	■ ■ ■ ■ ■
stretch 2	■ ■ ■
stretch 3	■ ■

stretch 4 ■
... ■ infinitely many
stretches...

|
▼

sum of infinitely many stretches = FINITE time
(Achilles overtakes the tortoise)

The paradox was not in the world: it was in the
language.

The moral is double, and it stitches this chapter to all the preceding ones. First: **a primitive language can keep a false conclusion standing for centuries, with every appearance of coherence** — not because those who use it are stupid, but because the wrong structure of the language does not let the error be *seen*. Second: only a structural language, founded on relations and order, dissolves the paradox and returns to fitting the facts. The paradox was not in the world. It was in the map.

Here lies the reason for the great gap we must close. Mathematics is a language of perfect structure but exceedingly narrow range: with it we can say very little, in restricted domains. Ordinary languages are the opposite: with them we can speak of everything, but they have a primitive structure that does not respect the relations of the world. The task — it is also the task of this book — is to bring the two closer together: to make ordinary languages more structural without losing their richness. On the day they meet, we shall have a way of speaking that is simple and faithful at once. [\[23\]](#)

4. The engineer and the "should"

At this point it is only honest to clarify a word we shall be using, one that usually makes people wince: **should**. We do not mean it in a moral or dogmatic sense — "you must, because I say so." We mean it in an **engineering** sense.

An engineer studying a motorcycle he has never seen before analyzes its structure and concludes: with this configuration, under these conditions, the machine *should* run in a certain way. That is not a command: it is a structural prediction. And the test is not a sermon but a gesture: you fill the tank and turn the key. If the engine starts, the prediction was right.

We do the same with the human being. By studying the structure of knowledge and of language, we can say that, with that structure, man *should* react in a certain way. And the verification is not moral: it is practical. Wherever the non-Aristotelian system has been applied — in clinical settings too, with people in nervous difficulty — it has produced measurable improvement. Which makes it an experimental discipline, not a philosophical sermon. It is, again, the principle of the preceding chapter: **we do not moralize; we change the structure — and then we see whether the motorcycle starts.**

This also explains why mathematics is so precious a laboratory for anyone who wants to understand the mind. It is the only science without physical content: watching a person mathematize, we observe the only accessible case of "pure" mental functioning set down in black and white. It is the sharpest dinosaur footprint we possess — and for centuries we trampled it without reading it.

In 2026 this blindness carries a new cost. We live inside systems — algorithms, models, indicators — that are *entirely* mathematical in structure, and that decide matters of credit, health, work, and attention. Yet the education that would let a citizen read their structure — tell a datum from a model, a correlation from a cause, a map from the territory — remains, nearly everywhere, close to zero. Not through incapacity: through a residue of that ancient "theological" attitude toward mathematics, treated as a mysterious and frightening truth instead of as what it is — the behavior of a nervous system that, for once, is imitating no animal. To restore it to its place — a structural language in the service of understanding, to be taught to everyone as reading is taught — is among the most urgent acts of semantic hygiene of our time. And here, as always, the stakes come back to the personal: learning to ask, in front of a score or a prediction that concerns you, *which particulars this map has included, and which it has forgotten*, is the difference between using the instruments that decide about you and being decided by them. ^[24]

5. Practical exercises

This chapter is measured by your capacity to feel the difference between what an abstraction includes and what it forgets. Five protocols.

Exercise 1 — Circle or pencil?

For one day, whenever you meet a categorical statement ("the data say...", "it is scientifically proven...", "the model predicts..."), ask yourself: is this a *mathematical circle* — an absolute deduction inside a closed system — or a *pencil*, an abstraction from the real world that

has left particulars out? It is almost always the second. Recognizing this restores every "absolute" to its proper measure.

Exercise 2 — Which particulars were forgotten

Choose a map that steers one of your decisions (an indicator, a score, a statistic). Instead of asking whether it is "true," ask what it has *left out*. List three particulars of the real phenomenon that the map does not capture. Often one of the three is precisely the decisive one.

Exercise 3 — Hunting the verbal paradox

Search your own convictions, or a debate you follow, for a conclusion that seems "logically" ironclad but that experience contradicts (like Achilles who "never catches" the tortoise). Ask yourself: where is the structural error of language that keeps it standing? Training yourself to scent verbal paradoxes is training yourself not to remain a prisoner of words.

Exercise 4 — The engineer's "should"

Take a prediction you make about a person or a situation ("she will react like this," "it will end like that"). Treat it as an engineer would: what is the *structure* from which you deduce it? And what is the concrete gesture — the equivalent of turning the key — that would test it? Replacing the moral "should" with the engineering "should" turns judgments into checkable hypotheses.

Exercise 5 — Reading a black trace

Take a simple formula or graph you come across (a percentage, a curve, an average). Instead of submitting to it, read it as a footprint:

what does this trace say about the structure of the phenomenon? What does it *not* say? This is the beginning of structural literacy — knowing how to read the black traces on white paper that decide so much of our lives.

6. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **We have studied man by reading the wrong footprints.** By generalizing from what we share with the animals and ignoring the sharpest traces of the structured mind — mathematics — we have remained, where man is concerned, nearly at the level of the primitives. It is the imitation game carried into science itself.
2. **To study language is to study a behavior.** Not printed sentences, but what people do when they speak: language is an activity of the organism, as natural as walking.
3. **Mathematics is a language** — the simplest and the most structurally perfect. Its power comes not from "superior" minds but from method and structure, isomorphic with that of the world.
4. **Two kinds of abstraction.** The mathematical kind (the *circle*) includes all particulars in the definition: a fiction, but absolute deduction. The physical kind (the *pencil*) proceeds by forgetting: real, but deduction forever revisable.
5. **The distinction that counts is not abstract/concrete, but includes-what-matters / forgets-what-mattered.** Mathematics is the limiting case of the good; identity-talk, which mistakes the pencil for its definition, is the worst case of the bad.

6. **A primitive language can uphold the false for centuries.**

Achilles and the tortoise: an absurd conclusion stayed "valid" for two thousand years because the structure of the language would not let the error be seen. Only a structural language dissolves it. The paradox was not in the world: it was in the map.

7. **The great gap.** Mathematics has perfect structure but the narrowest range; ordinary languages have enormous range but primitive structure. The task is to bring them closer: to make ordinary language structural without losing its richness.

8. **The "should" is engineering, not morality.** With this structure, man *should* react thus — and the proof is not a sermon; it is turning the key and seeing whether the motorcycle starts. We do not moralize: we change the structure and verify.

9. **Mathematics is the laboratory of the mind.** The only science without physical content, it is the only accessible case of "pure" mental functioning set down in black and white. To ignore it is to give up our best microscope.

10. **In 2026 we live inside systems of mathematical structure** that decide about us — yet almost no one is put in a position to read them. Restoring mathematics to its place, as a structural language to be taught to everyone, is an urgent act of semantic hygiene: the difference between using the instruments that concern you and being used by them.

The next chapter (Chapter VI, *On Symbolism*) takes a further step: what, exactly, a symbol is; why whoever governs symbols governs those who use them; and how to tell an expression that has meaning from one that has only its appearance.

The point of this chapter, however, is one. **Mathematics is not an eternal truth handed down from the sky: it is the cleanest footprint the mind leaves when it stops imitating the animals and begins to look for structure.**

Notes

Chapter VI — On Symbolism

What is the temperature of a single electron? Does Wednesday weigh more than the number seven? What color is the jealousy of a theorem?

The questions are built to perfection. Subject, verb, object: not one grammatical error. Yet they have no answer — not because they are difficult, but because they ask nothing. Temperature is the vibration of many molecules: a single electron has none, and asking for it is like asking the weight of a day of the week. The form is impeccable; the content, zero. They are **noise dressed up as words**.

Do you ever wonder how many of your arguments, your anxieties, your "problems" share exactly this nature — sentences perfect in form and empty in substance, agitating you as if they asked something real?

That is the theme of this chapter. So far we have seen that language is a map, and that structure is what counts. Now we look at the elementary brick of every map: the **symbol**. A symbol is a sign that stands for something; but we continually produce signs that stand for

nothing, and pass them off — on others and on ourselves — as if they did. Learning to tell a symbol from a noise is not an exercise in logic: it is among the most vital forms of hygiene, because — as we are about to see — whoever rules the symbols rules those who use them.

Let us begin exactly there.

1. Those who rule the symbols rule us

Nearly everything in human life runs on symbols: words, numbers, laws, formulas, maps — and money. Take a banknote: it is a piece of paper, worth something only because an agreement among human beings assigns it a value. Stop accepting it, and it goes back to being paper. The same holds for bonds, contracts, shares: behind the money-symbol there is no physical substance; there is a network of agreements. This is why we may define the human being, without rhetoric, as a **symbolic class of life**: we live immersed in symbols as fish live in water.

From which follows a fact worth looking at squarely: **those who rule the symbols rule us**. Whoever sets the value of the currency, writes the laws, compiles the schoolbooks, steers the public narratives — determines, in large measure, how we think and act. This is not an indictment: it is a structural observation. No revolution can abolish it, for as long as we remain symbolic beings we shall be guided by those who handle the symbols — the only alternative would be regression to the animal level, which has no symbols.

If we cannot eliminate the "rulers of symbols," one sensible hope remains: that they be chosen for competence and lucidity, not skill in manipulation. And here lies an instructive asymmetry. Some handle symbols they do not produce — bankers, certain politicians, certain peddlers of doctrine — and at times pass off as value what has none. Others *produce* the most precious symbols we have — scientists, teachers — yet often with no awareness of their power, and so end up governed by the former. The first defense of a community is not one more law: it is more people able to tell, unaided, a full symbol from an empty one. ^[25]

2. Symbol or noise? The bounced check

What makes a sign a symbol? One thing only: that it **stand for something**. A sign that stands for nothing is not a symbol — it is an empty sign.

An analogy makes this immediate, and it is a banking one. If your account holds zero and you sign a check, you have produced a *sign* — not a *symbol*, for it represents no real value. The law has a name and a penalty for this: writing bad checks — fraud. Now, we do the same thing with sounds, continually: we emit noises that look like words but represent nothing, and hand them over as if they were words. It is **semantic fraud** — only, for this one, no penalty is on the books.

SIGN, SYMBOL, NOISE

a sign that stands for something → SYMBOL (a word, genuine coin)

a sign that stands for nothing → NOISE (a
bounced check,
"blah-blah")

Passing a noise off as a symbol = semantic fraud.
(Same structure as the bad check – with no
penalty on the books.)

But "standing for something" means that the something must, in some way, *exist* — and here a distinction is needed, for existence comes in more than one kind. We can recognize two. There is **physical existence**, tied to the senses and to permanence: the pencil on the table exists physically. And there is **logical existence**, which a great mathematician elegantly defined as *freedom from self-contradiction*: a statement exists logically if it is coherent with itself. The mathematical circle we met in Chapter V does not exist physically, but it exists logically — perfectly coherent. A "square circle" exists in neither sense: a contradiction, a jumble of words. Write whole volumes about it: it will remain a "blah-blah," a noise with the shape of a sentence.^[26]

In the terms we have built: a symbol is a **form** that has value only if it hooks onto a **content** — physical or logical. Physical existence is content that lets itself be perceived; logical existence is form coherent with itself. When a form hooks onto neither, we have a bounced check: an empty form circulating as money.

3. Every symbol has its level

There is a subtler — and far more frequent — way in which a symbol empties itself: when it is perfectly valid at one level, and we drag it to a level where it no longer means anything.

Let us return to the electron. *Temperature* is an excellent symbol: it stands for the vibration of a collection of molecules. Applied to a room, a body, a pencil, it works admirably. Applied to a *single* electron, it ceases to represent anything — for temperature, by definition, requires many molecules. The same symbol, valid in one context, becomes noise in another. And faced with the question "what is the temperature of an electron?", answering "sixty degrees" or "I don't know" is equally senseless: the only correct answer is that **the question has no meaning**.

The classic example of this error is the unicorn. The word *unicorn* is a perfectly valid symbol — provided you assign it to *its* discipline. In heraldry, in mythology, in the inner life (the "-logy" of human fantasies), the unicorn stands for something real: a figure, a symbol, an image. But assert that the unicorn exists in *zoology* — as an animal of flesh and blood, out there — and you have assigned the symbol to the wrong level, where it represents nothing observable. It is an error, so long as it remains correctable. Defend it against all evidence, driven by an affective push you no longer control, and it is no longer an error: it is a disorder.

THE UNICORN AND ITS "-OLOGY"

unicorn in HERALDRY / MYTH / the inner life	→
valid symbol	
unicorn in ZOOLOGY (a real animal)	→
noise / error	

└ defended against all evidence →
semantic disorder

The same symbol: full at its own level, empty at another.

This mechanism holds for a great many terms that make us suffer. Moving an inner entity — a fear, an image, a desire — into the domain of external facts is the root of an enormous quantity of cognitive and emotional trouble. Psychiatry has a name for it: **projection** — attributing to the world "outside" what happens "inside." Whence a golden rule, simple and powerful: assign every term to its discipline, to its level. It is consciousness of abstracting applied to symbols — marking the level at which a symbol actually stands for something, and not mistaking one page of the book for the whole book. [\[27\]](#)

4. The third factor, and the empty symbols of 2026

There is a test, simple and nearly infallible, for knowing whether you are using words or merely noises. We call it the **third factor**.

Imagine I say: "There are matches in this box," and you say: "No, there aren't." Can we quarrel? For an instant. Then we open the box and look. The dispute closes, because there is a *third factor* — the real object — to which our words refer, and which decides. Now imagine I say: "Is blah-blah a case of tra-tra?" and you answer "yes" or "no." We can quarrel *forever*: there is no third factor; we are using sounds, not symbols, and there is nothing out there to refer them to.

THE THIRD FACTOR

"Are there matches in the box?" → open it
and look:

words (they stand for the object) A
SOLVABLE DISPUTE

"Is blah-blah a case of tra-tra?" → nothing
to look at:

sounds (they stand for nothing) an
endless NON-PROBLEM

Hence a conclusion worth gold in daily life: **when we use true symbols, every dispute is in principle solvable** — complicated perhaps, slow perhaps, but a solution exists. When we use sounds dressed up as words, the clash is by definition unsolvable, because there is nothing to solve. An enormous part of human conflict — private, public, "philosophical" — is made not of hard problems but of *non-problems*, sounds mistaken for words. And a non-problem, once recognized as such, simply dissolves. ^[28]

In 2026 this old fraud circulates at a speed and scale never seen before. The slogan shared a million times, the banner-label, the empty formula repeated until it "sounds true": these are bounced checks issued in series. The platforms reward the *sound* — what activates and propagates — not the *word* — what represents and can be verified. And with systems that generate text on demand, producing grammatically perfect forms devoid of any third factor now costs next to nothing: noise dressed up as words has become a commodity. In such an environment, the capacity to ask "where is the third factor?" is not pedantry: it is self-defense. ^[29]

And here is the constructive conclusion that stitches this chapter to those before it. Semantic fraud is not escaped by preaching. **Ethics and sanity are not preached: they are enabled by an honest symbolism.** A person who thinks with full symbols, who tells words from noises and assigns every term to its level, develops more balanced reactions almost unaided — less anxiety, fewer useless conflicts, firmer decisions. A mind fed on noises, however earnestly exhorted to virtue, stays agitated and unstable. It is, once more, the structural principle of the preceding chapters: we do not moralize, we work on structure — and here the structure is the quality of the symbols we let in.

5. Practical exercises

This chapter is measured by one capacity: no longer letting yourself be paid in counterfeit money. Five protocols.

Exercise 1 — Word or noise?

For one day, when a statement strikes you, stop and ask: *what exactly does this sentence stand for? Could I point to the thing it refers to?* If the answer is clear, it is a word. If the sentence sounds important but you cannot point to anything it represents, suspect a noise in disguise.

Exercise 2 — Where is the third factor?

In the next argument that heats you up, before you fire back, look for the third factor: *is there something — a fact, an object, a measurement — that, if we looked at it together, would decide who is*

right? If there is, the dispute is solvable: go find it. If not, you are using sounds: the sanest thing is to stop.

Exercise 3 — Assigning the "-ology"

Take a loaded term with which you judge yourself or others (*failure*, *enemy*, *destiny*). Ask yourself at what level, in what "discipline," you are applying that symbol — and whether at that level it actually stands for something observable, or whether you have moved an inner entity into the world of facts. Reassigning it to its level defuses it.

Exercise 4 — The ill-posed question

For one week, hunt down meaningless questions — your own and those put to you. "What is the meaning of it all?", "why me?", "who is *really* right?": often these are electron temperatures, questions with the shape of sense and the content of nothing. Recognizing them as ill-posed is already a liberation.

Exercise 5 — Don't preach: change the symbol

Think of something you try to obtain from yourself (or from someone) by sheer exhortation — "I must be calmer," "you should trust me more." Stop preaching it. Instead, change *one* symbol you describe it with: replace an empty label with a description that stands for something concrete and verifiable. Watch whether the honest symbol does more than a thousand sermons.

6. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **The human being is a symbolic class of life.** Nearly everything — money, laws, words, narratives — runs on symbols. That is why *those who rule the symbols rule us*: not an indictment, but a structural observation that no revolution abolishes.
2. **A symbol is a sign that stands for something.** A sign that stands for nothing is not a symbol: it is a bounced check. Passing it off as a symbol — on others or on oneself — is semantic fraud, only with no penalty on the books.
3. **Two existences.** The physical (senses, permanence) and the logical (freedom from self-contradiction). A "square circle" exists in neither: it is a noise with the shape of a sentence. A symbol is a form that has value only if it hooks onto a content, physical or logical.
4. **Every symbol has its level.** A term valid at one level becomes noise at another: "the temperature of an electron" is a meaningless question. The only correct answer is that the question means nothing.
5. **The error of the wrong "-ology."** The unicorn is a full symbol in heraldry or in the inner life, an empty one in zoology. Moving an inner entity into the world of facts is the root of projection — and, when defended against all evidence, of a disorder.
6. **The third factor.** This is the test: is there a fact, an object, a measurement that would decide the dispute? If yes, you are using words; if no, sounds. With words, every dispute is solvable; with sounds, never.

7. **Many "problems" are non-problems.** An enormous part of human conflict is made of sounds mistaken for words. Once recognized as such, a non-problem dissolves.
8. **In 2026, noise is a commodity.** Viral slogans, banner-labels, texts generated on demand: perfect forms without a third factor, issued in series. The platforms reward the sound that propagates, not the word that represents. Asking "where is the third factor?" is self-defense.
9. **Ethics is not preached: it is enabled.** A mind fed on full symbols develops saner reactions on its own; one fed on noises stays unstable, however many sermons it receives. One works on structure — here, the quality of the symbols — not on morals.
10. **Bridges are not built with the formulas for surfaces when the formulas for volumes are needed.** A symbolism of the wrong structure undermines every civilization at its base; an honest one saves the enormous nervous energy we now squander in uncertainty and bluff.

The next chapter (Chapter VII, *Linguistic Revision*) draws the threads together: how a language is concretely reformed so that it stops making us see isolated objects where there are relations — and what we reject, and what we adopt, in passing from a language of identity to a language of structure.

The point of this chapter, however, is one. **A symbol that stands for nothing is a bounced check. Learn to tell words from noises — and no one will ever again be able to pay you in counterfeit coin.**

Notes

Chapter VII — Linguistic Revision

Count how many times, today, you have said or thought "**the**": *the* right solution, *the* right person, *the* correct way to do things, *the* truth. A minuscule article — *the* — carrying an enormous claim inside it: that of that thing there exists *only one*.

For millennia "geometry" meant *the* geometry — Euclid's, the only one thinkable. Then, in the nineteenth century, a handful of mathematicians changed a single postulate and discovered other geometries, as coherent as the first and yet different: at a stroke, *the* geometry had become *a* geometry, one among many. The same happened to the universe: Newton's had been *the* universe, until Einstein showed that it was *a* possible universe. The greatest revolution of modern thought can be compressed into a grammatical change that is almost invisible: **from the definite article *the* to the indefinite *a*.**

Do you ever ask yourself how much of your suffering is born of the number of *the*'s you carry around in your head?

In this chapter we draw together the threads of the six that came before. We have seen that language is a map, that what counts is structure, that a symbol has value only insofar as it stands for something. Now we turn to the oldest and most tenacious map we have inherited — the language of identity, codified by Aristotle — and we watch how it is to be reformed: what we reject, what we adopt, in order to pass from a tongue that makes us see absolutes where there are relations to a tongue cut to the measure of the structure of the world.

Let us begin with the cage.

1. The cage of Aristotelian language

Aristotle is probably the thinker who has influenced more human beings than any other in history. We are not speaking of him as an individual, but of the entire tradition — **Aristotelianism** — that proceeds from him and that, century after century, has settled into our habits of speech until it has come to seem "the natural way of thinking."

The delicate point is precisely this: Aristotelianism is not a choice we make; it is a **cage we are born inside**. We breathe it in with our mother tongue; it is handed to us before we are old enough to evaluate it — it is, once again, the imitation game, this time at the root of grammar itself. And the cage is so robust that it produces a phenomenon everyone knows: we understand an argument, we accept it, and *one minute later* we find ourselves contradicting it without noticing, dragged along by the old habits. We do not analyze the structure of the facts: we automatically defend the structure of our language.

Hence a curious and costly fact. Contemporary science — relativity, quantum physics — is built out of non-Aristotelian, relational, non-elementalistic languages. But our everyday speech has remained Aristotelian: identity-bound, absolutist, additive. We live with two maps in our pocket that do not match, and the friction between them distorts thought and keeps primitive reactions alive. Einstein's advance, at bottom, was also an act of **semantic hygiene**: he refused to separate in words "space" and "time" where experience

shows them inseparable, and he adopted — with Minkowski — the language of space-time. He changed the language in order to be able to see the fact.^[30]

2. Additive or functional: the painted leaf and the real leaf

There is one precise way in which primitive language deceives us, and it shows itself in a simple example: two green leaves.

Take a plastic leaf, green. That green was **added** by a human hand: a dye laid on from outside. It is a quality stuck onto the object. Now take a real leaf, green. Here the green was not "added" by anyone: it is a **functional process**, the outcome of the interaction between light and chlorophyll — it is the blade of grass of Chapter IV. And yet our language treats the two greens in exactly the same way, as if both were a property "attached" to the object. It is an **additive** language: it reasons as if every characteristic were a quality spread onto things from outside, by some hand — an old echo of a world imagined as built by beings who "add" attributes.

TWO WAYS OF SEEING A QUALITY	
ADDITIVE (primitive language structure)	FUNCTIONAL (real structure)
the leaf IS green	the green
HAPPENS	
(a quality stuck on, $\Rightarrow$ chlorophyll	(process: light

like the paint on the	≈ retina ≈
nervous system)	
artificial leaf)	
has X, "	not "the thing
"the thing has property X"	but "X emerges
from a web	
	of relations"

Out of this additive mode grows the grammar of the "**is** of identity" — "the leaf *is* green," "that man *is* a failure" — which Aristotle systematized in his logic. But that logic is not a law of thought: it is the codification of a primitive language, a map with the wrong structure mistaken for the structure of the world. Passing to the functional means ceasing to ask "what *is* this thing" and beginning to ask "from what relations does what I see *emerge*."^[31]

3. The extrovert–introvert axis: where excess becomes illness

There is another inheritance of this history, and it bears directly on sanity.

Aristotle and his teacher Plato embody two opposite poles. Aristotle was, psychologically, an **extrovert**: he projected his own internal processes onto the external world and treated them as objective things, out there. Plato was an **introvert**: for him the true reality was internal, made of ideas. This tension runs through the whole history of thought — and, carried to its extremes, it shows a clinical face.

The extreme extrovert falls into **crude empiricism**: he believes he relies "only on the facts," but never notices that every one of his facts is already filtered through the language and the doctrines he has projected outward. The extreme introvert degenerates into **pure idealism**: he builds inner worlds without verification and mistakes them for reality. Pushed all the way, these two excesses come to resemble, strikingly, two great clinical pictures: total projection outward recalls the paranoid structure; total withdrawal inward, cut loose from every verification, recalls the schizoid structure.

THE EXTROVERT — INTROVERT AXIS

EXTROVERT excess	BALANCE	
INTROVERT excess		
(all is "outside")	(sane)	(all is "inside")
crude empiricism	dynamic	pure
idealism		
↓ extreme	integration of both ↓	
extreme		
paranoid structure	outside ≈ inside	
schizoid structure		

Not two boxes: a continuum. Sanity lies at the center,
in the regulated to-and-fro between observing outside
and observing inside.

The point, once again, is not one of kind but of **degree**: there are not "the sane" and "the sick"; there are positions along an axis, and

sanity is the capacity to move back and forth — to observe outside *and* inside, alternating the two regimes instead of staying wedged in one.^[32] The language of identity, which fixes everything into absolute boxes, pushes toward the extremes: it makes you "be" an extrovert or an introvert, a paranoiac or a dreamer. The language of structure, made of relations and of *a* instead of *the*, reopens the space of movement.

4. The revision: what we reject, what we adopt

Three great systems have sustained our culture, and they were interwoven: **Aristotle** (subject-predicate logic), **Euclid** (additive geometry), **Newton** (classical mechanics). Brilliant, coherent — and built on the same linear, additive base. Within the last century, three independent revisions have overtaken them: the **non-Euclidean geometries**, the **non-Newtonian physics** (relativity and quanta), and the **non-Aristotelian system** — the one this book belongs to. Three lines born separately, driven by the same thrust: to replace inadequate maps with maps isomorphic to the facts. And the old systems are not thrown away: they become **special cases** of the new ones, valid within their limits — just as Euclid's geometry remains valid on the plane.

Reforming the language, concretely, means choosing what to leave behind and what to take up. In condensed form:

FROM THE LANGUAGE OF IDENTITY TO THE LANGUAGE OF
STRUCTURE

WE REJECT

WE ADOPT

the "is" of identity
(word = thing)
not the thing)

non-identity
(the word is

true / false as the only
logic
logic (excluded middle)
probability)

many-valued

(degrees of

elementalism
as-a-whole
(mind|body, sense|reason)
functions)

the organism-

(inseparable

additive qualities
representation
(stuck-on properties)
relations)

functional

(processes,

one cause → one effect
conditions
(binary causality)
causality)

networks of

(many-valued

grammar = law of the world
habit, to be

the facts

grammar = a

tested against

man = a sum of parts
functional organism

man = a

Summed up in one line: **less identity and fewer dualisms; more context, levels, probability, function, structure**. This is not an abstract program: it is a series of everyday moves, each of them already met in the chapters behind us — turning the "is" into "behaves as... under these conditions," marking the level, looking for the third factor, preferring the open example ("and so on") to the closed definition.^[33]

And since we do not yet possess a complete new map, there is a practical method for the meantime, and it is disarmingly simple: **study what has worked best** (mathematics, the experimental sciences — the "black marks on white paper" of the previous chapter), train your reactions to that structure, and when a problem seems to have no way out, try to **reformulate it** instead of forcing it into the old schemes. More laborious than receiving a ready-made system — but it produces results that hold.

In 2026 this revision is more urgent than ever, and for a new reason. The tools with which we now think collectively — search engines, feeds, models that generate text — are optimized for the language of identity: the curt label, the "us against them," the black-and-white answer, the headline that closes instead of opening. They reward *the* answer, not *an* answer among the possible ones. To keep alive, in the middle of all this, the capacity to say *a* where everything pushes you to say *the* — to treat every map as one among many, awaiting its test — is not an intellectual refinement: it is the difference between thinking and being thought for.

5. Practical exercises

This chapter is measured by your capacity to feel when you are using the language of identity instead of the language of structure. Five protocols.

Exercise 1 — From "the" to "a"

For one day, hunt down your absolute *the*'s: *the* solution, *the* truth, *the* right way, *the* kind of person. Each time, try reformulating with "a" or "one": *a* possible solution, *one* way among others. Watch what happens to the tension inside you when you stop demanding that there be only one.

Exercise 2 — Additive or functional?

Choose a quality you attribute to someone or something ("he is cold," "she is aggressive," "he is good at this"). Ask yourself: am I treating it as stuck-on paint (additive), or as a process that emerges from relations and contexts (functional)? Rewrite it in the functional key: "he behaves in manner X under these conditions, with these people, at this moment."

Exercise 3 — Where do I fall on the axis?

Observe, across one day, whether you lean toward the extreme extrovert (you are certain the problem is all "out there," in other people, in the facts) or toward the extreme introvert (you are certain it is all "inside," in your own ideas, detached from any verification). Sanity is the movement: try, just once, deliberately making the opposite gesture — going to look for an external fact if you were ruminating, or listening to your internal reaction if you were busy accusing the world.

Exercise 4 — One postulate at a time

Take a conviction you hold as *the* obvious truth. Treat it as a postulate: *what would change if it were otherwise?* Changing a single postulate opens a family of new systems — that is exactly how non-Euclidean geometry was born. You are not required to renounce it: you are required to discover that it is *a* choice, not *the* necessity.

Exercise 5 — Reformulate, don't force

The next time you run up against a problem "with no way out," stop before pressing on with the usual schemes and ask yourself: *perhaps it is not the problem that is insoluble, but my formulation that is wrong?* Rewrite the question. Often the way out was never in the problem: it was in a better map.

6. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **The modern revolution is the passage from "the" to "a."** From *the* geometry, *the* universe, *the* truth to *a* geometry, *a* universe, *a* truth among the possible ones. A minuscule grammatical change that contains an entire structural turn.
2. **Aristotelianism is a cage we are born inside.** Not a choice but an inheritance breathed in with the mother tongue: the imitation game at the root of grammar. It is so robust that we understand an argument and contradict it a minute later, dragged along by habit.
3. **We live with two maps that do not match.** Science is non-Aristotelian; everyday speech has remained identity-bound. The

friction distorts thought. Einstein's advance was also semantic hygiene: changing the language in order to see the fact.

4. **Additive against functional.** Primitive language treats qualities as stuck-on paint ("the leaf is green"); reality is functional (the green *emerges* from a web of relations). Passing to the functional means ceasing to ask "what is it" and asking "from what relations does it emerge."
5. **The extrovert–introvert axis.** The extreme extrovert (everything "outside") recalls the paranoid structure; the extreme introvert (everything "inside") the schizoid. Not two boxes but a continuum: sanity is the regulated to-and-fro between observing outside and observing inside.
6. **The Aristotle–Euclid–Newton triad** shares one linear, additive base. Three independent revisions — non-Euclidean geometries, non-Newtonian physics, the non-Aristotelian system — overtake it with the same structural thrust. The old systems remain as special cases of the new.
7. **What we reject / what we adopt.** Out go identity, two-valued logic, elementalism, additive qualities, binary causality, grammar mistaken for a law of the world. In come non-identity, structure, many-valued logic, functional representation, multiordinality, networks of causes, extensional methods. In brief: fewer absolutes, more context and structure.
8. **The method for the meantime.** Until a complete new map exists: study what has worked best (mathematics, the sciences), train your reactions to that structure, and when a problem seems insoluble, reformulate it instead of forcing it into the old schemes.
9. **In 2026 the collective tools reward "the."** Feeds, engines, generative models are optimized for the curt label and the black-

and-white answer. Keeping alive the capacity to say "a" — to treat every map as one among many — is the difference between thinking and being thought for.

10. **This is not a moral choice; it is a change of structure.** As in the preceding chapters: one does not get free of the cage by good intentions, but by changing the language — the article, the logic, the grammar — with which we build our maps.

The next chapter (Chapter VIII, *General Epistemology*) carries all of this onto more ambitious ground: what it really means to *know*, once we have abandoned identity; and why — surprise — it is not the fool who goes mad, but often the most gifted and sensitive, when a distorted language ruins their instruments.

The point of this chapter, however, is one. **Almost the whole of sanity fits in a single letter: learning to say *a* where we used to say *the*.**

Notes

Chapter VIII — General Epistemology

Think of the people you have watched "break down" — a burnout, a depression, a long dark stretch. Call them to mind. Almost never is it the dullest, the flattest, the simplest person you know. Far more often it is one of the sharpest, the most sensitive, the most capable.

It is a fact that unsettles at first sight. If sanity were a matter of "sturdiness," the mentally frailest ought to give way first. Instead the

opposite happens: **it is not the idiot who goes mad**. Whoever functions in an elementary way never even reaches the complex levels that can shatter. Those who break down are the ones who reached those levels — and who, immersed in distorted conditions, watch them come apart.

Have you ever asked yourself why it should be the best who are the most exposed?

The answer is epistemological, and it carries us to the heart of this chapter: what it means *to know*, once we have abandoned the language of identity. We shall see that a human being is not a sum of pieces but an integrated organism with a dominant center — and that precisely because thought and language are the highest and most complex center, they are also the point from which the fall is most ruinous. To grasp this changes everything: how we look at illness, at knowledge, and even at the words with which we do science.

Let us begin with the organism.

1. The organism-as-a-whole

There is a principle that runs through the whole of this research: the **organism-as-a-whole**. Every datum we have on life confirms it — an organism is not the sum of its parts but an integrated system, in which every element stands in relation to all the others and to its environment.

Curiously, this principle has been stated dozens of times in the history of thought, and almost never *applied*. It was welcomed as a fine general intuition, then judged "sterile" for concrete research.

Why? For a reason we now recognize at once: the **language** was missing. As long as you speak an idiom that splits "mind" from "body" at the outset, "sense" from "intellect," "inside" from "outside," you cannot put the whole organism into practice — your very grammar forbids it. The principle stayed true and unusable, like a key without the right lock.

The lock is the **structural term**. When someone coins a word that carries a new model inside it — *tropism*, say, for the response of the whole organism to a stimulus (to light, to a chemical) — he does not merely gain one more label: he gains a schema that lets him see relations where before he saw only additions, and that suggests experiments no one had thought of. It is the point of the previous chapter turned the right way up: as the wrong language imprisons, the right language opens. **Words well chosen are not name-tags: they are instruments that re-postulate an entire field.**^[34]

2. Function generates the organ

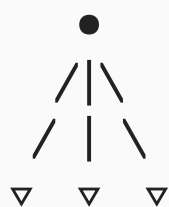
There is an elegant experiment that shows how integration is born. Take some living protoplasm, the base matter of cells. Stimulate it at one point: the excitation spreads to the neighboring zones, but with *decreasing* intensity, like a wave that fades. In this way a **gradient** forms: one zone becomes dominant, the others subordinate. And out of that gradient an axis emerges, an order, a new functional integration. It is not a sum of local reactions: it is a structure.

This principle has a consequence worth fixing in place, because it is a small revolution: **function generates the organ**, not the other way around. There is no organ first that then "does" something; there is

first an activity, a gradient, a function — and the organ is its stabilization. The nerves themselves, in the course of development, are nothing but physiological gradients that have become permanent.

THE GRADIENT: HOW A CENTER IS BORN

stimulus at one point



the excitation spreads
with decreasing intensity

DOMINANT
zone

subordinate
zones



an AXIS emerges, an order, an organ
(function comes first; the organ stabilizes it)

In the development of the organism, the end that becomes the head starts out with a higher metabolism and becomes the **dominant center**: the head commands the body not by decree but by gradient. And the highest processes — thought, language, **semantic reactions** — appeared later in evolution and occupy the *most* dominant position. From here, at last, comes the answer to the question we opened with. If the semantic center is the one that organizes the entire system, then **to disturb it is to disturb everything**. This is why a "mental" disturbance does not stay confined to one part: it strikes the conductor of the orchestra, and the whole orchestra feels it. And this is why it is not the idiot who breaks down but the most gifted: only someone who has fully developed that complex center has something, up there, that can be shattered. [\[35\]](#)

We see it in everyday life, too, far from the clinic. The very intelligent person who enters a semantically toxic workplace — where words stand for nothing, where orders contradict one another, where "yes" means "no" — suffers more than the colleague who simply carries out instructions without question. The more sensitive child, in a family that uses language in distorted ways, pays a higher price than the "thicker-skinned" sibling. It is not a punishment for intelligence: it is that the highest center is also the most exposed, and what nourishes or poisons it are — before anything else — symbols.

3. A word can change a science

If words re-postulate a field, then a single wrong word can mislead for centuries — and a single right word can loosen an ancient knot.

The classic example comes from physics. For a very long time people searched for the "**heat substance**": an invisible fluid that entered and left bodies, making them warm or cold. Why was it sought? Because the *grammar* suggested it: "heat" is a noun, and nouns name things, substances. The form of the word had created a ghost, and generations of scientists chased it. The knot came undone only when heat stopped being treated as a *substance* and was reformulated as a *process* — energy, the motion of molecules. The additive word ("the thing *has* heat") had become functional ("heat *happens*").

THE GHOST OF THE "HEAT SUBSTANCE"

grammar: "heat" is a noun



the trap: there must exist a "heat substance"
 (a fluid that flows in and out)
 ↓
centuries lost hunting for a thing that isn't
there
 ↓
solution: heat IS not a substance,
 it HAPPENS (energy, motion)
 → the word had dropped the very
relation that mattered

It is a perfect case of **abstraction that loses**: the word "heat-substance" had let fall precisely the decisive relation (motion), keeping a shell that seemed to name a thing.^[36] And there are thousands of them, even in everyday speech: when we say "he has courage," "she possesses intelligence," "he is full of anger," we treat processes as substances — and we set about looking, inside people, for fluids that do not exist.

The same principle also cures another ghost, a subtler one: the "**unknowable**." To postulate an unknowable *beyond* all knowledge is a contradiction: you are claiming to know something (that it exists, that it is there) about what you declare to be unknowable. The sane move is to replace it with "**unknown structure**": not a metaphysical wall, but simply what we have not investigated yet. It looks like a quibble over words. In truth it shifts an entire question from dogma to research — from "it cannot be known" to "we do not know it yet." It is the difference between a walled-up door and a locked door whose key you do not yet have.

4. The order of inquiry, and the observer who disturbs

All of this points to a precise order of knowing — and explains why, historically, we have almost always reversed it.

The natural order is: **first** discover the structure through research; **then** fit the language to it; **finally** educate the reactions to the new terms. It is the order of Chapter IV — from facts to theory — applied to knowledge as a whole. What we have done instead is almost always the opposite: first we invented primitive languages, then we dogmatized them, and finally we imposed them on reality, demanding that the world conform to our grammar. The result is fragile doctrines, false contradictions, centuries of delay.

THE ORDER OF INQUIRY

NATURAL (sane)
history)

structure of the facts
language
↓
adequate language
↓
education of the reactions
reality
↓
knowledge that grows
and delays

INVERTED (our

primitive
↓
dogma
↓
imposition on
↓
contradictions

Twentieth-century physics put things back in the right order, and at one point it discovered something that touches us closely. Studying the world of the quanta, it found that **the clean separation between observer and observed does not hold**: every measurement disturbs what it measures. From this comes the uncertainty principle, which does not abolish knowledge at all but forces a change of language — from the dry logic of "true/false" to a **logic of degrees**, of probability. Not "it is so or it is not so," but "it is so with this degree of probability, at this level." It is, once again, the passage from "the" to "a": not *the* answer, but a distribution of possible answers.

In 2026 this lesson is more timely than ever, and not only in physics. We live submerged in measurements, scores, forecasts — and we treat them as neutral photographs of a reality independent of whoever measures it. But every measurement is also an act that *intervenes*: a test that changes the one who takes it, a metric that redesigns the very behaviors it claims only to register, an algorithm that, by predicting what you will do, nudges you into doing it. The observer disturbs the observed outside the laboratory too. Sanity, here, is to remember two things at once: that there is a real structure to be discovered (we are not in "everyone has their own truth"), and that every map we make of that structure is taken from a point of view, with an instrument, at a level — and must be read as *a* reading, not as *the* reality.^[37]

5. Practical exercises

This chapter is measured by your capacity to treat words as instruments that re-postulate, not as photographs. Five protocols.

Exercise 1 — Who holds the gradient

Observe, in a group you know (a family, an office, a team), where the "dominant center" lies — who or what organizes the tone of everything else. Then notice how a disturbance to that center (a boss in crisis, a parent in difficulty) propagates through the whole system. It is the organism-as-a-whole on a social scale: nothing is ever truly an "isolated part."

Exercise 2 — Substance or process?

For one day, hunt down the nouns that turn a process into a substance: "he has courage," "she possesses talent," "he is full of anger," "I lack motivation." Rewrite them as processes: "he behaves with courage when...", "anger rises in him under these conditions..." Notice how many "inner substances" you were chasing that were, in fact, relations and situations.

Exercise 3 — From "unknowable" to "unknown structure"

Take something you have always regarded as "impossible to know" (about yourself, about another person, about a situation).

Reformulate it: not "it cannot be known," but "I do not know it *yet* — what data would I need to know more?" Shift the door from walled-up to merely locked, and see whether a key appears.

Exercise 4 — The measurement that intervenes

Choose a measurement that concerns you (a grade, a fitness score, the numbers on a scale, the metrics of a job). Ask yourself: does this measurement merely *describe* me, or is it also *changing* me — steering what I do so as to optimize it? Recognizing when the

observer disturbs the observed gives you back the freedom not to chase the number.

Exercise 5 — Put the order back

The next time you defend a conviction, check the order: did you start from the structure of the facts and arrive at the theory, or did you start from a word or a dogma that you are imposing on reality? If it is the second, stop and begin again from the facts. It is the natural order of inquiry, applied to an argument.

6. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **It is not the idiot who goes mad.** Those who break down are often the most gifted and sensitive: the disturbance strikes the highest and most complex level, and only someone who has developed it has something, up there, that can come apart.
2. **The organism is a whole, not a sum of parts.** A principle stated for centuries and never applied, because the language was missing: an idiom that splits mind from body cannot put it into practice.
3. **Words re-postulate a field.** A structural term (tropism, gradient) is not a label: it is a schema that lets us see relations where before there were additions, and it suggests new experiments.
4. **Function generates the organ.** From a gradient of excitation a dominant center emerges and then an organ: activity comes first,

then the structure that stabilizes it. The nerves themselves are gradients that have become permanent.

5. **The semantic center is the most dominant.** Thought and language organize the entire system; to disturb them is to disturb everything. This is why symbols — what nourishes or poisons that center — matter so much, in the clinic as in the office as in the family.
6. **A wrong word misleads for centuries.** The "heat substance" was a ghost created by grammar: a noun that sent people looking for a thing where there was a process. It is an abstraction that loses precisely the decisive relation — and we utter thousands of them every day ("he has courage").
7. **From "unknowable" to "unknown structure."** To postulate an unknowable is a contradiction; to speak of a structure not yet investigated shifts the question from dogma to research. From a walled-up door to a locked one whose key we can look for.
8. **The natural order of inquiry:** first the structure, then the language, then the education of the reactions. Historically we have reversed it — first the primitive language, then the dogma, then the imposition on reality — and we have reaped contradictions and delays.
9. **The observer disturbs the observed.** Quantum physics showed that every measurement intervenes on what it measures, forcing the passage from "true/false" logic to a logic of degrees. It holds outside the laboratory too: tests, metrics, and algorithms change what they claim only to register.
10. **Two things at once.** There is a real structure to be discovered (not "everyone has their own truth"); and every map we make is

taken from a point of view, with an instrument, at a level — *a* reading, not *the* reality.

The next chapter (Chapter IX, *Colloidal Behavior*) descends to the most material level: life is always in the colloidal state — a middle ground between solid and liquid — and from this physical base the old fracture between "body" and "mind" finally dissolves.

The point of this chapter, however, is one. **Function generates the organ: first comes what a system does, then the form that stabilizes it. This is why, to change the form, we work on the function — and the highest function of a human being runs through symbols.**

Notes

Chapter IX — Colloidal Behavior

You are slicing bread, or cutting vegetables for dinner. The blade slips, and a moment later there is a small cut on your fingertip. A drop of blood wells up: red, glossy, perfectly liquid.

You watch it swell. It stings faintly. And then — without your doing anything, without your deciding it — within a minute something changes: the drop stops flowing, thickens, turns from liquid into a dark, rubbery paste, and before long a scab. On its own, the matter you are made of has passed from the liquid state to something almost solid. No one ordered it to.

Have you ever asked yourself what you are made of, exactly? Solid, like the bone you feel under the skin? Liquid, like the blood that a moment ago was flowing? The uncomfortable answer is: neither one nor the other.

Life does not live in the solid and does not live in the liquid. It lives in a middle state — a state of matter that stands between the two and is neither. The blood setting before your eyes is precisely that state, passing in real time from fluid to jelly. And in that middle ground — not in rock, not in water, but in the uncertain territory between them — everything we call being alive takes place: the heartbeat, thought, emotion, fever, healing.

In the previous chapter we saw that it is function that generates the organ, and that the highest of human functions — thought and language — is no immaterial ghost: it travels on real electrical currents, it is a form of physical energy. Now we descend one step further, beneath the organ and beneath the function, down to the matter that makes them possible. And here we shall find two things that change everything: that on this material base the oldest of all fractures — the one between "body" and "mind" — finally dissolves; and that a word, being physical energy, can act upon you exactly as heat or acid do.

Let us begin, then, from a drop.

1. The middle state: what a colloid is

Take any piece of matter and divide it into ever smaller parts. You cannot do this forever. At a certain point you reach the **molecule**, the

smallest particle that still keeps the chemical properties of the substance. But — and here is the interesting point — the smallest particle you can see with the most powerful microscope is still about a thousand times larger than a molecule. Between the molecule and the visible, then, there opens an enormous band of intermediate sizes, a world that for a long time no one looked at. Some have called it "the borderland of matter," others the **world of neglected dimensions**.

THE WORLD OF NEGLECTED DIMENSIONS

molecule	← colloidal behavior →
visible	
(chemistry)	matter's middle state
particle	
.....[here life dwells	
].....●	
too small	neither crystal nor fluid:
a thousand times	
to be seen	suspension, gel, emulsion
larger than	
the molecule	

It is precisely in this band that matter stops behaving as we would expect and displays the phenomena most characteristic of life: **colloidal behavior**. The word "colloid" — from the Greek for *glue* — was coined around 1861 to distinguish two families of substances: those that crystallize readily and pass through membranes (the "crystalloids"), and those that form gelatinous masses and do not pass through them (the "colloids"). It was soon discovered, however,

that there are no "colloidal substances" in the strict sense: the very same material — common table salt, for example — can behave as a crystalloid or as a colloid depending on the conditions. It is not a substance: it is a **behavior**. For this reason it is better to speak of colloidal behavior than of colloids.

You know it better than you think, because you handle it every day. Milk is a colloid: minute droplets of fat suspended in water.

Mayonnaise is a colloid: oil and water held together in an emulsion that, if you get it wrong, "breaks" and separates. The gelatin you put in the fridge goes from liquid to solid without freezing. The cream you whip traps air in a stable foam. Fog is water suspended in air; smoke is a solid suspended in air. And you, inside, are the most sophisticated version of all this: the cytoplasm of your cells, your blood, your lymph, your mucus, the humor of your eyes — matter organized in the colloidal state.

What makes this state special is a matter of **structure**, and it is worth fixing, because it holds up everything else. When a substance is broken down into very fine particles, its total surface becomes enormous relative to its volume. A handful of matter, subdivided finely enough, can develop a total surface as vast as half a football field. And it is on surfaces — not in the heart of the mass — that the decisive forces act. A colloid is matter in which *almost everything is surface*: this is why it is so sensitive, so reactive, so easy to move from one state to another. It is exactly the physical condition required by something that must stay reactive in order to stay alive.

On these immense surfaces two opposing forces work, in a continual tug of war. On one side the **surface energies**, which tend to make the particles merge into one another — to coagulate, to set: this is the

drop of blood becoming a scab. On the other the **electric charges**, which, repelling one another (like repels like), keep the particles apart and in suspension: this is the blood staying fluid as long as it flows. Whether a colloid stays liquid (the "sol" state) or sets (the "gel" state) depends on the balance between these two forces. And that balance is unstable by nature: light, heat, an electric field, a trace of acid are enough to shift it. When coagulation becomes complete and irreversible, the colloid loses its behavior — it is said, with a harsh but exact word, to "die." The egg you fry in the pan is exactly this: a transparent, fluid colloid that, heated, coagulates into a solid white and never comes back. The difference between a living cell and a dead one is, literally, the difference between a colloid still mobile and one coagulated.

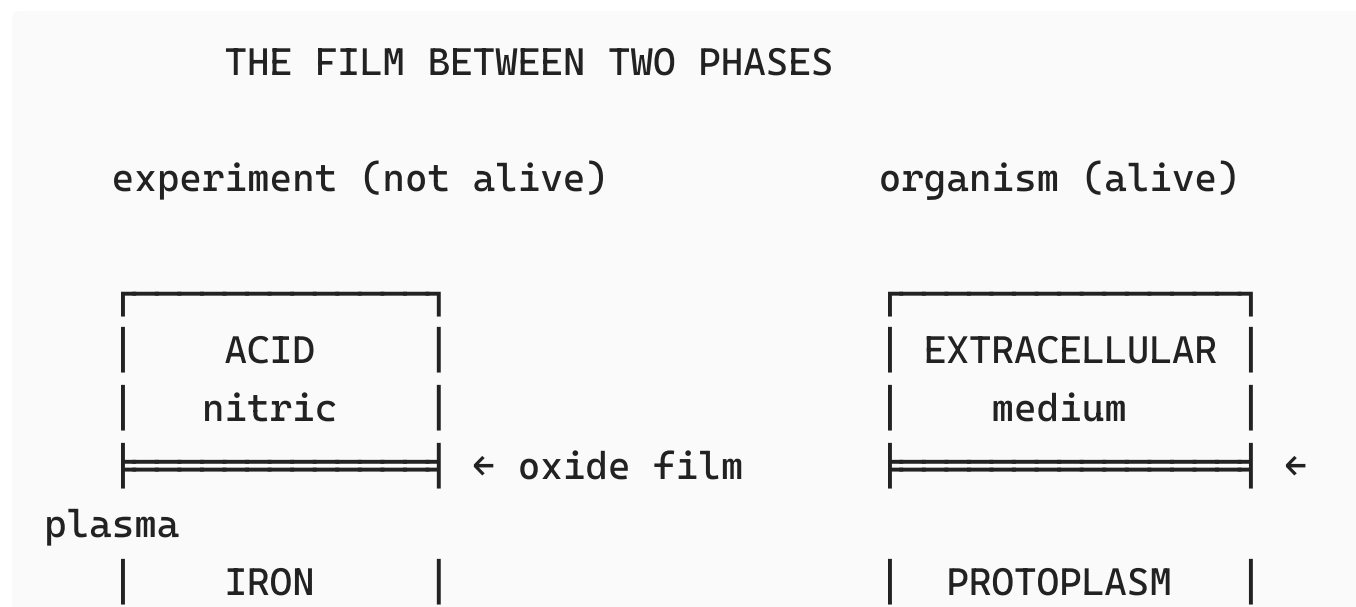
This is why we start here. As long as we treat "body" and "mind" as two different substances — one heavy and visible, the other light and invisible — the problem of how they communicate remains insoluble, and it has remained insoluble for millennia. But if we look at the material base, the fracture is not there. There is a single matter in the colloidal state, extraordinarily sensitive, shot through with electric currents, that lets itself be moved by every form of energy. What we call "mental" and what we call "physical" are not two worlds: they are two descriptions of the same colloidal behavior, read at different levels. It is the principle of Chapter IV — *structure is the only content of knowledge* — returning here in its most concrete form: the colloidal structure is also the **bridge** between what we believed separate.^[38]

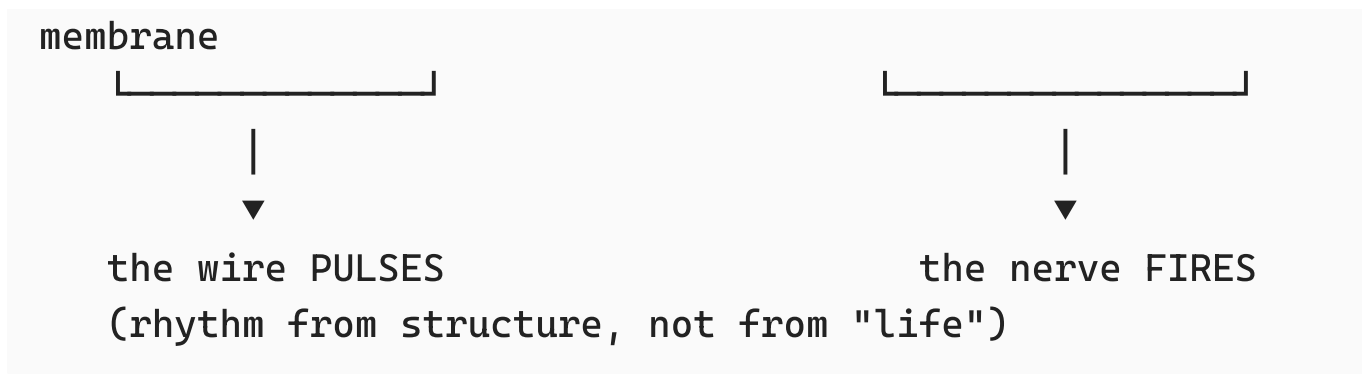
2. The film that pulses

There is a structural detail in all this that deserves a section of its own, because it explains one of the most mysterious things about the living: **rhythm**.

Organized colloidal systems are not undifferentiated masses: they are separated and held together by **films**, thin surface films that behave like membranes. And a film dividing two electrically conducting phases behaves, in effect, like a small electrode. This is a fact you can see outside the body, in an experiment as simple as it is unsettling.

Take a strand of iron wire and immerse it in nitric acid. On the surface of the metal a very thin film of oxide forms, and between the iron and the acid — the two "phases" — that film serves as a boundary. Touch the wire at the right point, and something happens that you would not expect from a piece of dead metal: the wire begins to **pulse**. An electrical variation runs along it, rhythmic, regular, and it resembles, uncannily, the activity of a nerve fiber or a muscle. There is nothing alive in the wire. And yet it beats. The rhythmicity was not hidden in "life": it was hidden in the **structure** — in the film between two phases.





In your nerve fibers the situation is identical in structure: the inner protoplasm and the fluid that surrounds them are the two phases, separated by the membrane. And as the iron wire pulses, so the nerve fires, the heart beats, the breath comes and goes, sleep and waking alternate. **Rhythm is not some mysterious clock hidden away somewhere: it arises from the very structure of living matter.** We put it in the language of our own apparatus: the time of the organism — its beating, its pulsing — is generated by the structure, not imposed from outside; it is the *time that emerges from the system's own cycles*, a property we shall take up thoroughly when we speak of how matter generates its own time. ^[39]

From this film structure follows **excitability** as well: the organism is sensitive to electric currents only as long as its films are intact. With death, when the colloid coagulates, the semipermeability of the membranes and electrical sensitivity vanish together. Life, electrically, is the film that holds.

And there is a third fact, the most important for us. Send a weak electric current through an inorganic colloid: only the small portion near the electrodes coagulates, the rest does not notice. Send the same weak current through living protoplasm, and *all* of it coagulates. Why? Because in the living thing the inner films — the membranes of every cell — themselves serve as electrodes: the whole organism is,

structurally, "in the immediate vicinity" of the electrodes. A local disturbance does not stay local: it propagates to the whole. It is the material version of a principle we know from Chapter VIII, the **organism-as-a-whole**: here it is not a fine philosophical idea, it is a measurable electrochemical fact. Touch one point, and all the points respond. Keep this propagation in mind: shortly it will help us understand why a word can run through you from head to foot.

3. The fifth factor

Let us now put the pieces together. We have a matter — yours — in the colloidal state: all surface, shot through with currents, held in unstable balance between setting and dissolving, and made in such a way that every local disturbance propagates to the whole. The question becomes: what, exactly, can shift that balance?

The experiments answer with a surprisingly short list. Four great families of factors are able to disturb the colloidal balance: **physical** (X-rays, light, ultraviolet, heat, electric fields); **mechanical** (friction, pressure, puncture); **chemical** (acids, alkalis, fat solvents, poisons); **biological** (microbes, parasites, foreign cells).^[40] Everything we see happen to an organism, from healing to disease, passes through one of these four channels, which all act in the same way: by altering the colloidal structure.

One example shows how common and how deep this plane of action is. Anesthetics are fat solvents, and they act on the colloidal structure of membranes. This is why **ether**, at the same concentration, does the same thing to creatures as far apart as can be: it puts a man to sleep, halts the movement of a fish, stops the writhing of a worm,

arrests the activity of a plant cell — and then, once the ether is removed, each returns as before, unharmed. Four forms of life that have almost nothing in common in appearance respond identically, because they have in common the thing that counts: the colloidal structure. It is a perfect illustration of the thread running through the whole book — not the appearance, but the underlying structure is what determines behavior. The same holds, in small, every time the dentist numbs a nerve for you, or one glass of wine too many changes your mood: you are shifting, chemically, your colloidal state — and with it, what you call your mind.

And here comes the point that by itself justifies the chapter. In the human being, to the four factors a **fifth** is added: **semantic reactions** — the responses of meaning to words, images, memories, hypotheses. This is not a manner of speaking. We saw in the previous chapter that thought and emotion *are* real electric currents. An electric current is a physical factor. Therefore a semantic reaction — a word that frightens you, a memory that grips your stomach — is, literally, a physical factor acting on your colloidal balance, exactly as heat, acid, or light do. It is the fifth factor because in other organisms it is not there: only the human being lets a sequence of words shift the chemistry of his body. And it is here — not in a separate soul — that the "mental" touches the "physical": a semantic reaction is a material event, and it propagates to the whole, because we have seen that in the living thing every local disturbance becomes general. The word that, in Chapter I, made your stomach contract — we now know *how* it does so: it moves, by way of a current, the colloid you are made of.

This explains why certain effects, in the body, do not add up but **amplify**. Take a phenomenon doctors know well. If the heart, for whatever reason, slows the circulation, carbon dioxide accumulates in the blood; the carbon dioxide raises the viscosity of the blood — makes it denser, more "gel"; the denser blood forces the already tired heart to work harder; and this slows the circulation still further. The breakdown feeds itself.

THE RING THAT BITES ITS OWN TAIL

(why some breakdowns don't add up: they multiply)

the heart slows



carbon dioxide builds up



the blood grows denser (more "gel")



the tired heart works harder



each turn worsens the next: exponential growth,
not additive

It is a **feedback loop**, and its effect is *non-additive*: it does not sum equal harms, it multiplies them, even at an exponential rate. You will recognize it outside physiology, because it is the same design as a thousand daily spirals. The anxiety that takes away sleep; the lost sleep that makes everything more threatening the next day; the

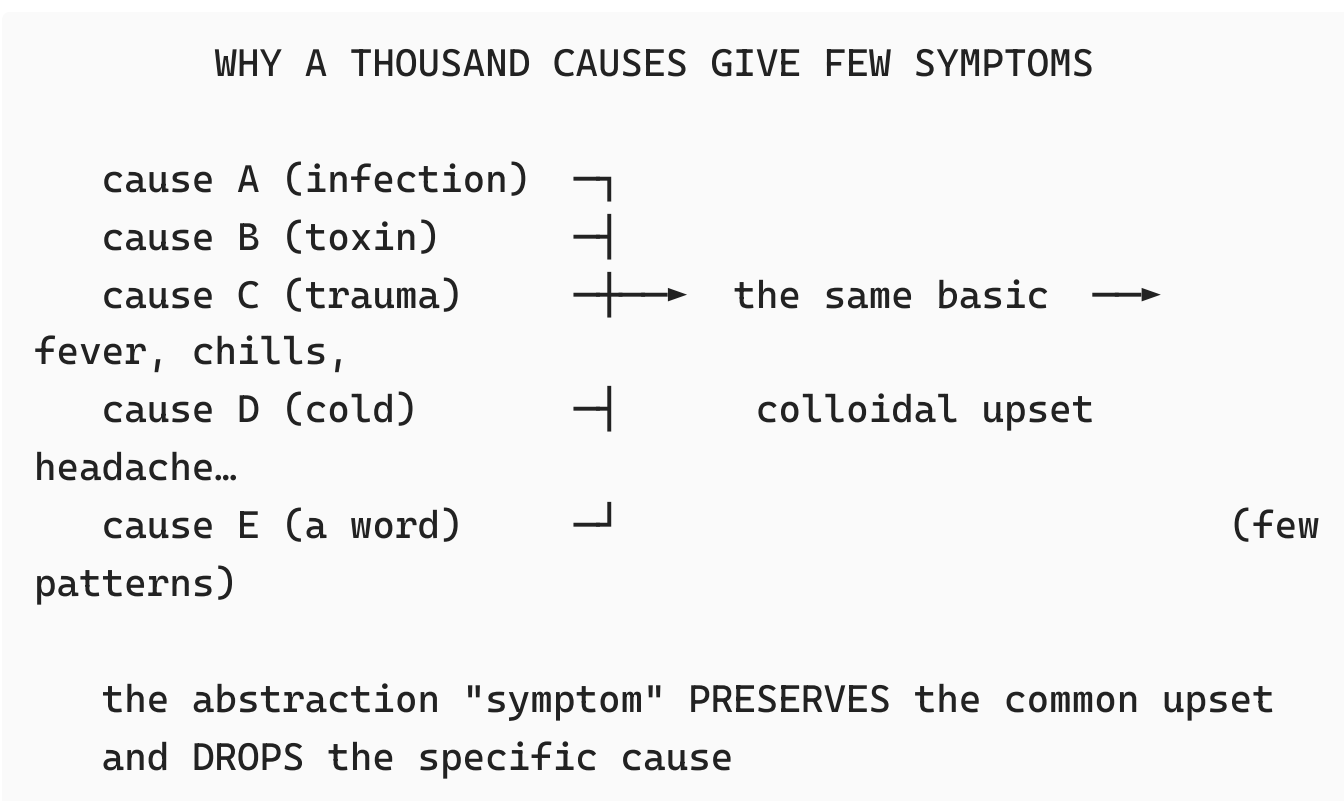
greater threat that raises the anxiety. The stress that tightens the muscles; the tight muscles that hurt; the pain that increases the stress. In all these cases the fifth factor — a meaning, a worry, a phrase you repeat to yourself — enters the loop like any other physical factor, and sets it turning. Understanding that it is a loop, and not a sum, is already the first step toward breaking it: you do not have to remove all the harm, it is enough to interrupt the turn at any single point — the breath, the sleep, the phrase you tell yourself — and the amplification stops.^[41]

4. The convergence of symptoms and the memory of living matter

If there really is a single colloidal behavior at the base of everything, we ought to find two precise confirmations. The first: wildly different causes ought to produce **similar symptoms**. The second: living matter ought to be capable, on its own, of an elementary form of **memory**. We find both.

Let us begin with the convergence. It is a curious fact that diseases, however countless in their causes, speak a language of symptoms that is surprisingly poor and standard. On the "physical" side: fever, chills, headache, nausea, convulsions. On the "mental" side: identifications, illusions, delusions, hallucinations. Thousands of causes, a handful of outcomes. Why? Because if the common base is colloidal, disturbances even very different from one another end up pushing that unstable system along the same few paths. It has even been reproduced in the laboratory: by injecting simple inert precipitates, chemically inactive, one induces artificial colloidal

disturbances that mimic real symptoms. What counts is the structure of the disturbance, not its chemical label.



This is a textbook case of what in Chapter IV we called **abstraction that preserves and abstraction that loses**. The symptom is a most powerful abstraction: it preserves the fact that *there is a colloidal disturbance*, and it drops which cause produced it. It is extremely useful for noticing that something is wrong; it is deceptive if it is mistaken for the cause. Whoever treats the symptom as if it were the disease — whoever treats the fever and forgets why it is there — is mistaking the isolated form for the content, the fundamental semantic error from which we started. The symptom says "the colloid is disturbed"; it does not say, on its own, by what. It is an abstraction that, to be useful, must always be reopened toward the cause.^[42]

Let us come to memory, and here the story becomes truly remarkable. Take the seed of a pumpkin and let it germinate in the

dark, in a moist container, until the rootlet is a couple of centimeters long. By gravity, the root grows downward. If you now turn the container ninety degrees, laying the root horizontal, then after a short delay — in the pumpkin, about ten minutes — the root curves downward. That delay is the key. You turn the container from position to position *just before* the delay runs out, repeating the turn several times. Then you put the root back in its natural downward position, and leave it alone. And here the root does something no one asked of it: it goes on swinging back and forth, on its own, *at the same intervals as your experiment* — and it keeps this up for days.

The stimulus has ceased to act, but its imprint has stayed in the structure. The root "remembers" the rhythm it was accustomed to. There is no brain, no nervous system: there is only protoplasm, living matter in the colloidal state, which has preserved the form of a past solicitation and re-enacts it on its own. **The capacity to form patterns and to retain them is a general property of living matter** — the elementary, physical base of what in us we call habit and learning. In our apparatus we say that the colloidal structure is capable of *resonance*: a solicitation leaves an imprint that orients the subsequent responses, and each new cycle leans on the trace of past ones. It is the same principle by which a repeated gesture becomes automatic, a path walked many times becomes the easiest, a long-practiced reaction then fires on its own: not "will," but matter that keeps the form of what has passed through it.^[43]

Putting the two confirmations together, we obtain the thesis of the chapter in its full form. The colloidal structure does not only explain how the body works: it explains the **equivalence** between what we used to call "physical," "chemical," and "mental," and it serves as a

bridge between these classes we believed separate. Semantic reactions — words, emotions, meanings — are energies that modulate the colloidal state; language is one of these energies, and its structure is reflected in the material conditions of the organism that depend on it. To study life in cadavers, as was long done, was to study it where it is not: the living cell is semifluid, governed by surface forces; the dead cell is coagulated, and obeys a different regime. Life is a fact of the still-mobile colloid — and its traits are found identical from the smallest detail to the whole organism.

5. The consequences in 2026

One might think that the colloidal level is a laboratory matter, far from everyday life. The opposite is true: today more than ever we live inside its consequences, often without naming them.

Medicine rediscovers the bridge. For a century "psychosomatic" was almost a suspect word, like saying "imaginary." Today it is no longer. We know that chronic stress raises cortisol, changes inflammation, worsens sleep, alters the clotting of the blood and the gut flora — that is, it acts, materially, on the colloidal state of the body. We know that gut and brain talk to each other continually, that the vagus nerve modulates in real time how much we are in alarm or in calm, that a "mental" trauma leaves measurable traces in the tissues. All of this is nothing but the fifth factor finally taken seriously: meanings are physical inputs, and the body registers them as it registers heat and acid. The old body/mind fracture does not close with a philosophy: it closes with the chemistry of surfaces.

The fifth factor industrialized. If a word is a physical factor, then an environment that administers alarming words to you all day long is, literally, an environment that administers a substance to you. Digital platforms do exactly this: they deliver, at a continuous rhythm, semantic micro-stimuli detached from any real context — a headline, a label, an abstract threat — each of which enters the feedback loop we spoke of and sets it turning. The body does not distinguish the threat read from the threat lived: it responds to the structure of the signal. Hundreds of these activations a day keep the colloidal system in a chronic state of pre-alarm that never returns to rest. It is not a metaphor for contemporary malaise: it is its physiology.

Treating the substrate while forgetting the signal. There is today an enormous industry that works on the colloid while ignoring the fifth factor: supplements, diets, devices that measure sleep, heartbeat, inflammation, the "optimization" of the body by way of molecules. Nothing wrong in itself — but it is half the picture. The chemistry is refined while the semantic source that disturbs it is left intact; inflammation is lowered with a pill while the same mind goes on feeding into the loop the words that reignite it. We measure the territory with ever more precise instruments, and we forget that the most powerful of the factors that move it is the phrase we repeat to ourselves. It is, once again, the error of mistaking a partial map — the numbers of the body — for the whole territory.

And here the stakes descend from the general to the personal. The point of this chapter is not that "you need to relax." It is far more concrete: the worry turning on its own in your head tonight is not a "mental" event in a separate theater. It is a physical factor that is shifting, at this very moment, the colloid you are made of — your

sleep, your digestion, your heartbeat. Not because you are weak: because you are a living being, and living beings are made of a matter that words move. Knowing it does not take away the weight of the meaning; it gives it back, though, its real place — one input among others, inside a loop that, once identified, can be interrupted.

6. Practical exercises

This chapter is measured by the capacity to feel your own "mental" states as material events, and to act on them accordingly. Five protocols.

Exercise 1 — The colloid on the plate

For one week, once a day, observe an everyday colloid at the moment it changes state: the egg going from transparent to white, the gelatin setting, the mayonnaise whipping up or "breaking," the milk curdling. Note the sol→gel passage. It serves to make familiar, with your eyes, the same kind of transition that goes on constantly inside you. The matter you are made of does, in small and without pause, what you see on the plate.

Exercise 2 — Where is the loop

Choose a spiral you know well: anxiety→insomnia→anxiety, stress→tension→pain→stress, or any other. Draw it as a circle of arrows, not as a list. Then find **a single point** where you could interrupt it — a gesture, not a resolution (getting up and walking, lengthening the breath, writing down the phrase spinning in your head). The exercise is not "thinking positive": it is treating your distress as a physical loop and looking for its breaking point.

Exercise 3 — The word as a physical factor

The next time a word or a message provokes a clear bodily reaction in you, stop and name it for what it is: *a physical factor has just entered my system, as if I had drunk a coffee or caught a chill*. Not to belittle the emotion, but to place it: it is a material input, and as such it has a course, a peak, and a decline. Watching the peak and waiting for the decline, instead of feeding it, is colloidal hygiene.

Exercise 4 — Map your semantic environment

For one day, keep count of how many times a screen administers a verbal micro-alarm to you (notifications, headlines, alarming previews). Treat them as doses: not "neutral information," but substances entering your feedback loop. At the end of the day ask yourself whether the dose was proportionate to what you could do with it. It is the first step toward choosing the environment you administer to yourself.

Exercise 5 — The path walked many times

Choose a habit — good or bad — that fires in you "on its own." Recognize it for what it is structurally: not a failure of will, but an imprint left in the matter by many repetitions, like the rhythm in the pumpkin root. This changes the strategy: you do not fight yourself with reproach, but rewrite the trace with new repetitions, knowing that matter keeps the form of what you make it pass through most often.

7. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **Life is always in the colloidal state.** Not solid, not liquid: a middle state, the "world of neglected dimensions." The blood that sets, the egg that cooks, the cytoplasm of your cells — the same matter passing between "sol" and "gel."
2. **It is matter made almost entirely of surface.** This is why it is so sensitive and reactive: light, heat, an electric field, a trace of acid are enough to shift its balance between setting and dissolving.
3. **Here the body/mind fracture dissolves.** Not two substances, but a single colloidal matter shot through with electric currents: "physical" and "mental" are two readings, at different levels, of the same behavior. The colloidal structure is the bridge.
4. **Rhythm arises from structure.** The iron wire in acid pulses like a nerve, because what counts is the film between two phases, not "life." Heartbeat, breath, sleep and waking: time generated by structure, not by a hidden clock.
5. **In the living thing every local disturbance becomes general.** The inner films serve as electrodes: a weak current coagulates all the protoplasm. It is the organism-as-a-whole as an electrochemical fact, not as a slogan.
6. **Four factors disturb the colloidal balance** — physical, mechanical, chemical, biological — and all act on the same structural plane: ether, at the same concentration, stops man, fish, worm, and plant.
7. **In the human being there is a fifth factor: semantic reactions.** Since thought and emotion are real electric currents, a word is a

physical factor that moves your colloid like heat or acid. It is here, not in a separate soul, that meaning touches the flesh.

8. **Certain breakdowns do not add up: they multiply.** The feedback loop (heart→carbon dioxide→viscosity→heart) is non-additive. The same design holds for anxiety→insomnia and stress→pain: the fifth factor enters the loop and sets it turning — and it is broken by interrupting it at any one point.
9. **A thousand causes, few symptoms.** Wildly different disturbances converge on the same patterns because the base is colloidal: the "symptom" is an abstraction that preserves the common disturbance and loses the specific cause. Useful for noticing it, deceptive if mistaken for the cause.
10. **Living matter remembers.** The pumpkin root retains the rhythm it was accustomed to: habit and learning are, at bottom, imprints preserved in the structure — resonance, not will. Matter keeps the form of what passes through it.

The next chapter (Chapter X, *The Organism-as-a-Whole*) rises from the material level to that of the whole individual: it shows how, from this colloidal base, an integrated organism emerges, with a center that responds *together* — to the point that a pure belief, with nothing physical about it, can make the eyes water and the throat swell. It is the chapter that closes the first arc of this volume, gathers up the whole thread we have followed, and opens the door to its second.

The point of this chapter, however, is one. **You are not a mind set upon a body: you are living matter, in the colloidal state, that words move as heat moves water. This is why meanings weigh upon the flesh — and this is why, knowing it, you can learn to choose them.**

Notes

Chapter X — The Organism-as-a-Whole

Someone mentions lice. The note that came home from school, a colleague scratching his head, an article about bedbugs in hotel rooms. And within a few seconds, while you are still reading or listening, your scalp begins to itch. Your hand goes there on its own — behind the neck, into the hair.

There is nothing. No insect, no bite, no contact: only a word, an image. And yet the itch is real — the skin really itches, the hand really moves. A sequence of meanings has produced, in a few instants, a full physical sensation, and with it a behavior.

Have you ever asked yourself *who*, exactly, is making you itch?

There is a clinical case, by now a classic, that shows the same thing in its pure state. A patient suffered violent attacks of hay fever whenever he found himself near roses: watering eyes, blocked nose, sneezing, congested membranes, the whole train of it. One day, from behind a screen, someone suddenly produced a bouquet of roses, and the attack began — immediate, complete, exactly as always. Only the roses were **fake**, made of paper. No pollen, no scent, nothing chemically active. The reaction, though, was real in every physiological detail.

In the previous chapter we saw that you are made of a matter — a colloid — that a word can stir as heat stirs water. Now we draw out the consequence at the level of the whole person: the organism

never responds in pieces, it responds **as a whole**, and it does so even to a pure belief. And in every reaction of this kind there is a guest we always forget to count — a hidden observer. This chapter closes the first arc of the volume: it gathers up the whole thread we have followed and carries us to the threshold of the second.

Let us see, beginning with the itch.

1. Who is making you itch: the hidden observer

Let us go back to the paper roses, because they hold more than they seem to. The sentence we would use to describe the case is obvious: "the roses give him hay fever." But that sentence no longer holds. The roses were paper. There was no pollen. So it is not *the roses* that make him sneeze — they cannot be, because there was nothing physical capable of doing it. What produced the reaction, whole and entire, was the patient's **reading**: his conviction that they were real. Take away the pollen, and only he is left standing.

This takes us straight back to Chapter I: every experience is the meeting of three components — a content, a form, and an observer, $\langle C, F, O \rangle$ — and the perennial error is to mistake the isolated form for the whole thing. Here the observer does not merely *select* what to see: he **produces** the physical reaction. The paper roses are the sharpest demonstration in this book that the observer is not a neutral spectator standing before a reality already made. He is an operator who enters into the result.

The trouble is that, in the way we speak, the observer vanishes at every turn. "Roses make you sneeze." "That piece of news is

distressing." "This food is disgusting." "That person is unbearable." In each of these sentences there is a ghost: an observer who does the work, but whom the grammar has spirited away, leaving the property stuck to the object. Let us call it by its name — the **hidden observer** — because recognizing it and putting it back into the sentence is one of the most liberating moves you can learn. "Roses make *me* sneeze" becomes "*I react* to my reading of the roses." "That news is distressing" becomes "*I feel* distress reading that news." This is not a grammarian's quibble: it is recovering the point where you have a grip. On the object you can do almost nothing; on your reading, you can do something.

THE HIDDEN OBSERVER

physical object		observer	
reaction			
(PAPER roses)	→	believes them real,	→
sneezing, watering			
no pollen		"reads" them	eyes,
blocked nose			
no scent		(the guest we forget)	– all
of it real			

the sentence "roses make you sneeze" ERASES the observer
 and pins the blame on the wrong object.
 Put it back: "I react to my reading of the roses."

And note what truly matters for this chapter: the reaction, set off by a pure reading, was **total**. It was not "the nose" that sneezed as an isolated part: the eyes, the membranes, the vessels, the glands, the

breath all responded together. A single meaning moved the entire organism. It is the principle that gives the chapter its title — the **organism-as-a-whole** — caught in the act: not a sum of parts each reacting on its own account, but a single system in which a disturbance, by whatever door it enters, becomes the response of all.

[44]

2. The whole responds before the part

That the organism acts as a whole, not as a sum of organs, is no impression: it is a fact you can put your hand on among the simplest creatures, where everything lies barer.

Take a small marine flatworm and turn it onto its back: it rights itself quickly. Remove its brain and turn it over again: it rights itself all the same — more slowly, but it manages. Cut it almost in half, severing the nerves that run its length and leaving the two portions joined only by a flap of tissue: the two halves go on moving in *coordination*, as though nothing had happened. In a freshwater flatworm cut clean through, the rear portion — with no brain, no eyes — flees the light toward the dark corners exactly as the whole animal would, only with a few minutes' delay. The message is clear, and for us decisive: **function is not shut inside an organ**. The brain speeds and sharpens the response, but the capacity to respond belongs to the whole organism. The whole comes before the part.

THE WHOLE BEFORE THE PART

whole flatworm → rights itself, flees the light
(fast)

without brain —————> rights itself, flees the light
(slower)

cut in half —————> the two portions STILL move in
coordination

the brain speeds and sharpens; it is NOT the sole seat
of function.

take away the part, and the whole still responds.

The same holds for **memory** — a thread we take up directly from the previous chapter, where we watched a squash root hold a rhythm. There is a famous experiment with an earthworm in a small T-shaped maze: on one side the free exit, on the other a stretch of sandpaper followed by a slight shock. After many trials the worm learns to avoid the unpleasant side. And here is the point: if you remove its first segments, brain included, **the habit remains** — it reacts more slowly, but it still knows the way. Only months later, when it regenerates a new brain, does the habit vanish, and it has to be learned again from scratch. Memory, then, was not a file stored in an organ: it was a configuration of the entire nervous system. It is, once again, living matter holding the form of what has passed through it — the same structural resonance we called, in the previous chapter, the physical basis of habit.

The chemistry of the environment, too, speaks to the whole organism at once. A jellyfish grows restless or settles simply by a change in the calcium concentration of the water; certain marine larvae, which as a rule flee the light, can be induced to seek it by lowering the temperature or raising the salt — and the trick reverses when the conditions are restored. The organism does not add up local reactions to isolated stimuli: it responds, all together, to a *global*

condition. You recognize it in yourself every day, far from any laboratory: a night of sleep gone missing, a meal skipped, blood sugar falling, and all at once it is not "a detail" that changes but *the whole of you* — mood, patience, clarity, generosity. It is not a part of you that has changed: it is your condition, and with it you have responded entire. Only as we climb the ladder of life do the organs specialize and one or another become dominant — the headless caterpillar survives and lays its eggs, but can no longer *choose* the right leaf — and yet the principle never reverses. The more complex a system, the more heavily one of its centers weighs on the whole. It is exactly what we found in Chapter VIII, speaking of the semantic center: in the human being, the most dominant point is that of thought and language.

3. Many-to-one: nutrition shapes body and mind together

There is a small word, in medicine, that hides one of the most important principles in this book. You meet it when someone says that rickets is cured with cod-liver oil **or** with exposure to the sun. That modest "or" says something enormous: two utterly different causes — a substance swallowed, a light on the skin — produce the *same* effect. In life the relation between cause and effect is almost never one-to-one. It is **many-to-one**: different paths converge on the same outcome.

MANY-TO-ONE

cod-liver oil $\neg$

sunlight $\begin{array}{c} \text{+} \\ \text{---} \end{array} \rightarrow$ same outcome: recovery
(... still other paths) $\perp$ from rickets

the outcome KEEPS "the system is back in balance"
and LETS FALL which path brought it there.

→ to hunt for THE single cause, here, is the wrong question.

It is the same design we saw in the previous chapter in the symptoms — a thousand causes, a few outcomes — and it carries the same moral: the outcome is an **abstraction that keeps** the general fact (here: the system is back in balance) and **lets fall** the particular path that brought it there. Whoever insists, before a living phenomenon, on finding *the* single cause is often asking the wrong question: he should be asking which *paths* converge on that outcome. It is a correction that changes medicine, education, and the way we read people — and one that defends us from the wholly Aristotelian vice of hunting for a single culprit where many conditions are at work together.

The most striking case of this convergence touches something we thought untouchable: character, and even instinct. A series of experiments showed that phenomena as far apart as loss of weight, premature aging, and high mortality among the young depended in large part on diet. And then the finding that leaves you speechless. A well-fed female rat is a good mother; she does not harm a hair of her young. The same female, placed on an *abundant* but deficient diet, changes her behavior at the root: she turns aggressive, and kills her pups shortly after birth. This is no metaphor: it has been verified in the laboratory. And — the point that matters — it is **reversible**: correct the diet, and the maternal instinct returns. In the same way,

nervousness and irritability can be switched on or off simply by changing what goes into the bowl.

Let us pause on what this means. A minimal, purely "physical" lack in the diet changed not only the bones or the coat: it changed *behavior, affection, instinct* — the things we call "mind," "heart," "character." And it changed them reversibly, in both directions. It is the proof, from the opposite direction to the paper roses, of the same unity: there a meaning moved the body, here a substance moves the mind. The two arrows meet in the middle, and that middle is the whole organism, where "physical" and "mental" are not two separate rooms but two descriptions of a single process. You know it yourself, if you think about it without prejudice: who "you" are after three sleepless nights, or on an empty stomach, or with a fever, is not quite the same "you" as always. Not because you are fickle — because you are a whole, and when the material base changes, you change entire. ^[45]

4. The body is a living language

Let us now bring into focus the side that concerns us most closely: the one in which **meaning** moves the body. It is the fifth factor of the previous chapter, seen now at work in the whole organism.

Consider the migraine. One and the same attack — the throbbing pain, the spots in the visual field, the nausea, the aversion to light — can be set off by things that have nothing in common with one another: a blow or a swing in pressure (physical); alcohol, nicotine, a thyroid imbalance (chemical-endocrine); fatigue (a reflex of the body); or anger, fear, a disappointment, a worry going round and round (pure meaning). It is many-to-one again: paths as different as can be,

a single response of the whole. And among those paths, on a par with a blow or a poison, stands an unspoken sentence, an expectation, a wrong endured. Meaning sits at the table of the physical factors, because — as we have seen — it *is* a physical factor.

There is, further, a dominance that nature entrusts to tiny glands. A thyroid that works too little, during development, does not slow "a function": it remodels the whole individual — growth, bones, skin, and together with them language, perception, intelligence. A small central gland governs, through a handful of molecules, the unity of the entire body. It is the same lesson as the gradient of Chapter VIII: it is not bulk that commands but the dominant center; and the slightest alteration of it is enough to make the whole system respond.

And then there is the phenomenon that, more than any other, shows that the body *speaks*. In certain disorders the physical symptoms are real and measurable — a paralysis, an area that has lost feeling, a voice that fades out — but their distribution does not follow the anatomical map of the nerves at all: it follows a **symbolic** map. The part that becomes paralyzed, the zone that loses sensation, the word one stumbles over in a stammer correspond to a *meaning*, not to a nervous territory. The body, here, does not break down at random: it expresses itself. It draws upon the flesh the shape of a meaning that can find no other road. This is why one can say, quite literally, that **the body is a living language** — and, when the meanings that inhabit it are in conflict or distorted, a faithful map of our incoherent meanings. Not "imaginary": entirely real, and legible, provided we stop looking only for the lesion and begin to read the sense. ^{[46][47]}

Hold together the three levels we have crossed — the colloidal base of the previous chapter, the dominant semantic center of Chapter VIII, and now the organism that responds as a whole — and you will have the heart of this whole first part of our inquiry: you are not a mind perched on a machine. You are a single living being, material from head to foot, whose highest function works with symbols — and in whom, therefore, what you do to meanings you do to the flesh, and the reverse.

5. The consequences in 2026

For almost a century this view was treated as a suspect oddity. Today it is the liveliest frontier of medicine and psychology — and with it return, magnified, the risks of not understanding it.

Medicine stitches body and mind back together. "Psychosomatic" is no longer an accusation of faking: it is a chapter of physiology. We can measure the nocebo effect — real symptoms produced by the expectation of harm — and its twin, the placebo effect; we know that the gut and the brain are in ceaseless dialogue, that lifestyle (sleep, movement, food, relationships) alters the course of illnesses once called merely "organic." It is the organism-as-a-whole become clinical practice: one treats the person, not the isolated organ. The paper roses, a century later, are in the textbook.

The industrialized nocebo. If a mere belief is enough to unleash a full bodily reaction, then an environment that administers to you, all day long, predictions of harm, cheap diagnoses, and alarms about what you eat, breathe, and are, is an environment that administers nocebo in continuous doses. The headlines announcing catastrophe,

the influencers selling the disease of the moment, the algorithms that reward fear: each of these is a bouquet of paper roses held out from behind a screen. The body does not tell the difference: it reacts to the reading. And it reacts, as always, entire.

The trap of separating again. Alongside the rediscovery of unity lives its opposite: a culture that returns to breaking the human being into optimizable pieces. On one side, those who treat every distress as a pure chemical defect, to be corrected with a molecule, ignoring the meaning that feeds it; on the other, those who treat every illness as a pure "matter of the mind," to be resolved with the right thoughts, ignoring the matter. They are the same error from two sides: cutting in two what is a whole. The principle of this chapter is the defense against both — because it states that there is no "over here" and "over there," but a single living being in which every cause, physical or semantic, becomes the response of the whole.

And here, for the last time in this first arc of the volume, the stakes descend from the general to the personal. Knowing that you are a whole changes the way you treat yourself. It means no longer reproaching yourself for "being weak" when a bad night makes you another person, and recognizing that you have changed condition, not worth. It means remembering, when a piece of news tightens your stomach, that there is a hidden observer in that tightening — and that putting it back into the sentence gives you a grip again. It means treating sleep, food, the words you repeat to yourself, and the images you expose yourself to not as accessories, but as what composes you, day after day. You are not a mind that owns a body. You are a whole in the making, and one that — knowing it — can begin to make itself better.

6. Practical exercises

This chapter is measured by your capacity to treat yourself as a whole, and to recover the observer wherever the language had made it disappear. Five protocols.

Exercise 1 — Put the observer back in the sentence

For one day, hunt down the sentences in which a property is glued to an object: "this is boring," "he is unbearable," "that news is depressing." Rewrite them by restoring the hidden observer: "*I am bored* by this," "*I can't stand* his way of...", "*I feel low* when I read that news." Notice where, all at once, a grip reappears that you did not have before.

Exercise 2 — The condition, not the character

The next time you judge yourself "irritable," "listless," "down in the dumps," before taking it out on your character make an inventory of your *condition*: how much you slept, when you last ate, how long you have been sitting still, what you read in the last hour. Often you will find that "who you are" has not changed: your material base has changed, and you have responded entire. Correct the condition before you put the character on trial.

Exercise 3 — Hunt for the many-to-one

Choose an outcome you care about (sleeping well, working with concentration, feeling at peace at the end of the day) and, instead of looking for its *single* cause, list the many paths that converge on it: light, food, movement, relationships, words, screens. Then act on two

or three paths together. It is the many-to-one principle turned to your advantage: not a switch, but a system.

Exercise 4 — Recognize the nocebo

For one week, every time a prediction of harm (a headline, a symptom read online, an alarm) provokes a bodily reaction in you, stop and name it: *it is a bouquet of paper roses*. The reaction is real, but the object is not. Then observe: if you shift the reading, what does the body do? Not to deny the real risks, but so as not to administer nocebo to yourself for nothing.

Exercise 5 — Treat your ingredients as ingredients

For three days, treat sleep, food, movement, the words you say to yourself, and the images you expose yourself to as the ingredients that, literally, compose you day by day. Note down just one of them that habitually worsens your "whole," and change it. Observe the effect on the whole, not only on the part. It is the organism-as-a-whole applied to your everyday life.

7. In summary

The central points of this chapter, to hold on to as we close the first arc of the volume:

1. **The organism responds as a whole.** The paper roses unleash a complete attack — eyes, membranes, vessels, breath — with nothing chemical at all: a single meaning moves the whole. Not a sum of parts, but a single system.

2. **There is always a hidden observer.** It is not "the roses" that make him sneeze: it is the patient's reading. Language erases the observer and glues the property to the object. Putting it back into the sentence — "I react to my reading" — is to recover a grip.
3. **Function is not shut inside an organ.** The brainless flatworm still rights itself; cut in two, its halves stay coordinated. The brain speeds and sharpens, but the capacity to respond belongs to the whole. The whole comes before the part.
4. **Memory is a configuration of the whole, not a file in an organ.** The earthworm without its front segments keeps the habit; it loses it only when it regenerates the brain. It is living matter holding the form of what has passed through it — the resonance of the previous chapter.
5. **The organism responds to global conditions.** Change the chemistry of the water and the jellyfish changes its behavior; change your sleep or your blood sugar and the whole of "you" changes. Not a detail: the condition, and with it the whole.
6. **Cause and effect, in the living, are many-to-one.** Cod-liver oil or sunlight cure the same rickets: hunting for the single cause is often the wrong question. The outcome keeps the general fact and lets fall the path — an abstraction, to be reopened toward the many paths that converge.
7. **Nutrition shapes body and mind together.** A purely "physical" deficiency transforms an animal's behavior and even its maternal instinct — and reversibly. The arrow that runs from body to mind meets, in the middle, the one that runs from the roses to the body.
8. **The body is a living language.** Where symptoms follow a symbolic and not an anatomical map, the body does not break down: it expresses itself, drawing upon the flesh the shape of

meanings in conflict. Real and legible, provided we stop looking only for the lesion.

9. **A single living being, not a mind on a machine.** Colloidal base (Chapter IX) + dominant semantic center (Chapter VIII) + organism responding as a whole (here): what you do to meanings you do to the flesh, and the reverse.
10. **Knowing is not yet applying.** None of this becomes sanity until it is practiced: first the datum, then the word; first the condition, then the judgment; first the whole, then the part. It is a realignment of function to be trained, not a notion to be possessed.

You are not a mind set upon a body: you are a single living being that speaks the language of meanings. This is why meanings weigh upon the flesh — and why, by recovering the hidden observer in every reaction, you stop being a spectator of your condition and become its operator.

Closing the first arc of the volume

We set out, ten chapters ago, from an uncomfortable observation: in our nervous reactions, far too often, **we still copy the animals** — we react to the signal as if it were the fact. From there we have followed a single thread, tight, without ever letting it go.

THE THREAD OF THE FIRST ARC

I we are not animals: at times we copy them (the imitation game)

II the mechanism of the copy: semantic reactions,

the unsayable

III collective infantilism – and the time-binding
that redeems it

IV structure is the only content of knowledge: the
map is not the territory

V mathematics as the imprint of the structured mind

VI the symbol against the noise: what it truly
represents, what it does not

VII the revision: from "the" to "a," from additive
identity to function

VIII epistemology: function generates the organ; the
semantic center dominates

IX the material base: you are a colloid, and the
word is the fifth physical factor

X the organism-as-a-whole: the whole responds, the
body is a language

Look at it whole, now. We began with imitation and we have arrived at the flesh: and the journey has been, from beginning to end, a single movement — restoring the natural order where we had inverted it. First the fact, then the word. First the structure, then the theory. First the datum, then the judgment. First the whole, then the part. What we call sanity is not a list of virtues: it is a nervous system that has found its own order again — and because it is a mechanism, and not a gift, it can be trained.

But a distance remains, and this chapter has named it: **knowing is not yet applying.**^[48] We have described *what* must be corrected and *why*. We have not yet built the fine instruments — the structural factors of language, the grammar of order and relations, the way mathematics mirrors at once the world and the nervous system — with which this realignment stops being a good idea and becomes a

practicable discipline. That is the work of the second half of this volume.

Its second arc — the **architecture** named in this volume's own title — takes up exactly from here. If in these first ten chapters we have laid the foundations — the difference between signal and symbol, structure as the only content, the whole organism — in the chapters that follow we enter the architecture: function and order as the factors that give shape to thought; relations as the raw material of reality; the notions of infinity and of cause refounded; space, time, and matter rethought from their roots; and finally mathematics as the language that mirrors, in a single gesture, the structure of the world and that of our nervous system. Where here we have learned *that* the map is not the territory, there we shall learn to *build better maps*.

For now let it be enough to recall the point from which everything set out, and to which everything has returned, now that we know it weighs all the way into the flesh:

We are not animals: at times we copy them. And what is copied — individually and collectively — can cease to be copied.

Notes

Chapter XI — On Function

You are in the shower. You nudge the dial a hair toward the red and, a moment later, the water warms; you ease it back, and it cools. You do not even think about it: the hand corrects on its own, because you

can feel that the temperature *depends* on the position of the dial. A little further this way, a little warmer. It is a relation — and you know it with your body before you know it with your head.

Your whole day is built this way. The total at the checkout depends on what you put in the cart; the delay, on how much traffic you meet; the evening's mood, on how much you slept the night before. Look closely and you almost never see separate, immobile "things": you see **dependences** — threads tying one thing to another, so that moving one end moves the other. There is an old and precise name for this way of seeing the world, and it comes from mathematics: it is called a **function**. A function is not a thing: it is a dependence — the bond by which, given the one, the other is determined.

Have you ever wondered why, then, the moment we pass from dials to *words*, we suddenly forget this way of seeing?

In front of the shower nobody debates whether "hot" is a fixed property: everyone feels that it depends on the dial. But in front of words like *freedom*, *justice*, *science*, *safety* we behave in exactly the opposite way: we treat them as dials *locked* on a single setting — our own — and then quarrel endlessly with those who have locked them on another. The first arc of this volume laid the foundations: the difference between signal and symbol, structure as the only content of knowledge, the organism-as-a-whole. With this chapter the volume enters its second arc, and the task changes: we now build the **architecture** — the structural factors out of which a language cut to the measure of reality is assembled. And we start with the first brick, the one that carries all the others: learning to see, and to handle, words as what they are — not fixed labels, but dials with many settings.

In Chapter VII we caught sight of the decisive passage: from the absolute *the* — *the* truth, *the* solution — to *a*, one among the possibles. The function is the exact form of that passage: the way mathematics, the best-made language we possess, thinks in relations instead of immobile things. Let us see.

1. The function: seeing by dependences, not by things

Let us begin at the heart, in plain language. A quantity is said to be a **function** of another when, once the first is fixed, the second is thereby determined. The area of a rectangle is a function of its sides: choose the sides, and the area is settled. The distance covered is a function of the speed; the volume of a gas, of its temperature and its pressure; the prosperity of the umbrella seller, of the rain. In symbols we write $y = f(x)$, which reads "y is a function of x": tell me x, and I will tell you y.

There is a small asymmetry here, worth noticing because it is not absolute. We call x the **independent** variable — the one to which we may give whatever value we please — and y the **dependent** one — the one that follows. But this is a convenience of choice: the dependence is mutual, and according to the problem we may turn the dial from either end. What remains — and what changes the way of thinking — is that the object of our interest is no longer "the thing," but the **bond** between things.

TWO WAYS OF LOOKING AT THE WORLD

by fixed things (old)

by functions (new)

"the heat"	heat = f(dial
position)	
"the price"	price = f(demand,
supply, ...)	
"the mood"	mood = f(sleep,
food, context, ...)	

$x \longrightarrow [f] \longrightarrow y$
what you choose what depends on it

Not separate, immobile objects: THREADS of dependence.

This is the direct thread back to the first arc of this volume. There we distinguished the **additive** way of speaking — the thing "has" a property, as if it were a possession — from the **functional** way — the property *happens* inside a network of relations. The mathematical function is that functional way brought to its most limpid form. And it is the entrance door to the entire architecture we shall build: because what is real in a system is not the parts taken alone, but the relations that bind them and the function that emerges from them. Relations come first. [\[49\]](#)

You can see it already in the most innocent of formulas. "One plus one makes two," $1 + 1 = 2$, looks like a truth that sits there on the page by itself, independent of everything. It is not so. Those black signs on white paper are the product of a three-term relation: there is someone who traced them — call him Smith —, there are the signs, and there is someone who reads and understands them — call him Brown. The signs, taken alone, mean nothing: they would not exist without a Smith who writes them, and they would be worth nothing

without a Brown who grasps their use. The only relation that counts is the one between Smith and Brown; the signs are merely the bridge. It is, once again, the ternary structure of Chapter I — a content, a form, an observer — and the hidden observer of Chapter X: here too we believe the meaning to be "in the signs," when it lives in the relation between the people who use them. Keeping this three-term relation in view makes the analysis harder, but it is the only honest way: it follows of necessity from having rejected the "is" of identity.

2. Words are variables, not constants

To understand the function we must understand the **variable**, and this is where mathematics hands us its greatest gift for everyday life.

A variable, in its precise sense, is a symbol that may take any one of many values: an open container. The mathematician's x is like a glass into which one liquid or another may be poured. And attend to a subtle point, because it changes everything: **the variable does not change by itself**. It is not a restless entity that varies on its own account; it is a set of still possibilities among which *someone* chooses. The change is not in the x : it is in the hand and in the intention of whoever pours. As long as you do not choose, the x stays open; the moment you choose a value, the x is fixed and becomes a **constant** — a glass with one possible content only.

Now the leap. Most of the words we use for the things that matter — *humanity, science, man, education, ethics, politics, freedom*, but also *iron, wood, apple, object* — *are not one-valued constants*. They are variables. They are names for stages of processes, and they change content with every use, every epoch, every context. "The apple" is

not a fixed object: it is a container that fills, each time, with a different apple, seen by a different observer, for a different purpose. The "science" of 2026 does not have the same content as the "science" of 1800. To treat one of these variable-words as if it were a constant — as if *freedom* had *one* fixed value, mine — is the root error from which nearly all the others grow. It is the old identity, the "A is A," returning in disguise: mistaking an open container for today's content.

There is a way of thinking that defuses the error, and mathematics has practiced it from the beginning: the **extensional method**.

Extensional means dealing with many distinct, real individuals — this one, and this one, and this other one — instead of a single label that swallows them all. In mathematics they are the numbers taken one by one (1, 2, 3...), each with its own name. In life it is the recognition that every person, every event, every apple is unrepeatable, and that the word — always a high-level abstraction — inevitably leaves something of them out. It is the lesson of Chapter IV, seen from within: whenever we speak, we never grasp the individual entire. Knowing *which* part we are leaving out, and remembering that we leave it, is half of sanity. The container is not the liquid; the variable is not the value; the word is not the thing.^[50]

3. True, false, or meaningless: the propositional function

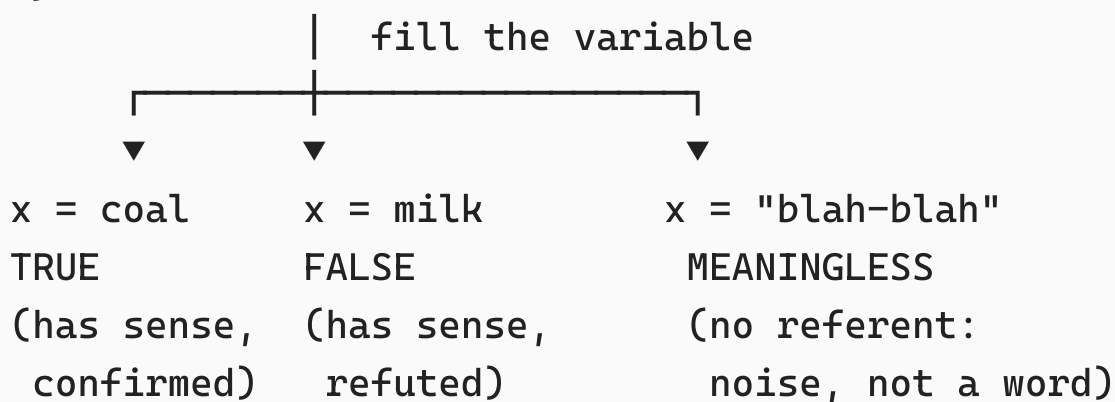
Put function and variable together and we obtain the sharpest instrument of this chapter. Take a statement that contains a variable not yet filled — for instance, "x is black." A sentence of this kind has a name: it is a **propositional function**. And it has a property that

catches us off guard: **it is neither true nor false**. It is ambiguous, because as long as the x remains empty it does not yet say anything definite. To argue over whether "x is black" is true or false is time wasted: the two terms simply do not apply.

Everything changes the moment you fill the variable. Assign x the value "coal" and you obtain "coal is black": now it is a proposition, and a true one at that. Assign "milk" and you obtain "milk is black": again a proposition, this time false. But there is a third outcome, and here a theme from Chapter VI returns. Assign to x a sound that represents nothing — "blah-blah is black" — and you obtain neither the true nor the false: you obtain a sentence **devoid of meaning**. It is not false: it is empty. It is the noise dressed up as a word we spoke of there — the perfect form with no content.

THREE OUTCOMES, NOT TWO

"x is black" ← propositional function (x still empty: neither true nor false)



Nearly all disputes live in the two outer boxes: "x still empty" and "meaningless". There, agreement is impossible.

Here is the consequence that is worth the whole chapter. In everyday life, most of our difficulties do *not* arise in the territory where "true" and "false" hold — where, after all, one can check and come to agreement. They arise in the immense territory of propositional functions left open, and of meaningless sentences mistaken for statements. "Freedom is a right," "foreigners are a problem," "science has proved that...": these are almost always unfilled variables — *which* freedom, *which* foreigners, *which* science, when, under what conditions — that we treat as if they were one-valued propositions, already true or already false. And since over an open variable one can argue forever without concluding, we stand there shouting each our own value, convinced we are talking about the same thing. To tell a full sentence from an empty one, and an open variable from a closed proposition, is not logical pedantry: it is semantic hygiene of the most powerful kind there is — and, quite literally, a condition of sanity, because treating empty sounds as full symbols is exactly what, in its extreme forms, produces delusion.^[51]

4. The date that dissolves absolutes

If nearly all our important words are variables, and nearly all our sentences are ambiguous propositional functions, we seem to have walked into a blind alley: how does anyone come to agreement about anything? The answer is of a surprising simplicity, and it is a tool you can adopt today. To turn an ambiguous propositional function into a checkable proposition, it is enough to **fill the variables** — and the most economical way to do so is to add **coordinates**, beginning with the simplest of them all: the **date**.

"Science says that..." is a propositional function: it holds, tacitly, "forever," and for precisely that reason it holds at no definite moment. "Science, *in 2026*, says that..." is another matter: it has become a proposition — bounded, dated, and therefore at last checkable and open to discussion. The science of 2026 is not the science of 1800, nor that of 300 B.C.; the moment you declare it, you stop claiming an eternal truth and assert something that can be verified. It looks like a typographical detail. It is instead a deep change in the way the mind handles what it says.

THE DATE DISSOLVES THE ABSOLUTE

"science says..."		"science, in
2026, says..."		
propositional function	→	proposition
holds "forever"		holds at these
coordinates		
ambiguous, beyond dispute		definite,
checkable		
claim of INFINITE validity		validity bounded
in time		
(tacit) = absolutism		and conditions =
"a", not "the"		

What the date abolishes is a hidden infinity: the old claim that a "general" statement held good for an infinite number of years to come. For centuries some men believed they were dealing in "eternal verities," never noticing that those verities were made of words — and mostly of the words of an ancient language mirroring the presumed structure of the world of two thousand years ago. Dating a

statement is the gesture that brings the feet back to the ground: not "so it is and shall be," but "so it appears, here, now, with this information." It is also the cleanest antidote to absolutism — and to an error that follows absolutism like its shadow. When we fight an absolute, we almost always plant another in its place: a militant atheist is, at the level of mechanism, as rigid as the fanatic he fights; he opposes a dogma to a dogma. The way out is not to choose the right absolute: it is to stop speaking in absolutes altogether — to give a date and conditions, and to return to handling a value among the possibles instead of *the* value forever. It is Einstein's semantic hygiene from Chapter VII made daily practice: changing the way of saying in order to be able to see the fact.

5. The hidden structure beneath doctrines

One last step remains, and it is the one that opens the entire architecture of the volume. So far we have spoken of single sentences. But sentences organize themselves into **doctrines** — bodies of ideas, theories, schools of thought — and doctrines too have a structure, usually invisible to those who live inside them.

Beneath every doctrine, in fact, there lies a skeleton of starting assumptions — call them its **postulates** — from which everything else descends. A set of such assumptions, together with all that follows from it, is what we call the **structure** of a doctrine (in technical terms, its *doctrinal function*): not its particular content, but the network of relations that carries it. The same skeleton can dress itself in different contents: change the examples, change the names, and from a single structure many apparently different doctrines are born.

This is why, if you want to understand a doctrine truly — and above all to compare it with another — you must not stop at what it says: you must climb back to the skeleton that generates it. In mathematics this is done all the time; outside mathematics almost never — which is why we so often quarrel between positions that have the *same* structure without noticing it, or believe positions similar that are structurally opposed. When a structure is large enough to carry an entire field — we shall then call it a **system-function** — it governs the thinking of everyone who works inside it, whether they know it or not. All the schools of psychotherapy prior to a certain turning point, for instance, however fiercely they quarreled with one another, rested in fact on a single underlying structure: variations on one theme.

And here comes the most important idea, the one we shall use through the rest of this volume. How do we tell what in a doctrine is *real* from what is merely an accident of the language in which it is expressed? One does a single thing, but a decisive one: one **translates**. Reformulate the same problem in different languages, built on different structures, and watch what survives. What stays the same across all the translations is **intrinsic** — it belongs to the thing itself, not to the way of saying it; we call it an **invariant**. What changes from one formulation to another was only an ornament of the particular language, and can be dropped without loss.

WHAT SURVIVES TRANSLATION IS REAL

same problem, stated in three different languages:

language A $\neg$
language B $\dashv$ $\rightarrow$ what stays the same = INVARIANT
(real, intrinsic)

language C — what changes = accident
of the language

method: keep the systems separate → develop each
to the end
→ only then translate → see what
survives.

This method — keep the systems separate, develop each in its own terms to the end, and *only afterward* look for the translations — is also a hygiene against one of the most frequent of errors: mixing, from the outset, words drawn from incompatible structures, and obtaining a muddle in which the invariants vanish and the properties of the language are mistaken for properties of things. The golden rule is simple: one system at a time, then the comparison. This is how the history of science has actually advanced: not by the piling up of isolated facts, but by the appearance of new structures — relativity, the new quantum physics, the revision of the foundations of mathematics, the colloid science of Chapter IX — each of which offered a new language and, with it, brought out invariants that no one before could see.

One last thing, lest all this be taken for an exercise for cold heads. Even the most abstract thought is a fact of the whole organism. It has been measured that while a person works through a mathematical problem, the body traces its own "emotional curve" — a genuine physiological reaction. The old idea that science is a purely "intellectual" affair, separate from feeling, is a residue of that habit of breaking the human being into pieces which the first arc of this volume dismantled. It is the principle of the organism-as-a-whole, met again where you would least expect it — among variables and

functions. To hold together the structure and what the structure does to the body of whoever uses it is not an extra: it is the condition on which a theory of sanity can be, in earnest, a theory of *health*.^[52]

6. The consequences in 2026

No chapter of this book is more topical than the one on the function, because 2026 is the time in which open variables and empty sentences have become an industry.

"Science says so." It is the propositional function par excellence of our age: a variable — *which* study, by *what* methods, under *what* conditions, at *what* date — passed off as a one-valued constant, and an eternal one into the bargain. It works as a weapon in both directions: whoever wants to close a discussion invokes "science" without coordinates, and whoever wants to deny science exploits precisely that absence of coordinates to declare that "then it is all opinion." The cure is the same in both cases, and it is the gesture of this chapter: fill the variable and date it. Not "science says," but "this study, in 2026, with this method, on this population, shows this."

Banner-words. Public debates are fought almost entirely over locked variable-words: *freedom*, *security*, *merit*, *nature*, *rights*. Each side uses them as one-valued constants — its own value — and the algorithms that organize our attention reward exactly this: the collision between incompatible values of the same word produces more reaction, and therefore more visibility, than any attempt to fill the variable and date it. The result is a permanent noise of propositional functions treated as truths, where agreement is structurally impossible — not because people argue in bad faith, but

because they are turning different dials while believing it is the same one.

The machines that talk. Generative language models are, in a precise sense, factories of grammatically perfect forms whose meaning depends entirely on the variables that the reader, alone, fills in. They produce sentences impeccable in structure that may be full, false, or empty according to the referent — and it is the reader, often without knowing it, who assigns the values and decides whether what he holds is a symbol or a noise. This chapter offers exactly the grid for not being fooled: to ask, before every output, *to what field does this refer, with what coordinates — and has the variable been filled, or only left to sound well?*

And here the stakes descend, as always, from the general to the personal. The sentences you repeat to yourself about yourself — "I am not a capable person," "it is too late," "I am made this way" — are nearly all propositional functions with a locked variable and no date: absolutes disguised as facts. Capable of *what*, under *what* conditions, at *what* date? Learning to fill your own variables and to date your own judgments is not optimism: it is restoring to checkable form what habit had fixed into an absolute. It is ceasing to say *the* me and beginning to say *a* me — at these coordinates, today.

7. Practical exercises

This chapter is measured by your ability to recognize, and then to fill, the variables hidden in everyday sentences. Five protocols.

Exercise 1 — Hunting dependences

For one day, try to restate five things that happen to you in the form "y depends on x." Not "I am in a bad mood," but "my mood depends, today, also on how much I slept and on what I ate." Not "the project is late," but "the delay depends on these three things." Seeing by dependences, instead of by fixed states, hands you back, each time, a dial on which you have a grip.

Exercise 2 — The container and the content

Choose a word you use often and with weight — *success*, *respect*, *love*, *security* — and write down three different contents you have given it at three different moments or contexts of your life. You will notice that it was a container, not a thing. The next time you use it in a discussion, try declaring which content you are using now.

Exercise 3 — True, false, or empty?

For one week, when you meet strong statements (news items, slogans, cutting opinions), sort them into three boxes: this is a checkable proposition (true or false); or it is an unfilled variable (useless to quarrel over until we fill it); or it is a sentence without a referent (a sound that seems to say something). Merely naming the box cuts the urge to react by half.

Exercise 4 — Put in the date

For one day, every time you are about to make a "general" and "absolute" statement, add to it, mentally, a date and conditions: *by what I know, today, in this context*. Observe two things: how many "eternal" statements turn out to be true only at a date, and how much tension discharges the moment you stop claiming the "forever."

Exercise 5 — Climb back to the skeleton

Take two positions that seem opposed to you (two parties, two schools, two pieces of advice) and try to write down, for each, the two or three starting assumptions from which all the rest descends. Often you will discover that they share the skeleton and quarrel over the furnishings, or that they rest on two incompatible skeletons that no one had ever declared. It is the beginning of comparison between structures instead of between slogans.

8. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **A function is a dependence, not a thing.** $y = f(x)$: given x , y is determined. To see the world by functions is to look at the *bonds* between things, not at isolated objects — the functional mode that Chapter VII already set against the additive one.
2. **Relations come first.** What is real in a system is not the parts taken alone, but the relations that bind them and the function that emerges. It is the entrance door to the entire architecture of this volume.
3. **$1 + 1 = 2$ is a three-term relation.** The one who writes, the signs, the one who reads: the signs alone mean nothing. The meaning lives in the relation between the people, not "in the signs" — the ternary structure and the hidden observer of the volume's first arc.
4. **The important words are variables, not constants.** *Science*, *freedom*, *man*, *apple* are containers with many values, not fixed

things. Treating a variable as a constant — *freedom* with *one* value, mine — is identity returning in disguise.

5. **The variable does not change by itself.** It is a set of still possibilities among which *someone* chooses. The change is in the hand that pours, not in the glass. And the extensional method reminds us that every individual is unique, and that the word always leaves something of them out.
6. **The propositional function is neither true nor false.** "x is black" is ambiguous while the x stays empty. Fill it and it becomes a proposition: true (coal), false (milk), or **meaningless** (blah-blah) — the noise dressed up as a word from Chapter VI. Three outcomes, not two.
7. **Nearly all disputes live outside true/false.** We quarrel over unfilled variables and over empty sentences mistaken for statements: there, agreement is impossible by structure, not by bad faith. Telling the full sentence from the empty one is basic semantic hygiene.
8. **The date dissolves absolutes.** "Science in 2026" instead of "science" turns an ambiguous propositional function into a checkable proposition, abolishes the claim to eternal validity, and defuses absolutism — including the mirror absolutism of those who fight one dogma with another.
9. **Beneath every doctrine lies a skeleton of postulates.** Climbing back to the structure, instead of stopping at the content, makes real comparison possible: sometimes two positions are the same skeleton with different furnishings, sometimes two incompatible skeletons that were never declared.
10. **What survives translation is real.** Reformulate the same problem in different languages: the **invariant** that remains is

intrinsic; what changes was an accident of the language. Keep the systems separate, develop them, then translate. And remember that even the most abstract thought is a fact of the whole organism.

The next chapter (Chapter XII, *On Order*) takes up the second structural factor: how **order** — succession, the before and the after — is not a detail but a constitutive property of reality and of the nervous system, and how putting it in its right place changes what we can know.

The point of this chapter, however, is one. **The important words are not fixed labels: they are dials with many settings. We quarrel because we believe them locked; we understand one another the moment we fill them and give them a date.**

Notes

Chapter XII — On Order

Read three words: "the dog bites." Add one more: "the dog bites the man." It is an ordinary scene, almost a non-event. Now take the very same words — none removed, none added — and change only their places: "the man bites the dog." The world, all at once, is a different one. So different that the second sentence, and not the first, would end up in the newspapers.

Stop for a moment and notice what happened in your body: the first sentence left you indifferent, the second made you raise an eyebrow.

And yet the words were the same. What changed — who acts and who is acted upon, what is ordinary and what is incredible — is in none of the three words. "Dog," "man," "bites" are identical in both cases. What changed lives *between* the words: in their **order**.

Have you ever asked yourself how much of what you call "reality" depends not on the things, but on the order in which they stand?

In the previous chapter we saw that the important words are variables — dials with many settings. Now we add the second factor of the architecture, and we discover something surprising: even with the dials held fixed, the order in which you arrange them changes the result. Order looks like a matter for grammarians — the trivial idea that a, b, c is not c, b, a . It is in fact one of the deepest properties there is. The whole of mathematics rests on it; reality, as we shall see, is made of relations, and every relation is an order; and — this is the point that changes everything — sanity itself is, quite literally, a question of order kept or order overturned.

Let us see, beginning with the "between."

1. Order is a "being-between"

Let us begin with the simplest thing, because it is also the most fundamental. What is order, reduced to the bone? It is knowing that something **stands in the middle** of two other things. If b stands between a and c , then the row $a-b-c$ is one thing, and the row $c-b-a$ is another. That is all. It is so elementary that it cannot be explained in simpler words: order is one of those ultimate bricks of

thought that we take as given and declare openly, like a rule of the game written on the table before we begin.

And yet on this brick an enormous edifice stands. The row of numbers — 1, 2, 3, 4 — is an ordered series: to count *is* to put in order. A sequence of names without relations — "Smith, Brown, Jones" — says nothing yet; but add a bond, an order — "Smith kicks Brown" — and a scene is born, with a *before* and an *after*, a who and a whom. The bond you added is not the name of a thing: it is the name of a **relation**. And here is the heart of the chapter, and the thread that ties it to the last one: a relation is always, at bottom, an order. "Between," "before," "greater than," "cause of" — these are all ways of saying that something stands in a certain place with respect to something else.

ORDER LIVES BETWEEN THE ELEMENTS, NOT IN THEM

the same elements		order A
order B		
{ dog, man, bites }	→	dog→bites→man ≠
man→bites→dog		
		(non-event)

(front page)

identical ingredients, gestures in a different
order → cake or disaster
the same notes, a different order → melody or
noise

Change the order without touching the elements:
everything changes.

This brings us to a conclusion we shall use throughout the volume. In Chapter IV we said that of a thing we know and transmit not its essence, but its **structure** — the web of its relations. Now we can say something more precise: structure, in its turn, reduces to *order*. To know the structure of something means to know what stands with what, in what order, with what bonds. This is why a language built on order and on relations — such as mathematics — is the one that fits reality most closely: because reality *is* a fabric of ordered relations, and "to exist," for anything whatever, means to exist *in relation* with something else. There are not things first, which only then enter into relations: there are relations, and things are the nodes they form. Relations come first — and every relation carries an order with it. ^[53]

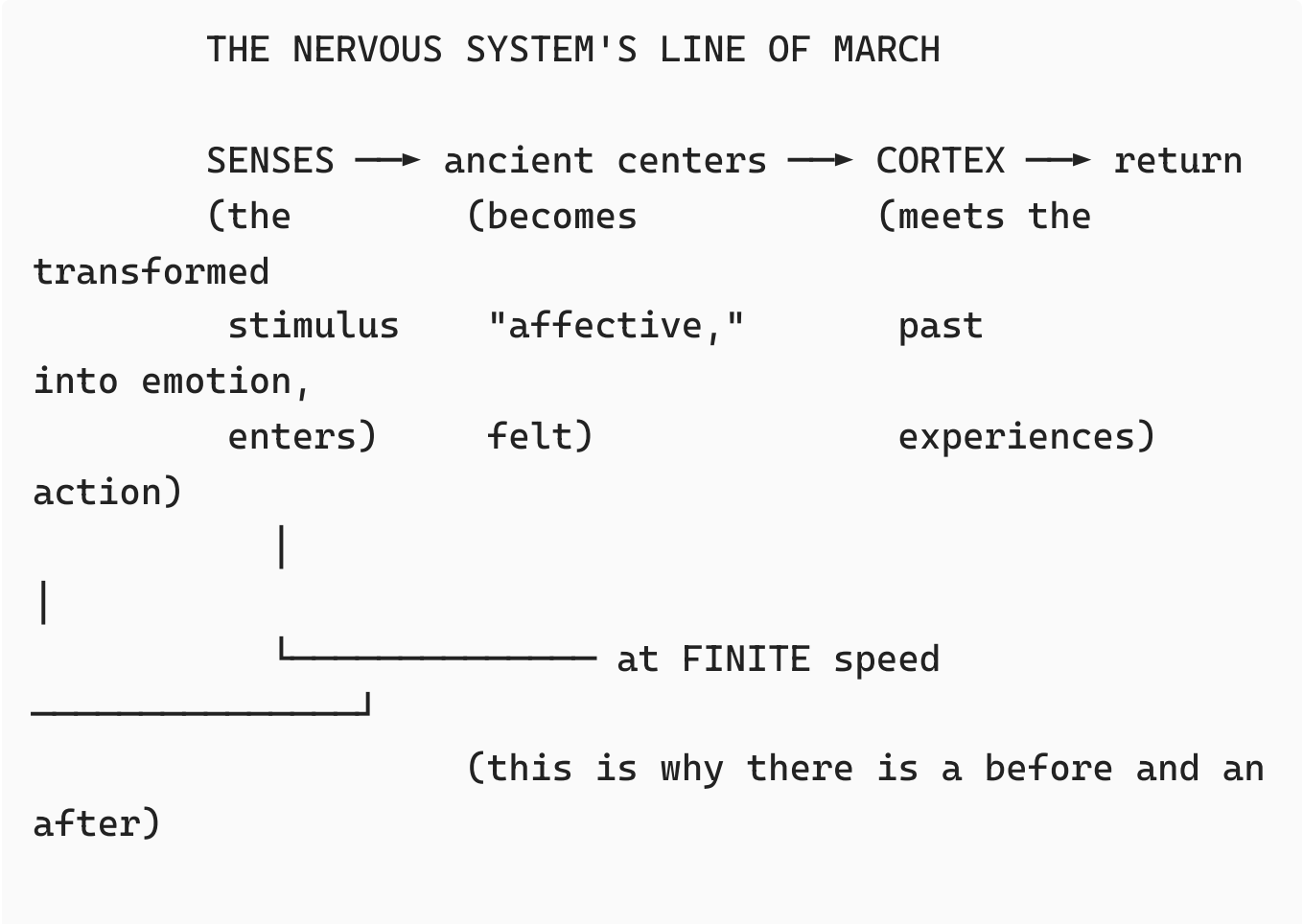
2. The body is made one-way

If order were only a property of sentences, it would be the grammarians' affair. But order is carved into the flesh. Your nervous system is not a sack in which everything happens at once: it is a machine that imposes, physically, a before and an after. And the reason is of a disarming concreteness.

For a long time it was imagined, without saying so, that certain things happened "instantly," at infinite speed. This is false, and the falsehood shows most clearly in the nervous system itself. Nerve impulses do not run instantaneously: they travel at a **finite** speed, a hundred meters a second at most. From this single fact everything follows. If a signal takes time to go from one point to another, then things happen *in order*, one after another, and not all together. Finite speed *creates* the sequence. And the points of contact between one

neuron and the next — the synapses — let the signal pass in one direction only, like one-way doors: again, a before and an after, written into the structure.

From this a natural direction is born, an obligatory line of march. A stimulus enters through the senses, reaches first the ancient, deep centers — where it takes on affective tone, becomes "felt" — then climbs to the cortex, the "new brain," where it meets the deposit of past experience, and from there descends again, transformed, until it becomes what we call an emotion or an action. Think of a bad meal: a disturbance starts from digestion, climbs along this ordered path, meets your memories and your interpretations at the cortex, and anything at all may come out — a bad mood, a quarrel, or, who knows, a page of poetry. The same impulse, according to *what it meets and in what order*, becomes the most different things.



Not a passive tube: a trigger. The stimulus does not "pass through,"
it springs a mechanism that releases energy already primed.

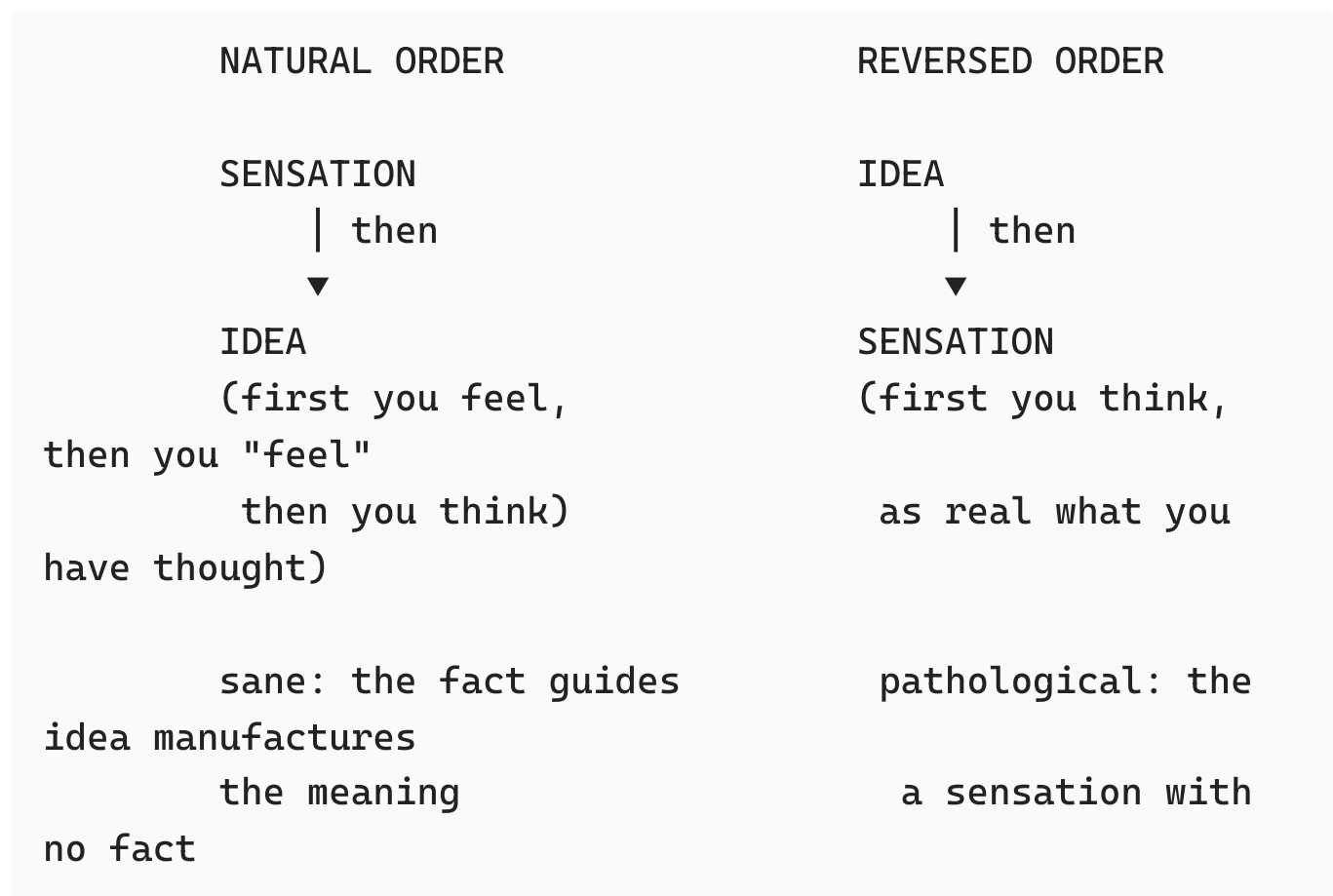
It is worth correcting a wrong image at once. The reflex is not an open tube into which the stimulus enters at one end and leaves at the other. It is rather a **trigger**: the stimulus does not "pass through" anything, it springs a mechanism that releases an energy already accumulated and ready. The brain does not undergo: it acts. And it acts with a combinatorial richness that makes the head spin — with its tens of billions of cells connected to one another, the number of possible configurations far exceeds the number of atoms in the whole known universe. This boundless machine, however, works *in order*. When the order is altered, everything is altered: think only of how a poison that lowers the resistance of the nerves everywhere turns a mild stimulus into a convulsion of the whole body — a sign that, underneath, every part is bound to every other in a single ordered weave. It is, on the physiological plane, the organism-as-a-whole of Chapter VIII: not separate parts, but a single tissue in which what counts is where the signal arrives, and at what moment. ^[54]

3. The natural order, and what happens when you overturn it

We come now to the point that justifies the whole chapter, and it is also the most practical. That line of march — from the senses, below, up to the idea, above — is not an anatomical detail: it is a **natural order of survival**. First the sensation, then the meaning; first the

datum that enters through the senses, then the idea that works upon it. It is the same order of sane inquiry we found in Chapter VIII — first the fact, then the theory — here seen from inside the nervous system.

And here is the discovery that runs through this whole inquiry: a great part of human mental suffering is born from **overturning this order**. Instead of going from sensation to idea, we go from idea to sensation: we think a thing, and then we *feel* it as if it were real. In its extreme form, this is the mechanism of hallucination — an inner image treated as if it came from outside. But there is no need to reach the clinic: the same inversion works, in small, in a great many of our days.



You will recognize the inversion, because you have lived it. The worry that circles at night — "tomorrow will go badly" — and the stomach

that really tightens, though nothing has happened: this is an idea that has manufactured a sensation. It is the same thing that, in Chapter I, happened with the word "biopsy," and that in Chapter X we saw in its pure state with the paper roses — a pure belief that sets off a whole physical reaction. The order had been overturned: the idea preceded and produced the body. The same design governs the small daily avalanches. A curt message arrives from the boss; an interpretation sets off ("I did something wrong"); the interpretation produces the tightening of the stomach and the sharp reply — and at that point something really has happened, but you created it, starting from the idea. The way out is not "think positive": it is to **put the order back**. To return first to the sensation and to the fact — *what has really happened? five words on a screen* — and only then to let the interpretation come. To slide the datum in *first*, and watch the whole avalanche reorganize itself.

Beneath this inversion there lies a subtler truth worth seeing, because it is the root of the map/territory problem. Sensations are never the event: they are already a partial translation of it. A falling stone is not the pain you feel when it lands on your foot; the pain is what your nervous system *makes* of that event, after letting almost all of it fall away — the chemistry of the stone, its inner structure, everything you do not feel. Blow on an eye and you will get a sensation of light: the senses do not photograph reality, they translate it, adding a nuance of their own each time. What we call "seeing" or "hearing" is already the first rung of abstraction of Chapter V — a map, not the territory. And to overturn the order, to treat the idea as if it were the event, is to mistake the map you have made for the territory you have never touched. [\[55\]](#)

4. Differences first, similarities after

There is another way in which order governs the mind, and it explains an enormity of misunderstandings. When the nervous system abstracts — when it grasps only certain traits of a thing and lets the rest fall away — it catches the **differences** first. Every individual is unique: this apple is not that one, this dog is not that dog, this moment is no other. The **similarities**, on the other hand, are not out there ready-made: they are a product of our nervous system, which at a certain point decides to neglect the differences and to put things together. Father and son are never identical; the mother cell and the daughter cell are not either. Similarity is a construction of ours, most useful and most risky.

From here come two opposite ways of handling words, and it is a distinction that, once seen, is never forgotten. I can define a group **by extension** — listing the concrete individuals one by one, each with its own name: "Marco, Anna, Luca." Or **by intension** — indicating a common property that sums them up: "the Italians." The first way respects the natural order: it starts from the real individuals, unique, and keeps them distinct. The second overturns it: it starts from the label and stuffs anyone at all inside, flattening the differences. "All dogs are faithful" is a sentence by intension: convenient, and almost always false if you take it literally, because a single dog is enough to refute it. "This dog belongs to this owner" is a sentence by extension: limited, but true and verifiable. The label "tree" holds the oak, the pine, and the beech together by making you forget how different they are; and this is perfectly fine, so long as you remember that it is a shortcut of yours, not a thing in the world.

TWO WAYS OF GATHERING THINGS

EXTENSION (natural order) (reversed order)	INTENSION
you list the unique individuals a single label	you start from
Marco · Anna · Luca · ...	"the Italians"
you keep the differences differences	you flatten the
limited but verifiable often false	convenient but
Treating the label as if it were the thing = identification.	

The danger is not using labels — it is impossible to do without them. The danger is forgetting that they are labels, and treating the similarity we have constructed as if it were a real thing out there. It is the error we called, earlier in this volume, **identification**: confusing two levels, mistaking the label for the individual, the category for the person, "the foreigners" for those three unique human beings in front of you. It is the abstraction that, instead of preserving the relations that count, loses precisely the decisive one — difference. And when identification becomes the habitual mode of functioning, it does not remain an error of style: it becomes the ground on which prejudice, fanaticism and, in its extreme forms, delusion grow.^[56]

5. The consequences in 2026

No century has had, as ours has, the power to change the meaning of things without changing a single one — simply by reordering them. The chapter on order is, for this reason, among the most current in the book.

Order that rewrites reality. A feed — of news, of posts, of videos — is a sequence, and we have just seen that changing the sequence, with the elements held equal, changes the world described. The algorithms that decide *which* content you see first and which after do not "add" falsehoods: they often show you true facts, but in the order that produces the most reaction. It is "the man bites the dog" applied to what you read all day long: the same reality, reordered, becomes alarm, indignation, fear. To recognize that order is itself a message — and to ask *who* decided that sequence, and why — is one of the most necessary forms of mental hygiene of our time.

The idea that precedes the sensation, on an industrial scale. The inversion of order — thinking a thing and then feeling it as real — has become a business model. Headlines, notifications and previews tell you *what* you will feel before anything has even happened: "here is why you should be anxious," "what is about to happen will frighten you." The body, faithful to its physiology, produces the announced anxiety, exactly as the stomach tightens at the words "tomorrow will go badly." It is nocebo on a continuous cycle: a sensation manufactured out of an idea that someone has put in your head, with no fact behind it.

The illusion of infinite speed. Messages that arrive "instantly," pages that load in a heartbeat, transactions that seem simultaneous: everything, in the digital world, conspires to make us forget that every process happens in order and at finite speed. It is the same old error

of "infinite speed," dressed up as progress. Even a machine that generates text does so one piece at a time, in sequence; even the "real-time" news has crossed an ordered chain of steps, each of which could add or take away. To remember that there is no "everything at once," but always a before and an after, gives back the possibility of slowing down and of looking at the links of the chain.

And here, for the last time, the stakes descend to the personal. Your most recurrent suffering almost always has the shape of a reversed order: an idea about yourself — "I am inadequate," "it will go badly," "they don't want me" — that precedes and manufactures the sensation, until you live as real something that has not yet happened. To put the order back — to return to the fact before the judgment, to the sensation before the idea, to the individual before the label — is not an exercise in optimism. It is to bring your nervous system back to its natural line of march, the one it was made for. And a nervous system that works in the right direction is, as we have said from the very beginning, what we call, quite simply, sane.

6. Practical exercises

This chapter is measured by your capacity to recognize the hidden order in things, and to put it back when it has been overturned. Five protocols.

Exercise 1 — Reverse the order

For a few days, play at reversing the order of sentences you hear or read: "the boss criticizes the employee" / "the employee criticizes the boss"; "the law protects the citizen" / "the citizen protects the law."

Observe how much the meaning changes without the words changing. It is the quickest way to feel, with the body, that meaning lives *between* the elements.

Exercise 2 — Climb the chain back

The next time you react strongly to something (a message, a piece of news, a look), stop and reconstruct the chain in reverse: what did I *feel*? which *idea* arrived right after? did the reaction come from the fact, or from the idea I formed of the fact? Often you will discover that you reacted to your interpretation, not to the event. Recognizing this, by itself, dismantles half the avalanche.

Exercise 3 — The datum first

For one day, before every worry, impose a single step ahead of all the rest: to name the bare *fact*, in physical terms. Not "everything is falling apart," but "I received this three-line email." Returning to the sensation and the datum before the idea is putting the natural order back, and it almost always cuts down to size what the idea had inflated.

Exercise 4 — Extension against label

Choose a label you use often for a group of people ("the politicians," "those people from...", "my family"). Replace it for one day with the concrete names and faces, one by one. Observe how what you feel and what you would say changes. It is the passage from intension to extension: from the label to the unique individuals it was hiding.

Exercise 5 — Who decided the sequence

For one week, when you scroll a feed, stop now and then to ask yourself: why this *before* that? What effect is the order I have been served having on me? Not in order to stop reading, but to remember that the sequence is a message, and that someone chose it. To recover order as an object of attention gives you back a margin of freedom.

7. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **Order is a "being-between."** $a-b-c$ is not $c-b-a$. "The dog bites the man" is not "the man bites the dog": same elements, different order, different world. Meaning lives *between* things, not in things.
2. **A relation is always an order.** "Between," "before," "greater than," "cause of" say where something stands with respect to something else. Adding a bond to scattered names is what turns a list into a scene with a before and an after.
3. **Structure reduces to order.** Of a thing we know its relations, and relations are orders. This is why a language made of order — mathematics — fits most closely a reality that is itself a fabric of relations. Relations come first; things are their nodes.
4. **The body imposes order.** Nerve impulses travel at finite, not infinite, speed, and the synapses are one-way doors: hence a before and an after written into the flesh. The brain is not a passive tube, it is a trigger that releases energy already primed.

5. **There is a natural line of march.** From the senses to the affective centers to the cortex and back: first the sensation, then the meaning. It is the natural order of survival — the same "first the fact, then the theory" of Chapter VIII, seen from the inside.
6. **To overturn the order is the root of suffering.** To go from idea to sensation — to think a thing and then feel it as real — is the mechanism of hallucination and, in small, of the worry that tightens the stomach though nothing has happened. The paper roses of Chapter X were this.
7. **The sensation is not the event.** The falling stone is not the pain in the foot: the senses translate, they do not photograph, and they let almost everything fall away. "Seeing" is already a map. To treat the idea as the event is to mistake the map for the territory.
8. **Differences first, similarities after.** Every individual is unique; the similarities are constructed by the nervous system. It is a useful and risky operation: useful because it makes words possible, risky because it makes us forget the differences.
9. **Extension against intension.** Listing the unique individuals (Marco, Anna, Luca) respects the natural order; starting from the label ("the Italians") overturns and flattens it. "All dogs are faithful" is almost always false; "this dog of this owner" is verifiable.
10. **To treat the label as the thing is identification.** Confusing the category with the person, the constructed similarity with a reality out there, is the error from which prejudice, fanaticism and, at the extreme, delusion grow. To put the order back — the fact before the judgment, the individual before the label — is to bring the nervous system back to its natural direction, that is, to sanity.

The next chapter (Chapter XIII, *On Relations*) takes up the thread left here — a relation is an order — and unwinds it: what relations really are, why they are more real than the "things" we bind together, and how to learn to see the world as a network of bonds instead of a warehouse of objects.

The point of this chapter, however, is one. **Change the order without touching the elements, and everything changes: reality, and your suffering, live in the "between."** To put the natural order back — first the sensation, then the idea; first the individual, then the label — is the very gesture of sanity.

Notes

Chapter XIII — On Relations

"Smith is taller than Jones." Turn the sentence around, swap the two names: "Jones is taller than Smith." The two cannot be true together — one excludes the other. Now try another sentence: "Smith is similar to Jones." Swap again: "Jones is similar to Smith." This time both hold: it is the same thing, said from either side.

You have just discovered, with two sentences and a game of swapping, that relations are not all alike. Some can be turned around without damage: if you are my neighbor, I am your neighbor; if this resembles that, that resembles this. Others do not: if I am older than you, you are not older than me; if I am your father, you are not my father. And precisely the ones that *cannot* be turned — those with a

fixed direction, where everything changes if you invert it — are the most important we have.

Do you ever ask yourself why certain things, in the world and inside you, have a direction that cannot be reversed?

In the preceding chapter we saw that a relation is always an order. Now we look at relations more closely and find that the most precious among them — before and after, greater and less, part and whole, cause and effect — have exactly this: a fixed direction that will not be overturned. And from here we arrive at a discovery that is the hinge of this entire volume: the way of speaking we have inherited — "X is Y" — cannot hold these relations. From that incapacity springs the oldest and most expensive error of the human mind, the one the first half of this volume had only named: **identity**.

Let us see, beginning with the game of turning sentences around.

1. Relations that can be turned around, and relations that cannot

Let us put a little order — the word is apt — into this game. A relation that holds in both directions, that stays true when you swap the terms, is called **symmetric**. "Neighbor of," "spouse of," "similar to," "different from": if they hold between A and B, they hold between B and A as well. For these relations order is indifferent: you may turn them as you please.

There are others that behave in the opposite way. "Father of," "greater than," "before," "above," "part of": if A is the father of B, B is *never* the father of A; if A is greater than B, B is never greater than A.

These relations run in one direction only, and they are called **asymmetric**. For them, order is not a detail: it is everything. To invert them is impossible — and precisely for this reason each of them *establishes* an order. The "before" and "after," the "greater" and "less," the "whole" and "part," which hold up space, time, measure, cause and effect — all are asymmetric relations.

TWO FAMILIES OF RELATIONS

SYMMETRIC (can be turned
direction)

A —similar— B
than → B

↯ holds the other way too
the other way

"neighbor," "spouse,"
"before," "above,"
"different"
of"

order is indifferent
everything
relation
order

ASYMMETRIC (fixed

A —greater

x does NOT hold

"father,"

"part of," "cause

order IS

→ every asymmetric

establishes an

Keep this difference in mind, because everything that follows turns on it. The relations that really matter — the ones that give the world a direction, that build the series, the scales, the successions, and that let us say *which* comes first and *which* is greater — are asymmetric. And asymmetric relations, as we shall see at once, are exactly the

ones our everyday language cannot hold. Here the first arc of this volume — where we said that "to exist means to exist in relation" — joins the present one: for it is not enough to say that everything stands in relation. One must be able to say *in which direction*.^[57]

2. Why "X is Y" is not enough

We come to the heart of the chapter, and to the deep justification of a move that earlier in this volume we had only proposed: replacing the "is" of identity with a language of relations.

The way of speaking we have inherited is built of subject and predicate: "X is Y." "The rose is red," "Smith is tall," "the water is cold." This form can do one thing only: fasten a *property* onto a subject. And it works perfectly well, so long as we are dealing with properties — that is, with symmetric relations. "Smith is tall" and "Jones is tall" say that both possess the property "tallness"; "they are different" says that they possess different properties. Everything holds.

But try to say, in this language, that *Smith is taller than Jones*. If you confine yourself to "Smith is tall" and "Jones is short," you have lost the link; if you say "they are of different heights," you have said something true but incomplete — because "different" is symmetric, and it leaves open the possibility that Jones is the taller, which is false. The only way to tell the truth is to name the *direction*: who is taller than whom. And that direction — the asymmetric relation — the form "X is Y" cannot contain. We can state properties; we cannot state the relations that have a direction. Yet these, as we have seen,

are precisely the ones that hold up everything that counts: before and after, greater and less, cause and effect.

THE CAGE OF "X IS Y"

can say properties		CANNOT say
relations		
(symmetric relations)		with a direction
(asymmetric)		
"Smith is tall"	x	"Smith is taller
than Jones"		
"Jones is short"		(if you say only
"they differ,"		
"they are different"		you stay open to
the false:		
		that Jones is
the taller)		

The things that count – before/after,
cause/effect, part/whole –
are asymmetric, and the cage of "X is Y" does not
hold them.

This is why, in Chapter VII, turning "X is Y" into "X **behaves as Y under these conditions**" was not a softening but a structural correction: it was the passage from a language that can only glue on properties to one that can hold relations and their directions. And one case above all shows to the very bottom how much the old language deceives us — the case of the observer. When you say "the leaf is green," you speak as if greenness were a property lodged in the leaf. But green, as we saw in Chapter IV, is born of a relation among the leaf, the light, and your nervous system — and that relation is

asymmetric: the leaf appears green *to you*, but you do not appear green *to the leaf*. The direction cannot be turned. To say "the leaf is green," erasing the observer and the direction, is exactly the hidden observer of Chapter X, written into the grammar itself. Everyday language makes us treat fixed-direction relations as if they were properties of things — and this small error of form, repeated a million times, is the root of an enormous error.^[58]

3. The identity that does not exist, and the identification that makes us ill

The enormous error bears an ancient and venerated name: **identity**. It is the old "law of thought" that still sits in the textbooks — "everything is identical with itself," "A is A." It sounds so obvious as to deserve no attention. It is, instead, simply false.

"Identity" means absolute sameness in *all* respects. And sameness of that kind exists nowhere. Everything we touch is a process, always in motion, always a little different from one instant to the next: the thing of this moment is not identical with the thing of a second ago, and no thing is identical with another "in all respects." Even writing $1 = 1$ realizes no absolute identity: the two symbols stand at different points on the page, traced with a little more or a little less ink, by a hand that has meanwhile changed. We may speak of *equality* or of *equivalence* — this here is equal to that there, for a certain purpose, at a certain moment — but never of identity. To teach children that "everything is identical with itself" is like teaching them that one plus one never makes two: a false doctrine that then costs a whole lifetime to unlearn.

The trouble is not the word itself: it is what it makes us do. Confusing two things as if they were *identical* — the word with the object, the idea with the experience, the label with the person, the map with the territory — has a precise name, and it is the underlying disease of this entire work: **identification**. To identify is to treat two different levels as if they were the same. And it is no oddity of the insane: in mild form it afflicts nearly all of us, all day long.

IDENTIFICATION: TWO LEVELS TREATED AS ONE

level of the SYMBOL	≠	level of REALITY
the word "dog"		an actual dog
the idea "danger"		a real danger
the label "enemy"		a person

| identification: "they are the same thing"



the body reacts to the symbol as if it were the reality

(the gland secretes, the stomach tightens, the fear fires)

There is a celebrated experiment that shows identification in the pure state, and we met it already in Chapter I. A dog that hears a bell ring a moment before its food begins, after a while, to salivate at the bell alone: its nervous system *identifies* the signal with the food, and produces the same secretions. This is the animal's standard of evaluation. Now the point that concerns us: when the reactions of the human body are measured — the secretions, the conductance of the skin — it turns out that most of us do exactly the same. We identify the symbol with the reality, and the glands answer: not the salivary

glands, perhaps, but the adrenals, which pour fear and anger into the bloodstream in response to a word, a label, a headline. The stomach that tightens at the word *biopsy*, from which this whole work set out, is just this: a real secretion in response to a symbol, like the dog's at the bell. We react, literally, at a level of animal conditioning.

And here the circle closes with Chapter III, the chapter on infantilism. Where does identification come from? From infancy, where it is even natural. For a newborn, the cry "is" the food: it emits a sound and the milk arrives, and it learns that the sound *is* the thing. Words "are" magic, because they produce effects. At that age, all is well. The trouble is that this infantile reaction — the symbol treated as the thing — is almost never corrected, and we carry it into adult life, where it becomes the source of most of our suffering. The adult who flies into a rage at a label, who fears a word, who defends an idea as if defending his own skin, is doing, with an adult brain, what the newborn did: confusing the symbol with the reality. Identity, from a law of thought, stands revealed as what it is — the mechanism that keeps an entire species infantile. ^[59]

4. Who lives on our phantoms

There is an uncomfortable corollary, and it must be said, because identification is not only a private error: it is also a business. When a person reacts to symbols instead of facts — when he takes fright at a word, waxes indignant over a label, peoples the world with semantic phantoms — he stops looking at real things. And this suits somebody.

It is a structural mechanism, not a conspiracy theory. Whoever wants control — a power, a market, a faction — has every interest in

keeping people's standard of evaluation low: in supplying phantoms onto which fear and anger can be discharged, while the real things remain elsewhere, in the hands of those who distribute the phantoms. The "escapes from reality" — the mythologies that explain everything, the slogans sufficient unto themselves, the indignations on command — work this way: they give the illusion of a meaning and keep attention far from where the decisions are really made. And there is a cruel detail: whoever lives inside this illusion usually *resists* the one who tries to free him. He suffers, but he defends his suffering, because it is the only world he knows. Only after coming out of it does he realize how ill he had been.

The way out is not a better slogan. It is structural, and it is the same one that runs through this entire volume. First: remove from your vocabulary the "is" of identity, and with it the pretense that things "are" thus forever and everywhere. Replace it with a language of relations, of directions, of conditions and of dates — "this *behaves as* that, under these conditions, today." Second: restore the natural order, which identification reverses — first the fact, then the label; first the event, then the name; first the thing, then the judgment. It is no accident that the language which carried out this revision first is mathematics, which lives on relations and directions: to study it, even only in spirit, is to learn the way out of identity. Before man and his affairs the choice is clean-cut, and this book poses it from the start: either we bring into human affairs the same relational rigor that made science possible, or we keep identity and keep the chaos. ^[60]

5. The consequences in 2026

If there is an age in which identification has been put to work on an industrial scale, it is ours. Everything in the digital environment is built to make us react to symbols as if they were reality.

Glands that fire at words. A headline, a notification, a comment: often there is nothing physical in front of you, only symbols on a screen. Yet the body answers like the dog at the bell — the pulse quickens, the adrenals pour, the indignation mounts. The platforms measure this reaction and reward it: the more reliably a word triggers the secretion, the more it gets shown. It is identification turned into a business model, a machine that lives on our confusing the signal with the fact. To recognize it — *I am reacting to a symbol, not to a real danger* — is the first move for switching off the alarm.

Phantoms in place of things. Never as much as today have we been kept busy with semantic phantoms — categories, labels, abstract enemies — while the real things, the decisions that matter, happen elsewhere. Whoever distributes the phantoms earns twice: from our attention and from our distraction. The defense is not a better phantom, but the return to the extension of the preceding chapter: behind the label "they," the concrete faces and names; behind the slogan, the dated and verifiable fact.

The identity of the machines. The systems that talk to us push us, more than anything else, toward identifying: we treat the word they generate as if it were the thing, the fluent answer as if it were true, the synthetic face as if it were a person. It is the newborn's old magic of words, handed back by a machine that produces it on demand. The grid for not getting lost is the usual one: the symbol is not the reality; ask yourself at what level you are looking, and whether behind the form there stands a fact or only a well-packaged phantom.

And here, as always, the stakes come down to the personal. The most painful identification is not with other people's words: it is with the words you use on yourself. "I am a failure," "I am made this way," "I am worthless": these are labels — symbols — which you treat as if they were your reality, and the body obeys, secretes, closes down. To undo identity, here, means remembering the simplest and most liberating thing in this whole volume: *you are not the label you give yourself*. You are a process, always in motion, always a little different — and no word, not even your own, is the thing.

6. Practical exercises

This chapter is to be measured by your capacity to distinguish relations from properties, and symbols from things. Five protocols.

Exercise 1 — The swapping game

For a few days, when you meet a statement, try swapping its terms. "The rich exploit the poor" → "the poor exploit the rich": does the sentence hold, or does it capsize? If it capsizes, you have an asymmetric relation, with a precise direction to be named; if it holds, it is symmetric. Learning to feel the direction of relations is learning to see where the direction of things really lies.

Exercise 2 — From "is" to relation

Take five sentences of the form "X is Y" that you said today and rewrite them as relations with a direction and a condition: not "he is incompetent," but "he handled *that* situation badly, on *that* day"; not "the situation is desperate," but "this has grown worse compared with

a month ago." Watch how the relation, unlike the label, leaves room for change.

Exercise 3 — Dog at the bell

The next time a word or an image provokes a strong physical reaction in you (anger, fear, a tightening of the stomach), stop and name it: *I am salivating at the bell*. There is no real danger in front of me; there is a symbol, and my body has identified it with reality. Merely recognizing this lowers the secretion: it is the way a human nervous system stops reacting like a dog's.

Exercise 4 — Dismantle the label on yourself

Choose a label you often use on yourself, one of the kind that hurts. Write it down, and then write beneath it three concrete, dated facts it claims to summarize. You will see that the label "is" false by identity: no set of dated facts is equivalent to an absolute judgment on "what you are." You are the process, not the word.

Exercise 5 — Who profits from the phantom

For one week, when a piece of content outrages or frightens you, add one question: *who benefits from my reacting this way?* Not to fall into suspicion of everything, but to remember that indignation on command is a product, and that behind the phantom onto which you discharge your attention there are, somewhere, real things that someone would rather you did not look at.

7. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **Relations are not all alike.** Some can be turned around (symmetric: "neighbor," "similar"), others have a fixed direction (asymmetric: "father," "greater than," "before"). For the former, order is indifferent; for the latter, it is everything.
2. **The relations that matter are asymmetric.** Before and after, greater and less, part and whole, cause and effect: all with a fixed direction. Each of them, since it cannot be inverted, *establishes* an order — the thread of the preceding chapter.
3. **"X is Y" cannot hold asymmetric relations.** The subject-predicate form can glue properties on; it cannot state directions. "Smith is taller than Jones" cannot be reduced to "they are different" without losing what matters — who is taller than whom.
4. **This is why the revision of the "is" was structural.** Passing from "X is Y" to "X behaves as Y under these conditions" is not a softening: it is passing to a language capable of holding relations and their directions, as mathematics does.
5. **The observer is an asymmetric relation.** The leaf appears green to you, but you do not appear green to the leaf. Saying "the leaf is green" erases the direction and the observer: it is the hidden observer written into the grammar.
6. **Identity does not exist.** Absolute sameness in all respects is found nowhere, because everything is process. "Everything is identical with itself" is false. We may have equality and equivalence — here, now, for a purpose — never identity.
7. **Identification is the underlying disease.** Treating two levels as one — the word with the thing, the idea with the experience, the

label with the person. In mild form it afflicts nearly all of us, all day long.

8. **We identify like Pavlov's dog.** The body secretes in response to symbols: the adrenals pour fear and anger over a word, as the dog's saliva flows at the bell. It is reacting at a level of animal conditioning.
9. **It comes from infancy, and it stays.** For the newborn the cry "is" food, words "are" magic: natural at that age, but almost never corrected — and carried into adult life it becomes the source of suffering, the infantilism of Chapter III.
10. **Undoing identity is structural, and it liberates.** Remove the "is," restore the natural order (first the fact, then the label), react to things and not to their names. Also, and above all, with the words you use on yourself: you are the process, not the label.

The next chapter (Chapter XIV, *On the Notion of "Infinity"*) takes one of the largest and most mistreated words we possess — *infinity* — and shows what it really means, why so many confusions arise from treating it as if it were a thing, and how to handle it without getting lost.

The point of this chapter, however, is one. **The things that matter have a direction that cannot be turned; and a language that can only say "X is Y" does not hold that direction. From this comes the mind's most expensive error: mistaking the symbol for the thing. You are not the label — you are the process.**

Notes

Chapter XIV — On the Notion of "Infinity"

You have stood, at some time, between two mirrors that face each other — in an elevator, at the barber's, in certain bathrooms. You look, and you see a corridor of yourself repeating: your image, and inside it another, and inside that another still, smaller and darker each time, until the line loses itself in the dark.

You try to find "the last" image with your eyes — the one at the far end of the corridor. But there is none. There is no far end, no final you: there is only the same gesture — one mirror handing the image back to the other — repeated without end. What you called "infinity," believing it a thing down there at the bottom, is not a thing: it is a *process* that does not stop.

Do you ever ask yourself whether "infinity" is a thing, or a doing?

That is the question of this chapter, and the answer changes the way we use one of the largest and most mistreated words we possess. "Infinity" is not the name of an enormous object located somewhere: it is the description of a process that has no end — like counting, where to every number you can always add one, never arriving at a "last." To treat it as a thing — "the infinite," with the article, as if it were an object to hold in the hand — is the source of paradoxes, of mysteries, and of ghosts. And it does not concern mathematicians only: it concerns you every time you say "forever," "everyone," "never," "eternally."

In the chapter on function (Chapter XI) we saw that dating a statement — "science in 2026" — dissolves its claim to hold forever. Now we look that "forever" in the face, and see what it really is. Let us begin.

1. "Infinity" is a verb, not a noun

Let us begin with the move that resolves half of the confusions. The word *infinite* is to be used as an **adjective** describing a process — an infinite counting, an infinite dividing — and never as a **noun**, the name of a thing. The moment you say "the infinite," as if it were a complete object, somewhere, already made, you begin to manufacture contradictions.

You can see it plainly with counting. Ask a child for the biggest number, and he will try — "a thousand!", "a million!", "a billion!" — until it dawns on him that whatever number he names, you can always add one. There is no number bigger than all the rest. But careful: this does *not* mean that somewhere a colossal "infinite" number exists that beats them all. It means the opposite: that counting is a process *with no last step*. Infinity is not the destination at the end of the row of numbers; it is the fact that the row has no end. It is a doing, not a thing.

INFINITY: NOT A THING, BUT A PROCESS

x as a NOUN

"the infinite"

process"

an enormous thing,
not stop:

complete, down at the end
(never a last)

✓ as an ADJECTIVE

"an infinite

a doing that does

1 → 2 → 3 → 4 → ...

To look for "the last number" or "the last image
in the mirror"

is to look for a thing where there is only a
gesture
repeated without end.

It is exactly the same correction we made with heat in Chapter IX. For centuries men searched for "the substance heat," a fluid-thing, because the word *heat* is a noun and nouns name things. The knot came undone when it was understood that heat *is* not a substance — it *happens*; it is a process. With "infinity" we stand at the same point, and the cure is the same: not an object to grasp, but a process to recognize. Grammar, once again, had laid a trap for us, sending us to hunt for a thing where there was only a doing.^[61]

2. The process is not its result

There is a second confusion, subtler and more expensive; once you have seen it you do not forget it. On one side stands the *process* of generating numbers, which never stops; on the other, every single *number* you obtain by stopping, which is always finite, however large. They are two different things, and exchanging them is the root of every muddle about infinity.

Think it through: you can count as long as you please, without end; but every number you actually *reach* — a million, a billion, a billion billions — is finite. The process is without end; the result always comes with one. *Infinite*, applied to a process, means simply "indefinite": no stopping point is scheduled; you can always take one more step. But the extra step gives you, every time, another finite thing.

TWO THINGS NOT TO CONFUSE

the PROCESS of counting number)	the RESULT (a number)
$1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow \dots$ without end 10^{9999}	1, or 1000, or 10^{9999}
"infinite" (indefinite) however large	always FINITE,

To exchange the endless process for a completed
"infinite
number" is the error that generates the
paradoxes.

Do you recognize the trap? It is the same one as in the previous chapter: treating two different levels as if they were one — here, the process that does not end and the number that does. It is identification again, in one of its purest forms. And it has concrete consequences: a large part of the mathematical disputes and "mysteries" concerning infinity — the famous "infinite" or "transfinite" numbers — are born of precisely this exchange, of treating an endless process as if it were a finite, completed thing. Keep the doing distinct from the done, and the ghosts dissolve.

3. When infinity overturns the rule of whole and part

Now for a surprise worth the chapter by itself: it shows that the rules learned in the finite world no longer hold once we pass to the infinite.

There is a rule that seems obvious to you beyond any doubt: **the whole is greater than the part**. A slice is less than the whole cake; a room is less than the house. You know it so well that it never occurs to you to question it. And rightly so — but only for finite things. For infinite processes, it simply no longer holds.

Look. Take all the numbers: 1, 2, 3, 4, 5... And take only the even numbers: 2, 4, 6, 8, 10... The evens are a *part* of all the numbers (half are missing — the odds). So there ought to be "fewer" of them. And yet try pairing them off, one to one: with 1 pair its double, 2; with 2 pair 4; with 3 pair 6; with 4 pair 8... Go on as long as you like: every number has its even partner, and none is left unpaired. There is an even number for every number. So there are "as many" evens as numbers altogether — the part has as many elements as the whole. The rule has turned upside down.

THE WHOLE AND THE PART, OVERTURNED

all the numbers:	1	2	3	4	5	...
	▼	▼	▼	▼	▼	(pair

each with its double)

the evens (a part):	2	4	6	8	10	...
---------------------	---	---	---	---	----	-----

none is left unpaired → as many evens as numbers
"the whole > the part" holds only in the FINITE;
here it flips.

This is not a trick: it is the very definition of an infinite process — a process that can be put into one-to-one correspondence with a part of itself. And the lesson is larger than mathematics. The habits we

acquire in the world of finite things — "the part is less than the whole," "the smaller comes first," "everything has a boundary" — are not laws of the universe: they are generalizations drawn from our limited experience, and they stop holding the moment we change scale. It is the same humility we met in Chapter VII, where Euclid's geometry turned out to be *one* geometry among many: what strikes us as "self-evident of necessity" is almost always self-evident only *within the boundaries in which we learned it.* ^[62]

4. "Forever" is a number of years in disguise

Here we reach the point you take home, because it touches the way you speak every day. The most absolute words we use — *forever, eternally, always, everyone, never* — are nearly always an "infinity" disguised as a noun: the claim that something holds for *an infinite number of years*, or in *all* possible cases. And we have just seen that an infinity-thing does not exist: there exists only a process. To translate those great vague absolutes into a quantitative, precise question — *for how many years, exactly? in how many cases?* — is one of the most powerful instruments this chapter hands us — the twin of the dating we learned in the chapter on function.

"This truth holds forever" becomes "it holds for an infinite number of years" becomes, at last, an honest question: *really, for every year to come? or only so long as certain conditions hold?* Nearly always, put this way, the claim to eternity deflates and returns to being a finite thing — dated, discussable. The "trick" is simple: take a qualitative, foggy expression — *permanent, universal, absolute* — and translate

it into numbers of years or of cases. The fog lifts, and you see the facts it was claiming to assert.

DEFLATING THE ABSOLUTES

"it holds FOREVER"
infinite number of years"

→ "it holds for an

to come?"

→ "really, every year

returns finite and dated)

(almost never: it

"EVERYONE does it"
exactly?"

→ "in how many cases,

"it will NEVER change"
time, under what conditions?"

→ "over what span of

translating the foggy qualitative into the
precise quantitative

= deflating the false infinite (twin of dating,
Chapter XI)

Then there is a second gift, concerning the "rare," the "chance event," the "miracle." Imagine an event of vanishing probability — that in a hall of a hundred people, by pure chance, everyone has a name beginning with M. On the human scale it is practically impossible: it might happen once in a number of years a hundred digits long. And yet, over an *infinite* number of years, that rarest of events would happen an infinite number of times — that is, from the standpoint of the endless process, "just as often" as anything else. What we call "rare" or "random" is rare only against the minuscule

scale of our own life. The error — an ancient one — is to take man as the measure of all things: to carry our time scale into the affairs of the cosmos and call "impossible" what is merely improbable *for us*.

Widen the scale, and the rare becomes regular, and even "chance" reveals an order. It is an enormous lesson in humility, and an antidote against two twin diseases: marveling at coincidences as if they were magic, and despairing of long undertakings as if they were impossible.^[63]

One last warning, which closes the circle with the chapter on identity. All of this stands on one condition: that we do not turn "time" into a thing. We can measure *years* perfectly well — a year is a concrete process, one circuit of the Earth, a unit we choose — but "time," taken as an object flowing somewhere, is once again a ghost-noun, like "the infinite." Speak of years, of days, of cycles — things you can count and date — and you move on solid ground. Speak of "Time" with a capital letter, as of a thing, and you are back to chasing a ghost.^[64]

5. The consequences in 2026

Absolute words have never been so cheap as they are today, and never so profitable. That is why the chapter on infinity, which looks like the most abstract, is among the most practical.

Absolutes as merchandise. "This changes everything forever," "nothing will ever be the same," "the end of...", "the dawn of a new era": the language of headlines, of advertising, of the prophets of the present lives on infinities disguised as nouns. They work because an absolute cannot be verified — it holds "forever," which is to say at no

checkable moment — and so it hangs there, imposing, immune to refutation. The defense is the gesture of this chapter: translate. *For how many years? in how many cases? under what conditions?* Nearly always, the absolute set in front of a date deflates into a modest, debatable prediction — as it ought to be.

Coincidences and algorithms. We live immersed in enormous numbers — billions of people, billions of messages, billions of trials a day — and among enormous numbers the rarest coincidences become daily fare: someone wins the lottery twice, two strangers have the identical life story, a model "guesses" something astonishing. Our mind, calibrated on the minuscule scale of an individual life, cries "miracle!" or "that cannot be chance!" But at that scale of trials the rare *must* happen, and often. Remembering that ours is not the measure of all things is, in 2026, also a hygiene against the superstition of large numbers — and against those who exploit it.

Long undertakings. The reversal also works in our favor, and it is good to know it. What looks "impossible" from the scale of a single day — learning a language, recovering from a habit, building something durable — is only a long process, made of finite steps, each of them within your reach. To confuse a long process with an unreachable destination is the same error as confusing endless counting with an "infinite number": it discourages whoever believes he must arrive "at the end" all at once, when there is only the next finite step to take.

And here the stakes descend, for the last time, to the personal. The heaviest sentences you pass on yourself nearly all have the form of an infinity in disguise: "I will *a/ways* be like this," "I will *never* manage

it," "it is *forever*." They are absolutes, and like all absolutes they cannot be verified — precisely because they speak of an infinite number of years you will not live. Translate them: *so far, under these conditions, as far as I have seen to date*. The "forever" that weighs on your chest, set in front of a date, stops being a destiny and returns to what it is: a finite thing — and therefore still changeable.

6. Practical exercises

This chapter is measured by your capacity to recognize infinities disguised as things and bring them back to process. Five protocols.

Exercise 1 — Hunting the "forever"

For a few days, note down every time you say or think an absolute word: *always, never, everyone, no one, forever*. Then, for each one, put the quantitative question: *how many times, exactly? in how many cases? so far, or truly for every future?* Observe how many of your "always" were "often" — and how many of your "never" were "not so far."

Exercise 2 — Thing, or doing?

Take three words you use as nouns — "the infinite," "time," "chance," "destiny" — and try rewriting them as processes or relations: not "time passes," but "the days succeed one another"; not "it was destiny," but "from these conditions, this followed." Feel how, once stripped of the article that made them things, they stop being ghosts and become handleable again.

Exercise 3 — The next finite step

Choose a goal that seems "impossible" or boundless to you. Instead of staring at the destination "down at the end," write down only the next finite step — today's — which is certainly within your reach. Remember: a long process is not an unreachable destination; it is a chain of finite steps. You do not have to arrive at infinity; you have to do the next number.

Exercise 4 — Dismantle the miracle

The next time a coincidence makes you think "that cannot be chance," try estimating how many trials there have been: how many people, how many days, how many occasions. Over large numbers, the rare becomes expected. Not to strip the world of wonder, but to keep from being governed by the superstition of large numbers — or by those who sell it to you.

Exercise 5 — Dating your own sentences

Take a heavy sentence you pronounce on yourself in the absolute form — "I have *a/ways* been like this," "I will *never* change." Rewrite it with a date and a condition: "so far, in the situations I have met, I have reacted this way." Observe the difference: the absolute is a destiny; the dated version is a point of departure.

7. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **"Infinite" is an adjective, not a noun.** It describes a process that does not stop — counting, dividing — not an enormous,

completed thing somewhere. "The infinite," with the article, is a grammatical ghost, as "the substance heat" once was.

2. **Infinity is not the destination at the end of the row: it is the fact that the row has no end.** There is no number greater than all the rest, because you can always add one. Not an object, but a doing with no last step.
3. **The process is not its result.** You can count without end (process), but every number you reach is finite (result). To exchange them — to treat the endless doing as a finite, completed thing — is identification, and it breeds the "infinite numbers" and their paradoxes.
4. **In the infinite world, whole and part change places.** There are as many even numbers as numbers altogether: pair each number with its double, and none is left unpaired. The rule "the whole is greater than the part" holds only in the finite.
5. **The rules of the finite do not hold everywhere.** What strikes us as "self-evident of necessity" is almost always self-evident only within the boundaries in which we learned it — like Euclid's geometry, which proved to be *one* geometry among many.
6. **"Forever" is a number of years in disguise.** The absolutes — *always, everyone, never, eternally* — are hidden infinity-things. Translating them into a quantitative question — *for how many years? in how many cases?* — deflates them. It is the twin of the dating of the chapter on function.
7. **On an infinite scale, the rare becomes regular.** An event of vanishing probability, over an infinite number of trials, happens infinitely many times. "Rare" and "random" are such only against the minuscule scale of our life: the error is to take man as the measure of all things.

8. **Humility against two twin diseases.** Marveling at coincidences as at magic, and despairing of long undertakings as of impossible destinations: both are born of confusing our scale with the scale of the process.
9. **Do not turn time into a thing.** Years and days can be counted and dated — solid ground; "Time" as an object that flows is a ghost-noun, like "the infinite."
10. **Your own condemnations of yourself are infinities in disguise.** "I will always be like this," "I will never manage it": absolutes that cannot be verified, because they speak of an infinite future. Dated — "so far," "under these conditions" — they return to being finite things, and therefore changeable.

The next chapter (Chapter XV, *The "Infinitesimal" and "Cause and Effect"*) takes hold of infinity from the other end — the endlessly small — and from there confronts one of the most powerful and most misunderstood pairs we use for reading the world: cause and effect.

The point of this chapter, however, is one. **Infinity is not a thing; it is a doing. And nearly all our "forevers" and our "nevers" are infinities disguised as destiny. Bring them back to process, give them a date, and destiny returns to being a finite thing — that is, something on which you can still act.**

Notes

Chapter XV — The "Infinitesimal" and "Cause and Effect"

Break a square of chocolate in half. Now break one of the halves in half again. Then again, and again. Each time, a smaller fragment between your fingers. And at some point the question arrives on its own: will I ever reach the smallest possible piece — the one that cannot be divided any further?

The answer, in principle, is no. However minute the fragment, it remains a *finite* piece, and a finite piece can always be divided again. There is no "infinitely small piece," no last indivisible grain at the bottom of the scale. It is the mirror image of what we saw in the last chapter: just as there is no largest of all numbers, there is no smallest of all pieces. Dividing, like counting, is a process that does not stop — and every result you reach is, once again, finite.

Do you ever wonder why this business of "a small that never ends" should change anything in your life?

Because from here — from a detail that looks like a matter for mathematicians — follows a consequence that overturns one of the most deeply rooted ways we read the world: **cause and effect**. If the infinitely small does not exist, neither does the "next moment": between any two instants there is always another. And if between a cause and its effect there is always an interval — however thin — then in that interval *something can always intervene*. The old certainty "same cause, same effect" begins to creak. Let us see.

1. Even the small never ends

Let us begin by clearing up the ghost. For centuries people believed in a thing called the **infinitesimal**: an infinitely small quantity, smaller

than any number yet different from zero. The Greeks imagined it when they pictured a circle as a polygon with infinitely many, infinitely short sides; and when the calculus was invented — the one school still calls "infinitesimal calculus" — it seemed that without this mysterious entity mathematics could not stand. Yet no one could say what it was: it had to be different from zero (since adding up enough of them yielded a whole), yet it was no finite fraction either. An impossible object — which, however, no one seemed able to do without.

The solution came when a mathematician proved two things at once: that the infinitesimal is meaningless, and that the calculus has no need of it whatever. Everything could be done without it. The ghost was dismissed, and a large problem with it. The reason is the same as in the last chapter: *infinitesimal*, like *infinite*, was a noun disguised as a thing, while behind it there was only a *process* — dividing without end. Not a very small object to be grasped, but a doing that never halts, all of whose results remain finite.

TWO ENDLESS PROCESSES, NO "THING" AT THE BOTTOM

toward the large

$1 \rightarrow 2 \rightarrow 3 \rightarrow \dots$ (counting)

(dividing)

no "largest number"

("infinite" = process)

process)

toward the small

$1 \rightarrow \frac{1}{2} \rightarrow \frac{1}{4} \rightarrow \frac{1}{8} \rightarrow \dots$

no "smallest piece"

("infinitesimal" =

every result, on either side, is FINITE.

From this there follows at once an oddity we shall need in a moment. If the infinitely small does not exist, then neither does the **"next moment."** Between any two instants, however close, there is always another in between — and another still, without end. Two instants can never be "attached," consecutive. And even that "present" we believe we inhabit — the now-instant, thin as a blade — turns out to be far vaguer than we think: try to stop the "now," to hold it still, and you find that while you are naming it, it has already gone. There is no razor-thin threshold where the future turns into the past: there is a process, once again, not a thing.^[65]

2. Cause and effect do not touch

Now comes the twist — and it changes the way we read nearly everything. We are used to imagining cause and effect as glued together: the ball strikes the ball, and off it goes; the lightning "produces" the thunder; A pushes B, contiguous in time, the one stuck fast to the other. It is a convenient picture, and almost always a deceptive one.

Because, as we have just seen, there is no "next moment": between the cause and the effect there is always an interval, and that interval is *finite*. And in a finite interval, however small, **something can always happen**. The famous certainty "same cause, same effect" holds on one condition only, a condition almost never realized: that in the interval nothing in the environment interferes with the passage from the conditions we call "cause" to the conditions we call "effect." But the environment changes continually, and the factors in play are innumerable. If we could really take everything into account, the

probability that an event should repeat itself *identical in every detail* — exhibiting that clean two-term linkage we have always taken for granted — would be practically nil. We never observe "the same cause" all the way down: by the time we know the antecedents well enough to predict the consequences accurately, we discover that those conditions were so complex as to have hardly any chance of turning up again.

THE OLD PICTURE	THE REAL PICTURE
CAUSE ■■■EFFECT	CAUSE —[finite
interval]→ EFFECT	
glued, contiguous	
"same cause,	here something
can	
same effect"	ALWAYS
intervene	
→ the two-term certainty holds only if NOTHING	
interferes	
(a condition almost never realized)	

Be careful: we are not denying that regular sequences occur in the world — they do, fortunately. We are saying that the principle "same cause, same effect," taken as an absolute law, does not stand up to the structure of the world. The regularities are there, but they are *probabilities* and *averages*, not iron guarantees. And there is an enormous practical consequence: to be reasonably sure of an effect, it is not enough to supply "the cause" — you must also control the environment and keep the interferences out. That, at bottom, is what

every well-made experiment does, and every project that succeeds: it does not trust the magic of "just do X"; it guards the interval.

3. From two terms to a network: the many-to-one

There is a second defect in the old "cause—effect" pair, more radical still, and we have already met it earlier in this volume. "Cause and effect" is a relation with *two* terms: one thing that pushes, one thing pushed. But in the world events do not go about in couples: they are bound together in complicated series, in networks of converging threads. To reduce this network to a single arrow — "the cause of this is that" — is a primitive simplification, convenient for speaking quickly, misleading the moment we take it seriously.

TWO TERMS	A NETWORK (the many-to-one)
cause → effect (a single arrow)	factor A ↙ factor B →
outcome	factor C ↘ factor D ↘
	many routes converge
on one result;	hunting for THE
single cause is the wrong question	

It is the same **many-to-one** we met in Chapter X, where rickets is cured with cod-liver oil *or* with sunlight: not one cause, but many routes converging on one outcome. Before a living, social, human

phenomenon, hunting for *the* cause — the single culprit, the one explanation — is almost always the wrong question: one should ask *which* factors, in *which* series, with *which* weights, made that outcome probable. And here the circle closes with the chapter on function: general assertions about "the cause of everything" or "the effect of that," with no factors and no conditions specified, are not propositions, true or false — they are propositional functions, variables left unfilled, over which one can quarrel endlessly without ever concluding. To expand the two-term arrow into the real series — several factors, in an order, with their probabilities — is already to draw closer to the structure of the world.

One detail should be added, and it does justice to a good many dogmatisms. "Cause and effect," in the two-valued sense, is a **statistical average**, and like all averages it holds at a certain scale and not at others. It works, roughly, for billiard balls and falling stones — the large, macroscopic world. But descending to the very small, where the intervals are minute and entirely different conditions prevail, that simple causality ceases to apply: there, probability reigns. Even "space" and "time," at those scales, behave as averages and not as fixed things. The lesson is the lesson of this whole volume: a rule drawn from one scale is not a law of the universe, and must be brought back inside the boundaries where it holds. ^[66]

4. We find what we want to find

It remains to say why we cling so fiercely to "cause and effect" in its crudest form — and here the discussion becomes, once again, a

question of sanity.

The absolutist attitude toward cause — the conviction that to every thing there corresponds *one* precise cause, waiting to be found — is not merely a logical error: it is a powerful obstacle to honest observation. For we human beings tend to *find what we want to find*. If we approach a problem with an unacknowledged desire — that the culprit be that one, that the explanation be this one — and the facts fail to confirm it, we grow confused, we grow irritable, and we end by pronouncing the sentences that close instead of opening: "it's too complicated," "it can't be understood," "it's fate." Under this pressure our capacity to observe and analyze drops, smothered by a kind of daze. It is a mechanism that does damage in science as in private life: we look for the cause that suits us — a scapegoat, a guilt, an explanation that absolves us — and we stop looking at the real network of factors.

The way out is the one that runs through this entire book, and here it takes a precise operational form. Invert the habitual order: do not start from the explanation you already carry in your head and then force the facts into it, but start from observation — silent, patient, without names — and only afterward look for the words and relations that resemble it, and then put them to the test. It is the natural order of Chapter VIII — first the fact, then the theory — applied to the most slippery of our habits: the attribution of blame and cause. Knowledge, in the end, is not in the events: it is an activity of our nervous system, made of observation and abstraction. Remembering this makes us humbler and freer — because what is ours, and therefore correctable, is the way we read, not the facts we read. ^[67]

5. The consequences in 2026

Few errors, in our time, do as much damage as two-term causality taken seriously. We live immersed in single causes, lone culprits, flash explanations.

The hunt for the single cause. Something happens — a crisis, a collapse, an item in the news — and within a few hours the entire public conversation organizes itself around *one* cause, *one* culprit. It is reassuring: a single cause can be hated, fought, eliminated. But almost no real phenomenon — economic, social, clinical — has a single cause; there are networks of converging factors, the many-to-one. Whoever offers the single cause is offering a convenient ghost, and often offering it on purpose, for a scapegoat keeps attention away from the real network, where responsibilities are distributed and far less spectacular.

Correlation passed off as cause. In 2026 the data show correlations at every corner: this goes with that; people who do X tend to have Y. And the mind, hungry for cause, leaps at once: "then X causes Y." But going together is not causing: in the interval there may be ten other factors at work, or the arrow may point the other way. This chapter's grid is the defense: before saying "the cause is X," ask which other factors converge, at what scale the regularity holds, and whether you are not simply finding the cause you desired.

The automatisms that decide by "causes." The systems that profile us and make our recommendations act as if "same cause, same effect" were true: you did X, therefore you will want Y; you belong to this group, therefore you are like this. It is two-term causality applied to human beings — who are, instead, complex and

changing networks. When a machine — or a person — reduces you to your presumed "cause," it is committing this chapter's error upon you.

And here the stakes descend, one last time, to the personal, and touch the heaviest of all attributions: **blame**. Our suffering is full of two-term causalities turned against ourselves: "if I ended up like this, it is the fault of that thing, of that person, of that defect of mine." One cause, one culprit — usually us. But a life, like every living phenomenon, is a many-to-one: no outcome has a single cause, and searching for one — to condemn ourselves or to condemn others — is the wrong question. Not in order to strip away responsibility, but to give truth back its real shape: a network of factors — some of which, starting today, you can begin to move.

6. Practical exercises

This chapter is measured by the capacity to stop hunting for *the* cause and to see the network. Five protocols.

Exercise 1 — Break without end

Once, actually perform the chocolate experiment (or use a sheet of paper): divide, divide again, and notice that you never arrive at a "final piece," and that every piece remains finite. It serves to feel, with your hands, that the small is a process, not a thing — and to defuse the idea that anything whatever must have a "bottom."

Exercise 2 — The interval

The next time you take for granted a "just do X and Y follows," stop and look at the interval: what, between X and Y, could intervene and change the result? You will almost always find several candidates. Guarding the interval — instead of trusting the magic of the cause — is what separates the projects that succeed from the ones that fail.

Exercise 3 — Which factors, not which cause

Take an outcome that matters to you (a success, a failure, a quarrel) and, instead of asking *what was the cause*, list the factors that converged on it: at least five, from different domains. Watch how the question "which factors?" opens where the question "which cause?" closed. This is the many-to-one used as an instrument.

Exercise 4 — Am I finding what I want?

When an explanation convinces you immediately, add one uncomfortable question: *is this the true cause, or the cause I desired?* The explanation that absolves us, or that blames someone we already disliked, tends to arrive too fast. Suspecting your own desire is the first step of honest observation.

Exercise 5 — Dismantle the single blame

Take a blame you lay on yourself, in the form "if it went that way, it is because I...". Rewrite it as a network: list the factors — yours, other people's, the context's, chance's — that made that outcome probable. Not to escape responsibility, but to see it in its real shape: distributed — and therefore, at certain points, within your power.

7. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **The infinitesimal does not exist.** However far you divide, what remains is always finite: there is no "infinitely small piece." Like the infinitely large, the infinitely small is a process (dividing without end), not a thing.
2. **No "next moment."** Between any two instants there is always another; two instants are never attached. Even the "present" as a blade-thin instant is a fiction: time is a process, not a thin threshold.
3. **Cause and effect do not touch.** Between them there is always a finite interval, and in a finite interval something can always intervene. "Same cause, same effect" holds only if nothing in the environment interferes — a condition almost never realized.
4. **Regularities are probabilities, not guarantees.** We do not deny the world's regular sequences; we deny that they are iron laws. To be sure of an effect, "the cause" is not enough: the interval and the environment must be guarded.
5. **"Cause–effect" is an arrow; reality is a network.** Events are bound in complex series; reducing them to two terms is a primitive simplification. It is the many-to-one of Chapter X: many routes converge on one outcome.
6. **Hunting for *the* cause is the wrong question.** Before a living or human phenomenon one should ask *which* factors, in what order, with what weights. Statements about "the cause of everything," with no factors and no conditions, are propositional functions — neither true nor false.

7. **Simple causality is a statistical average.** It holds, roughly, at the large scale (stones, billiards); at the very small, where other conditions prevail, probability reigns. A rule drawn from one scale is not a law of the universe.
8. **We find what we want to find.** The absolutist attitude toward cause blinds: we hunt for the culprit or the explanation that suits us, and we stop seeing the network. Knowledge is an activity of our nervous system, not the events themselves.
9. **The way out is to invert the order.** Not the explanation before the facts, but observation before the explanation — the natural order of Chapter VIII, applied to the most slippery of habits: the attribution of causes and blame.
10. **Blame, too, is a many-to-one.** No outcome of a life has a single cause; searching for one — to condemn oneself or to condemn others — is the wrong question. Truth has the shape of a network of factors, some of which, from today, you can move.

The next chapter (Chapter XVI, *On the Existence of Relations*) draws the conclusions of this part: if what is real are relations and their directions, in what sense do relations *exist*? And why does treating them as real — more real than the "things" they bind — change the way we stand in the world?

The point of this chapter, however, is one. **Cause and effect are not glued together: between them there is always an interval where something can happen, and every outcome is a network of factors, not a single arrow. To stop hunting for *the* cause — the lone culprit, inside you and outside you — and to begin seeing the factors is already half of freedom.**

Chapter XVI — On the Existence of Relations

You have heard it a thousand times, and perhaps you have said it yourself: "Truth does not exist," "everything is relative," "nothing can be known for certain." Sentences delivered with confidence, often with a faintly disenchanted air, by people who feel a little more awake than those who still "believe in something."

And every time, something fails to add up, even if at the moment you cannot say what. Look at the first one closely. "Truth does not exist": but this sentence — you would want it to be true, would you not? If it is true, then at least one truth exists: this one. If it is false, you are back where you started. Either way, the sentence eats its own tail: in pronouncing it, you do exactly what it denies. The same goes for "everything is relative" (this statement too? then not everything is) and for "nothing can be known" (and this — how do you know it?).

Have you ever asked yourself why certain statements destroy themselves in the very instant you utter them?

That is the phenomenon at the heart of this chapter, and it leads us to a discovery that crowns this whole part of the book. There are things you **cannot deny without, in the same breath, using them.**

Relations are among them. You can imagine a world without this chair, without that tree; you cannot even say a world without relations, without the difference between yes and no, without the act of putting in order — because saying it employs them. And this reveals in what

sense — an exceedingly strong one — relations "exist": not as objects out there, but as the inevitable fabric of every thought.

Over the last several chapters we have built the factors of the architecture — function, order, relations and their directions. Now we close this part by asking in what sense those relations are real. Let us see.

1. The things you cannot deny without using them

There is a discovery, owed to a thinker who loved mathematics and order, as simple as it is profound. There exist certain activities of the mind that *reinstate themselves* precisely in the attempt to eliminate them. Whatever you do to be rid of them, you set them back to work in the very act of trying.

The examples strike like lightning. Try maintaining that "categories do not exist": to say it, you had to gather all things into a single category — "categories" — and deny it. You categorized in order to declare that no one categorizes. Try denying that there is any difference between affirming and denying, or saying that "yes" and "no" are the same thing: in that breath you affirmed one thing and denied another — which is to say, you used the very difference between yes and no you had meant to erase. These are activities which, as was once said in memorable words, we know in two ways at once: we *find* them — because we observe them as we act — and they are *necessary* — because the mere attempt to remove them implies their presence.

THE SENTENCE THAT EATS ITS OWN TAIL

"truth does not exist" → is it true? then
one truth exists

"everything is relative" → this too? then
not everything is

"nothing can be known" → and this – how do
you know it?

"categories do not exist" → "categories" is a
category

in saying it, you do exactly what it denies: it
destroys itself

Let us call them, then, **necessary** activities: not in the sense of "required by law," but in the sense that there is no thought without them. Relating, distinguishing, ordering, classifying are not things we decide to do: they are what thinking *consists in*. And here lies a beautiful detail, worth welcoming without alarm: human knowledge, in this respect, is **circular** — we use thought to study thought, language to study language, relations to speak about relations. At first sight it disconcerts. But recognized with courage, this circularity is not a defect: it is the very form of a mind reflecting upon itself, and it adds — rather than subtracts — interest and beauty to the whole affair. ^[68]

2. This is why relations are more real than things

From here follows the point that crowns the entire architecture we have built. We are accustomed to thinking that "things" are the solid, the real, and that the relations between them are something more

tenuous, something added on, almost a manner of speaking. It is the other way around.

Look. You can remove a thing — this chair, that tree, even a person — and the world goes on: it changes, but it remains a world. Things are, in a certain sense, replaceable. Now try to remove the *relations* instead: try to imagine, or even merely to say, a world without order, without the difference between before and after, without the bond between yes and no. You cannot — because in order to say it, you have already used them. Relations do not let themselves be removed, not even in thought. They are inescapable where things are replaceable. And what you cannot remove even in thought holds, over what you can remove, a kind of priority: in this exceedingly strong sense, relations "exist" more than the things they bind.

WHAT YOU CAN REMOVE, AND WHAT YOU CANNOT

remove a THING
the RELATIONS

(this chair, that tree)
not exist,"

→ the world changes, but remains
after are the same")

already used them to say it

things are replaceable
inescapable

→ in this sense, relations "exist" more

try to remove

("relations do

"before and

→ you have

relations are

It is the conclusion toward which everything in the first half of this volume was pressing, and which we can now state without fear. In Chapter IV we saw that of a thing we know not the essence but the structure — the web of relations. In Chapters XII and XIII we saw that structure reduces to order, and that relations have a direction. Now we close the circle: those relations are not an addition to things; they are what comes first, the fabric out of which things themselves emerge as knots. Not a world of objects that then, as the case may be, enter into relation; but a world of relations, in which the "objects" are the points where the relations knot together. Relations come first — and they cannot even be denied.^[69]

3. A test against nonsense

This discovery puts into our hands a practical instrument, razor-sharp, against a precise kind of foolishness much in fashion today. A sentence that destroys itself in the saying is neither true nor false: it is simply *empty* — a sound that has the form of a statement without its substance, the noise dressed up as a word of Chapter VI.

Keep it in your pocket as a test: whenever you hear a claim that pretends to hold for everything, try applying it to itself. "Everything is opinion" — is that an opinion? If yes, I may decline to share it; if no, then it is not true that everything is opinion. "Science knows nothing for certain" — and is this a certainty? "Every rule has an exception" — this rule too? "One must never judge" — is that not already a judgment? Statements that do not survive this test do not deserve the effort of a discussion: not because they are false, but because they say nothing — they cancel themselves. This is not logical pedantry: it

is a concrete defense against those who use such turns of phrase to sound deep, to shut down a conversation, or to demolish every confidence in knowledge while keeping their own intact. Unmasking the sentence that eats its own tail is, quite literally, mental hygiene.

[70]

4. "Chance" is (often) merely ignorance

There is a second cloud this chapter helps to disperse, and it concerns two words we carry around laden with mystery: "chance" and "destiny" — or, in cooler language, "indeterminate" and "determined."

We call "chance" whatever we fail to predict. But often that "chance" is not a property of the world: it is a measure of our ignorance. Think of a system of equations: if you have three unknowns and only one equation, you cannot find the values — they remain "indeterminate"; they seem free to be anything whatever. Add the missing equations — that is, add knowledge — and the unknowns settle, one by one. The "indeterminate," here, was never in the world: it was in the number of equations you lacked. A great part of what in everyday life we call "chance," "luck," "coincidence" is exactly this — information we do not have, not disorder in things.

"CHANCE" IS OFTEN IGNORANCE

3 unknowns, 1 equation → values

"indeterminate"

(everything seems

possible, "random")

add equations → the unknowns settle
(= add knowledge)

most everyday "chance" = missing information,
not disorder in the world

This connects with what we saw in the chapter on infinity (Chapter XIV): an event "rare" or "random" at one scale becomes "regular," almost a law, at another. "Chance" and "law" are not two opposite natures of things: they are often two readings of the same process, from different levels or with different knowledge. This invites a double humility. On one side, not to cry destiny or miracle before what we simply cannot yet explain — and not to fall into the trap, epidemic today, of mistaking one's own ignorance for a hidden design, and extracting a conspiracy from everything one does not understand. On the other, not to fancy that everything can be predicted: adding equations is often difficult, at times impossible. (And it should be said honestly: at the minutest scale of matter, whether beneath what we call "chance" there lies hidden information or a genuine indeterminacy of the world remains one of the open, debated questions of physics. Humility, here, cuts in both directions.)^[71]

5. The consequences in 2026

Never as today have sentences that eat their own tails been common currency, and never as today have we confused ignorance with chance — or with conspiracy.

The relativism that destroys itself. "There are no facts, only interpretations," "your truth and my truth," "it's all constructed": the

public discourse of our time is full of absolute statements that deny the absolute, and therefore erase themselves. They work because they sound humble and tolerant — "who am I to say how things stand?" — but their real effect is to remove all common ground, and with it every possibility of agreement. The chapter's instrument is the defense: apply the statement to itself. If it destroys itself, you are not facing a position to be respected but a sound to be dismissed — and you can return to discussing facts.

Ignorance mistaken for design. Faced with what we do not understand — a crisis, a coincidence, an improbable event — the mind, which bears "I don't know" badly, fills the void with a design: someone decided, someone is scheming, nothing happens by chance. This is conspiracism in its pure form: treating one's own missing equations as evidence of a hidden hand at the controls. Remembering that "chance" is often only information we lack — and that over large numbers the rare is bound to happen — is an antidote. Not to deny that real designs exist, but so as not to see one wherever an explanation is missing.

Machines and the illusion of "chance." The systems that predict — the weather, the markets, your tastes — are not reading a destiny already written: they add equations, that is, data, to reduce the indeterminacy. When they "get it wrong," it is usually not because the world is capricious, but because equations were missing. And when they "guess" something startling about you, they have not read your soul: they had enough data. Understanding this defends you both from the myth of the omniscient machine and from the despair of believing yourself entirely predictable.

And here, as always, the stakes descend to the personal. The two clouds of this chapter often settle inside us. On one side, the sentences we tell ourselves that cancel themselves — "nothing ever changes anyway," said while you are doing something to change it; "I don't care," said with every evidence of caring. On the other, the trade of ignorance for destiny: "I was born unlucky," "it's my karma," when often there is only an equation we lack, a factor we have not yet seen. To recognize the sentence that eats its own tail, and ignorance dressed up as destiny, is to regain, each time, a margin of solid ground beneath your feet.

6. Practical exercises

This chapter is measured by your capacity to unmask self-destroying sentences and to tell chance from ignorance. Five protocols.

Exercise 1 — Apply it to itself

For one week, whenever you meet a statement that claims to hold "for everything" ("everything is relative," "nothing can be known," "people are all the same"), make a single move: apply it to itself. If it destroys itself, you have recognized it for what it is — a sound, not an argument. Note down how many you encounter in a day.

Exercise 2 — Try to remove the relation

Choose a relation you take for granted (before/after, cause/effect, inside/outside) and genuinely try to imagine a world — or even just a sentence — without it. Watch how, in order to deny it, you are forced to use it. It is the most direct way to feel that relations are not an addition to things: they are the fabric in which things stand.

Exercise 3 — Chance or ignorance?

The next time you say "it was chance" or "it's destiny," stop and ask: is this truly disorder in the world, or information I lack? Try listing the "equations" you do not have — the factors you do not know. Often you will discover that "chance" was only the name of your ignorance, and that some of those equations you could even find.

Exercise 4 — Take the conspiracy apart

Faced with an explanation that attributes to a hidden design whatever you do not understand, test the more sober hypothesis: what if a piece of information were simply missing? And what if, over large enough numbers, that "impossible" event were bound to happen anyway? Not to rule out every real design, but so as not to see one every time you lack an explanation.

Exercise 5 — Your trap-sentences

Catch a sentence you tell yourself that the facts contradict: "I don't care" while you care enormously, "it's pointless anyway" while you are still trying. Write it down next to what you are actually doing. Seeing the sentence refuted by the action strips it of its power: it is a small hygiene of coherence between what you say and what you do.

7. In summary

The central points of this chapter, to carry into the chapters that follow:

- 1. There are things you cannot deny without using them.**

"Categories do not exist" is a category; "there is no difference

between yes and no" uses that difference. Denying them sets them back to work: they are **necessary** activities of thought.

2. **Relations are among them.** Relating, distinguishing, ordering are not things we choose to do: they are what thinking *consists in*. There is no thought without them.
3. **Knowledge is circular, and that is as it should be.** We use thought to study thought, relations to speak of relations. Recognized with courage, the circularity is not a defect: it is the form of a mind reflecting on itself.
4. **Relations are more real than things.** You can remove a thing and the world remains; you cannot remove relations even in thought, because to say so you use them. Things are replaceable, relations inescapable.
5. **Relations come first.** Not a world of objects that then enter into relation, but a world of relations in which the "objects" are the knots. It is the conclusion toward which structure (Chapter IV), order (Chapter XII), and relations (Chapter XIII) were pressing.
6. **A test against nonsense: apply the statement to itself.** Is "everything is opinion" an opinion? Sentences that destroy themselves in the saying are neither true nor false: they are empty — sound dressed up as word.
7. **Unmasking the sentence that eats its own tail is mental hygiene.** It defends against those who use such turns of phrase to sound deep, to shut down a conversation, or to demolish other people's confidence in knowledge while sheltering their own.
8. **"Chance" is often only ignorance.** Like three unknowns and a single equation: the indeterminacy lies in the missing information, not in the world. Add equations — knowledge — and the unknowns settle.

9. **"Chance" and "law" are often two readings of the same process.** At different scales, or with different knowledge, the rare becomes regular. Double humility: do not call destiny what you do not yet know, and do not fancy you can predict everything. (At the very small, the world's indeterminacy remains an open question.)
10. **The two clouds settle inside us as well.** The sentences we tell ourselves that cancel themselves ("nothing ever changes anyway," while you are changing something); and ignorance dressed up as destiny ("I was born unlucky"). Recognizing them is regaining solid ground.

The next chapter (Chapter XVII, *On the Notions of "Matter," "Space," "Time"*) closes this part of the work by bringing everything we have built — function, order, relations, infinity, cause — to the greatest proving ground of all: the three words with which we believe we know what the world is.

The point of this chapter, however, is one. **Relations are not an addition to things: they are what you cannot deny without using it, and therefore what comes first. And many of the sentences that hold us fast — "everything is relative," "I was born unlucky" — dissolve the moment we apply them to themselves, or the moment we call ignorance by its name.**

Notes

Chapter XVII — On the Notions of "Matter," "Space," "Time"

Ask someone, right now: "Hand me a piece of matter." Almost certainly, after a moment's hesitation, they will hand you a pencil, a pen, whatever object lies nearest.

But what you are now holding is not "matter" in the pure state. It is a pencil: it has a *shape*, it occupies a *place* — which is to say, it is already made of space. And it wears down as you write, it was manufactured yesterday and will be shorter tomorrow — which is to say, it is already made of time. Try asking to be given matter *without* the space it occupies and *without* the time through which it lasts: no one can manage it. Nowhere does there exist a piece of "matter" that is not also space and also time.

Do you ever ask yourself whether "matter," "space," and "time" — the three words with which we believe we know what the world is — are really three things?

That is the question with which we close this part of the book, and it is the largest of them all. On these three words we have built the very idea of reality; and they are about to reveal themselves as not three things but three *ways of looking* at a single reality that pulses. Over the last several chapters we have forged the instruments — the function, order, relations and their directions, the infinite as process, cause as a network. Now we bring them all to the greatest testing bench there is, and we discover that matter, space, and time are not the solid foundation we believed them to be: they are abstractions, like all the others — made by our nervous system, and to be handled with the same care.

Let us see, beginning with that pencil.

1. Three words for a single thing

Let us return to the pencil, because it already contains everything. You cannot separate its "matter" from the "space" it occupies, nor from the "time" through which it lasts: the three come together, always. And the same holds in reverse. Ask "give me a piece of space" and the most the other person can do is wave a hand through the air — but that air is full of gases, of dust, of fields: what they are showing you is, once again, matter. Ask "give me some time" and they will point to the clock — that is, to matter moving through space. From whichever side you begin, the other two come back in through the window.

The conclusion is sharp, and it changes the way one thinks about the world: "matter," "space," and "time" are not three distinct things that exist out there. They are three **ways of looking** at a single reality — three words, not three objects. It is as when, standing before a river, you say *water*, *current*, and *flowing*: you have not pointed to three separate things, but to the same process, looked at from three sides. A great mathematician, centuries ago, had called them *ways of considering*: not parts of the world, but ways our mind has of slicing it.

THREE WORDS, ONE SINGLE PROCESS

```
ask for "MATTER" → you get a pencil (has
shape=space,
                                wears down=time)
ask for "SPACE" → a hand waves through the
full air (=matter)
ask for "TIME" → a finger points at the clock
(=matter
```

in motion=space)

from whichever side you begin, the other two come back in:

not three things, but three WAYS OF LOOKING at one pulsing reality

This is not a play on words: it is the same move that runs through the whole of our work. In Chapter IV we said that of a thing we know not the essence but the structure — the web of relations. Here we see that claim at work on the most fundamental words we possess: "matter," "space," "time" do not name substances; they name *relations* that our nervous system extracts from a single process. And like all abstractions, they are supremely useful so long as we remember that they are abstractions — and they become sources of confusion, and even of suffering, the moment we mistake them for the things themselves. Let us look at them one by one. [\[72\]](#)

2. Space is not empty

Begin with "space," because it is the one about which we deceive ourselves most. We picture it as a void: the nothing in which things sit, the empty container to be crossed. The image is so natural it seems obvious. And it is false.

There is an experiment that shows this better than a thousand words. Open an umbrella inside a room and carry it from one wall to the other: it arrives intact. Now open the same umbrella out of doors, in the middle of a storm, and cross the courtyard to the house opposite: it arrives turned inside out and bent. And yet the "space" between the

two walls and the "space" between the two houses looked like the same thing — emptiness to be crossed. They were not: the second was full of wind, and the wind made the difference. What we call "empty space" is never empty: it is full of air, of dust, of light, of fields, of energy. It is, quite literally, a **fullness**.

SPACE IS A FULLNESS, NOT A VOID

the umbrella in the living room in the storm ("empty" space) "space") → arrives intact inside out	the umbrella (the same → arrives
--	--

the difference: the second was full of wind.
"empty space" = full of air, dust, light, fields,
energy

= a FULLNESS

The "absolute void," pure "nothing," is not merely something never found in nature: it is an idea that cannot even be *said*. We learned this in the preceding chapter: a symbol, to be a symbol and not a noise, must stand for *something*. But "absolute nothing" is, by definition, that which is not anything — and a word that claims to represent nothing represents nothing: it is an empty sound dressed up as a concept. To speak of "absolute space" as a real thing, separate from what it contains, is to chase one of those grammatical ghosts that this book dismantles at every step.

And since space is not an empty container, the anguished questions about its "boundaries" fall away as well. Where does space end? What is there beyond the edge of the universe? They sound like deep questions, and they may be badly posed. There is an image that dissolves them, and it is the same one that twentieth-century physics made precise: think of the surface of the Earth. You can walk in a straight line as long as you like, forever, without ever meeting an "edge," a border, an end — and yet the Earth is not infinite: it has precise, finite dimensions. It is **unbounded and finite** at once: without rims, but not endless. The universe, the physicists tell us, may be exactly like this — and then the question "what is there beyond the boundary?" is like asking what lies "north of the North Pole": a question built correctly, and asking nothing.^[73]

3. Time is not a thing

Pass now to "time," and it is the one that hurts us most, because we treat it as an enemy: something that "flows," that "slips away from us," that "consumes us." But stop for a moment: where is it, this time? You cannot touch it, see it, put it in your pocket. The only thing you can point to, when someone asks "what time is it?" or "give me a minute," is a *clock* — that is, matter that moves, and that we count.

For time, looked at closely, is not a thing: it is a **rhythm we count**. It is three in the afternoon in Milan and, at the very same instant, nine in the morning in New York. Which of the two is the "true" hour? Neither: you are merely comparing two instruments that count beats, your clock and theirs. There is no universal "now" stamped upon the universe; there are events, and we order them and count them

against a chosen rhythm — one turn of the Earth, one oscillation, one beat. "Time" becomes something manageable only when you break it into countable *units*: seconds, minutes, hours. Before it is counted, it is only a vague sensation; counted, it becomes the most powerful instrument we have.

And there is more: the very continuity of time, that smooth "flowing" we take for granted, is in good part a construction of our nervous system. Watch a film. You see a horse galloping — but on the filmstrip there is no gallop: there are sixteen motionless photographs for every second, sixteen snapshots separated by gaps. It is your brain that welds them into fluid movement. Slow the recording down and that gallop becomes a swim through the air; speed it up and it becomes a shudder. The same "continuous time" you believe you watch flowing by is a synthesis that you perform, frame after frame.

TIME IS A COUNTED RHYTHM, NOT A THING

"what time is it?" → you point at a CLOCK
(matter in motion)

Milan 3 p.m. = New York 9 a.m. → neither is
"the true hour":

two

instruments counting beats

the cinema: 16 still photographs per second →
your brain

welds them into "continuous movement"

→ continuity and "flowing" are a SYNTHESIS of the
nervous system

Where, then, does our sensation of time come from? From within: we are made of rhythms. At the microscopic level we are long chains of pulsating clocks; at the large level, the heartbeat, the breath, hunger, sleep and waking, the cycles of the day and of the year. The "time" we feel is our nervous system's capacity to line up and integrate these rhythms — it is time *generated* by our own cycles, not an external river in which we float. This is the point that takes up and completes the chapter on the infinite: "time" as a thing that flows somewhere is a ghost-noun. *Years, days, beats* can be counted — solid; "Time" with a capital letter, objectified into a thing, generates only senseless questions — "the beginning of time," "the end of time" — and one precise form of suffering: the "I have no time" that keeps us gasping, as if time were a substance being taken away from us, instead of a rhythm that is, in part, ours to command.^[74]

4. Matter is not substance: the event takes the place of the three words

There remains "matter," the most solid of the three — the one you feel hard beneath your fingers, and which seems to leave no room for doubt. And yet it is the most surprising.

Take up the pencil again and imagine you could magnify it a billion times. That compact fullness you feel between your fingers disappears: you discover a swarming that is almost entirely *empty*, a fine dust of particles far apart from one another, in incessant motion — more like a starry sky than a brick. The "solidity" you perceive is not a full substance: it is a process, an activity so rapid and so dense that your senses read it as "full" and "still." It is exactly what we saw

earlier in this volume with heat: for centuries the "heat substance" was hunted, a fluid-thing, until it was understood that heat is not a substance at all — it *happens*; it is movement. "Matter" stands today at the same point: not a full substance, but structure and process, relation and not thing.

At this point the old tripartition — matter, space, time, three separate boxes — no longer holds, and twentieth-century physics took the decisive step: instead of patching the three words, it **replaced** them. In their place it set a single word: the **event**. An event is always *something, somewhere, at some time* — all together, inseparable. No longer matter standing still in an empty space that changes with time, but a single fabric in which the three directions of space and the direction of time are the threads of one net: **space-time**. And you inhabit this net every day without noticing. When you make an appointment, it is not enough to say *where*: you must also say *when*. "In front of the station" is not an appointment; "in front of the station at six" is. A place plus an hour: an event, in four dimensions. Relativity did nothing but take seriously, and make precise, what you were already living.

FROM THREE BOXES TO A SINGLE FABRIC

OLD (elementalism)	NEW (the event)
matter space time	EVENT = something,
somewhere,	
three separate things	at some time
	(all together,
inseparable)	

an appointment: "where" + "when" = an event in 4

dimensions

(space-time: a network of events, not three boxes)

A word, too, about the famous "curvature of space," which sounds like a mystery reserved for initiates. It seems absurd as long as you imagine space as a void: "curving nothing" means nothing. But if space is *fullness*, then the matter becomes simple, and you see it every day: watch how the smoke rising from a cigarette or from a cup curls and wraps upon itself. *That* is the curvature of a fullness. The space-time that curves around masses is not a void bending by magic: it is a fullness that has a shape, and that changes that shape. None of this denies the reality of the world — it describes that reality better, with words cut to the measure of its structure instead of to the measure of our old prejudices.^[75]

5. We abstract only a drop of the ocean

One last thing remains to be said, and it puts everything in perspective. If matter, space, and time are abstractions made by our nervous system, the question arises: *how much* of what is there do we actually manage to abstract? The answer, humbling and liberating at once, is: very little.

We are immersed in an ocean of energy — waves, vibrations, fields of every frequency — and our senses fish out a drop of it. Of the enormous spectrum of electromagnetic waves, the eye catches only a thin slice, the one we call "visible light"; all the rest — the radio waves, the X-rays, the infrared, the microwaves passing through you at this instant — is invisible to us. Nor do we even have "five senses,"

as we were taught: we have more than twenty, if we count balance, the position of the body, temperature, pain, hunger, thirst. The senses give us a rough and partial map: abstractions of low order. It is science, with its instruments, that extends that map — that makes us "see" X-rays and "hear" radio waves: abstractions of higher order, built on top of the first.

And there is a double warning, which closes the circle with the whole volume. The first: the stimulus is not the response. The falling stone is not the pain you feel; the flame you see is not the burning — the senses translate, they do not photograph, as we saw when speaking of order. The second, subtler: not only the senses but the *instruments* deform what they measure. A straight stick, plunged into water, appears broken: it is not your mind that errs, it is the light that bends. Every instrument, like every eye, has its own physical subjectivity, and modifies a little the very thing it claims merely to record. It is the observer disturbing the observed of Chapter VIII, found again in the very heart of physics: there exists no measurement taken from no point of view. To know is not to receive the world passively: it is an activity of our nervous system and of our instruments — and what we can correct, therefore, is not the facts, but the way in which we abstract them.^[76]

6. The consequences in 2026

The three oldest words in the world have never been so entangled with our technology, and with our anxieties, as they are today.

Non-absolute time is already in your pocket. The navigator that guides you works thanks to satellites whose clocks run at a rhythm

different from yours, through the effects of speed and of gravity: without correcting for that difference, every direction it gave you would be off by kilometers. The discovery that "time" is not a uniform absolute, but depends on where you are and how you move, is no longer laboratory philosophy: it is what brings the package to your address. And in the systems that keep the digital world running — servers scattered across the planet, messages crossing one another in flight — no common "now" exists: events are ordered by convention, because a universal instant, quite simply, is not there. It is the chapter on simultaneity — in the third volume of this edition — already at work.

The objectification of time, and the breathlessness. "I have no time" is perhaps the most repeated sentence of our century, and it is born precisely of this chapter's error: treating time as a substance that is being taken away from us. But time is not a thing one possesses or loses: it is the way we order and count our rhythms and our activities. To reformulate "I have no time" as "I do not have enough room, at this rhythm, for everything I have put into it" moves the problem to where it really lives — in the choices, in the rhythms, in the priorities — and gives it back, at least in part, into our hands. It is a small gesture of semantic hygiene with a large effect on the breathlessness.

Matter as information and fields. The pencil that is "almost entirely empty," made of processes more than of substance, is not a curiosity: it is the picture that contemporary physics has made precise. Particles are ripples in fields that fill everything; space-time itself is a dynamic fullness that ripples in its turn — we have even "felt" it tremble, when in 2015 gravitational waves were detected for the first

time. We live, more and more, in a world in which "matter" and "information" draw close to each other: one more reason to handle the word *matter* as an abstraction, and not as the last of our certainties.

And here, for the last time in this part, the stakes come down to the personal. The three words we believed to be the world's most solid foundation have revealed themselves to be abstractions — ways of looking, not things. This is not a loss: it is a liberation. For if even "matter," "space," and "time" are maps and not territories, then we can stop submitting to them as to destinies of stone. The "time that consumes us," the "space we lack," the "weight of the matter" of things: these too are, in part, ways of looking — and ways of looking, unlike destinies, can be changed.

7. Practical exercises

This chapter is measured by your capacity to treat "matter," "space," and "time" as tool-words and not as immutable things. Five protocols.

Exercise 1 — Ask for a piece of matter

Actually perform the experiment: ask someone, "hand me a piece of matter," and then observe, together with them, how whatever they hand you always has a shape (space) and a duration (time) as well. It serves to feel, in a single gesture, that the three words cannot be separated — they are three ways of looking at one single thing.

Exercise 2 — The full space

For one day, every time you think "empty space" (the empty room, the sky, the distance), try to name what it is full of: air, light, sounds, dust, fields. Breaking the habit of the "void" is breaking the habit of a ghost, and it makes you more attentive to what, in that "void," actually acts — like the wind on the umbrella.

Exercise 3 — Count the rhythms

For a few minutes, stop thinking of time as something that flows, and count it as rhythm: the breath, the heartbeat, your steps. Notice that the "time" you feel is born within, from your own cycles, not from an external river. It is the most direct way to stop enduring time and to begin, in some measure, to command it.

Exercise 4 — Reformulate the "I have no time"

For one week, every time you are about to say "I have no time," stop and reformulate: "at this rhythm, I have chosen to put these things before that one." This is not a consoling word-game: it moves the problem from time-as-substance (which you cannot change) to your choices and your rhythms (which, at least in part, you can).

Exercise 5 — The drop and the ocean

Once a day, remember that of the signals passing through you at this instant — radio waves, wi-fi, infrared, cosmic rays — you perceive almost nothing. Not to feel small, but to remember that what you see is a drop, and that your map of the world, however rich, leaves out an ocean. It is the humility that keeps the mind open.

8. In summary

The central points of this chapter, to carry into the chapters that follow:

1. **"Matter," "space," "time" are not three things.** They are three *ways of looking* at a single reality that pulses. The pencil is already matter, space, and time together; from whichever word you begin, the other two come back in.
2. **They are abstractions, like all the others.** They name not substances out there, but relations that the nervous system extracts from a single process. Supremely useful so long as we remember that they are abstractions; sources of confusion and of suffering the moment we mistake them for the things.
3. **Space is not a void: it is a fullness.** The umbrella intact in the living room and inside out in the storm: the same "space" was full of wind. "Absolute void" does not exist — and cannot even be said, because a symbol must stand for something.
4. **Unbounded does not mean infinite.** On the surface of a sphere you can walk forever without meeting an edge, and yet the sphere is finite. The universe may be like this: without borders, but not endless. "What is there beyond the edge?" is like "what is there north of the North Pole?"
5. **Time is not a thing: it is a rhythm we count.** There is no universal "now": we compare clocks. It becomes manageable only when broken into units (seconds, hours). And its continuity — the "flowing" — is in part a synthesis of the nervous system, like movement at the cinema.
6. **Time is born within.** We are made of rhythms — heartbeat, breath, sleep; the "time" we feel is the capacity to line them up.

"Time" objectified is a ghost that generates senseless questions and the breathlessness of "I have no time."

7. **Matter is not full substance: it is process.** Magnified, the pencil is almost entirely emptiness in motion. "Solidity" is an activity too dense to be seen — like heat, a process mistaken for a thing.
8. **The event takes the place of the three words.** Physics did not patch up matter, space, and time: it replaced them with the *event* — something, somewhere, at some time, all together — and with space-time, a network of events. An appointment (where + when) is already 4D.
9. **The "curvature of space" is the curvature of a fullness.** Absurd if space is a void, obvious if it is full: watch how a cigarette's smoke wraps upon itself. Not a void bending by magic, but a fullness that has a shape.
10. **We abstract a drop of the ocean.** The senses fish out a sliver of the energy passing through us (more than twenty senses, not five); instruments extend the map but deform it in their turn. The stimulus is not the response; there exists no measurement from no point of view. Putting words in order is the first step toward putting theories in order — and behaviors.

With this, the part on the structural factors of the new language comes to a close. The next chapter opens the final part of this volume and gathers in its fruit: **Chapter XVIII, *Mathematics: A Language That Mirrors the Structure of the World***, shows why mathematics of all languages — the language made of functions, order, relations, and infinities that we have built chapter by chapter — is the most faithful map we possess of the structure of reality.

The point of this chapter, however, is one. **The three words with which we believe we know what the world is — matter, space, time — are not things, but ways of looking at a single reality that pulses. And a way of looking, unlike a destiny, is something we can learn to do better.**

Notes

Chapter XVIII — Mathematics: A Language That Mirrors the Structure of the World

Open the calendar on your phone and read that three years from now, on a precise day, at a precise minute, at a certain point on the Earth, the Sun will go dark for two minutes and nineteen seconds. A total eclipse, already written in there with the same calm with which your birthday is marked.

No one has "seen" that eclipse: it has not happened yet. And yet there it is, foretold. And when the day comes, the sky will obey — to the second. A handful of symbols, worked out on a page long before anything happens, knows in advance what the Sun will do. The same thing had happened, even more astonishingly, with the planet Neptune: it was "found" with calculations before it was found with the telescope, because another planet, Uranus, was moving strangely, and the calculations said that somewhere, at an exact position, there had to be an invisible body pulling on it. When the telescope was finally pointed where the relations had said to look, the planet was there.

Do you ever ask yourself how a row of numbers, written on a page, can know in advance what the world will do?

It is the question with which the final arc of this volume opens, and the answer crowns everything we have built. In Chapter V, earlier in this volume, we called mathematics the cleanest imprint the human mind has ever left. Now we can say something stronger: mathematics is a **language** — the most rigorous we have — whose structure *mirrors* the structure of the world. That is why it "works": that is why a prediction made on paper, in the language of relations, is one the world then keeps. Not magic, not sacred truth: similarity of structure. Let us see — beginning by stripping mathematics of the aura that keeps it from being understood.

1. Mathematics is a language, not a sacred truth

The first step is the hardest, because it runs against a very old habit. We were raised to think of mathematics as something *sacred*: eternal truths that have existed forever in a perfect heaven, which human beings do not invent but "discover," and before which one can only bow. From that aura come veneration and fear together — and even the follies, old and new, of those who ascribe magical powers to numbers.

Let us set all of this aside. Mathematics is a human **language**, made by human beings, like English or music: it has its symbols, its rules, its sentences. It is a special language — the most precise and rigorous we have managed to build — but a language it remains. And, like every language, as we saw earlier in this volume, it is also a **form of behavior**: an activity of the human nervous system,

something the brain *does*, not a motionless object in another world. There is nothing sacred in any formula: even the ones that look most fundamental today may, tomorrow, be revised. The mathematicians who made the greatest revolutions had, without knowing it, exactly this attitude: they treated mathematics as a human construction to be handled, not as an idol to be worshiped.

This changes everything, starting with a fact that concerns millions of people: the fear of mathematics. Many convince themselves, as children, that they are "not the type" — that they carry some defect which shuts them out forever. It is almost never true. The difficulty, in the overwhelming majority of cases, is not in the head of the learner: it is in the way mathematics is taught — as a body of truths to be endured and repeated, instead of as a language to be understood and used. Take away the sacred aura, and a tool remains; and a tool can be learned, each of us at our own pace. ^[77]

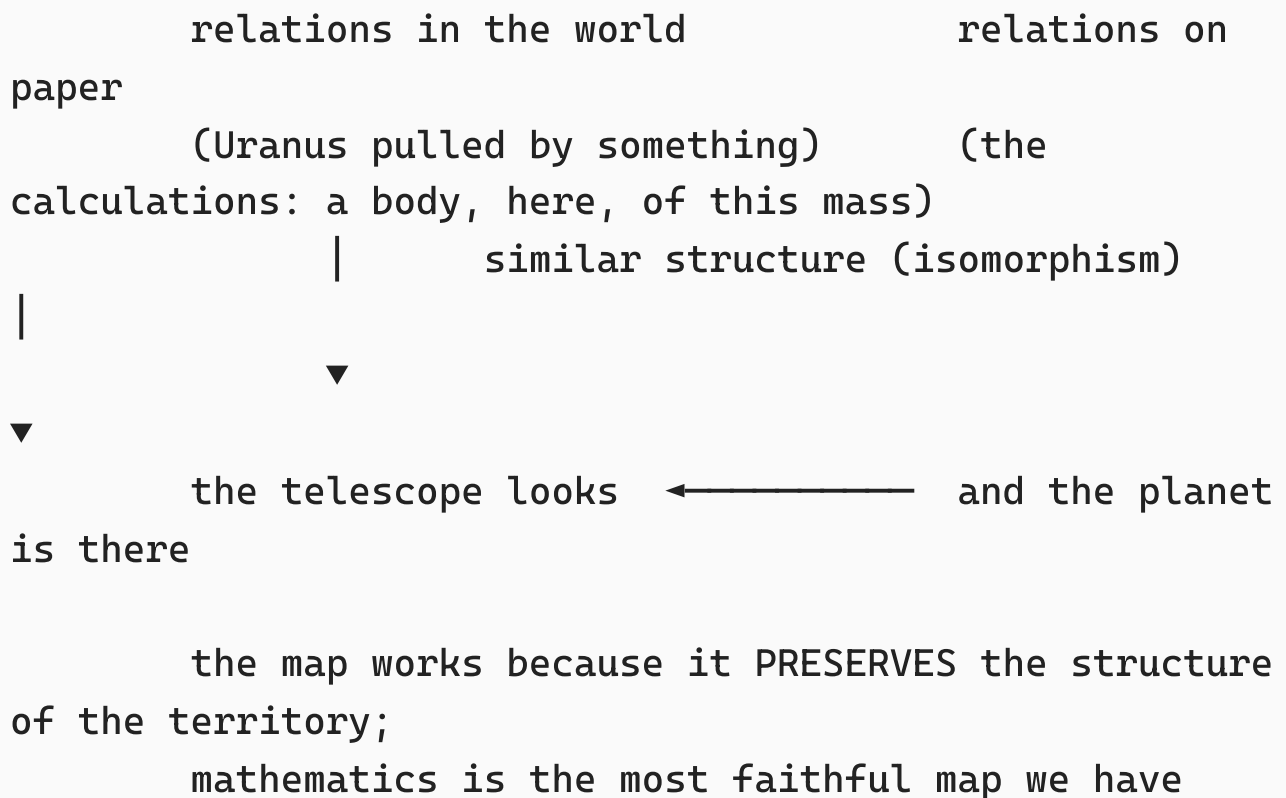
2. Why it works: it mirrors the structure of the world

Let us go back to the eclipse and to Neptune, because they hold the secret. How does a language manage to *predict* the world? The answer is a single word that runs through this entire work: **structure**.

Remember the principle of Chapter IV: of a thing we know not the essence but the structure — the web of relations. And remember the criterion of isomorphism: a map is good when it *preserves the structure* of the territory — when what stands in a certain order on the paper stands in the same order on the ground. Well: mathematics is the most faithful map we have ever built. It works because its

structure — made of relations, of orders, of functions — is *similar* to the structure of the world, which is itself made of individuals in relation and in order with one another. When the calculations predict where Neptune is, it is because the relations written on the paper mirror faithfully enough the real relations among the celestial bodies: and then what is true in the map turns out to be true in the territory as well.

WHY MATHEMATICS "PREDICTS"



Here a great circle closes. Everything we have built in this part of the book — the function, order, relations and their directions, the infinite as a process — was nothing other than the vocabulary of this language. Mathematics is the tongue made of functions, orders, and relations; and since the world, as we have seen chapter after chapter, is itself a fabric of functions, orders, and relations, the two "speak the

same language." It is not a lucky accident, nor a mystery: it is the structural reason why mathematics is so "unreasonably effective" in the sciences. It speaks the grammar of the world.

There is a reverse side, though, and it must be held tight from the start, because it is the most important point for our time. A map, however faithful, *is not* the territory. Mathematics mirrors the structure of the world; it is not the world. When we forget this — when we mistake the model for the reality, the equation for the fact, the number for the thing — we are back at the oldest of errors, identification, only now with a far more powerful instrument in hand. The strength of mathematics and its danger are one and the same: it is a map so good that one is tempted to believe it the territory.^[78]

3. A number is a relation, not a thing

To understand how mathematics mirrors the structure of the world, you have to understand its most elementary word: the **number**. And here comes a surprise that changes the way the whole subject looks. A number is not a *thing*. It is a **relation**.

Take "5." It looks like an object, an entity sitting somewhere. But look at what it really means: "5" means "five times a unit" — five times something taken as one. Five apples are five times one apple: the number is the *comparison*, the exact relation between a quantity and a chosen unit. That is why numbers are so precise and so powerful: each one is the proper and unique name of an exact relation, not the vague label of a thing. "Greater than" is already a relation, but an imprecise one; "five times" is a precise relation — unique, unrepeatable. It is the discovery of Chapter XIII — the world is made

of relations — brought to its sharpest edge: numbers *are* relations set in a row.

You can see it in a gesture you make without thinking. You are setting the table for a dinner and want to know whether you have enough chairs. You do not count the guests and then the chairs: you put one chair at each place. If a chair is left over at the end, there were more chairs; if someone is left standing, there were fewer; if everything comes out even, there were "just as many." You have just answered a question of quantity *without uttering a single number* — by pairing one to one, that is, by using a relation. This is the very root of mathematics, older than counting: before the word *seven* there is the gesture of setting one thing beside another and seeing whether they correspond.

A NUMBER IS A RELATION

"5" = five times a unit (an exact, unique relation)

not a "thing" sitting somewhere

chairs ● ● ● ● ● → one chair for each person:

people ▲ ▲ ▲ ▲ a chair left over
⇒ "more chairs than people"

(you know "which is more" without counting)

It pays to distinguish, here, two uses that everyday language runs together. When you say "I live at 5 Main Street," that "5" is not a number in the mathematical sense: it is a *name*, a label for telling one

door from another. The proof is that you cannot add it: 5 Main Street plus 3 Main Street does not make 8 Main Street. It is a numeral-name, not a number-relation. Real mathematics begins when numbers stop being labels and become relations that can be composed, compared, transformed. It is the difference between using figures as tags and using them as the exact grammar of the relations between things.^[79]

4. From quality to relation, and the surprise of emergence

If mathematics is the language of exact relations, then "doing mathematics" on something means one precise thing: turning a vague quality into a measurable relation. Take the most innocent statement in the world: "the grass is green." It is an excellent sentence for everyday life, but for science it is next to nothing — *green* is a word with blurred edges, different for every eye. Begin to refine it, though, and something happens. What is green? A certain reflected light. What light? A wave. How long? Between 495 and 570 millionths of a millimeter. Suddenly "green" has become an exact relation — a wavelength, a frequency — on which any two people can at last agree and make predictions. This is the passage mathematics performs everywhere: from the foggy qualitative to the precise relational.

It is an immense power, and here we must say, with the same honesty that runs through this book, what its price is. Turning every quality into a measurable relation is what made science possible; but it is also the temptation to believe that *only* what can be measured

exists, and to throw everything else away as if it did not count. Mathematics lights up what it touches; but if we take it for the only light, we end by no longer seeing all that which, while real, does not yet let itself be put into numbers. Rigor is a virtue as long as it remembers its own boundaries.

Then there is a discovery mathematics itself forces on us, and it dismantles one of our most deeply rooted illusions: that the whole is always the sum of its parts. Sometimes it is. If you add a guest to the dinner, you add a plate and a chair: two plus one makes three, tidily. This is the **additive** world, and it is described by the simplest equations, the "linear" ones. But take two gases, hydrogen and oxygen, and combine them the right way: you do not get "some hydrogen plus some oxygen." You get **water** — something that resembles neither of the two, that puts out fire instead of feeding it, and whose properties were written nowhere in the starting gases. Something new has *emerged*.

ADDITIVE vs EMERGENT

additive (linear)	emergent (non-linear)
guest + plate + chair → WATER	hydrogen + oxygen
$2 + 1 = 3$	properties of the
whole are NEW, the whole = sum of the parts in the parts	written nowhere
the world that matters is almost always the second kind	

→ emergence needs richer languages (non-linear equations)

This is the **non-additive** world, and describing it takes richer equations, "non-linear" ones. This is not a technical detail: it is the structure of nearly everything that matters. The organism that is more than the sum of its organs (we saw it earlier in this volume), a team that is more than its players, an economy, a climate, a mind: all are systems in which something *emerges* from the parts that was not in the parts. Additive thinking — "just add it up" — fails precisely on the most important problems, and it is one of the reasons why simple solutions to complex problems almost never work. Mature mathematics serves this purpose too: to give us a language for emergence, exactly where the arithmetic of "just add more" deceives us. ^[80]

5. What stays the same: invariants and transformations

We arrive at the heart of modern mathematics, and at an instrument of thought whose value reaches far beyond numbers. For centuries it was assumed that the task of mathematics was to find *fixed answers*: the value, the solution, the right number. Then came a deeper idea, which unified the entire discipline: study not what changes, but **what stays the same when everything changes**.

Think of a figure drawn on a sheet of rubber. You stretch the sheet, rotate it, fold it: the figure deforms, the angles change, the lengths stretch. Almost everything is transformed. But something, usually,

remains: a point that was inside the figure stays inside; two lines that crossed go on crossing. That "something that survives every transformation" has a name — the **invariant** — and it is the most precious thing mathematics knows how to look for. Because the invariant is what truly belongs to the figure, and not to the particular way you drew it or looked at it.

THE INVARIANT: WHAT SURVIVES THE TRANSFORMATION

```
figure  —[rotate, stretch, fold]→  deformed
figure                                     |
      |                                     |
      changing: angles, lengths, position
      REMAINS: the invariant (what truly belongs to the
figure,
                        not to the way you happened to draw it)

      seeking invariants = seeking the real beneath
appearances
```

You recognize this idea, because we met it at the opening of this arc of the volume, in the chapter on the function (Chapter XI): what survives when you translate the same problem into different languages is the invariant, and it is the *real* part; what changed was only an accident of the language. Here the same idea becomes the engine of the most advanced science. Einstein's theory, at its root, is a hunt for invariants: what stays the same for all observers, however they move? What stays the same — not what each observer sees from his own point of view — is what we may call real. It is the highest form of that search for objectivity which runs through this whole volume: separating what belongs to things from what belongs

only to our way of looking at them. Mature mathematics teaches us to do this with precision — and, once learned, the move can be used everywhere: in an argument, in a decision, in trying to understand a person. Always ask: *what, here, stays true however I turn the thing?* That is the invariant. That is the real.^[81]

6. The consequences in 2026

Never have we lived so deep inside mathematics — and never have we been so much at risk of mistaking it for the reality it is only supposed to mirror.

Artificial intelligence is applied mathematics. Underneath every model that recommends us a movie, translates a language, or generates a text, there is no mind: there are matrices, non-linear functions, operations in spaces of very many dimensions — exactly the mathematical languages this chapter has been about.

Understanding this takes nothing away from the power of these tools; it takes away the veil of magic, and with it the awe. A machine that "speaks" is executing enormously complex mathematics over great quantities of data, not reading truths in a heaven. It too is a language — and like every language, it can be precise or it can produce noise.

The model is not the reality. It is the most serious danger of our time, and the chapter hands us the exact antidote. A weather forecast, a reliability score, a recommendation, the confident answer of a text-generating system: all are *models*, maps made of relations. They are enormously useful as long as we remember that they mirror the territory, and they become dangerous the instant we mistake them for the territory itself. Treating the score as if it were the person,

the forecast as if it were the future, a model's output as if it were a fact: this is the same old identification — the map taken for the territory — armed with unprecedented power. The defense is not to reject models, but to remember, every time, that they are maps: excellent ones, and not for that reason the world.

Datafication and what stays outside. Translating everything into numbers — "the grass is green" into nanometers, a person into a profile, a day into metrics — is the gesture that gives rigor, and our century has pushed it all the way. But it carries the risk we have named: believing that only what is measured exists, and throwing the rest away as if it did not count. Remembering that the map, however detailed, always leaves out something of the territory is, in 2026, a form of collective sanity.

And here, for the last time in this arc of the volume, the stakes come down to the personal. You too, every day, are described by models — scores, profiles, predictions about what you will do. You are not those numbers. They are partial maps, taken from one point of view, with one instrument, on one date: useful to whoever uses them, but not you. The most liberating thing this chapter hands you is the same one that opens it: a prediction, however precise, is a way of looking, not a destiny. And what stays true of you however you are turned — your invariant — is in none of those numbers.

7. Practical exercises

This chapter is measured by one capacity: treating mathematics as a language-map, and never mistaking the map for the territory. Five protocols.

Exercise 1 — Numbers or names?

For one day, in front of the numbers you meet, ask yourself whether they are *relations* (they can be added and compared: prices, distances, quantities) or *names* (labels that do not add: the house number, the number of a train, a clothing size). Distinguishing the two uses is the first step toward ceasing to treat figures as magical things and beginning to use them as tools.

Exercise 2 — From quality to relation

Take a vague judgment you often make ("he is a cold person," "that restaurant is expensive," "I am making progress") and try to turn it into a more precise relation: compared with whom? how much, compared with what? measured how? Not to reduce everything to numbers, but to feel the difference between a fog and a relation, and to choose when you need the one and when the other.

Exercise 3 — Additive or emergent?

Choose a situation that concerns you (a team, a family, a project, your health) and ask: is it additive — just add up the parts — or emergent — the whole does something the parts alone do not? It is almost always the second. Recognizing this saves you from the "just add more" solutions that fail precisely on the problems that count.

Exercise 4 — Look for the invariant

In an argument, or facing a difficult decision, stop and ask yourself: *what, here, stays true however I turn the thing?* Strip away the points of view, the formulations, the moods of the moment, and see what survives. That is the invariant — the real part — and it is almost always smaller, and more solid, than everything else.

Exercise 5 — The model is not you

For one week, every time a number describes you — a grade, a score, a metric, a prediction about you — repeat to yourself: *this is a map, not the territory; taken from one point of view, with one instrument, on one date*. Not to ignore it, but not to identify with it. You are the territory; the number is only one partial map of you.

8. In summary

The central points of this chapter, to carry into the concluding chapter:

1. **Mathematics is a language, not a sacred truth.** Made by human beings, made of symbols and rules, and at the same time a form of behavior of the nervous system. Nothing mystical in numbers: a tool to be understood and used, not an idol.
2. **The fear of mathematics is almost always a problem of teaching.** Not a defect in the learner, but the fruit of presenting mathematics as truth to be endured instead of as a language to be handled. Take away the aura, and a learnable tool remains.
3. **It works because it mirrors the structure of the world.** The predicted eclipse, Neptune found on paper before it was found in the telescope: mathematics is the most faithful map we have, and a faithful map preserves the structure of the territory. It speaks the grammar of the world.
4. **It is the vocabulary of this part of the book.** Functions, orders, relations, invariants: mathematics is the tongue made of these,

and the world is a fabric of these. That is why the two "speak the same language" — not by accident, but for a structural reason.

5. **A number is a relation, not a thing.** "5" is "five times a unit": an exact and unique relation. The root of mathematics is older than counting: pairing one to one (the chairs and the guests) and seeing which is more, without a single number.
6. **Numbers and numerals are not the same thing.** The "5" of 5 Main Street is a name, and it does not add; the "5" of five apples is a relation, and it composes. Mathematics begins when figures stop being tags and become the grammar of relations.
7. **Doing mathematics is turning quality into exact relation.** "The grass is green" becomes a wavelength. It is an immense power, with its price: the temptation to believe that only what is measured exists. Rigor is a virtue as long as it remembers its own boundaries.
8. **The whole is not always the sum of the parts.** The guest plus the chair, yes (additive); hydrogen plus oxygen makes water, no (emergent). Nearly everything that matters is non-additive, and emergence needs richer languages: "just add it up" thinking fails on the big problems.
9. **The heart of modern mathematics is the invariant.** What stays the same when everything is transformed is what truly belongs to things, not to our way of looking at them. Einstein's theory is a hunt for invariants; and the question "what stays true however I turn the thing?" can be used everywhere.
10. **The map is not the territory.** Mathematics mirrors the structure of the world; it is not the world. Mistaking the model for the reality — the score for the person, the forecast for the future, a system's

output for a fact — is the same old identification, armed with a new power. You are the territory; the number is only a map.

The final chapter of this volume (Chapter XIX, *Mathematics: A Language That Mirrors the Structure of the Human Nervous System*) completes the picture from the other side. We have seen that mathematics mirrors the structure of the *world*; now we shall see that it also mirrors the structure of the *mind* that produces it — and it is in this double mirror that the whole architecture closes.

The point of this chapter, though, is one. **Mathematics predicts the world because it mirrors the world's structure: it is the most faithful map we have. But a map, however perfect, is not the territory — and you, like everything real, are more than any model that describes you.**

Notes

Chapter XIX — Mathematics: A Language That Mirrors the Structure of the Human Nervous System

You recognize a friend at a distance: from behind, in the rain, in the middle of a crowd, in a light that changes with every step. The image reaching your eyes is never twice the same — the angle changes, the distance, the shadow, the color, even the way she carries herself.

And yet you, beneath all these differing versions, find something that does not change, and you say: "it's her." In a fraction of a second you

have discarded everything that varied and seized what remains — the form that survives every deformation. Without noticing, you have performed the most mathematical operation there is: finding the invariant inside change.

Do you ever ask yourself whether your mind, in the mere business of living, is doing mathematics without knowing it?

That is the question with which this volume closes, and it is its seal. In Chapter XVIII we saw that mathematics mirrors the structure of the world. Now we discover the other half, and the more surprising one: mathematics also mirrors the structure of the *mind* that produces it. It is a **double mirror**. And not because mathematicians are special creatures: because mathematics is nothing other than the human nervous system working *well* — doing, cleanly and explicitly, exactly what your mind does all the time, blindly, while it recognizes a face, counts cookies, gets a joke. In this double mirror — the mind on one side, the world on the other, and mathematics as the bridge between the two — the whole architecture we have been building comes to a close. Let us look, starting from that face.

1. Your mind does mathematics without knowing it

Look closely at what you did in recognizing your friend. The world that pours in on you is a continuous flux, always different: no image, no sound, no instant ever repeats itself identically. If your mind recorded it all just as it comes, it would drown in change. Instead it does three things, continuously and without effort: it **abstracts** (discards the details, keeps the essential), it **relates** (connects this to

that), and it **hunts for what stays the same** (the invariant) beneath the thousand transformations of appearances. Recognizing a face, seeing that two situations "are the same problem," feeling that a melody is the same melody even when played in another key: all are versions of a single gesture.

And that gesture — abstracting, relating, finding invariants — is *exactly* what mathematics is made of. Mathematics is not an alien activity that a few lucky brains happen to manage: it is the natural way *every* human nervous system works, made explicit, cleaned of its errors, and written down on paper. When a mathematician looks for "what does not change under a transformation," he is doing, with full awareness and precision, the very thing you do without noticing when you find your friend again in the crowd. That is why his most important words — relation, order, difference, variable, function, transformation, invariant — are not technical jargon: they are the precise names of the operations your mind has been performing all along.

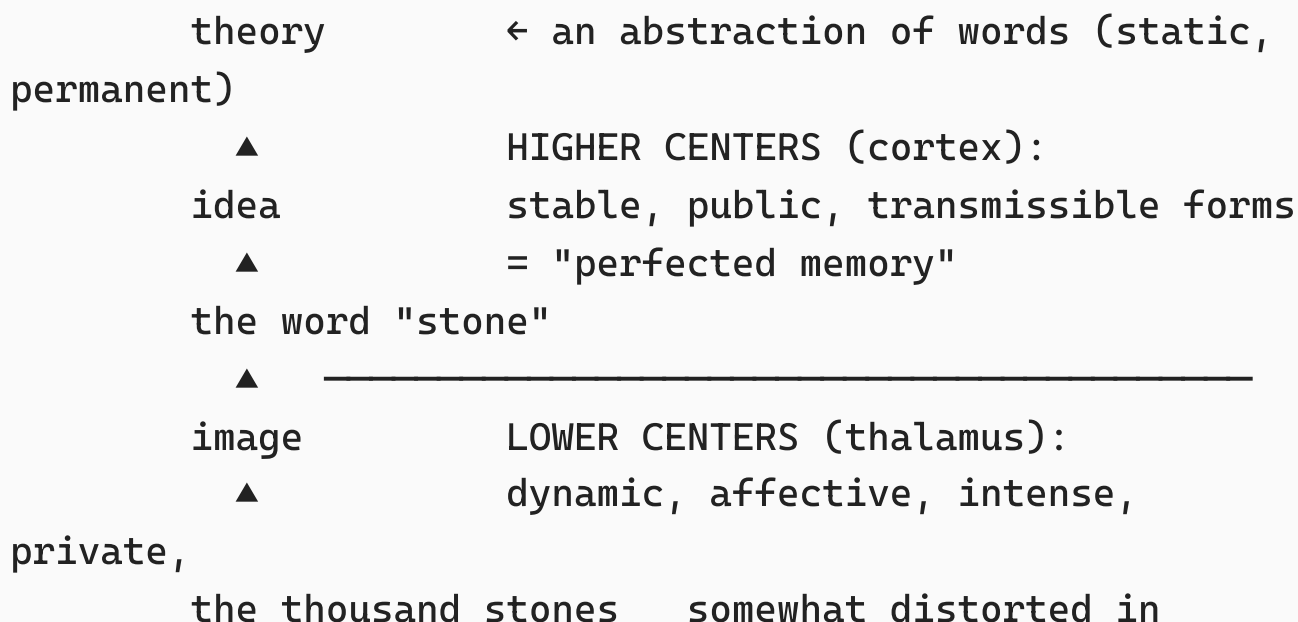
There is a detail that makes all this deeper still, and it closes a circle with the first arc of this volume. Those words have a special property: they hold for the "senses" and for the "mind" together — they do not split the two apart. "Relation," "order," "difference" describe in the same terms how your eye takes in two neighboring points and how your thought takes in two neighboring ideas. They are words that do not break the organism into pieces — they are, in the language of this book, *non-elementalistic*. And this is why mathematics mirrors the nervous system better than any other language we possess: because it speaks the language of the organism-as-a-whole, not the language that cuts a human being artificially into "body" and "mind."^[82]

2. The ladder of abstraction: from flux to form

To understand how mathematics mirrors the mind, we must watch *how* the mind abstracts. And it abstracts in a precise way: **by rungs**.

Watch a child learning to count. At first the child counts *the cookies*: one, two, three cookies. Then come the toy cars, then the fingers. And at a certain point something silent and immense happens: the child stops counting cookies and begins to count. The "three" detaches itself from the things and becomes an empty form, valid everywhere. That leap — from the concrete thing to the abstraction that leaves it behind — is the same leap your nervous system performs at every step. From thousands of stones seen and touched, it has drawn out the image "stone"; from thousands of images, the word *stone*; from the word, an idea; from the idea, a theory. Each rung is an abstraction of the abstraction before it: a photograph of a photograph of a photograph.

THE LADDER OF ABSTRACTION



recall

(the flux of the world)

These rungs are not all alike, and this is where the chapter touches sanity. The *low* rungs, close to the world — sensations, emotions, intuitions — are **dynamic**: alive, intense, shifting, private, and they deform in recall (try remembering with precision a strong emotion from yesterday). The *high* rungs — concepts, definitions, theories — are **static**: still, permanent, the same for everyone, and for exactly that reason transmissible. A circle defined as "the set of points at equal distance from the center" remains identical today, tomorrow, in a thousand years, in anyone's mind. It is, quite literally, a **perfected memory**: something that does not decay, and that we can store even *outside* the brain — in books, in instruments — and hand on to other brains. This is the faculty that Chapter III, earlier in this volume, called *time-binding*, seen here from its nervous root: the high, static rungs are what allows knowledge to accumulate instead of dying with us. ^[83]

3. The double mirror, and the craft of sanity

Now we can name the heart of the chapter, and with it the seal of the entire volume. Mathematics is a double mirror: it mirrors the structure of the **world** — which is flux, change, relation — and the structure of the **nervous system** — which abstracts that flux into stable forms. The bridge between the two is always the same one, the one that runs through this whole book: similarity of structure. Mathematics works because it is similar, at one and the same time, to how the world is made outside and to how the mind is made within.

And here lies the most practical lesson of all, the one on which sanity is staked. The world is a flux that never stops; but we, in order to understand it and to act, must stop it into stable forms. The decisive question then becomes: do we know how to **translate** the dynamic into the static and — above all — to translate the static back into the dynamic, without confusing the two? For sanity lies precisely in this fluent translation between the two levels; and illness, as we shall see, is born of staying locked in one of them, or of swapping them.

THE CRAFT OF SANITY: TRANSLATING BETWEEN THE TWO LEVELS

the film running	the filmstrip
stopped	
(dynamic, emotional)	(static, analyzable)
you live the scene, but	each frame held
still:	
the details blur	gestures and
grimaces measurable,	
and memory distorts	comparable
sanity = knowing how to pass back and forth	
between the two	
(living the flux AND knowing how to stop it into	
form)	

The image that says it best is the cinema. You walk out of a film shaken; but if a friend asks you *what* happened in the key scene, you stammer: you remember the emotion, not the details, and the little you do remember you are already distorting. That is how the low, dynamic rungs work: intense and ungraspable. Now imagine stopping

the filmstrip and looking at the single frames: every gesture, every grimace becomes fixed, measurable, comparable. That is how the high, static rungs work. A sane person can do both, and pass from one to the other: live the flux *and* know how to stop it into form in order to understand it. Whoever stays locked at the bottom reacts only on impulse, swept away by emotion, unable to hold the image still long enough to look at it — this is "thalamic thinking," emotional and unclear (birds, with a large thalamus and little cortex, are at once highly excitable and stupid). Whoever stays locked at the top lives on cold abstractions cut off from feeling. Mathematics is the language that performs this translation in the most rigorous way we know — the calculus, in particular, is the art of passing from continuous motion to its single frames and back. To generalize its *method* (not its technique) to life is to learn to remain the prisoner of neither level. ^[84]

4. Hunting the invariant

Let us return to the face we started from, because it holds the most powerful thinking tool in this chapter — and in the whole volume. To recognize your friend is to find, beneath all the transformations (light, angle, distance), what **does not change** — the invariant. And this, which your brain does in a flash for faces, is exactly what the highest mathematics does, with maximal rigor, for everything.

We met it at the opening of this volume's second arc, in Chapter XI, speaking of the function: what survives when you translate the same problem into different languages is the real part; what changes was an accident of the language. Here we discover that it is the **natural way the nervous system orients itself in the world**. In order not to

drown in the flux, the mind hunts continuously for what remains constant: the face under different lights, the melody in different keys, the object from different angles, the person who is "still her" despite the years. Without this hunt for the invariant we could recognize nothing, and every instant would be a new and unmanageable world.

THE INVARIANT: WHAT REMAINS "HER"

the same person, a thousand appearances:

from behind ┘

in half-light ┘

at twenty ┘ → you find what does NOT

change = "it's her"

grown older ┘ (the invariant = the real,

beneath appearances)

in profile ┘

the mind orients itself by hunting invariants;
mathematics does the same, with full rigor

It is the same hunt that has guided the highest science. The "laws of nature," looked at closely, are nothing but invariants: what remains the same for all observers, however they move and from whatever point they look. Einstein's theory, at its root, is exactly this — the search for what is the same for everyone, separated from what depends on the single point of view. And here mathematics hands us its greatest gift for everyday life, because that question can be used anywhere: in an argument, in a decision, in the attempt to understand another person or yourself. *What, here, remains true however I turn the thing?* Strip away the moods of the moment, the formulations, the points of view, and look at what survives. That is the invariant. That is

the real — usually smaller, and more solid, than all the noise around it. [\[85\]](#)

5. The danger of static forms, and the cure

The high, static abstractions — concepts, definitions, theories — are the most precious treasure we own: without them, no science, no shared memory, no civilization. But precisely because they are still and permanent, they conceal a precise danger, and it is the red thread that ties this chapter to the whole book.

The danger is forgetting which rung one is standing on, and treating a static form as if it were the living experience from which it was abstracted. Treating the word as if it were the thing, the idea as if it were the fact, the label as if it were the person: this is **identification**, the underlying illness we named in Chapter XIII, seen here from its nervous root. The static form is so convenient, so stable, that the mind is tempted to take it for reality — and when it does, it stays trapped inside an abstraction, disconnected from the flux it was supposed to represent. On the individual scale, this is the person who defends an idea as if defending his own skin, who lives a label as a sentence, who mistakes a map for the territory. On the collective scale, it is the mechanism of mass hysterias, of fanaticisms, of wars fought over words: whole peoples reacting to static forms — a slogan, an abstract enemy, a flag — as if they were physical realities, and losing contact with living facts.

There is also — and it must be said — a necessary return movement. The high abstractions do not stay up there: they are "digested" and translated back down, all the way down, until they color the emotions

and the reactions of the body anew. The process is healthy when the idea returns to nourish feeling; it becomes pathological when a wrong abstraction, or one mistaken for reality, descends to manufacture fears and illusions — and, in the extreme cases, delusions and hallucinations. The cure, the only one, is the same that this whole book has been preparing: **consciousness of abstracting**. To know, at every moment, which rung one is standing on; to remember that the word is not the thing, that the theory is not the fact, that the static form is a construction of ours and not the living reality. The high rungs cannot be eliminated — that would be a return to the animal; but we can learn not to confuse them, to translate fluently between the levels, to remain the prisoner of none.

And here the chapter hands us the image that seals everything. Look at three states of the same nervous mechanism. The **insane** person lives his premises as *the* absolute truth — single, unmodifiable: he is trapped inside a static form he has mistaken for reality, and can no longer find his way out of it. The **average man** stands in the middle, often closer to the first than he believes: he holds many of his ideas as immobile truths, and identifies himself with them without noticing. The **mathematician**, in his working hours, does the opposite: he holds his premises as *hypotheses* — "if this, then that" — knowing that they are constructions, not eternal truths, and stands ready to change them if the facts demand it. It is not a difference of intelligence: "it takes a good mind to be insane." It is a difference in *awareness of levels*. And in that difference lies the whole of sanity: not owning fewer ideas, but knowing that they are ideas — maps, not territories; static forms, not the living reality.^[86]

6. The consequences in 2026

Never has the double mirror of this chapter been more visible than it is today — and never have we been more at risk of forgetting its lesson.

Machines that imitate the brain. Artificial neural networks — the systems that today translate, recognize faces, generate text — are mathematics explicitly built in the image of the nervous system: layers of abstraction stacked one upon another, from raw detail to general form, exactly the ladder of rungs of this chapter. The circle this book intuited nearly a century ago has closed: mathematics, born as a mirror of the mind, has become an artificial mind made of mathematics. Understanding this is the best defense against awe: a machine that "recognizes" or "speaks" is climbing up and down a ladder of abstractions, not reading truths off some heaven.

The machines' hallucinations. It is instructive that the most discussed defect of these systems should be called "hallucination" — the very word of the clinic. And the mechanism is truly the one this chapter describes: a static form (a well-constructed, grammatically perfect output) presented as if it were a fact, disconnected from the real flux it is supposed to represent. It is identification — the map taken for the territory — observed in a machine. The cure, here too, is consciousness of abstracting, applied by those of us who use it: remembering that the output is a form, not a fact, and that it must be carried back into contact with reality.

The education of thought. The thesis that sanity is the capacity to translate between levels — to remain the prisoner neither of raw emotion nor of cold abstraction, and never to mistake a form for

reality — is, in 2026, a program of collective mental hygiene. In an environment saturated with two-valued slogans, with labels passed off as persons, with predictions passed off as destinies, knowing which rung you are standing on has become a defense against manipulation and polarization. It is, quite literally, what the second volume of this edition teaches you to practice.

And here, one last time, the stakes descend to the personal. You are none of the static forms with which you describe yourself. "I'm made this way," "I'm a failure," "I'm the kind of person who...": these are still photographs, high-level abstractions you have mistaken for your living reality. But you are the flux, not the photograph; the territory, not the map; the process, not the label. The most liberating thing this volume hands you is the same thing mathematics teaches without saying it: hold your premises about yourself as hypotheses, not as eternal truths — and stay ready, always, to change them when the facts, alive, ask you to.

7. Practical exercises

This chapter is measured by your capacity to recognize which rung of abstraction you are standing on, and to translate fluently between the levels. Five protocols.

Exercise 1 — Find the invariant

In the course of one day, pick three situations that feel to you like "the same old thing" (a certain kind of quarrel, a certain reaction, a certain pattern). Ask yourself: what, exactly, repeats itself beneath the differing appearances? What is the invariant? Naming it is the first

step toward recognizing it before it acts on you — and perhaps toward changing it.

Exercise 2 — Stop the film

The next time a strong emotion sweeps you away, try to do with your mind what you would do with a film: stop it on a single frame. *What, exactly, happened? Which facts, in what order?* Passing from the overwhelming flux (low rung) to the analyzable form (high rung) is the very gesture that distinguishes understanding from reacting.

Exercise 3 — Which rung am I on?

For one day, in front of what you say, ask yourself at what level you are speaking: a fact you saw? a word? an idea? a judgment about an idea? And above all: am I treating one of these forms as if it were the living reality I drew it from? Recognizing the rung is the practical antidote to identification.

Exercise 4 — Hypotheses, not truths

Take one conviction you hold as absolute — about yourself, about a person, about the world. Rewrite it in the mathematician's form: "*if* things stand thus, *then* this follows" — a hypothesis you keep for as long as the facts confirm it, and stand ready to change. Notice how much freedom it returns to you to treat a "truth" as a provisional premise.

Exercise 5 — You are the flux

Catch a static label you define yourself with ("I'm made this way," "I'm someone who..."). Remind yourself that it is a still photograph, not the living film you are. Then look for a single recent fact that

contradicts it: there almost always is one. You are not the static form; you are the process that static forms try, always imperfectly, to capture.

8. In summary

The central points of this chapter, to hold on to as the close of this volume:

1. **Your mind does mathematics without knowing it.** Recognizing a face under different lights is finding the invariant in change — the most mathematical operation there is. The mind abstracts, relates, hunts for what stays the same: this is what mathematics is made of.
2. **Mathematics is the nervous system working well.** Not an alien activity for special brains, but the natural mode of every human mind, made explicit and cleaned. Its words — relation, order, function, invariant — are the names of operations you have been performing all along.
3. **They are non-elementalistic words.** They hold for the senses and for the mind together; they do not split them. That is why mathematics mirrors the organism-as-a-whole better than a language that cuts the human being into "body" and "mind."
4. **The mind abstracts by rungs.** From the thousand stones to the word *stone*, to the idea, to the theory: each rung is an abstraction of the one before. The low rungs are dynamic (emotions — intense and shifting); the high ones are static (concepts — still and transmissible): a "perfected memory" that makes time-binding possible.

5. **The double mirror.** Mathematics mirrors the structure of the world (Chapter XVIII) *and* the structure of the mind (this chapter). The bridge is always similarity of structure: mathematics is similar, at once, to how the world is made outside and to how the mind is made within.
6. **Sanity is translating between the levels.** The world is flux; we stop it into forms. Knowing how to pass from the dynamic to the static and back — living the flux and knowing how to stop it in order to understand it — is sanity. Staying locked at the bottom is reacting on impulse; staying locked at the top is living on cold abstractions.
7. **Hunting the invariant is how we orient ourselves.** In order not to drown in the flux, the mind hunts for what remains constant. The "laws of nature" are invariants; Einstein's theory is a hunt for the invariant. And the question "what remains true however I turn the thing?" can be used anywhere.
8. **Static forms are precious and dangerous.** Without them, no science and no civilization; but treating them as the living reality — the word for the thing, the idea for the fact — is identification: on the individual scale a prison, on the collective scale the mechanism of mass hysterias and of wars fought over words.
9. **The cure is consciousness of abstracting.** Not eliminating the high rungs, but knowing at every moment which one you are standing on, and not confusing them. Translating fluently; remaining the prisoner of no level.
10. **The insane person, the average man, the mathematician: three states of one mechanism.** The insane person lives his premises as *the* absolute truth; the average man identifies with his ideas without knowing it; the mathematician holds them as

hypotheses, ready to change them. Sanity is not having fewer ideas, but knowing that they are ideas — maps, not territories.

You are none of the static forms with which you describe yourself: you are the flux they try to capture. And the sane mind, like mathematics, does not own fewer truths — it simply knows that its truths are hypotheses, maps of a living territory, to be redrawn when the facts require it.

The Close of Volume I

We set out, nine chapters ago — at the turn into this volume's second arc — from the knob of a shower: the heat that *depends* on its position, and the words we treat instead as knobs frozen in place. From there we built, piece by piece, the **architecture** of a language cut to the measure of the structure of the world and of the mind.

THE ARCHITECTURE OF THE VOLUME'S SECOND ARC

XI the function: seeing by dependencies, words as variables

XII order: meaning lives in the "between"; the nervous system's direction of travel

XIII relations: what matters is asymmetrical; identity does not exist

XIV the infinite: a process, not a thing; "forever" is a number in disguise

XV the infinitesimal and cause: no "next moment"; the many-to-one

XVI the existence of relations: what you cannot deny without using it

XVII matter, space, time: not things but ways of looking; the event

XVIII mathematics mirrors the structure of the WORLD

XIX mathematics mirrors the structure of the MIND — the double mirror

Look at it whole, now. We began with the function and arrived at the double mirror, and the journey has been one single movement: to show that reality is not a warehouse of separate things but a fabric of relations, orders, and functions — and that the mind, when it works well, is built to read exactly that fabric. Mathematics is the point where the two touch: the language in which the world and the mind, both made of structure, finally coincide. This is, quite literally, what the architecture in this volume's title names — *the structure of mind and reality*: not two architectures, but one, seen from its two sides.

And yet everything we have built remains, for now, a map. We know *what* sane thought is — conscious abstraction, fluent translation between levels, the hunt for invariants, the refusal of identity. We have not yet learned to *practice* it, day by day, on our own nervous system. It is exactly the distance that closed this volume's first arc — *knowing is not yet applying* — and that the next volume takes upon itself to close.

The second volume of this edition — ***Abstraction and Sanity: The Nervous System, Identification, and Consciousness of Abstracting*** — picks up from here, and descends into the body. If in the two arcs of this volume we laid the foundations (the difference between signal and symbol, structure, the whole organism) and built the architecture (function, order, relations, the event, the double mirror), in the second volume we enter **psychophysiology**: how the

nervous system operates by orders of abstraction, how it can lose the consciousness of its own operation — identification — and how it can regain that consciousness through deliberate practice. There we shall meet the instrument that turns all this theory into daily training — the Structural Differential — and learn, at last, not only to *understand* consciousness of abstracting but to *build* it into our own nervous system. And once that discipline is in the body, the third volume of this edition — *The Structures of the World* — will turn it outward again, onto mathematics, relativity, and the notion of matter: the very structures this double mirror has been reflecting all along, read at last by a nervous system that knows what it is doing.

For now, let the seal of this volume suffice — which is also the simplest and most liberating thing we have said:

Mind and world are made of the same fabric — relations, orders, invariants — and mathematics is the language in which the two recognize each other. To learn to speak it, even only in spirit, is to learn never again to mistake our maps for the living territory we are.

Notes

© 2026 Fabio Ghioni — Ordinate Sciences Press.

This work is distributed under a Creative Commons Attribution 4.0 International license (CC BY 4.0):

<https://creativecommons.org/licenses/by/4.0/>

This is Volume I of the three volumes of *General Semantics Evolved*. The print edition is available from Amazon KDP.

1. The distinction between reaction to the signal (typical of the animal system) and the evaluated, level-aware response to the symbol (proper to the human system) is the nucleus from which the entire non-Aristotelian tradition proceeds; see Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), of which the present work is a deliberate re-elaboration and updating. The functional definition of humanity as a *time-binding* class of life — the capacity to transmit and amplify the acquisitions of one generation to the next — goes back to Korzybski, *Manhood of Humanity* (E. P. Dutton, 1921). For the contemporary neuroscientific picture of the mechanism by which a verbal stimulus triggers a full physiological response (the amygdala's "low road," prior to cortical evaluation), see Joseph LeDoux, *The Emotional Brain: The Mysterious Underpinnings of Emotional Life* (Simon & Schuster, 1996); Antonio Damasio, *The Strange Order of Things: Life, Feeling, and the Making of Cultures* (Pantheon, 2018); for the mechanisms of conditioning, Ivan Pavlov, *Conditioned Reflexes* (Oxford University Press, 1927). The imitation phenomenon in nervous reactions — the "copying" discussed above — is taken up in detail in Chapter II; for its neurobiological substrate see Giacomo Rizzolatti and Corrado Sinigaglia, *Mirrors in the Brain: How Our Minds Share Actions and Emotions* (Oxford University Press, 2008); for the role of imitation in human cultural learning — the cognitive analogue of time-binding — see Michael Tomasello, *The Cultural Origins of Human Cognition* (Harvard University Press, 1999). The framing of the nervous system as an expressive instrument rather than a "controller" is developed in Ghioni, *The Technology of Expressions — A Foundational System for Conscious Architecture* (Ordinative Sciences Press, 2026), chapters 17 and 28. The formal works of our apparatus now in preparation will be released

under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

2. The tripartition $\langle C, F, O \rangle$ — Content, Form, Observer — is the state structure of every real phenomenon in *Ordinative Set Theory* (OST): see Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026), chapter 1 §1.3. The distinction between what an expression manifests and the coherent totality from which it is drawn is formalized in *Semantic Algebra* (Ghioni, in preparation, 2026) through the structural-extraction operator and the proper-inclusion relation . For the phenomenological and cognitive-science case for the constitutive role of the observer in perception, see Francisco Varela, Evan Thompson, and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (MIT Press, revised edition 2016); Andy Clark, *Surfing Uncertainty: Prediction, Action, and the Embodied Mind* (Oxford University Press, 2015). ↩
3. On the structural analogy between the non-Aristotelian revision and the non-Euclidean and non-Newtonian systems — three interlocking revisions, expressions of a single tendency of the age — see Korzybski, *Science and Sanity* (1933/1994), Chapter I. For the relativistic revolution and the non-separability of space and time, see Albert Einstein, *Relativity: The Special and the General Theory* (current editions); Hermann Minkowski, "Space and Time" (1909); and, for an accessible history, Peter Galison, *Einstein's Clocks, Poincaré's Maps: Empires of Time* (W. W. Norton, 2003). The reading of these revisions as passages from an ontology of substances to an ontology of relations is developed in Ghioni, *Ordinative Set Theory* (Ordinative Sciences Press, 2026). ↩
4. The thesis that structure — the web of relations — is the only transferable content of knowledge is one of the load-bearing claims of *Science and Sanity* (1933/1994), Chapter IV. The distinction between abstraction that preserves and abstraction that loses the relevant relations is formalized, in our apparatus, through the notion of preservative versus degenerative forgetful functor in *Ordinative Category Theory* (Ghioni, in preparation, 2026): an abstraction corresponds to a functor that preserves certain

relations and forgets others, and its quality is measured by the degree of structure preserved. This is offered as a conceptual framework, to be used as such and not as a proved theorem; for the classic references on category theory see Saunders Mac Lane, *Categories for the Working Mathematician* (Springer, 2nd ed. 1998), and Steve Awodey, *Category Theory* (Oxford University Press, 2010). For the cartographic principle "the map is not the territory" in the non-Aristotelian tradition and its contemporary legacies, see S. I. Hayakawa, *Language in Thought and Action* (Harcourt, 5th ed. 1990); Gregory Bateson, *Steps to an Ecology of Mind* (University of Chicago Press, 1972). ↩

5. The multiordinality of our most important terms — their property of changing meaning according to the level of abstraction at which they are applied — is introduced in *Science and Sanity* (1933/1994), Chapter I, and developed in detail in the parts devoted to orders of abstraction. In our apparatus, levels of abstraction correspond to successive applications of forgetful functors, and their confusion (treating a higher order as if it were the event) is the general form of identification: see Ghioni, *Ordinative Category Theory* (in preparation, 2026). For the linguistic and cognitive roots of the phenomenon, see George Lakoff and Mark Johnson, *Metaphors We Live By* (University of Chicago Press, 1980); and, on the difference between automatic and reflective processing, Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2011). ↩
6. On the contemporary industrialization of semantic reactions — the multiplication, by the platforms, of occasions for conditioned reaction to verbal stimuli detached from real contexts — see Jean Twenge, *iGen* (Atria Books, 2017); Jonathan Haidt, *The Anxious Generation* (Penguin Press, 2024); Shoshana Zuboff, *The Age of Surveillance Capitalism* (PublicAffairs, 2019), for the economic frame; Jaron Lanier, *Ten Arguments for Deleting Your Social Media Accounts Right Now* (Henry Holt, 2018). The reading of artificial-intelligence models as maps (partial structural representations) whose mistaking for the territory produces systematic distortions is developed, in our apparatus, through the notion of lossy abstraction and the relation of *Semantic Algebra* (Ghioni, in preparation, 2026). For the analysis

of manipulation dynamics as configurations of semantic reaction, see the TE_MODULE_PPRO module of the Technology of Expressions framework.



7. The notion of the *semantic reaction* — the psychophysiological response of the organism-as-a-whole to stimuli that carry meaning — is one of the operative cornerstones of the non-Aristotelian tradition; see Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter II, section A. The non-elementalistic frame (the refusal of any rigid separation between "mind" and "emotions," between the "psychic" and the "bodily") finds ample confirmation today in the affective neurosciences: see Antonio Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (Putnam, 1994) and *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain* (Harcourt, 2003); Stephen Porges, *The Polyvagal Theory* (Norton, 2011), for the physiological substrate of organismic unity; and, for the picture of embodied cognition, Francisco Varela, Evan Thompson, and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (MIT Press, revised edition 2016). The framing of the semantic reaction as a transit within the structure $\langle C, F, O \rangle$ is developed in Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026), chapter 1. The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩
8. The distinction between the un-speakable level (the event, the sensation, the contact — *not* made of words) and the verbal level is formalized, in our apparatus, through *Semantic Algebra* (Ghioni, in preparation, 2026): what we call un-speakable corresponds to the coherent reality from which every expression is drawn, while the verbal form is the projection obtained by structural extraction, with the proper inclusion — whatever we say, it does not exhaust the object. The dictum in the diagram is a native condensation of the canonical 1933 formulation: "Whatever you might say the object 'is', well it is not." The state structure $\langle C, F, O \rangle$ is that of *Ordinative Set Theory*

(Ghioni, Ordinate Sciences Press, 2026), chapter 1 §1.3. For the principle "the map is not the territory" and its legacies, see S. I. Hayakawa, *Language in Thought and Action* (Harcourt, 5th ed. 1990); Gregory Bateson, *Steps to an Ecology of Mind* (University of Chicago Press, 1972).



9. The practice of "silence on the objective level" — the temporary suspension of words in order to re-establish the order content → form — is proposed in *Science and Sanity* (1933/1994), Chapter II, section B, as elementary training of the semantic reactions. In our apparatus its efficacy reads as an **increase of resonance** with the coherent content: in the terms of *Proportional Algebra* (Ghioni, in preparation, 2026), suspending the form raises the phase compatibility between observer and content, improving the structural fidelity of the expression that follows. For the experimental record on the effects of non-verbal attention practices on psychophysiological regulation, see Jon Kabat-Zinn, *Full Catastrophe Living* (Delta, 1990; revised edition Bantam, 2013); Norman Farb et al., "Attending to the present: mindfulness meditation reveals distinct neural modes of self-reference," *Social Cognitive and Affective Neuroscience* (2007). ↩
10. The phenomenon of the imitation of nervous reactions, and its correction through the "regulating factor" of consciousness of abstracting, are developed in *Science and Sanity* (1933/1994), Chapter II, section C. For the neurobiological substrate of imitation, see Giacomo Rizzolatti and Corrado Sinigaglia, *Mirrors in the Brain: How Our Minds Share Actions and Emotions* (Oxford University Press, 2008); for imitation as the engine of human cultural learning — the cognitive analogue of *time-binding* — Michael Tomasello, *The Cultural Origins of Human Cognition* (Harvard University Press, 1999) and *A Natural History of Human Thinking* (Harvard University Press, 2014); for the power and the risks of the mimetic mechanism in collective dynamics, René Girard, *Violence and the Sacred* (Johns Hopkins University Press, 1977). In our apparatus, unconscious imitation corresponds to the reproduction of an abstraction made by others without re-evaluation — the passive application of an already fixed forgetful functor — while consciousness of abstracting is the choice of one's own

abstraction: see Ghioni, *Ordinative Category Theory* (in preparation, 2026), on the distinction between abstraction that preserves and abstraction that loses — the preservative versus the degenerative forgetful functor. ↩

11. On the contemporary industrialization of semantic reactions and the viral replication of verbal forms detached from content, see Jean Twenge, *iGen* (Atria Books, 2017); Jonathan Haidt, *The Anxious Generation* (Penguin Press, 2024); for the dynamics of the imitative transmission of cultural units, Richard Dawkins, *The Selfish Gene* (Oxford University Press, current edition), chapter 11, and Susan Blackmore, *The Meme Machine* (Oxford University Press, 1999); for the economic frame of the propagation, Shoshana Zuboff, *The Age of Surveillance Capitalism* (PublicAffairs, 2019). For the analysis of induced semantic reactions as configurations of manipulation, see the TE_MODULE_PPRO module of the Technology of Expressions framework. ↩
12. The definition of humanity as the class of life capable of *time-binding* — of binding time by accumulating and transmitting knowledge across the generations — goes back to Alfred Korzybski, *Manhood of Humanity* (E. P. Dutton, 1921), and is the declared foundation of the whole of *Science and Sanity* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter III. The triad of animal, plant, and man as binders, respectively, of space, energy, and time is Korzybski's. For the contemporary confirmation — cumulative cultural accumulation (the "cultural ratchet") as the distinctive trait of human cognition — see Michael Tomasello, *The Cultural Origins of Human Cognition* (Harvard University Press, 1999); Joseph Henrich, *The Secret of Our Success* (Princeton University Press, 2015); for a philosophical defense of knowledge as an open, cumulative process, David Deutsch, *The Beginning of Infinity* (Allen Lane, 2011). In our apparatus, time-binding is read as the intergenerational stabilization and resumption of structure: see Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026). The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

13. The notion of *infantilism* as an arrested stage in the development of the species — and the distinction of *degree, not of kind*, among pathology, widespread immaturity, and sanity — are developed in *Science and Sanity* (1933/1994), Chapter III. The metaphor of the bridge built with plane geometry alone is Korzybski's own. For the contemporary picture of the persistence of archaic reactions in technologically advanced settings, see Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2011); Robert Sapolsky, *Behave: The Biology of Humans at Our Best and Worst* (Penguin Press, 2017); for the reading of the sane/pathological "continuum" in psychopathology, Jim van Os et al., "A systematic review and meta-analysis of the psychosis continuum" (*Psychological Medicine*, 2009). ↩
14. The two negative premises — "the word is not the object" and "there are no absolutely separate objects" — from which it is deduced that structure alone connects language and world, are the methodological foundation of *Science and Sanity* (1933/1994), Chapters III–IV. The thesis of language as a structuring physiological function, and not a cultural ornament, anticipates themes of cognitive linguistics: see George Lakoff and Mark Johnson, *Metaphors We Live By* (University of Chicago Press, 1980); for the debate on the influence of linguistic structure on reactions, Guy Deutscher, *Through the Language Glass: Why the World Looks Different in Other Languages* (Metropolitan Books, 2010). In our apparatus the word/object non-identity is formalized as the proper inclusion in *Semantic Algebra* (Ghioni, in preparation, 2026); the non-separability of objects corresponds to the primacy of the relational field in *Ordinative Set Theory* (Ghioni, Ordinative Sciences Press, 2026), where singularities exist only within the web of relations that constitutes them. ↩
15. On the amplification of the "cascade" of semantic infantilism through digital media — the viral replication of verbal forms detached from level and content — see Jean Twenge, *iGen* (Atria Books, 2017); Jonathan Haidt, *The Anxious Generation* (Penguin Press, 2024); Shoshana Zuboff, *The Age of Surveillance Capitalism* (PublicAffairs, 2019), for the economic frame of the control of symbols; Byung-Chul Han, *In the Swarm: Digital Prospects*

(MIT Press, 2017), for the analysis of communicative regression in the networks. For the analysis of induced collective semantic reactions as configurations of propaganda and manipulation, see the TE_MODULE_PPRO module of the Technology of Expressions framework.



16. The circularity between the structure of language and psychophysiological reactions — the loop by which what we express shapes the state from which we shall express — is discussed in *Science and Sanity* (1933/1994), Chapter III, as the "circular function" of language and the nervous system. In our apparatus its conscious version corresponds to the ascending spiral of intergenerational resonance: in the terms of *Proportional Algebra* (Ghioni, in preparation, 2026), a stabilized structure that increases the phase compatibility of successive expressions. For the mechanisms of intergenerational transmission of patterns of regulation (and dysregulation), see Daniel J. Siegel, *The Developing Mind* (Guilford Press, 3rd ed. 2020); Sarah Blaffer Hrdy, *Mothers and Others: The Evolutionary Origins of Mutual Understanding* (Harvard University Press, 2009). ↩
17. The thesis of the "two tendencies" of science (experiment and verbal rigor), and the image of isolated facts that no more make a science "than a heap of bricks makes a house," are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter IV. The analysis of "structure" as a complex of ordered and interconnected parts, and of "similarity of structure" between relations, Korzybski takes from B. Russell and L. Wittgenstein: see Russell, *Introduction to Mathematical Philosophy* (Allen & Unwin, 1919), chapter 6, and Wittgenstein, *Tractatus Logico-Philosophicus* (Routledge, current editions). In our apparatus, structure as the transferable content of knowledge is the foundation of *Ordinative Set Theory*, in which the real is the triple $\langle \Sigma, R, \Phi \rangle$ of singularity, relational field, and emergent function: see Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026), chapter 1. The

formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

18. On the neurological primacy of order — grasped by the "lower centers" (the senses) and elaborated by the "higher centers" (thought) — see *Science and Sanity* (1933/1994), Chapter IV. The primacy of relation over the isolated object ("relations first, things second") is, in our apparatus, the founding assumption of *Ordinative Set Theory*: a singularity does not pre-exist the relational field R that constitutes it. For contemporary neuroscientific evidence on the perception of order and relations as primary operations of the nervous system, see György Buzsáki, *Rhythms of the Brain* (Oxford University Press, 2006); David Eagleman, *The Brain: The Story of You* (Pantheon, 2015); on the priority of relational structure in cognition, Dedre Gentner and Arthur B. Markman, "Structure Mapping in Analogy and Similarity," *American Psychologist* 52 (1997). ↩
19. The cartographic example (the cities Paris–Dresden–Warsaw with their order altered) and the notion of a map useful insofar as it is isomorphic to the territory are from *Science and Sanity* (1933/1994), Chapter IV; the "map of the map" regress goes back to Josiah Royce. In our apparatus, structural isomorphism is formalized as the degree of preservation of a functor: a good map is an abstraction that preserves the relevant relations (a preservative forgetful functor), a misleading one loses them (a degenerative forgetful functor) — see Ghioni, *Ordinative Category Theory* (in preparation, 2026); the non-identity of map and territory is the proper inclusion of *Semantic Algebra* (Ghioni, in preparation, 2026). For the principle in the tradition and its legacies: Gregory Bateson, *Steps to an Ecology of Mind* (University of Chicago Press, 1972); S. I. Hayakawa, *Language in Thought and Action* (Harcourt, 5th ed. 1990). ↩
20. The thesis that "we unconsciously read the structure of our language into the world," and the distinction between metaphysics (which projects an arbitrary structure, in inverted order), science (which discovers the structure of the world), and scientific method (which holds the natural order fast), are from *Science and Sanity* (1933/1994), Chapter IV. The influence of grammatical structure — the subject–predicate form in particular — on the

categories of thought is kin to the hypothesis of linguistic relativity: see Benjamin Lee Whorf, *Language, Thought, and Reality* (MIT Press, 2nd ed. 2012); for a contemporary critical assessment, Guy Deutscher, *Through the Language Glass* (Metropolitan Books, 2010); Daniel L. Everett, *Language: The Cultural Tool* (Pantheon, 2012). The operative principle "change the language, do not moralize" — structural correction in place of moral exhortation — is developed in the applied modules of the Technology of Expressions framework. ↩

21. On the contemporary age as an immersion in maps mistaken for territories — algorithmic models, systems of metrics and indicators, diagnostic labels treated as identities — see Cathy O'Neil, *Weapons of Math Destruction* (Crown, 2016), on the reification of indicators; Jerry Z. Muller, *The Tyranny of Metrics* (Princeton University Press, 2018); Shoshana Zuboff, *The Age of Surveillance Capitalism* (PublicAffairs, 2019). For AI models read as partial structural representations, and their failures as losses of relevant relations, see in our apparatus *Semantic Algebra* (Ghioni, in preparation, 2026) and the notion of lossy abstraction in *Ordinative Category Theory* (Ghioni, in preparation, 2026). For the critique of the reification of the diagnostic label, see the TE_MODULE_LENS module of the Technology of Expressions framework. ↩
22. The distinction between mathematical abstractions (with "all particulars included" in the definition, whence absolute deductions) and physical or everyday abstractions (which proceed "by forgetting," whence relative deductions), with the examples of the mathematical circle and the pencil, is from A. Korzybski, *Science and Sanity* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter V. Einstein's sentence ("so far as the laws of mathematics refer to reality, they are not certain...") is quoted by Korzybski at the opening of that chapter and comes from "Geometry and Experience" (1921). In our apparatus the difference is formalized as a distinction between functors: physical abstraction is a forgetful functor (degenerative when it drops relevant relations, preservative when it keeps the ones that matter), while mathematical abstraction is the limiting case in which the definition fixes the entire domain — see Ghioni, *Ordinative*

Category Theory (in preparation, 2026). The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

23. Zeno's paradox (Achilles and the tortoise) as the example of a false conclusion upheld for centuries by a structurally inadequate language, and dissolved by the mathematics of the continuum (the convergence of an infinite series to a finite sum), is discussed in *Science and Sanity* (1933/1994), Chapter V. For the mathematical treatment, see the foundations of analysis (Cauchy, Weierstrass) and, for an accessible history, Boyer, *The History of the Calculus and Its Conceptual Development* (Dover, 1959); for the philosophical discussion of Zeno's paradoxes, Salmon (ed.), *Zeno's Paradoxes* (Hackett, 2001). The gap between mathematical language (perfect structure, narrow range) and ordinary languages (vast range, primitive structure), and the program of bringing them together, is from Korzybski, Chapter V. ↩
24. The "engineering" attitude toward the word *should* (the testable structural prediction, illustrated with the motorcycle) and the thesis of mathematics as the only accessible case of "pure" mental functioning — the "black traces on white paper" that traditional psychology ignored — are from *Science and Sanity* (1933/1994), Chapter V. For the nature of mathematical cognition as embodied behavior of the nervous system, not access to Platonic truths, see Lakoff and Núñez, *Where Mathematics Comes From* (Basic Books, 2000); Dehaene, *The Number Sense* (Oxford University Press, updated edition 2011). For the critique of mathematics teaching as a mysterious, sealed-off discipline, Lockhart, *A Mathematician's Lament* (Bellevue Literary Press, 2009). On the structural opacity of contemporary algorithmic systems and the need for a literacy able to read their maps, O'Neil, *Weapons of Math Destruction* (Crown, 2016); for the reading, in our apparatus, of models as abstractions that can lose decisive relations, see *Semantic Algebra* and *Ordinative Category Theory* (Ghioni, in preparation, 2026). ↩
25. The definition of the human being as a "symbolic class of life" and the thesis that "those who rule the symbols rule us" — with money as a symbol

constituted by agreement, and the map of the "rulers of symbols" — are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter VI. For the nature of money and institutions as social facts constituted by symbolic agreements, see John Searle, *The Construction of Social Reality* (Free Press, 1995); for power as the government of symbols and narratives, Pierre Bourdieu, *Masculine Domination* (Stanford University Press, 2001) and the writings on symbolic power in *Practical Reason: On the Theory of Action* (Stanford University Press, 1998); Yuval Noah Harari, *Sapiens: A Brief History of Humankind* (Harper, 2015), on "shared myths." In our apparatus, a symbol is a form that acquires value only by hooking onto a coherent content: see Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026). The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

26. The distinction between a symbol (a sign that stands for something) and a sign devoid of meaning (the bad-check analogy), and the distinction between physical existence and "logical" existence (defined by Henri Poincaré as freedom from self-contradiction), with the examples of the "square circle" and the "blah-blah," are from *Science and Sanity* (1933/1994), Chapter VI. For the twentieth-century debate on criteria of significance and on the meaninglessness of certain propositions, see Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* (Routledge, current editions); A. J. Ayer, *Language, Truth and Logic* (Gollancz, 1936; Dover, current edition), for the verification principle; Harry Frankfurt, *On Bullshit* (Princeton University Press, 2005), for the contemporary analysis of discourse indifferent to truth. ↩
27. "Level applicability" — a symbol valid in one context becoming senseless in another (the "temperature of an electron"), and the unicorn as a full symbol in heraldry or psycho-logics and an empty one in zoology — is from *Science and Sanity* (1933/1994), Chapter VI; the temperature example

Korzybski took from Einstein. It is the precise analogue of what analytic philosophy would later call a *category mistake*: Gilbert Ryle, *The Concept of Mind* (Hutchinson, 1949; University of Chicago Press, current edition), chapter 1. In our apparatus it corresponds to marking the level of abstraction (the correct discipline or "-ology") and identifying the domain on which a term is defined — *Semantic Algebra* treats the displacement of an expression into the wrong domain as the loss of the invariants that made it meaningful (Ghioni, in preparation, 2026). On the mechanism of projection (attributing inner states to the external world), see Sigmund Freud, *Introductory Lectures on Psycho-Analysis* (Standard Edition; Norton, current edition); for its contemporary cognitive version, the work on *naïve realism* in social psychology (Ross and Ward, 1996). ↩

28. The "third factor" as the criterion of a dispute's solvability (the real object that decides — present in the case of the matches, absent in the "blah-blah / tra-tra" case), and the distinction between solvable problems (words) and non-problems (sounds), are from *Science and Sanity* (1933/1994), Chapter VI. It is kin to the demarcation criterion of the philosophy of science: a proposition has empirical content if there exists an observation that could decide it — see Karl Popper, *The Logic of Scientific Discovery* (Hutchinson, 1959; Routledge, current edition), on falsifiability. The principle that "ethics and sanity are not preached but enabled by a correct symbolism" is Korzybski's, Chapter VI; in our apparatus it corresponds to the thesis that the sane intervention is structural (on symbols and on language) and not hortatory: see the TE_MODULE_PPRO module of the Technology of Expressions framework. ↩
29. On the contemporary industrialization of "noise dressed up as words" — viral slogans, banner-labels, automatically generated content optimized for propagation rather than representation — see Harry Frankfurt, *On Bullshit* (Princeton University Press, 2005); Tim Wu, *The Attention Merchants* (Knopf, 2016); Shoshana Zuboff, *The Age of Surveillance Capitalism* (PublicAffairs, 2019). For the risks of generative systems that produce fluent linguistic forms detached from any verifiable referent, see Emily M. Bender, Timnit Gebru et al., "On the Dangers of Stochastic Parrots: Can

Language Models Be Too Big?" (FAccT, 2021). In our apparatus, the production of forms with no hooked content is a degenerate collapse, and its diffusion a vector of collective infantilism: see *Semantic Algebra* (Ghioni, in preparation, 2026) and the TE_MODULE_PPRO module of the Technology of Expressions. ↩

30. The passage from the definite article *the* to the indefinite *a* as the signature of the modern scientific revolution — *the* geometry becoming *a* geometry (Gauss, Lobachevsky, Bolyai, Riemann), Newton's universe becoming *a* universe (Einstein) — and the reading of Aristotelianism as an inherited and internalized linguistic structure are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter VII. On the relation between the structure of language and the categories of thought, see Benjamin Lee Whorf, *Language, Thought, and Reality* (MIT Press, 2nd ed. 2012); George Lakoff, *Don't Think of an Elephant!* (Chelsea Green, 2004), on framing. For the history of the non-Euclidean geometries, Marvin Jay Greenberg, *Euclidean and Non-Euclidean Geometries* (W. H. Freeman, 4th ed. 2008); for the relativistic revolution, Peter Galison, *Einstein's Clocks, Poincaré's Maps: Empires of Time* (W. W. Norton, 2003). In our apparatus, the abandonment of the absolute in favor of the "model among the possible" corresponds to the primacy of the relational field and of the observer in $\langle C, F, O \rangle$: Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026). The formal works now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩
31. The distinction between "additive" language (qualities as properties stuck on from outside, with the example of the painted versus the natural green leaf) and "functional" representation (qualities as processes emerging from relations), and the reading of the "is" of identity as the codification of a primitive language, are from *Science and Sanity* (1933/1994), Chapter VII. In our apparatus, the passage from the additive to the functional is the passage from the object-with-properties to the triple $\langle \Sigma, R, \Phi \rangle$, in which a

characteristic is an emergent function of the relational field and not an attribute of an isolated singularity: see Ghioni, *Ordinative Set Theory* (Ordinative Sciences Press, 2026). For the twentieth-century critique of the substance-property model, Alfred North Whitehead, *Process and Reality* (Free Press, corrected edition 1978); Ernst Cassirer, *Substance and Function* (Open Court, 1923). ↩

32. The extroversion–introversion axis (with Aristotle as extrovert and Plato as introvert), and the reading of its extremes as akin to the paranoid structure (total projection outward) and the schizoid structure (total withdrawal inward), with sanity as the dynamic integration of the two regimes, are from *Science and Sanity* (1933/1994), Chapter VII. The extrovert/introvert typology is Jung's: Carl Gustav Jung, *Psychological Types* (Princeton University Press, Collected Works vol. 6, 1971). For the dimensional conception of psychopathology — a matter of degree, not of kind, continuous with sanity — see Jim van Os et al., "A systematic review and meta-analysis of the psychosis continuum," *Psychological Medicine* 39 (2009); Thomas Insel et al., "Research Domain Criteria (RDoC)," *American Journal of Psychiatry* 167 (2010). In our apparatus, the two regimes correspond to two postures of the observer in *Semantic Algebra* (Ghioni, in preparation, 2026), and sanity to their regulated alternation, not to lockage in one alone. ↩
33. The lists of what the non-Aristotelian system "rejects" (the "is" of identity, two-valued logic, elementalism, additive qualities, binary causality, grammar mistaken for a law of the world, the additive definition of man) and of what it "adopts" (non-identity, structure and order, many-valued logic, functional representation, multiordinality, many-valued causality, extensional methods, the functional definition of man), together with the thesis of the classical systems as special cases of the new ones, are from *Science and Sanity* (1933/1994), Chapter VII. For many-valued and probabilistic logic, see Jan Łukasiewicz and the founders of polyvalent logic; for the extensional methods, Bertrand Russell and Alfred North Whitehead, *Principia Mathematica* (Cambridge University Press, 1910–1913). For the contemporary reading of digital systems as optimized toward binary,

identity-bound formats ("engagement" harvested on clean-cut conflict), Siva Vaidhyanathan, *Antisocial Media* (Oxford University Press, 2018); Shoshana Zuboff, *The Age of Surveillance Capitalism* (PublicAffairs, 2019). In our apparatus, the revision corresponds to the systematic passage from degenerative forgetful functors (which lose structure) to preservative ones: Ghioni, *Ordinative Category Theory* (in preparation, 2026). ↩

34. The principle of the organism-as-a-whole (the organism as an integrated system and not as a sum of parts), its historical failure to be applied for want of a non-elementalistic language, and the role of structural terms (J. Loeb's *tropism*) in re-postulating a discipline, are drawn from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter VIII, of which the present work is a deliberate re-elaboration and updating. For the contemporary picture of the organism as an integrated system and of embodied cognition, see Antonio Damasio, *Descartes' Error* (Putnam, 1994); Evan Thompson, *Mind in Life* (Harvard University Press, 2007); for systems biology, Denis Noble, *The Music of Life* (Oxford University Press, 2006). In our apparatus the organism-as-a-whole corresponds to the primacy of the relational field in the triad $\langle \Sigma, R, \Phi \rangle$, where the parts are singularities constituted by their relations: Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026). The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩
35. The theory of physiological gradients (C. M. Child), cephalic dominance, the nerves as stabilized gradients, and the thesis that "function generates the organ" — with the consequence that a disturbance of the dominant semantic center strikes the entire organism, and that it is the most developed systems, not the most elementary, that break down — are from *Science and Sanity* (1933/1994), Chapter VIII. For contemporary evidence on the hierarchical and dynamic organization of the nervous system and on function-structure plasticity, see Gerald Edelman, *Neural Darwinism* (Basic Books, 1987); György Buzsáki, *Rhythms of the Brain* (Oxford University

Press, 2006). On the link between distorted semantic environments and the vulnerability of the most sensitive subjects, see Gregory Bateson et al., "Toward a Theory of Schizophrenia," in Bateson, *Steps to an Ecology of Mind* (University of Chicago Press, 1972), on the "double bind"; and Elaine Aron, *The Highly Sensitive Person* (Broadway Books, 1996). In our apparatus the dominance of the semantic level is the centrality of the observer and of the reactions of meaning in the structure $\langle C, F, O \rangle$. ↩

36. The example of the "heat substance" — a ghost generated by the grammatical form of the noun, dissolved by the reformulation of heat as a process (energy) — is taken up (from H. Poincaré) in *Science and Sanity* (1933/1994), Chapter VIII, as a case of linguistic reification. In our apparatus it is a degenerative abstraction, a functor that forgets precisely the constitutive relation of the phenomenon: Ghioni, *Ordinative Category Theory* (in preparation, 2026). The replacement of "unknowable" with "unknown structure" is likewise from Chapter VIII. On reification (treating processes and abstractions as substances), see Alfred North Whitehead, *Science and the Modern World* (current editions), on the "fallacy of misplaced concreteness"; and George Lakoff and Mark Johnson, *Metaphors We Live By* (University of Chicago Press, 1980), on ontological metaphors. ↩
37. The natural order of inquiry (structure $\rightarrow$ language $\rightarrow$ education of the reactions) and its historical inversion, together with the non-elementalistic reformulation of physics (the Einstein–Minkowski space-time; Heisenberg's uncertainty as the passage from two-valued logic to a semantics of probability), are from *Science and Sanity* (1933/1994), Chapter VIII. For the uncertainty principle and the non-separability of observer and observed, see Werner Heisenberg, *Physics and Philosophy* (Harper, 1958); Carlo Rovelli, *Helgoland* (Riverhead Books, 2021). On the way measurements and indicators intervene on the behaviors they claim only to register (the "reactivity" of metrics), see Wendy Espeland and Michael Sauder, *Engines of Anxiety* (Russell Sage Foundation, 2016); Jerry Z. Muller, *The Tyranny of Metrics* (Princeton University Press, 2018). In our apparatus the many-

valued logic corresponds to the representation by degrees of probability and resonance in *Proportional Algebra* (Ghioni, in preparation, 2026). ↩

38. The principle that life is always found in the colloidal state — the "middle state" between solid and liquid, the "world of neglected dimensions" between the molecule and the visible particle — and the thesis that colloidal structure, and with it structure in general, is not only the sole transferable content of knowledge but also the *bridge* between the "physical," "chemical," and "mental" orders of phenomena, are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter IX, of which the present volume is a deliberate re-elaboration and updating. For the history and foundations of colloid science see the classic works of Thomas Graham, Alexander Findlay, Wolfgang Ostwald, and Herbert Freundlich, and for the placement of colloids as the link between the organic and the inorganic the observation of Wolfgang Pauli. For the contemporary picture of the cell as an organized physico-chemical system and of cellular water as a structured medium, see: Gerald Pollack, *Cells, Gels and the Engines of Life* (Ebner & Sons, 2001); Denis Noble, *The Music of Life* (Oxford University Press, 2006); for systems biology and the organism as an integrated whole, Stuart Kauffman, *At Home in the Universe* (Oxford University Press, 1995). In our apparatus the primacy of the organism-as-a-whole over the sum of the parts corresponds to the primacy of the relational field in the triad $\langle \Sigma, R, \Phi \rangle$, where the parts are singularities constituted by their relations: Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026). All works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩
39. The analysis of surface films as membrane-electrodes, the experiment of the iron wire immersed in nitric acid that reproduces a rhythmicity similar to that of protoplasm and nerve fibers, excitability as a function of the integrity of the films, and the coagulation of the whole protoplasm by weak currents (the inner films as electrodes) are from *Science and Sanity* (1933/1994),

Chapter IX, which draws on the work of R. S. Lillie on protoplasmic action. For the contemporary biophysics of excitable membranes and surface potentials see: Bertil Hille, *Ion Channels of Excitable Membranes* (Sinauer, 3rd ed. 2001). For the structural origin of biological rhythms — from the heartbeat to circadian and ultradian rhythms, and the synchronization of coupled oscillators — see: György Buzsáki, *Rhythms of the Brain* (Oxford University Press, 2006); Steven Strogatz, *Sync: The Emerging Science of Spontaneous Order* (Hyperion, 2003); Leon Glass and Michael Mackey, *From Clocks to Chaos* (Princeton University Press, 1988). In our apparatus the rhythm of the organism as time generated by structure itself — and not imposed by an external clock — corresponds to the notion of time as a pulsation emergent from the system's own coherent cycles (τ -pulsation) of *Proportional Algebra* (Ghioni, in preparation, 2026). ↩

40. A note, to be kept distinct from the empirical content of the chapter. In the body we have placed the "biological" factors (microbes, parasites, foreign cells) among the four that disturb the colloidal balance, in agreement with established physiology: infectious agents alter the colloidal state by producing acids and bases, and nothing in this chapter is to be understood as a revision of medical pathology or therapy. Within the broader philosophical frame of the Technology of Expressions there exists a *speculative* reading — mentioned here only for completeness and not as a scientific claim — that proposes to interpret some of these agents not as external "enemies" but as parts of the same natural system of which the organism is itself a part; it is a metaphysical hypothesis about how to conceive the organism/environment relation, with no clinical pretensions and not to be confused with the colloidal facts set out above. For the historical genesis of germ theory and for the debate, today settled in an interactionist sense, between "germ" and "terrain" see: René Dubos, *Mirage of Health* (Harper, 1959); for the ecology of the microbiota as an integral part of the organism, Ed Yong, *I Contain Multitudes* (Ecco, 2016). ↩
41. The four factors that disturb the colloidal balance (physical, mechanical, chemical, biological), the addition in the human being of a fifth factor — semantic reactions — as energetic manifestations capable of acting on the

colloidal structure, the common action of anesthetics (ether on man, fish, worm, and plant cell as an illustration of the shared structural plane), and the cardiac feedback loop as an example of *non-additive* colloidal change are from *Science and Sanity* (1933/1994), Chapter IX. That thought and emotion are measurable electrical correlates — enough to treat the semantic reaction as a physical factor — is today an established finding. For the physiology of stress and the feedback loops that amplify harm (and for the difference between adaptive acute stress and pathological chronic stress) see: Robert Sapolsky, *Why Zebras Don't Get Ulcers* (Holt, 3rd ed. 2004); Bruce McEwen, *The End of Stress as We Know It* (Joseph Henry Press, 2002), on the concept of allostatic load. For the link between meanings, emotions, and the physiology of the body see: Stephen Porges, *The Polyvagal Theory* (Norton, 2011); Bessel van der Kolk, *The Body Keeps the Score* (Viking, 2014); Gabor Maté, *When the Body Says No* (Wiley, 2003); Antonio Damasio, *Descartes' Error* (Putnam, 1994). In our apparatus the dissolution of the body/mind fracture corresponds to the reading of the "mental" and the "physical" as levels of abstraction of a single material relational field $\langle \Sigma, R, \Phi \rangle$, and the non-additive feedback loop to the non-additivity of the emergent functions of *Ordinative Set Theory* (Ghioni, 2026). ↩

42. The poverty and standardization of symptoms (few "physical" and "mental" patterns against innumerable causes), their experimental reproducibility by means of artificial colloidal disturbances induced by inert precipitates, and the *cautious* formulation of disease as "somehow connected to colloidal disturbances" (without univocal mechanical cause-and-effect links) are from *Science and Sanity* (1933/1994), Chapter IX. The convergence of heterogeneous causes on common patterns is, in our apparatus, a case of abstraction that preserves the structure of the disturbance and forgets the specific cause: in the formal framework of *Ordinative Category Theory* (Ghioni, in preparation, 2026) it corresponds to a degenerative forgetful functor that preserves the common relation and degrades the distinctions of origin. For the "common final pathways" of contemporary pathology — inflammation as a mechanism cutting across many diseases, and

psychoneuroimmunology as the study of the interactions between meanings, the nervous system, and immunity — see: Robert Ader (ed.), *Psychoneuroimmunology* (Academic Press, 4th ed. 2007); Randolph Nesse and George Williams, *Why We Get Sick* (Vintage, 1994), for the evolutionary frame of the symptom as a signal. ↩

43. The experiment of the pumpkin rootlet — the imprint of an imposed rhythm that persists for days after the stimulus has ceased — as proof that living matter possesses a general tendency to form and retain patterns (the physical base of habit and learning), and the thesis that the living cell must be studied while alive (semifluid, governed by surface forces) and not in the coagulated cadaver, are from *Science and Sanity* (1933/1994), Chapter IX. In our apparatus the capacity of the colloidal structure to preserve the imprint of a solicitation and to orient the subsequent responses corresponds to the notion of resonance (and of structural hysteresis) of *Proportional Algebra* (Ghioni, in preparation, 2026): each cycle leans on the trace of the preceding ones. For the contemporary correlates — the formation of habits as the consolidation of circuits in the basal ganglia, and the structure/function plasticity of the nervous system — see: Ann Graybiel, "Habits, Rituals, and the Evaluative Brain," *Annual Review of Neuroscience* (2008); Norman Doidge, *The Brain That Changes Itself* (Viking, 2007); Charles Duhigg, *The Power of Habit* (Random House, 2012), for the popularization of the mechanism. ↩
44. The principle of the organism-as-a-whole (non-elementalistic) as a structural character verifiable in biology, physiology, and psychiatry, and the clinical case of the "paper roses" (reported by M. Prince and taken up by W. A. White) as proof that a purely "mental" factor — a conviction — can trigger a complete chain of sensory, motor, vasomotor, and secretory reactions that are unmistakably "physical," are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, 1933, current edition 1994), Chapter X, of which the present volume is a re-elaboration and updating. For the contemporary science of the nocebo and placebo effects — real symptoms produced by expectation — see Fabrizio Benedetti,

Placebo Effects (Oxford University Press, 2nd ed. 2014), and Irving Kirsch, *The Emperor's New Drugs* (Basic Books, 2010). For the organism as an integrated system and for embodied cognition, see Antonio Damasio, *Descartes' Error* (Putnam, 1994); Evan Thompson, *Mind in Life* (Harvard University Press, 2007); Denis Noble, *The Music of Life* (Oxford University Press, 2006). In our apparatus the hidden observer — the third term of $\langle C, F, O \rangle$ that grammatical form erases, pinning on the object a property that depends on the observer — corresponds to the *Ghost Observer Principle* of *Semantic Algebra* (Ghioni, in preparation, 2026), for which an observer is implicit in every expression and must be brought back into view, especially in impersonal and passive constructions; and the primacy of the whole over the sum of the parts corresponds to the primacy of the relational field in the triad $\langle \Sigma, R, \Phi \rangle$ of *Ordinative Set Theory* (Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning*, Ordinative Sciences Press, 2026). All works in preparation will be available under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

45. The biological examples of functional unity beyond the brain (the flatworm *Thysanozoön*, which rights itself and moves in coordination even when divided; *Planaria torva*, which flees the light with neither brain nor eyes; the jellyfish and the marine larvae whose behavior changes as the chemistry and temperature of the environment vary), the persistence of the learned habit in the earthworm deprived of its front segments (experiments of R. M. Yerkes) and its disappearance upon regeneration of the brain — memory as a distributed configuration of the nervous system rather than the function of a single organ — are from *Science and Sanity* (1933/1994), Chapter X, which draws among others on the work of J. Loeb on tropisms and artificial fertilization and of C. M. Child on gradients and regeneration. In our apparatus the conservation of a learned pattern beyond the single organ corresponds to the notion of structural resonance/imprint in *Proportional Algebra* (Ghioni, in preparation, 2026), already invoked in the previous chapter. For the contemporary correlates of memory and habit as distributed properties, and of the plasticity of the nervous system, see Norman Doidge, *The Brain That Changes Itself* (Viking, 2007); Gerald

Edelman, *Bright Air, Brilliant Fire: On the Matter of the Mind* (Basic Books, 1992); and, for a popular account of the mechanism of habit, Charles Duhigg, *The Power of Habit* (Random House, 2012). ↩

46. The reading of the body as a "living language" — a system in which, when the meanings that inhabit it are in conflict, the disturbance organizes itself according to the structure of the meaning and not according to the anatomy — takes up and develops, in our apparatus, the idea that semantic reactions are a structural factor in their own right (previous chapter) and that the observer and meaning are constitutive of experience ($\langle C, F, O \rangle$, Chapter I). The notion that every representation structurally loses information with respect to what it represents — and that the body can make itself a "map of incoherent meanings" — finds in the same works in preparation a formal treatment: see the proper-inclusion relation of *Semantic Algebra* (Ghioni, in preparation, 2026), which distinguishes what an expression manifests from the coherent totality from which it is drawn. For the clinical tradition that reads the symptom as a text and not merely as a breakdown, see Bessel van der Kolk, *The Body Keeps the Score* (Viking, 2014); Gabor Maté, *When the Body Says No* (Wiley, 2003). ↩
47. The many-to-one causality of the living (rickets curable by cod-liver oil *or* by sunlight; the plurality of paths converging on a single outcome), the action of nutrition on the organism-as-a-whole up to the *reversible* modification of behavior and of the maternal instinct (experiments of E. V. McCollum on rats; the significance of the calcium/phosphorus ratio beyond absolute quantities), the taxonomy of migraine triggers (physical, chemical-endocrine, reflex, semantic), the endocrine dominance (thyroid, pituitary) over the development of the whole individual, and the semantic origin of real physical symptoms whose distribution follows a symbolic rather than an anatomical map (hysteria / conversion disorder) are from *Science and Sanity* (1933/1994), Chapter X. The convergence of many causes upon one outcome is, in our apparatus, a case of abstraction that keeps the general fact and forgets the particular path — in the frame of *Ordinative Category Theory* (Ghioni, in preparation, 2026), a forgetful functor that preserves the outcome and degrades the distinctions of origin. For the contemporary

evidence see, for nutritional psychiatry and the gut-brain axis, Emeran Mayer, *The Mind-Gut Connection* (Harper Wave, 2016); for the physiology of stress and mind-body unity, Robert Sapolsky, *Why Zebras Don't Get Ulcers* (Holt, 3rd ed. 2004); Bessel van der Kolk, *The Body Keeps the Score* (Viking, 2014); Stephen Porges, *The Polyvagal Theory* (Norton, 2011); and, for conversion disorder / functional neurological symptoms, Suzanne O'Sullivan, *It's All in Your Head* (Chatto & Windus, 2015). ↩

48. The thesis that the non-elementalistic principle is a necessary condition of adaptation and of sanity, that knowledge and understanding are relational and therefore structural functions, and above all that to "know" is not the same as to "apply habitually" — whence the need to exercise the use of the new terms so that the realignment produces real semantic effects — are from *Science and Sanity* (1933/1994), Chapter X, which thus closes the treatment of the foundations and announces the structural factors of non-Aristotelian languages developed in the parts that follow (here, in the second half of this volume). The distinction between identifying a problem and resolving it formally runs through our whole apparatus: the tradition of non-Aristotelian thought named with precision the phenomenon of structural loss ("the map is not the territory") without, however, quantifying it or furnishing a procedure for detecting it in a given expression; that quantification and that procedure are the object of *Semantic Algebra* (Ghioni, in preparation, 2026). On the gap between understanding a cognitive habit and embodying it, see Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2011), on the difficulty of correcting automatic processing by knowledge alone; and Norman Doidge, *The Brain That Changes Itself* (Viking, 2007), on the need for repeated practice if a new structure is to stabilize. ↩
49. The notion of function as a dependence between variable quantities, its structural and semantic centrality, the distinction between variable and constant, the definition $y = f(x)$ with mutually dependent and independent variables, and the analysis of $1 + 1 = 2$ as a three-term relation (the writer, the signs, the reader) following of necessity from the rejection of the "is" of identity, are from Alfred Korzybski, *Science and*

Sanity: An Introduction to Non-Aristotelian Systems and General Semantics (Institute of General Semantics, first edition 1933, current edition 1994), Chapter XI, of which the present chapter is a deliberate re-elaboration and updating; that chapter takes the notion of function from Descartes and Leibniz and cites C. J. Keyser and C. E. Picard. In our apparatus the primacy of relation over thing — "relations come first" — is the primacy of the relational field R in the triple $\langle \Sigma, R, \Phi \rangle$ of Ordinate Set Theory: see Ghioni, *Ordinate Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinate Sciences Press, 2026), where singularities are constituted by their relations and the emergent function is the proof of a system's reality. For the way mathematical thought structures the cognition of ratio and dependence, see George Lakoff and Rafael Núñez, *Where Mathematics Comes From: How the Embodied Mind Brings Mathematics into Being* (Basic Books, 2000); Stanislas Dehaene, *The Number Sense: How the Mind Creates Mathematics* (Oxford University Press, updated edition 2011). The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

50. The notion of the variable as an ∞ -valued symbol that does not change of itself (the change lying in the choice made by the operator), the extensional method as the treatment of many distinct, unique individuals, and the thesis that most of the terms of life are names for stages of ∞ -valued processes (variables) rather than one-valued constants, are from *Science and Sanity* (1933/1994), Chapter XI. In our apparatus, treating a variable-word as if it were a constant is the general form of identification, and the distinction between what an expression fixes and the totality of values from which it is drawn is formalized in *Semantic Algebra* (Ghioni, in preparation, 2026) through the proper-inclusion relation . For the non-classical, graded nature of ordinary-language concepts — categories with blurred boundaries, prototypes — see Eleanor Rosch, "Principles of Categorization," in Eleanor Rosch and Barbara B. Lloyd (eds.), *Cognition and Categorization* (Erlbaum, 1978); George Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind* (University of Chicago Press, 1987); on

the relation between the structure of a language and the categories perceived, Guy Deutscher, *Through the Language Glass: Why the World Looks Different in Other Languages* (Metropolitan Books, 2010). ↩

51. The notion of the propositional function (a statement containing variables, ambiguous, neither true nor false, which becomes a true or false proposition only when values are assigned), the crucial distinction between a false statement and a verbal form devoid of meaning ("blah-blah is black"), and the thesis that the greater part of human difficulties arises not in the domain of true/false but in the far vaster domain of propositional functions and meaninglessness, where agreement is structurally impossible, are from *Science and Sanity* (1933/1994), Chapter XI, which extends the notion of the propositional function from Bertrand Russell. In our apparatus the distinction between an expression that carries a real invariant and one that is empty form is the heart of the structural-extraction operator of *Semantic Algebra* (Ghioni, in preparation, 2026). For the question of the criterion of significance and the boundary between sense and nonsense, see, in the early-twentieth-century tradition, Ludwig Wittgenstein, *Tractatus Logico-Philosophicus* (current editions), and A. J. Ayer, *Language, Truth and Logic* (Gollancz, 1936; current editions); for the contemporary phenomenology of discourse that simulates meaning without a referent, Harry G. Frankfurt, *On Bullshit* (Princeton University Press, 2005), and Lee McIntyre, *Post-Truth* (MIT Press, 2018). ↩
52. The hidden structure of a doctrine as a set of postulates (C. J. Keyser's *doctrinal function*), its extension to the higher-order *system-functions* (with reference to H. M. Sheffer), the thesis that apparently different doctrines may share a single structure (all pre-1933 psychotherapies as variants of a single system-function), and above all the method of **invariants** — what survives the reformulation of a problem in languages of different structure (the "transformation of frames of reference" of mathematics) is intrinsic and real, while what changes is an accident of the language — are from *Science and Sanity* (1933/1994), Chapter XI; there one also finds the observation that scientific progress arises from new system-functions more than from isolated facts, and that the organism works as-a-whole even in

mathematical activity (the measurable emotional components of intellectual work). In our apparatus the invariant that survives translation between domains is precisely the invariant of *Semantic Algebra* — what the Strip extracts and re-projection preserves across different domains (Ghioni, in preparation, 2026); the reduction of a doctrine to its structure of postulates corresponds, in *Ordinative Category Theory* (Ghioni, in preparation, 2026), to identifying the functor that reveals its preserved structure. For the notion of the invariant and of transformation between frames of reference in mathematical physics, see Peter Galison, *Einstein's Clocks, Poincaré's Maps: Empires of Time* (W. W. Norton, 2003); for analogical thought as the alignment of structures, Dedre Gentner, "Structure-Mapping: A Theoretical Framework for Analogy," *Cognitive Science* 7 (1983), and Douglas Hofstadter and Emmanuel Sander, *Surfaces and Essences: Analogy as the Fuel and Fire of Thinking* (Basic Books, 2013). ↩

53. The notion of **order** as a fundamental undefined term, understood as *betweenness* (the "being-between": if b is between a and c, the series a-b-c differs from c-b-a), its role at the foundation of geometry, of higher mathematics and of the logic of order, the reduction of "relation" and of "structure" to (multidimensional) order, and the thesis that "to be means to be in relation," are found in Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter XII, of which the present volume is a re-elaboration and updating; the chapter leans on the work of E. V. Huntington, B. Russell, C. I. Lewis, and O. Veblen on order and seriality as the foundation of the exact sciences. In our apparatus the primacy of relation over "things" is the primacy of the relational field R in the triad $\langle \Sigma, R, \Phi \rangle$ of *Ordinative Set Theory* (Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning*, Ordinative Sciences Press, 2026), where singularities are constituted by their relations. On the role of serial order in behavior and cognition see Karl S. Lashley, "The Problem of Serial Order in Behavior" (in L. A. Jeffress, ed., *Cerebral Mechanisms in Behavior*, Wiley, 1951); on structure as a network of relations, Douglas Hofstadter and Emmanuel

Sander, *Surfaces and Essences: Analogy as the Fuel and Fire of Thinking* (Basic Books, 2013). All the works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

54. The finite speed of nerve impulses as that which *introduces* order (against the tacit assumption of "infinite speeds"), the polarity of the synapses (one-way transmission), the layered structure of the nervous system (ancient subcortical centers and the cortical "new brain"), the natural line of march of the stimulus (senses → affective centers → cortex → transformed return), the reflex as an active apparatus that releases stored energy (a "trigger") and not as a passive channel, and the boundless combinatorial richness of the interneuronic connections are found in *Science and Sanity* (1933/1994), Chapter XII, which draws on the neurology of C. J. Herrick (the types of reflex arc, including the "final common path") and of L. Edinger. For the contemporary picture see Charles S. Sherrington, *The Integrative Action of the Nervous System* (Yale University Press, 1906), on the final common path; Joseph LeDoux, *The Emotional Brain: The Mysterious Underpinnings of Emotional Life* (Simon & Schuster, 1996), on the subcortical "low road" prior to cortical evaluation; Antonio Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (Putnam, 1994); György Buzsáki, *Rhythms of the Brain* (Oxford University Press, 2006). ↩
55. The natural order of survival (from the lower abstraction — the sensation — to the higher — the idea) and its **inversion** (the idea that precedes and produces the sensation) as the root of suffering and of pathological manifestations, up to hallucination as the extreme form; the thesis that the sensation is not the event but already a partial translation of it (the falling stone is not the pain in the foot); and the schizophrenic regression to a lower order of abstraction, are found in *Science and Sanity* (1933/1994), Chapter XII, which cites the studies of W. A. White (*The Language of Schizophrenia*) and the work of I. P. Pavlov on the effect of the spatio-temporal order of stimuli. In our apparatus the inversion of order is the general form of the identification between levels, and the sensation as a translation that loses structure corresponds to the proper-inclusion relation

of *Semantic Algebra* (Ghioni, in preparation, 2026). For the contemporary correlates — the brain as a system that anticipates and "predicts" experience, anticipatory anxiety, the placebo effect — see Andy Clark, *Surfing Uncertainty: Prediction, Action, and the Embodied Mind* (Oxford University Press, 2015); Robert Sapolsky, *Why Zebras Don't Get Ulcers* (Holt, 3rd ed. 2004); Bessel van der Kolk, *The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma* (Viking, 2014); Fabrizio Benedetti, *Placebo Effects* (Oxford University Press, 2nd ed. 2014). ↩

56. The priority of differences over similarities in the process of abstraction (similarities as a product of the nervous system, not as data of the world), the distinction between definition **by extension** (enumeration of unique individuals) and **by intension** (a common property that flattens the differences), the fact that extension respects the natural order while intension inverts it, and the link between absolutized intension and identification are found in *Science and Sanity* (1933/1994), Chapter XII, which takes the intension/extension distinction from the logic of C. I. Lewis. In our apparatus the extensional method is the one introduced in the previous chapter, and the intensional flattening of differences is a case of abstraction that loses precisely the decisive relation — in the framework of *Ordinative Category Theory* (Ghioni, in preparation, 2026), a forgetful functor that degrades the individual distinctions. For the contemporary theory of cognitive categories with fuzzy, prototype-based boundaries see Eleanor Rosch, "Principles of Categorization" (in E. Rosch and B. B. Lloyd, eds., *Cognition and Categorization*, Erlbaum, 1978); George Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind* (University of Chicago Press, 1987). ↩
57. The classification of relations — symmetric (holding in both directions), non-symmetric, and **asymmetric** (fixed direction, never invertible), together with transitive, non-transitive, and intransitive —, the thesis that every asymmetric relation establishes an order, and the observation that the most important relations we have (before/after, greater/less, part/whole, space, time, cause/effect) are asymmetric, are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics*

(Institute of General Semantics, 1933, current edition 1994), Chapter XIII, of which the present volume is a re-elaboration and updating; that chapter rests on B. Russell's logic of relations, on C. J. Keyser's thesis ("to be" means "to be related"), on H. Poincaré ("science is a system of relations"), and on C. M. Child's work on the organism as a system of relations. In our apparatus the primacy of relation and of its direction is the primacy of the relational field R , intrinsically oriented, in the triple $\langle \Sigma, R, \Phi \rangle$ of Ordinate Set Theory: see Ghioni, *Ordinate Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinate Sciences Press, 2026). For the logic of relations and its foundational role, see Bertrand Russell, *Introduction to Mathematical Philosophy* (Allen & Unwin, 1919; current editions); Russell and Whitehead, *Principia Mathematica* (Cambridge University Press, 1910–13). All the works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

58. The argument that subject-predicate language ("X is Y") can express properties and symmetric relations but is structurally incapable of expressing asymmetric relations adequately (whence the necessity of a language of new structure), and the observation that the observer-observed relation is itself asymmetric ("if a leaf appears green to me, I do not appear green to the leaf"), are from *Science and Sanity* (1933/1994), Chapter XIII. In our apparatus this is the foundation of the replacement of the "is" of identity with relational, conditioned, and dated formulations (cf. Chapter VII of this volume), and the observer erased by the form "the leaf is green" is the *Ghost Observer Principle* of *Semantic Algebra* (Ghioni, in preparation, 2026): an observer implicit in every expression, to be brought back into view. For the constitutive role of the observer in perception, see Francisco Varela, Evan Thompson, and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (MIT Press, revised edition 2016); Andy Clark, *Surfing Uncertainty: Prediction, Action, and the Embodied Mind* (Oxford University Press, 2015); on how grammatical structure orients the categories through which we read the world, Guy

Deutscher, *Through the Language Glass: Why the World Looks Different in Other Languages* (Metropolitan Books, 2010). ↩

59. The thesis that "identity" (absolute sameness in all respects) is invariably false to facts — since everything is process —, that the word should be eliminated from our vocabulary while **identification** should be retained as the name of a widespread delusional state that in mild form afflicts most of us, and the analysis of I. P. Pavlov's conditioned reflex as *physiological identification* of the signal with the food (with the consequent glandular secretions, demonstrated in human beings by the psychogalvanic experiments), are from *Science and Sanity* (1933/1994), Chapter XIII; there one also finds the analysis of infantile identification (for the newborn "the cry *is* food," "words *are* magic") carried into adult life. In our apparatus identification is the confusion between levels of abstraction (treating the symbol as the referent, the higher-order abstraction as the lower), formalized by the proper-inclusion relation of *Semantic Algebra* and by the taxonomy of morphisms of *Ordinative Category Theory* (Ghioni, in preparation, 2026); secretion in response to the symbol points back to the colloidal basis of Chapter IX. For the contemporary correlates — conditioning, the physiological response to symbolic stimuli, the subcortical "low road" — see Ivan Pavlov, *Conditioned Reflexes* (Oxford University Press, 1927); Joseph LeDoux, *The Emotional Brain: The Mysterious Underpinnings of Emotional Life* (Simon & Schuster, 1996); Bessel van der Kolk, *The Body Keeps the Score* (Viking, 2014); Stephen Porges, *The Polyvagal Theory* (Norton, 2011). ↩
60. The three historical standards of evaluation (the literal identification of the pre-human and primitive stages; the partial identification of the infantile/Aristotelian period, with its two-valued "law of identity"; the adult/scientific evaluation founded on the elimination of identification and on an infinite-valued semantics of probability), and the analysis of how some profit by keeping humanity's standard of evaluation low — supplying semantic "escapes from reality" while the actual realities are controlled elsewhere —, together with the observation that those who live in the illusion often resist liberation, are from *Science and Sanity* (1933/1994),

Chapter XIII. In our apparatus the exploitation of others' identification is the object of the manipulation-analysis and psycho-politics module of the Technology of Expressions framework (Ghioni, in preparation, 2026), and the alternative between scientific evaluation and "prevailing chaos" restates the general non-Aristotelian principle. For the contemporary forms — the outrage economy, post-truth, the manipulation of attention — see Lee McIntyre, *Post-Truth* (MIT Press, 2018); Shoshana Zuboff, *The Age of Surveillance Capitalism* (PublicAffairs, 2019); Max Fisher, *The Chaos Machine* (Little, Brown, 2022); for the dynamics of induced un-sanity and the imitation of semantic reactions, Gustave Le Bon, *The Crowd: A Study of the Popular Mind* (1895; current English editions) and the crowd-psychology tradition, reread in a non-elementalistic key. ↩

61. The thesis that "infinite" is to be used as an adjective describing a process (a process that "has no end or does not stop") and never as a noun (on pain of self-contradiction), that no "actual, given, complete" infinity exists, and that the confusion between the two uses lies at the root of the paradoxes, is from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter XIV, of which the present volume is a re-elaboration and updating; that chapter discusses the work of B. Bolzano, R. Dedekind, and G. Cantor, and cites H. Poincaré, H. Weyl, and L. E. J. Brouwer on the foundations. In our apparatus, treating a process as if it were a completed thing is the general form of identification between levels (see the previous chapter), and contrasts with the process ontology of *Ordinative Set Theory*, in which what is real is the emergent function Φ — a doing, not a fixed object: see Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026). For accessible treatments of mathematical infinity and its paradoxes, see Rudy Rucker, *Infinity and the Mind* (Princeton University Press, 1982); Eli Maor, *To Infinity and Beyond* (Princeton University Press, 1991). The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

62. The distinction between the semantic process (indefinitely extendable) and its result (always a finite number), the definition of an infinite process as one that can be put into **one-to-one correspondence with a part of itself** (whence the "failure" of the Euclidean axiom "the whole is greater than the part," valid only for the finite), and the illustration by the even numbers in one-to-one correspondence with all the numbers, are from *Science and Sanity* (1933/1994), Chapter XIV, which recalls B. Russell's Tristram Shandy paradox and Leibniz's error (who wrongly concluded that infinite sequences are impossible). In our apparatus, the overturning of "self-evident rules" upon a change of scale recalls the principle that every generalization is valid within the boundaries in which it was abstracted (see Chapter VII, earlier in this volume, on the non-Euclidean systems as special cases). For the notion of one-to-one correspondence and of equivalence between infinite sets, in popular form, see George Gamow, *One Two Three... Infinity* (Viking, 1947; Dover, current edition); Douglas Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid* (Basic Books, 1979). ↩
63. The analysis by which an event extremely improbable on the human time scale, transposed onto an infinite number of years, occurs an infinite number of times — becoming "regular" and "law-conforming" — with the consequent critique of the anthropomorphic standpoint that takes "man as the measure of all things," is from *Science and Sanity* (1933/1994), Chapter XIV, which connects it to the theory of probability (from games of chance, to Boltzmann's second law of thermodynamics, to the many-valued "logic" of Łukasiewicz and Tarski, to quantum mechanics). In our apparatus, the ∞ -valued semantics of probability, which replaces two-valued true/false, corresponds to the graded representation of *Proportional Algebra* (Ghioni, in preparation, 2026). For the ways the human mind misjudges probabilities and large numbers (and for the statistics of "coincidences" over large numbers), see Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2011); Leonard Mlodinow, *The Drunkard's Walk: How Randomness Rules Our Lives* (Pantheon, 2008); David Hand, *The Improbability Principle* (Scientific American/Farrar, Straus and Giroux, 2014). ↩

64. The thesis that "universal" and "permanent" assertions amount to claims of validity "for an infinite number of years," and that translating vague qualitative language ("permanent," "absolute") into quantitative language (numbers of years or of cases) renders the hidden structural assumptions precise and analyzable, is from *Science and Sanity* (1933/1994), Chapter XIV; there too is the warning against objectifying "time" (the "years" — a process-unit we choose — can be measured; reified "time" cannot). In our apparatus this is the twin of the dating of statements introduced in Chapter XI, and the objectification of "time" is a case of treating a process as a thing (identification). For time as a magnitude measured through a process-unit, and not as an absolute container, see Carlo Rovelli, *The Order of Time* (Riverhead Books, 2018); Peter Galison, *Einstein's Clocks, Poincaré's Maps: Empires of Time* (W. W. Norton, 2003). In our apparatus, time as a pulsation generated by the cycles of the system, and not as an external container, is formalized in *Proportional Algebra* (Ghioni, in preparation, 2026). ↩
65. The analysis of the "infinitesimal" as a meaningless notion — the demonstration (due to K. Weierstrass) that it is not structurally necessary to the calculus and that every result of division, however small, remains a finite quantity — together with the consequence that, since the infinitely small does not exist, there is no "next moment" either (between any two instants there are always others, and the "present" as an instant becomes vague), is from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, 1933, current edition 1994), Chapter XV, of which the present volume is a re-elaboration and updating. In our apparatus the "infinitesimal" is, like the "infinite" of the previous chapter, a process mistakenly treated as a thing, in conflict with the process ontology of Ordinate Set Theory: see Ghioni, *Ordinate Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinate Sciences Press, 2026); and time as process — not as threshold or container — is formalized as pulsation in *Proportional Algebra* (Ghioni, in preparation, 2026). For the history of the calculus, of limits, and of the elimination of the infinitesimal, see Carl B.

Boyer, *The History of the Calculus and Its Conceptual Development* (Dover, 1959); for time and the instant in contemporary physics, Carlo Rovelli, *The Order of Time* (Riverhead Books, 2018). All the works in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

66. The thesis that, the interval between "cause" and "effect" being finite, something can always interfere — whence the untenability of the principle "same cause, same effect" taken as an absolute law —, that "cause—effect" is a two-term relation to be expanded into a complex series, and that two-valued causality is a scale-dependent statistical average (inapplicable to events at the small scale, where probability rules), is from *Science and Sanity* (1933/1994), Chapter XV, which leans on the analysis of B. Russell and recalls E. Mach, A. Einstein, and W. Heisenberg on the rethinking of causality in relativity and quantum mechanics. In our apparatus the replacement of the two-term arrow by a network of converging factors is the **many-to-one** already introduced in Chapter X of this volume (and, within Ordinate Category Theory, an outcome that preserves the convergence and forgets the particular route), while causal statements devoid of factors and conditions are the propositional functions of Chapter XI. For the contemporary conception of causality as network and as inference, rather than as simple linkage, see Judea Pearl and Dana Mackenzie, *The Book of Why* (Basic Books, 2018); J. L. Mackie, *The Cement of the Universe* (Oxford University Press, 1974); for multi-causality in biological and behavioral systems, Robert M. Sapolsky, *Behave: The Biology of Humans at Our Best and Worst* (Penguin Press, 2017). ↩
67. The thesis that the absolutist, objectified attitude toward "cause—effect" obstructs impartial observation — since "we tend to find what we want to find," and under affective pressure the capacity for observation shrinks into a kind of "emotional stupor" — and that knowledge is an activity of the nervous system, not the events themselves, whence the need to invert the habitual order (first observation, then verbal structure, then verification), is from *Science and Sanity* (1933/1994), Chapter XV; there one also finds the observation that the great mathematical discoveries are born of treating

mathematics as a form of human behavior (Weierstrass's analysis of the *genetic* process by which the infinitesimal was "created"). In our apparatus the tendency to find what one desires is precisely the target of the counterphase protocol (bias detection) of the Technology of Expressions framework, and the order observation → structure → verification is the natural order of Chapter VIII of this volume. For the contemporary correlates — confirmation bias, motivated blindness, the difficulty of observing against one's own desire — see Raymond S. Nickerson, "Confirmation Bias: A Ubiquitous Phenomenon in Many Guises" (*Review of General Psychology*, 1998); Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2011); Ziva Kunda, "The Case for Motivated Reasoning" (*Psychological Bulletin*, 1990). ↩

68. The discovery — due to J. Royce — that there exist "necessary" activities, forms, and relations (Royce called them "absolute"), such that the mere attempt to deny or eliminate them logically implies their presence (whoever denies the existence of classes classifies in saying so; whoever denies the difference between "yes" and "no" affirms and denies in the same breath), and the observation that the structure of human knowledge is intrinsically **circular** — disorienting if not faced with courage, but, once recognized, free of any vice and indeed a source of interest and beauty — are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, 1933, current edition 1994), Chapter XVI, which takes up Josiah Royce's analyses of order and of the "absolute" forms of knowledge; see Royce, "The Principles of Logic," in *Encyclopaedia of the Philosophical Sciences*, vol. I (Macmillan, 1913). In our apparatus, the constitutive and ineliminable character of relations corresponds to the primacy of the relational field R in the triple $\langle \Sigma, R, \Phi \rangle$ of *Ordinative Set Theory*, where singularities are constituted by their relations and do not precede them (Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning*, Ordinative Sciences Press, 2026). For the theme of **performative contradiction** — the assertion that refutes itself in the act of being made — in contemporary philosophy, see Karl-Otto Apel's transcendental pragmatics, in *Towards a*

Transformation of Philosophy (Routledge & Kegan Paul, 1980); Thomas Nagel, *The Last Word* (Oxford University Press, 1997), against self-referentially incoherent relativism. All the formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

69. The thesis that relations hold a priority over "things" — since objects can be removed (if only in thought) while relations cannot, the very attempt at their denial employing them — crowns, in our apparatus, the arc of the chapters on structure as the only content of knowledge (Chapter IV, earlier in this volume), on order (Chapter XII), and on asymmetrical relations (Chapter XIII). In *Ordinative Set Theory* this is the principle by which meaning precedes form ($\mathcal{M} \succ \mathcal{P}$) and the relational field is ontologically primary with respect to the singularities that knot within it (Ghioni, 2026). For the contemporary perspective of an ontology of relations, or of processes, rather than of substances, see Alfred North Whitehead, *Process and Reality* (Free Press, corrected edition 1978); Ernst Cassirer, *Substance and Function* (Open Court, 1923; Dover reprint 1953); Carlo Rovelli, *Helgoland: Making Sense of the Quantum Revolution* (Riverhead Books, 2021), on the relational nature of physical entities. ↩
70. The use of the self-application criterion as a test against "impossible" statements, statements devoid of "logical existence" — those that abuse symbolism by producing sounds instead of symbols — is consistent with the analysis of *Science and Sanity* (1933/1994), Chapter XVI, and takes up, in our apparatus, the distinction between full symbol and noise (Chapter VI, earlier in this volume) and between a proposition and a propositional function devoid of truth value (Chapter XI). For the critique of global relativism as a self-referentially incoherent position — "every truth is relative" applied to itself — see Paul Boghossian, *Fear of Knowledge: Against Relativism and Constructivism* (Oxford University Press, 2006); Thomas Nagel, *The Last Word* (Oxford University Press, 1997); for the classical tradition of the argument, the self-refutation of global skepticism already discussed by Aristotle (*Metaphysics*, Book IV) and taken up in contemporary logic. ↩

71. The analysis of "indeterminism" as an effect of missing knowledge — the analogy with a system of equations in which the unknowns remain indeterminate so long as the equations are fewer than the unknowns, and settle as equations (knowledge) are added — and the thesis that "chance" and "law" may be readings of the same process at different levels or with different information (an event "rare" at one scale becomes "regular" at another, as in Chapter XIV) are from *Science and Sanity* (1933/1994), Chapter XVI, where they are argued in support of an ∞ -valued determinism as a "test of structure." It should be noted, in honesty toward the present state of physics, that the question whether at the quantum scale indeterminacy is *epistemic* (hidden information) or *ontological* (genuine randomness of the world) remains open and debated: the theorems on Bell's inequalities have ruled out broad classes of local "hidden variables," so that the 1933 standpoint should be received as valid above all at the macroscopic, everyday scale. In our apparatus, the representation by degrees of probability, which replaces two-valued true/false, is formalized in *Proportional Algebra* (Ghioni, in preparation, 2026). For the conception of probability as a measure of information, and for the psychology of the perception of chance and conspiracy, see E. T. Jaynes, *Probability Theory: The Logic of Science* (Cambridge University Press, 2003); Leonard Mlodinow, *The Drunkard's Walk: How Randomness Rules Our Lives* (Pantheon, 2008); Sander van der Linden, *Foolproof: Why Misinformation Infects Our Minds and How to Build Immunity* (W. W. Norton, 2023), on why the mind seeks designs where there is noise. ↩
72. The thesis that "matter," "space," and "time" are not things or substances but *terms* — *modi considerandi*, "ways of considering," in the phrase of G. W. Leibniz — that is, abstractions and forms of representation produced by the nervous system, and inseparable from one another (the "hand me a piece of matter" experiment, and the pencil that is already shape and duration), is from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter XVII, of which the present volume is a re-elaboration and updating; that chapter invokes

H. Poincaré ("space is only a word that we have believed a thing"), B. Russell (*The Analysis of Matter*, Kegan Paul, 1927), and Eddington. In our apparatus, treating matter, space, and time as relations rather than as substances corresponds to the ontology of events and relations of *Ordinative Set Theory*, in which what is real are the singularities constituted by their relations in the field R, and not objects that precede them: see Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026); the structural refoundation of the notions of space and time is the object of a dedicated work in preparation (Ghioni, *Ordinative Spacetime*, in preparation, 2026). For the relational and processual conception of space, time, and matter in contemporary physics, see Carlo Rovelli, *Helgoland: Making Sense of the Quantum Revolution* (Riverhead, 2021) and *The Order of Time* (Riverhead, 2018); Bertrand Russell, *The Analysis of Matter* (Kegan Paul, 1927). The formal works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

73. The thesis that "space" is not empty but a **fullness** (a *plenum*) — always full of air, dust, fields, energy — that "absolute void" and "absolute space" are notions devoid of meaning (a symbol must represent something, and "nothing" represents nothing), and the analogy of the **unbounded-but-finite** (the surface of the sphere, walkable without end and yet of finite dimensions) as a model of the universe in Einstein's theory, are from *Science and Sanity* (1933/1994), Chapter XVII. In our apparatus, the impossibility of symbolizing "absolute nothing" is a case of the distinction between symbol and noise (Chapter VI) and between what can and cannot be denied (Chapter XVI). For the "void" that is not empty in contemporary physics (vacuum energy, quantum fields) and for the cosmology of the finite-but-unbounded universe, see Brian Greene, *The Fabric of the Cosmos* (Knopf, 2004); Stephen Hawking, *A Brief History of Time* (Bantam, 1988); Lawrence Krauss, *A Universe from Nothing* (Free Press, 2012). ↩
74. The thesis that "time" is not a thing but a process measured through a chosen unit-rhythm (the clock as "matter in motion" that we count), that no absolute "now" exists, that the perceived continuity of time is in part a

synthesis of the nervous system (the integration of the frames at the cinema; perceptual fusion), and that the organism is itself a system of rhythms (the micro- and macroscopic "pulsating clocks," from the heartbeat to the cycles of the day) from which the sense of time is born, are from *Science and Sanity* (1933/1994), Chapter XVII; there one also finds the critique of the objectification of time (the senseless questions about the "beginning" and the "end" of time). In our apparatus, time as pulsation generated by the coherent cycles of the system, and not as an external container, is formalized in *Proportional Algebra* (Ghioni, in preparation, 2026), and the warning against reifying time takes up Chapter XIV. For the psychology and neuroscience of time perception, and for biological clocks, see Dean Buonomano, *Your Brain Is a Time Machine* (W. W. Norton, 2017); Marc Wittmann, *Felt Time: The Psychology of How We Perceive Time* (MIT Press, 2016); for the molecular circadian rhythms, the work honored with the 2017 Nobel Prize (Hall, Rosbash, Young). ↩

75. The thesis that "matter" is not full substance but process and structure (solidity as sub-microscopic activity too dense and too rapid to be perceived, in parallel with the critique of the "heat substance" in Chapters VIII–IX), and that the new physics replaces the matter/space/time elementalism with the concept of the **event** and with four-dimensional **space-time** — a network of events and intervals, a "fullness" made of world-lines (Minkowski), whose "curvature" is the curvature of a fullness (the image of the smoke) and not of a void — are from *Science and Sanity* (1933/1994), Chapter XVII, which takes up the work of A. Einstein and H. Minkowski (who introduced the term "event") and quotes Eddington ("a network of intervals"). In our apparatus, the event as an inseparable unity of "something, somewhere, at some time" corresponds to the singularity as a node of the relational field in *Ordinative Set Theory*, and to the refoundation of space-time as an expression of relations (Ghioni, *Ordinative Spacetime*, in preparation, 2026). For matter as excitation of fields and for dynamic space-time in contemporary physics (down to the gravitational waves detected in 2015), see Frank Wilczek, *The Lightness of Being: Mass, Ether, and the Unification of Forces* (Basic Books, 2008); Sean Carroll, *Something*

Deeply Hidden (Dutton, 2019); Carlo Rovelli, *Reality Is Not What It Seems: The Journey to Quantum Gravity* (Riverhead, 2017). ↩

76. The thesis that the nervous system abstracts only a minute fraction of the energy in which we are immersed (the visible sliver of the enormous electromagnetic spectrum; the "more than twenty senses" against the traditional five; Weber's law on perceptual thresholds), that the senses give abstractions of lower order which scientific instruments extend into abstractions of higher order, that the stimulus is not the response (the stone is not the pain, the flame is not the burning), and that even the instrument deforms what it measures ("physical subjectivity": the stick broken in the water; the observer who disturbs the observed), are from *Science and Sanity* (1933/1994), Chapter XVII, which draws on the neurology of C. J. Herrick and on E. H. Weber's law, and invokes the Compton effect as a case of the instrument altering the phenomenon. In our apparatus this takes up the distinction between the orders of abstraction (Chapter V), the fact that the stimulus is not the response (Chapter XII), and the constitutive observer of the triple $\langle C, F, O \rangle$ together with the *Ghost Observer Principle* of *Semantic Algebra* (Ghioni, in preparation, 2026). For the real richness of the human senses and for the nervous system as a constructor (not a passive receiver) of perception, see David Eagleman, *The Brain: The Story of You* (Pantheon, 2015) and *Livewired: The Inside Story of the Ever-Changing Brain* (Pantheon, 2020); Donald Hoffman, *The Case Against Reality: Why Evolution Hid the Truth from Our Eyes* (W. W. Norton, 2019); Andy Clark, *Surfing Uncertainty: Prediction, Action, and the Embodied Mind* (Oxford University Press, 2015). ↩
77. The thesis that mathematics is a human **language** (the most rigorous we possess) and at the same time a **form of behavior of the nervous system**, not a body of eternal "discovered" truths or of sacred character, and the observation that the fear of mathematics is largely a problem of teaching (mathematics presented as truth to be endured rather than as a constructed language to be handled structurally), are from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933,

current edition 1994), Chapter XVIII, of which the present volume is a re-elaboration and updating; that chapter takes up the expression of numbers in logical terms from G. Frege, G. Peano, A. N. Whitehead, B. Russell, and C. J. Keyser, and quotes E. T. Bell. In our apparatus, mathematics as a language whose structure is similar to that of the world takes up the principle of structural isomorphism and of structure as the only content of knowledge (Chapters IV and V of this volume) and the notion of the preservative forgetful functor of *Ordinative Category Theory* (Ghioni, in preparation, 2026). For the debate on the "unreasonable effectiveness" of mathematics and on its nature (human construction versus Platonic discovery), see Eugene Wigner, "The Unreasonable Effectiveness of Mathematics in the Natural Sciences" (*Communications on Pure and Applied Mathematics*, 1960); George Lakoff and Rafael Núñez, *Where Mathematics Comes From: How the Embodied Mind Brings Mathematics into Being* (Basic Books, 2000); Reuben Hersh, *What Is Mathematics, Really?* (Oxford University Press, 1997). All the works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

78. The thesis that mathematics "works" and *predicts* (the discovery of Neptune by calculation before telescopic observation; the astronomical predictions) because its structure is **similar** to the structure of the world — both made of individuals in relation and in order — and that this structural similarity, not any mystical character, explains its effectiveness, is from *Science and Sanity* (1933/1994), Chapter XVIII, which invokes the map/territory principle (the epigraph from E. T. Bell on the map that is not the geographic object). In our apparatus this is the heart of Chapter IV of this volume (structure as the only transferable content of knowledge; isomorphism) and of the proper-inclusion relation of *Semantic Algebra*, which measures how much a representation preserves and how much it loses with respect to what it represents (Ghioni, in preparation, 2026). For the predictivity of mathematics and for the warning that "the map is not the territory" applied to models, see Freeman Dyson, "Mathematics in the Physical Sciences" (*Scientific American*, 1964); George E. P. Box, "Science and Statistics"

(*Journal of the American Statistical Association*, 1976), for the principle that "all models are wrong, some are useful." ↩

79. The thesis that a **number** is a relation (exact, unique, in general asymmetrical: "5" as "five times a unit") and not a thing, the distinction between the **cardinal** number (found by one-to-one correspondence, like the chairs and the guests, without counting) and the **ordinal** number (the place in the series), and the difference between **numbers** (composable relations) and **numerals** (figures used as names, which do not add: "Second Avenue + Third Avenue $\neq$ Fifth Avenue"), are from *Science and Sanity* (1933/1994), Chapter XVIII. In our apparatus the number as relation takes up the primacy of relations of Chapters XII and XIII and the notion of function of Chapter XI. For the cognitive roots of the number sense and for the history of the concept of number, see Stanislas Dehaene, *The Number Sense: How the Mind Creates Mathematics* (Oxford University Press, updated edition 2011); Tobias Dantzig, *Number: The Language of Science* (Macmillan, 1930; Plume edition, 2007); Brian Butterworth, *The Mathematical Brain* (Macmillan, 1999). ↩
80. The transformation of a vague quality into an exact relation ("the grass is green" refined down to a wavelength) as the typical operation of mathematics, and the distinction between **additive/linear** phenomena (the guest and the chair: the whole is the sum of the parts) and **non-additive/emergent** phenomena (hydrogen and oxygen producing water, with new properties present in neither of the parts), with the consequent need for languages (non-linear equations) to describe emergence, are from *Science and Sanity* (1933/1994), Chapter XVIII. In our apparatus non-additivity and emergence take up the principle of the organism-as-a-whole and of colloidal behavior (Chapters IX and X of this volume) and the emergent function, which is not the sum of the singularities, in Ghioni, *Ordinative Set Theory — The Architecture of Reality and the Genesis of Meaning* (Ordinative Sciences Press, 2026). For emergence and non-linearity in complex systems, see Philip W. Anderson, "More Is Different" (*Science*, 1972); Melanie Mitchell, *Complexity: A Guided Tour* (Oxford

University Press, 2009); Steven Strogatz, *Sync: The Emerging Science of Spontaneous Order* (Hyperion, 2003). ↩

81. The centrality of **invariants** and **transformations** as the unifying principle of modern mathematics (what stays the same under transformation belongs truly to the object, not to the system of representation; Einstein's theory as the search for what is invariant for all observers) is from *Science and Sanity* (1933/1994), Chapter XVIII, which connects it to the theory of functions and of groups. In our apparatus this is the same principle of invariants under translation introduced in Chapter XI (what survives the reformulation of a problem in different languages is real), formalized as the invariant of *Semantic Algebra* (Ghioni, in preparation, 2026); and the warning not to mistake the model for the reality takes up the map/territory principle (Chapter IV of this volume) and the analysis of identification (Chapter XIII). For the role of invariance and symmetry in physics, and for the critique of model-reality identification in the age of algorithms, see Hermann Weyl, *Symmetry* (Princeton University Press, 1952); Mario Livio, *The Golden Ratio* (Broadway Books, 2002) and *The Equation That Couldn't Be Solved* (Simon & Schuster, 2005), on invariance and groups; Cathy O'Neil, *Weapons of Math Destruction* (Crown, 2016), on the risk of treating models as truth. ↩
82. The thesis that mathematics is "similar in structure" to the human nervous system — because it is that system's purest and best-functioning product: the activity of abstracting by orders, proceeding by relations, and hunting for invariants, made explicit — and that its load-bearing terms (relation, order, difference, variable, function, transformation, invariance) are *non-elementalistic*, applying to the "senses" and the "mind" together and thereby mirroring the organism-as-a-whole, is from Alfred Korzybski, *Science and Sanity: An Introduction to Non-Aristotelian Systems and General Semantics* (Institute of General Semantics, first edition 1933, current edition 1994), Chapter XIX, of which the present work is a deliberate re-elaboration and updating; the "double mirror" (mathematics similar at once to the world and to the nervous system) welds this chapter to the one before it. In our apparatus, mathematics as the pure form of abstractive functioning takes

up the thesis of Chapter V, earlier in this volume (mathematics as the cleanest imprint of the structured mind), and the structural isomorphism of Chapter IV. On mathematics as an embodied activity rooted in human cognitive structure, see George Lakoff and Rafael Núñez, *Where Mathematics Comes From: How the Embodied Mind Brings Mathematics into Being* (Basic Books, 2000); Stanislas Dehaene, *The Number Sense: How the Mind Creates Mathematics* (Oxford University Press, updated edition 2011); Jean-Pierre Changeux and Alain Connes, *Conversations on Mind, Matter, and Mathematics* (Princeton University Press, 1995). All the works of our apparatus now in preparation will be released under CC 4.0 licenses on Zenodo, OSF, and Academia.edu in the course of 2026. ↩

83. The structuring of the nervous system by **orders of abstraction** (abstractions of abstractions: from the event to the image, to the word, to the idea, to the theory), the distinction between lower-order abstractions — dynamic, affective, tied to the subcortical/thalamic centers — and higher-order abstractions — static, permanent, cortical, a "perfected memory" and therefore transmissible — and the link between static abstractions and *time-binding* (the extra-neural storage of knowledge in books and instruments) are from *Science and Sanity* (1933/1994), Chapter XIX, which draws on H. Piéron's neurology of lower and higher centers and on the theory of nervous gradients. In our apparatus, the ladder of orders of abstraction takes up the two abstractions of Chapter V and the nervous system's direction of travel of Chapter XII, and prepares the consciousness of abstracting of the second volume of this edition. On the hierarchical organization of the cortex, prediction, and multi-level abstraction, see Jeff Hawkins, *A Thousand Brains: A New Theory of Intelligence* (Basic Books, 2021); Andy Clark, *Surfing Uncertainty: Prediction, Action, and the Embodied Mind* (Oxford University Press, 2015); György Buzsáki, *The Brain from Inside Out* (Oxford University Press, 2019). ↩
84. The thesis that sanity consists in the capacity to **translate** correctly between the dynamic level (the lower centers, the flux, emotion) and the static level (the higher centers, the stable forms) — and that the **differential calculus** is the language that performs this translation rigorously (layering a

continuous motion into steps and recomposing it) — together with the analogy of the moving film against the filmstrip stopped into measurable frames, is from *Science and Sanity* (1933/1994), Chapter XIX; there one also finds the notion of "thalamic thinking" (emotional and unclear) and the example of the birds (developed thalamus, deficient cortex). In our apparatus, this translation between dynamic and static takes up the notions of the infinite and the infinitesimal of Chapters XIV and XV, and time as the pulsation generated by the system's cycles in *Proportional Algebra* (Ghioni, in preparation, 2026). On the relation between automatic/affective and reflective processing, and on the regulation of emotion as a passage from flux to form, see Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2011); Bessel van der Kolk, *The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma* (Viking, 2014); Daniel J. Siegel, *Mindsight: The New Science of Personal Transformation* (Bantam, 2010). ↩

85. The centrality of the hunt for **invariants** under **transformation** as the fundamental operation both of mathematics (group theory and invariance as a unifying principle; the law of nature as what is invariant with respect to groups of transformations, from Riemann to Einstein) and of the nervous system (which orients itself by recognizing what remains constant beneath the transformations of appearances: the face under different lights) is from *Science and Sanity* (1933/1994), Chapter XIX, which draws on S. Lie, C. J. Keyser, G. Y. Rainich, H. Weyl, and J. B. Shaw. In our apparatus, the invariant that survives transformation is the same invariant under translation introduced in Chapter XI and formalized as the invariant of *Semantic Algebra* (Ghioni, in preparation, 2026). On the role of invariance and symmetry in physical law (and Noether's theorem linking symmetries and conservation laws), and on invariant recognition in vision and in neural networks, see Hermann Weyl, *Symmetry* (Princeton University Press, 1952); James J. DiCarlo, Davide Zoccolan, and Nicole C. Rust, "How Does the Brain Solve Visual Object Recognition?" (*Neuron*, 2012); for a popular account, Mario Livio, *The Equation That Couldn't Be Solved: How Mathematical Genius Discovered the Language of Symmetry* (Simon & Schuster, 2005). ↩

86. The thesis that the static, higher-order abstractions are at once supremely precious (memory, science, civilization) and dangerous — because treating them as the living reality from which they were abstracted is **identification** (the confusion of orders of abstraction), root of absolutism, of delusions and, on the collective scale, of mass hysterias and of wars fought over words — that the cure is **consciousness of abstracting** (knowing which level one stands on, without eliminating the high levels), and the comparison of the three states of the same nervous mechanism (the insane person who lives his premises as *the* absolute truth; the average man who identifies with them unawares; the mathematician who holds them as "if... then..." hypotheses, ready to change them — "it takes a good mind to be insane") are from *Science and Sanity* (1933/1994), Chapter XIX, which explicitly announces B. Russell's theory of types as a future "physiological theory" against the confusion of levels, and closes with the transition to the foundations of psychophysiology — the material of the second volume of this edition, *Abstraction and Sanity*. In our apparatus, identification as a confusion of levels takes up Chapter XIII and the proper-inclusion relation of *Semantic Algebra*; consciousness of abstracting and the Structural Differential are the operative heart of the second volume of this edition (Ghioni, in preparation, 2026). On cognitive flexibility against categorical rigidity, and on the psychology of mass dynamics, see Eleanor Rosch, "Principles of Categorization," in *Cognition and Categorization* (Erlbaum, 1978); Eric Hoffer, *The True Believer: Thoughts on the Nature of Mass Movements* (Harper, 1951); Lee McIntyre, *Post-Truth* (MIT Press, 2018). ↩