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*A Virtual Approach*

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Trondheim (*Kalvskinnet*) and Rome (*Quartiere Appio-Latino*), 2016

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*To GERHARD JARITZ, (Wien, Krems, Budapest), with gratitude for teachings, incitement and inspiration.*

*Thanking, as always, Liv Erstad S.-L., my University for all the essentials, for responding creatively and keeping me alert; she is an expert linguist, having been teaching at the universities of Göttingen and Trondheim; and thanking, again, Knut Rø, in his digital center at our Polytechnic, for our friendship, his patience, support and help!*

## *Table of Contents*

### **PART I INCEPTION THEORY 5**

- 1.1 Openings and Limits 5**
- 1.1.1 Scanning the Book with Graphs 8**
- 1.2 Straddling the Divide 11**
- 1.3 Platform Issues and Terms 16**
- 1.4 Introducing Models 23**
- 1.5 Loss of Certainties 27**

### **PART II CICERO THE DESIGNER. 31**

- 2.1 Meeting Cicero 31**
- 2.2 Roman Pragmatics 34**
- 2.3 Cicero's Program 40**
- 2.4 Augustus' Program 47**
- 2.5 A Model for the DRP 53**
- 2.6 Imposed Limitations 56**

### **PART III A THEORY OF MODELS 61**

- 3.1 Inception Theory 61**
- 3.2 Modeling Our Documents 68**
- 3.3 Open\_Source and Roadmaps 74**
- 3.4 Problematics Developed 76**
- 3.5 Models Embedded in Systems 85**
- 3.6 Making Models Work 88**
- 3.7 Models in their Context 93**
- 3.8 Mimicking Digital Models 106**
- 3.9 Creating Models 111**
- 3.10 A Metatheory of Models? 121**
- 3.11 Experts on Models 124**

### **PART IV FRAMEWORK THEORY 131**

- 4.1 Theory and System - an Overview 131**
- 4.2 Pattern Formation and Complexity 137**
- 4.3 Science Dynamics and the Non-Prof Reader 143**
- 4.4 Sciences of the Artificial 147**
- 4.5 Terms in Abstract Environments 152**
- 4.6 Thinking Digitally 154**

### **PART V ENVIRONMENT THEORY 157**

- 5.1 A Meta-Model and Six Perspectives 157**
- OS1 Management Information Systems 159**
- OS2 Science Systems 159**
- OS3 Social Sciences 162**
- OS4. Space Organization 168**
- OS5 Industrial Design 169**
- OS6 Organization Theory 171**
- 5.2 Learning Lessons 172**
- 5.3 Model Coordination 174**

### **DOCUMENTS 176**

- Cicero's De Re Publica 176**
- Terms in Cicero 184**
- Chronology 185**
- Bibliography 187**

### *Introduction*

We cannot write about model application without bearing constantly in mind the works by *Herbert A. \*Simon* (epithomized in his autobiography, *Models of My Life*, New York, 1991).

He started out from some central and - as he saw it - interconnected issues in economics, psychology and systems theory and from this kernel developed the picture of his engagement and actions through his life by centrifugally, one can say, covering a steadily increasing pattern of fields in research and teaching and writing a number of important and challenging books (all of which are cited on the present site).

Not having the competence nor the schooling and the scholarly *milieu* that Simon had, and hardly his penetrating intellect, my present contribution will be much more modest.

Chronicling events is theoretically speaking not a big issue. We can take Roman works like the *Annales* by *Tacitus* as a standard. Advanced studies of History will be discussed as we go on, and relevant models developed.

In the *Storytelling* category of History writing, the cases are distributed on a scale going from serious, sober, careful but biased and "shortcut" accounts like the ones on Spanish history discussed in SL, *Patterns*, and over to distortingly biased groping into the matter.

In his book on Johan Sebastian Bach, Klaus \*Eidam presents a critique on the Bach images conjured up by noted experts like Schweizer and Spitta. It is enough to cite the most dramatic distortion. Schweizer writes about Bach purely as an ecclesiastical composer, omitting or just citing the composer's very numerous non-religious works, such as the groundbreaking *Kunst der Fuge*, or his *Konzerte für Cembalo* or *Das Wohltemperierte Klavier*. To write cantatas belonged to Bach's official job as a *Kantor*; the secular works responded to a society on the move.

Let that be clear: there is no such things as an *objective* History writing. But there is a long way between *experimenting with or focusing on objectivity*, on one hand, and on the other, writing autobiographically conditioned selections, a kind of historical *Reader's Digest*. Politically dedicated historical account, like the Soviet ones, are easier to accept, since they usually turn out to represent, even reveal, critical aspects of the actual political values, programming and goals.

Since it is my purpose to discuss processes in different contexts, I shall handle my subjects *groupwise*, in relatively homogeneous clusters. I shall adopt and adapt the *Object-Oriented* paradigm (\*SL, *Burden*, pp.

184ff., esp. p. 186): *An object is a set of attributes and methods. Methods are groups of instructions with reference to the "attributes" ... or even: Object. A variable comprising both routines and data that is treated as a discreet entity.* Etc. (further details in the referenced site).

Thus *subjects* and *methods* will, as far as may seem rational, be treated as coherent groups, interconnecting "things, concepts" etc. with the programs for handling them.

This is less mysterious than it could seem, for it is exactly what we are doing in our everyday concern with whatever is before us, but we do not elaborate the idea and can remain unconscious about it, like the famous case of not being aware that we are speaking in prose (Molière).

Repeating what I have often noted, it is in the *present* situation and corresponding conditions that we are facing, reacting on and grasping something. Objects can be "historical" by being viewed in specific contexts, but they are all contemporaneous with our handling them. Working "at historical distance" comes to the same, since the "distance" is ours; *we* decide where the other end of the stretch lies.

Historical developments over time are usually presented as a more or less continuous flow, supported by the imprecision of human language. Let us say that this is the *analog model*.

Another model is the *digital* one, with any moment positioned in some *point*, from which the picture can expand, configuring an environment or a context. Briefly stated: *points or kernels versus lines or flows*.. This would be a good platform also under the umbrella of Mathematics, since here there is no continuity, only points; even in the curves of the Calculus.

But a historical kernel will rarely become workable unless some inherent complexities are being taken into account and handled in the terms of some system. Let us say we have before us three kernels in a chronological listing: A - B - C. Some factors in B will usually emerge in A in an initiating or inceptual condition, so we have A(b). And some B-factors will normally linger on under C: (b)C. ,

Perhaps a chronological account can give a flair of objectivity, but a strongly artificial note creeps into the game because of the factors just noted, and also because a continuous time-line presupposes that all the products are of more or less equal character.

## 1PART I INCEPTION THEORY

### 1.1 *Openings and Limits*

*On s'engage, et puis on voit*

*(Napoléon Bonaparte)*

Yes, first attacking the crucial problems, subsequently implementing, we know approximately where we are and so does the reader. The real attack can begin.

Subtitled the book *A Virtual Approach*, I simply mean that its main arguments cannot be determined as absolute or tenable, and to emphasize that my central project, which is to make two formally incompatible models work in unison, the *Definite* from Physics and the *Indefinite* from Humanities such as History, is being implemented in a virtual modality.

*Virtual. Of or pertaining to a device, service or sensory input that is perceived to be what it is not in actuality, usually as more "real" or concrete than it actually is (Microsoft Computer Dictionary, 5th ed., 2002, project ed. Sandra Haynes).*

The main idea is to tie the *InDef<inite>* values and programs and the *Def<inite>* ones together, relating History studies to Science rather than splitting them up into alternative academic subdivisions.

The subject of *History* is a central issue in this process.

There is no *the* History, (or *the* Science. or *the* Sociology), only *my* History and dedicated programs that can be considered constructive as far as they make sense *and* make working models of systems. There is no question of right or wrong, only of the leverage we will be able to achieve. The big issue is what entries and how much we can crunch into them.

Most written accounts, explanations or stories can be read in different ways. Take David \*Bank's extremely well-documented and detailed history of *Microsoft Corporation: Breaking Windows* (2001). He represented the *Wall Street Journal* on the West Coast through the most critical years at *Microsoft*, with *Windows*, *Office*, *Internet Explorer* and other programs and gates.

We can read Bank's book on at least *two levels*: as a record of the development, choices and universal role of *data architectures*, mainly focused on the biggest and central protagonist, *Microsoft*, and as a story about the *human and organizational* characteristics, with evaluation of the chief pro-

tagonists, such as Bill Gates, James E. Allchin and Brad Silverberg, tracking the story as one about multi-level organizational issues with staff ingredients - and conflicts as well as cooperation.

There are of course some points of difference between a corporation like *Microsoft* and *universities*, even in the US, where universities are *also* business affairs. But there are affinities. Bank notes almost continually the conservative strands in the company, how inbred usages canonized by early success, govern the institution and the people there. Such *organizational afflictions* also linger in our universities, in Europe, where they are public, and in the US where they are (mostly) private.

In university life, the ideas of Interdisciplinarity are frequently still at the stage that Murray \*Gell-Mann (Nobel Prize in Physics) sketched out with these words:

*People must get away from the idea that serious work is restricted to beating to death a well-defined problem in a narrow discipline, while broadly integrative thinking is relegated to cocktail parties. In academic life, in bureaucracies, and elsewhere, the task of integration is insufficiently respected (Gell-Mann, *The Quark and the Jaguar*, 1994).*

At least I can say that the issue of *integration* is central in the present work.

Connected with this program is that of an *Open\_Source* approach, picking up ideas and tools wherever we find them useful, without caring about academic categories.

Calling my assignment *an experiment*, I am not out to express modesty, but declaring that *Uncertainty*, roughly reflecting Werner Heisenberg's understanding of the term, is integrated in the build-up of my system and the models loaded into it.

We have to consider two kinds of *uncertainty*.

One arises at a basic atomic level, and has been named also *Unschärfrelation* (Werner \*Heisenberg).

The other one dominates large sections of the Sciences, including Math. Morris Kline's *Mathematics. The loss of certainty*, Oxford 1980, explores this theme. It is central in Philosophy and Literature, too. Bruno De Finetti published a book entitled *L'invenzione della verità - The Invention of Truth* (see upcoming references to \*De Finetti and Luigi Pirandello).

We are never "original", always mirroring some previously launched idea, model or, let us face it, notable writer. Nor do we "close" a theme, subject or debate: there is no *Right Way*, no *Most Important*, only *My Way* (to adopt Aneurin Bevan's autobiography title).

There is no need to tell me that we cannot apply modern political and social paradigms to Romans who lived centuries ago. But modern research

paradigmas and programs, such as in *Sociology, Economy, and Information* (\*Part V - the asterisk \* means *see*), can contribute hints and models for how to analyze and describe the conditions and actions of those people.

So much at this stage for the *theory vector*.

| The *substantive* query is this: a Historical text like Cicero's, structured according to very specific but for us distant parameters, how will it look when filtered through *our contemporary models* for document handling?

I shall be using graphical *models experimentally*: there are  $n$  options for how to build and use a chosen model. Every option is experimental, being a provisional tool for going on with a research program.

I shall use the term *Open\_Source* regardless of the fact the wording, with a different hyphen, is used in the computer industry. This program is somewhat different from the vaguer one labelled *Interdisciplinarity*, for it does not refer to academic disciplines but to any paradigm whatsoever.

All the cited publications are mine, most of them stored in our wine cantina (I can hear you: *That explains it!*).

Not imagining I am worthy of standing on the shoulders of giants, at least I do rely on a number of resource-full writers, Herbert Simon among them. I use this occasion to "promote" a number of other writers, from whose works I have profited. My book is not only out to present my views, but just as much to lead attention to the ideas of others: an *Open\_Source* assignment. So I shall be careful in presenting bibliographical references (*Part V, Bibliography*).

|My project is to *integrate in a system of models* two apparently incompatible entities, *values from Science* such as Physics and *values from Humanities* such as History. I have decided to name these two values *Def<inite>* and *InDef<inite>*, avoiding the more adequate terms of *Hard* and *Soft*, since these terms are in use in other connections..

Only rarely can we enter fully or "cover" a Science or its main ideas, and, for that matter, the Humanities, too, in which the boundaries are even more fluctuant. The relations will remain tangential. This is so also because there are no ways strictly to define or delimit any such field or area. My claim is that the boundaries between Science and the "softer" paradigms are not definite but shifty and opaque, can be substantiated by the observation, that much that is considered *scientific defies experimentation and measurement*.

A *tentatively framed theory* arises as we develop a plan for working out these queries, and, depending on the case on hand, perhaps also a model (or a group of models); *and* when adopting the rule stated by Einstein and others, *theory first*. His rule formalizes what is normal: we do not start out doing anything without some idea about where we are heading.

Theories, at least in non-digital universes, cannot be fully implemented, but we can move towards a workable concept and, in the present context, combine the *Def* and *InDef* parameters. This has to be sufficient, since we can only *approach* such a goal or terminus.

### 1.1.1 *Scanning the Book with Graphs*

Few among us can afford the time to read books completely. You will get a sufficient picture of the this one by reading the present comment, with four graphs, and looking through *Parts I and II*.

Four graphs will now be displayed for an introduction to the book:

Fig. 0.1 Structure of the Book

Fig. 0.2 Conjunction Schema

Fig. 0.3 Comprehensive Chart

Fig. 0.4. Survey Chart.

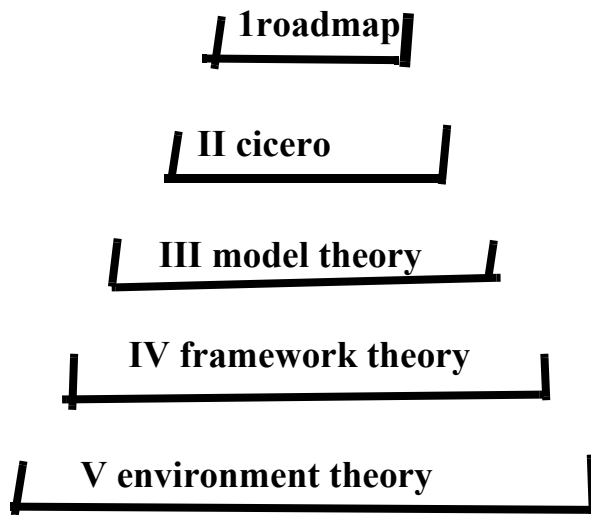


Fig. 0.1, *Structure of the book*.

Fig. 0.1, *Structure of the book*, shows its order with shells in a series from the widest to the most narrow, integrating in descending order (ascending on the figure); one could equally well have shown the same system with serially embedded concentric circles. In the figure, one level incorporates the next - as with Russian dolls or Chinese eggs.

Three more charts will now be displayed. Let me comment upon them here, before showing the figures.

Fig. O.2, *Conjunction Schema* (below) gives a view of the media logistics of the book.

*Next*, here is a *Comprehensive Chart* of the thematics of the book, in their contexts and with their interrelations (Fig. 0.3). It will be shown anew



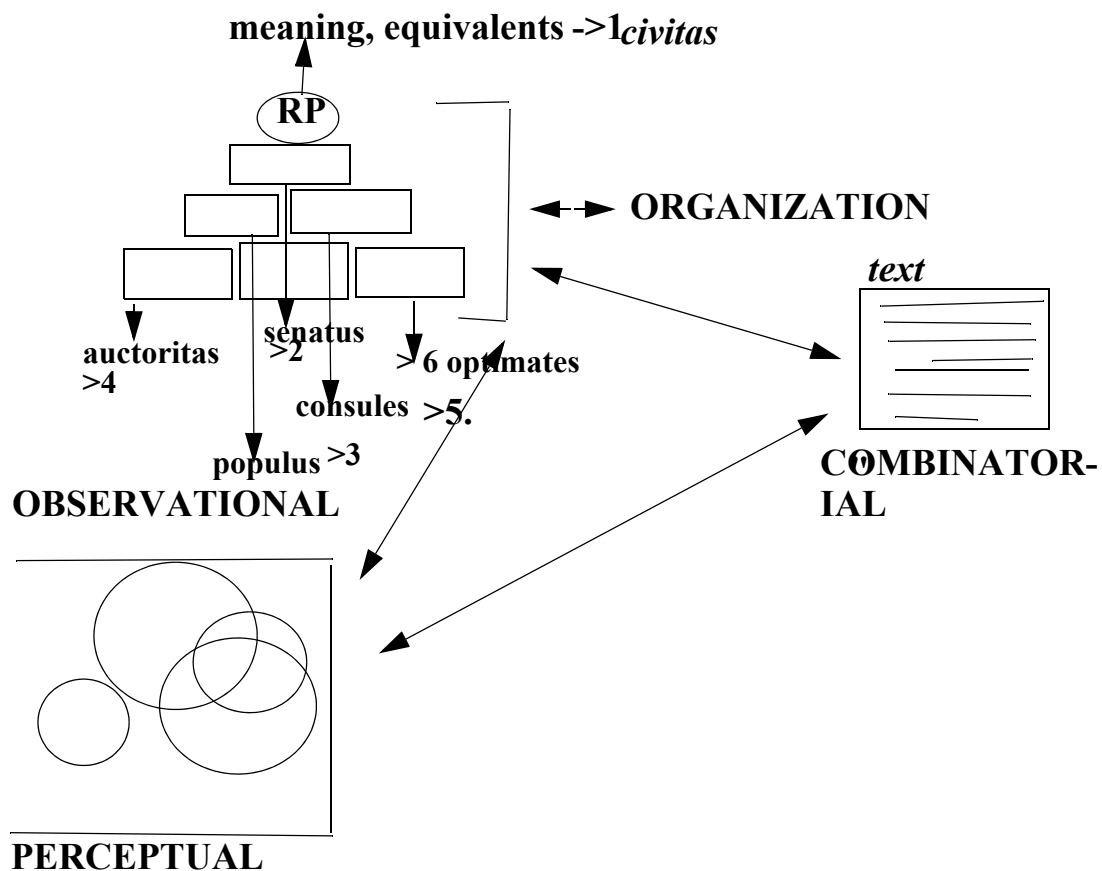
later on and with more details. The chart can be considered an overview of the thematic *and* our handling of the programs.

The *Survey Chart* (Fig. 0.4) conveys a summary of the theory-development, showing Classical and Probabilistic Math for the *Def* values, and the scale between Rational and Imponderable behind the *InDef* values.

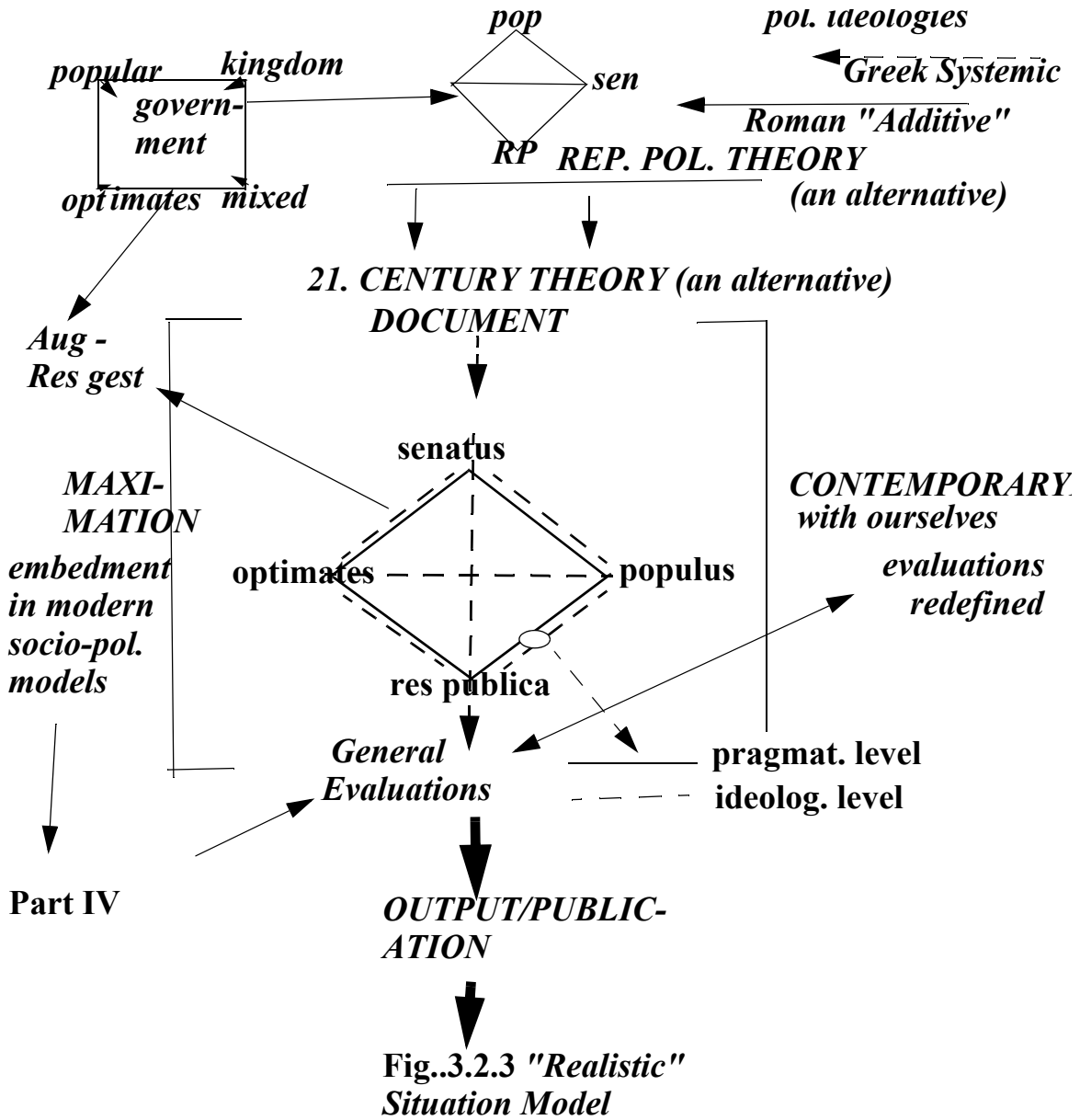
Not commenting further upon these charts means that the reader can scan them for a general survey, using them as one does with a geographical map when preparing to travel. The "maps" are expressions of how the author (myself) evaluates the issues and can be useful criticizing the ideas. After all, configural models showing argumentation have been in use since the Middle Ages.

Let me show a model of the main issues:

The group of Diagrams show: DRP = De re publica with comments; RG = Res gestae with comments, partly overlapping and integrated as an internal group in Part II, the whole enclosed in the programs in Part III, with reference to Part IV: OS1 to OS8 (for OSn = Open\_Source; see 3.3, *Open\_Source and Roadmaps*).



**Fig. 0.2, Conjunction Schema.** RP = the Roman state: *res publica*. 1, *civitas* indicates the larger socio-political framework. ORG. indicates elaboration of organizational issues in the observed system. COMB., the written comments.



**Fig. 0.3, Comprehensive Chart.**

The *Survey Chart* (Fig. 0.4, below) conveys a general picture that is open for debate. As it stands, it shows the framework basis or background for the subdivision in this book of models into *Def<inite>* and *InDef<inite>* models, respectively reflecting conditions in Science, esp. Physics, and Humanities, esp. History.

The left-hand group shows the two principal Science programs, the *Classical* (including the Quantum Mechanical) and the *Probabilistic* (represented by Bruno de \*Finetti).

The right-hand group shows the "normal" approach, called "rationalistic" (to simplify) and the *imponderabilia*, a category that will be frequently referred to in the text body.

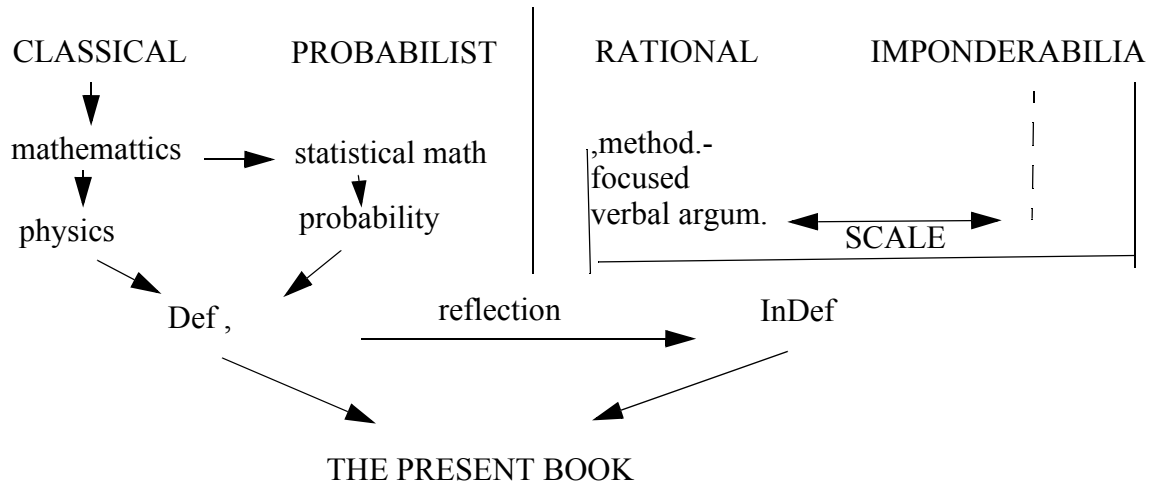


Fig. 0.4, *Survey Chart*.

## 1.2 *Straddling the Divide*

My motivation for subtitled this book *A Heuristic Approach* will surface as we go on. The central assignment in the present work is to develop a methodology for program, project, subject or general criteria *description*, such that the *entire analysis program* constitutes a description (graphically illustrated in Fig. 1.2.1, *Conjunction Schema*).

The book is for developpeing and presenting ideas. In some cases, implementation would require too much space, and then I shall just present the principles (\*Fig. 3.3.1, *Conjunction Schema*, for an example).

A leading notion in my work is the distinction between *discrete* and *continuous* proceedings. \*Eves notes as follows regarding *continuity* and also *continuum*, which is the more tricky idea: pp. 85ff.: on the two main kinds of math derived from the Greeks; 228f., re set theory; 231 and 235 (same subject). These math determinations of course cannot be applied to my use of graphical models, for which a *distinctiveness* arises from non-digital *and non-math geometrical configurations*, in other words, pictorially and conceptually.

The distinction, however approximately conceived, is useful for Historical contexts. Paul \*Feyerabend's book, *Wider den Methodenzwang*, 1999 (originally 1975, in English), delivers a major attack on the "continu-

ity" paradigm, according to which one sticks to one and the same basic principle all through.

Here is an example from his book; which should have been taken much more intensively into account here than is possible within the limited scope of a book with a highly complex assignment.

When Galileo Galilei published his revolutionary - and, as we know today, mainly correct - cosmological picture, he was attacked by Cardinal Bellarmino, who defended the traditional view of the Church (more carefully reported in SL, *\*Patterns*). Customarily, Historians considered the latter as a reactionary having lost the train. Feyerabend argues that the Cardinal was right within the universe he had to defend: Bellarmino was no reactionary and *had no option*.

In other words, both were right according to their different platform, between which there was no continuity or cohesion.

The trail to follow is to develop a methodology for program, project, subject or general criteria for *description*, such that the *entire analysis program* constitutes a description (graphically illustrated in Fig. 1.2.1, *Awareness Map*). The plan is discussed in 4.1, *Theory and System - an Overview*, with Fig. 4.1.2, *Procedures*.

The present book works logistically (of course) but not logically, and does not start out from some premises later to arrive at some conclusions.

Instead, any *Section* and argument can be considered equally important as the next. Thus the book does not represent a more or less continuous *flow*, but rather a matrix where  $n$  subjects are related to  $m$  principles or parameters.

My punch line is extending, deepening and controlling our efforts in Historical research regardless of academic classifications.

My *Goodbye to All That* (to pinch Robert Graves's title) regards traditional Humanities with which I started my academic life.

The basic idea is to connect experimentally, or heuristically, the operations regarding the *Definite* values and programs in *Science* and the more *Indefinite* in Humanities, in particular, *History* (for this distinction and the use of them, *\*3.3 Frameworks for Models*). For simplification I shall be using the tags, respectively, of *Def<inite>* and *InDef<inite>* to indicate model application and range. Another question: Is my distinction between a *graphical* and a *verbal model* obvious? Yes, but it is not clear, nor distinct, nor absolute, only *processual*.

The present work introduces the *supporting structure* for the body of a book, which it is my intention to publish in a next go, like a nineteenth-century US lattice frame for a building to be developed subsequently. My motivation for this stepwise procedure is plain: I was born in 1929.

The basic idea is to connect experimentally, or heuristically, the operations regarding the *Definite* values and programs in *Science* and the more *Indefinite* in Humanities, in particular, *History* (for this distinction and the use of them, \*3.3 *Frameworks for Models*). For simplification I shall be using the tags, respectively, of *Def<inite>* and *InDef<inite>* to indicate model application and range. Another question: Is my distinction between a *graphical* and a *verbal model* obvious? Yes, but it is not clear, nor distinct, nor absolute, only *processual*.

In the present experiment, we have to include the large and imprecisely definable category, or "bunch" of *imponderabilia*, spanning from passing impressions via various modalities of impressions to assumptions and beliefs. Almost any "solid" argument is accompanied by them.

The *imponderabilia* can be taken as stretches of ideas, notions or terms that defy being loaded into graphical or strict verbal models.

The *imponderabilia* can be taken as stretches of ideas, notions or terms that defy being loaded into graphical or strict verbal models.

We have to take these occurrences into consideration, for they can come up in the midst or at the fringe of more solid programs, and recordedly they can play a role in human conceptional activities. Some *critical distinctions* will be constantly in use or being referred to.

Having a general idea of the subject of this book, breaking it up into acceptable groups or categories was no plain job. Wanting to coordinate several disciplines that classically have been separated, one is taken for a ride. So the reader should, as indeed I hope, accept my invitation to contribute with critical evaluations.

At this point I shall launch some ideas valid for the entire project.

The work is for openings, not for solutions. Which should be pretty obvious, since there are only openings in matters of a certain complexity. It is a *ballon d'essai*, with many lacunae emerging if evaluated in substantive terms.

Some of my models might be considered superfluous. But I have included them in order to display the research process and stages in it. The process should be taken as more important than the outcome.

A *configurational (design) model* is more than a mirror-image of a concept, system or program. It challenges me to grasp, evaluate and eventually modify (or reject) a proposition or idea or plan. *Verbal* models are not equally efficient.

*Systems* are artificial constructs and so are most of the top emergents in Physics. So what we can handle at such levels, can be *described*, not strictly speaking defined, in absolute semantic or logical terms. A system

can be *constructed* and *understood* or *drafted* and *probed*, the latter alternative often bordering on tracing *imponderabilia*.

The principal idea of the present work is to *build relatively simple assumptions into models created according to preestablished rules*, and then focus my sights on Classical documents (mainly Cicero's).

*This decision sets the central strategy for my research.*

Taking a paradigm from Physics as representing the *Def<inite>* alternative, no concept or term in history studies, standing for an *InDef* case, can be directly connected with it. But it can be described and formalized as a reflection or image of a *Def* structure. Since we *recreate* whatever we experience, know or express, this move is not logistically invalid.

Connected with the *Def/InDef* paradigm, I apply the criterion of *How* rather than *What*.

I shall be applying a distinction *Word* versus *Model*, considering both graphical models, non-digitally applied, *and* verbal models. *Generally*, I shall use the term *model* for the graphical ones; whenever applying it to verbal constructs, make that clear, if the context does not make it so. Later on, I shall note that the distinctions just made are not absolute.

The relation between *Def*, and *InDef*, programs, the former worked by Math, Physics and machinery, the latter by our conceptualizing, as proposed in the *present* work, bears a modest and indirect relationship to *Alan Turing's* work, in a connection that is somewhat comparable to the relationship just noted regarding Giordano Bruno: a vague but meaningful, at least experimentally, *reflection* of a much more precise and stringent program that we can imagine but not implement, nor define it with precision.

Inventing and building a *model* can be the fulcrum in an *inception theory* (ITh), and developing and elaborating it the central factor in our *application theory* (Ath). By this rule, models can be the most important productive and informative agents in our work. An important paradigm here is *open\_source* work.

Building and applying *graphical models* is a question of *order, priorities and levels*. Qualifying my *models* as *tools* is meant to emphasize that I am busy with *experimentation* and that they are not models of "what there is" and how things *are*, but *how we handle them* cognitively and analytically. Which means that their use is connected with the main perspective of the Collection: to work in terms of *How* rather than *What*, a study of methodology rather than identities.

Most graphical models can be derived from or referred back to aggregates of *Venn diagrams*. They are *controllable*, they *locate* and *circumscribe*, and, as mentioned, they *show structure* (Richard Skemp) and can be

used for *pointing ahead*. Most important, they *simplify*, realizing Herbert Simon's criterium of simplification of complex subjects.

These qualities of course offer the principal advantage of graphical models in comparison to verbal ones.

In Western scholarship, the *pyramidal* approach is almost taken for given: that of starting from a dominant apex and then to descend and extend the view to graded subordinated occurrences of terms: the ordinary chart illustrating an administration or a business organization; and, in fact, semantics also (Emmon \*Bach). My approach is somewhat different.

The model group (Fig. 1.1.1, *Conjunction Schema*) shows a combination of *three models* and a reference to *Organization*. One is labelled *Perceptual*, the idea being that we elaborate mentally whatever comes up in our observations, and that this will include some *imponderabilia*, while the boundaries between the entities are not always sharp or clear, hence a system of *Venn diagrams*. The *imponderabilia* can be taken as stretches of ideas, notions or terms that defy being loaded into graphical or strict verbal models.

The third configuration in Fig. 1.1.1 presents the image of a written text, a document, intended to denote a *rational* approach (in inverted commas!), starting out from *observation* while elaborating the entries intellectually.

The three models in the group should be taken as alternatives while at the same time their interconnections are intended to display the usual situation of there being constant mutual influences between them, easily blurring the picture in any one of them.

This simple model group is included with two purposes. One is that of any diagram, *showing structure*, as Richard \*Skemp said, and a model better than a verbal story can do that; the other one is to work out the simplest possible configuration in respect for the bridge-building between *Def and InDef*, and between graphs and verbal expressions.

The entire work with my present contribution has been a question of *interface* between my *observations* of ideas and the *model-expressed theory* that carries the operational weightages.

Werner Heisenberg took seriously Einstein's insistence on developing *theory first*. In the present case, this means to *start* developing and displaying my *theory-bearing graphical models* at the outset of the present *Section* (Fig. 1.2.2 *Open\_Source Collection*).

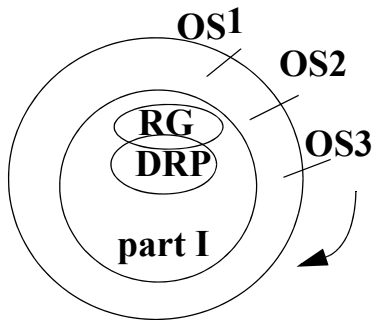


Fig. 1.2.2 *Open\_Source Collection*

Determinant functions are *Def<inite>*, and *InDef<inite>*, programs or statements and the primary issue how *the latter can reflect the former*. The problem will occupy us in various contexts (*Survey Chart.*, Fig. 0.4). The "scale" on the chart refers to the fact that the positions between the two extremes are floating and not definite. This, of course, is one of the reasons why the relation *Def/InDef*, is always problematic, there being no real interoperability, only a heuristic conception, which will be worked put as we go on.

The notion of the *Def* values and programs contains interior alternatives, as well as potential contradictions. Being expressed in terms of Mathematics -> Physics, *classical* math is basic but is accompanied by *probabilistic* Math. The term is central in De \*Finetti's writings.

The *InDef<inite>* end of the comparison is even more tricky. A scale can be established here, too, this time between *not-so-hard* cases at one end and *almost-imponderabilia* at the other, but both terminals depend too much on uncontrollable variables for us to attribute definiteness to them. This is the major imperfection in the present *Def/InDef*, program, an incitement to go on testing it and working on it.

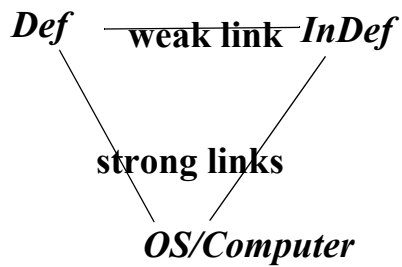
### 1.3 *Platform Issues and Terms*

A work aimed at terminology debate applying graphical models will unavoidably have to face the issue of the ground on which to stand, the *platform*, so to speak.

Let me go a bit further on the subject of the *platform* for the present assignment.

We can construct a three-node model relating an *Operating System, OS* - to the *Def* and the *InDef*, with these two units as extensions to a basic *OS*, and not otherwise, since the computer works with both kinds of media and should be the root node in the V-shaped configuration. This triangular *meta-model* can be designed as in Fig.1.3.1, *Def-InDef Link Chart*.





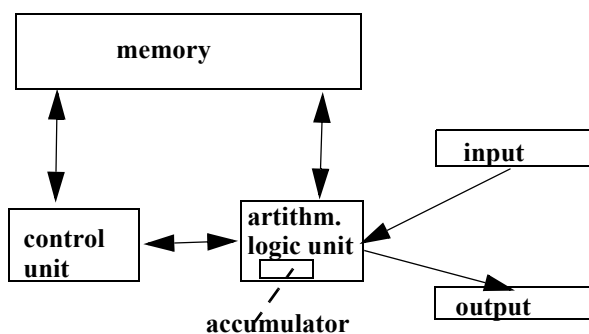
**Fig. 1.3.1, Def-InDef Link Chart..**  
*Operatiive System including*  
*a PC structure, next Def, InDef.*

Loading the *OS* units with adequate, sufficient and up-to-date contents is no minor job, and I have had recourse to two recent publications, \*Paterson (ca. 650 pages; excellent but disturbingly "paedagogic" ) and \*Tanenbaum (786 pages). Since the *OS* node is the origin of the flow through the model, and is fundamental for the entire discourse in this book, I will elaborate the configuration carefully.

This means to come up with a short but tentatively a fundamentally correct and adequete description of a typical *Operating System*, especially in *Windows* (here, with the role of an example of a general program) Fig. 1.3.1, *Def-InDef Link Chart..*

It is important to note that the *OS* presupposes the machine, or PC, assembling both computer levels, the *machine* and the *programs*. Let me look closer at it.

I will now introduce a procedure that should result as "realistic" and "rational" as any other traditionally in use in Historical and Social studies.



**Fig. 1.3.2 Operating System in a PC structure.**  
*The group with memory, input and output is redesigned*  
*after Tanenbaum and Austin.*

The figure just displayed (Fig. 1.3.2 *Operating System in a PC structure*), is redesigned after Figure 1-5 in \*Tanenbaum and Austin, and will be integrated in a new and larger configuration (Fig. 3.2.1, *Pseudo-Matrix*).

The next configuration, Fig. 1.3.3, *InDef Programs* shows a limited spectrum, sufficient for my argument here. Fig. 1.3.4, *Def - exemplified with Physics*, is intended to exemplify the principle of the present discourse; shocked experts on Physics are not welcome! The categories are culled from \*Beiser, but do not blame him. To simplify, I have left out most of Classical Physics: momentum, solids, gravity, energy, optics, etc., etc.

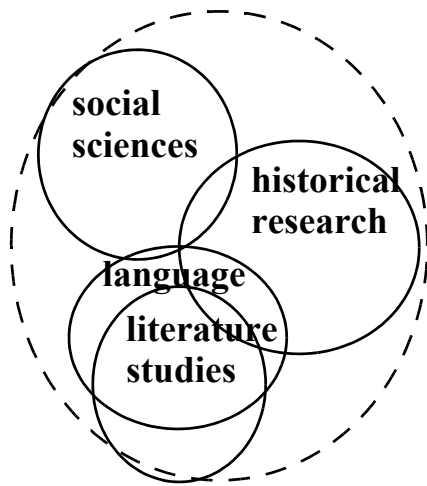


Fig. 1.3.3, *InDef - selected programs, broken line indicating vaguely defined outlines.*

I am not giving detailed comments on the models ijust referred to, since the idea behind them should emerge as we go on. But their *message* must be understood as being multilevel, with subordinated layers of sub-models, as in all universes of this type.

My graphical models must necessarily have solid *look*, since they are designed and not running. But within most of the levels in all my models, we should calculate *emergence* among sublevels not shown on the illustrated figures. This potential shuttling makes the procedures somewhat floating or uncertain.

The primary reason for this fluctuation lies in the nature of *non-digital graphical models* of the type used here: each *category of these dynamical models* (as distinct from mere *graphs* or *charts*), classified by design (since they are all on the same working level in this book), must be endowed with a sufficient choice of specific parameters, while any type of parameter, say  $\beta$ , can be functioning in other models, too. Digitally *executable* models are simpler, necessarily so.

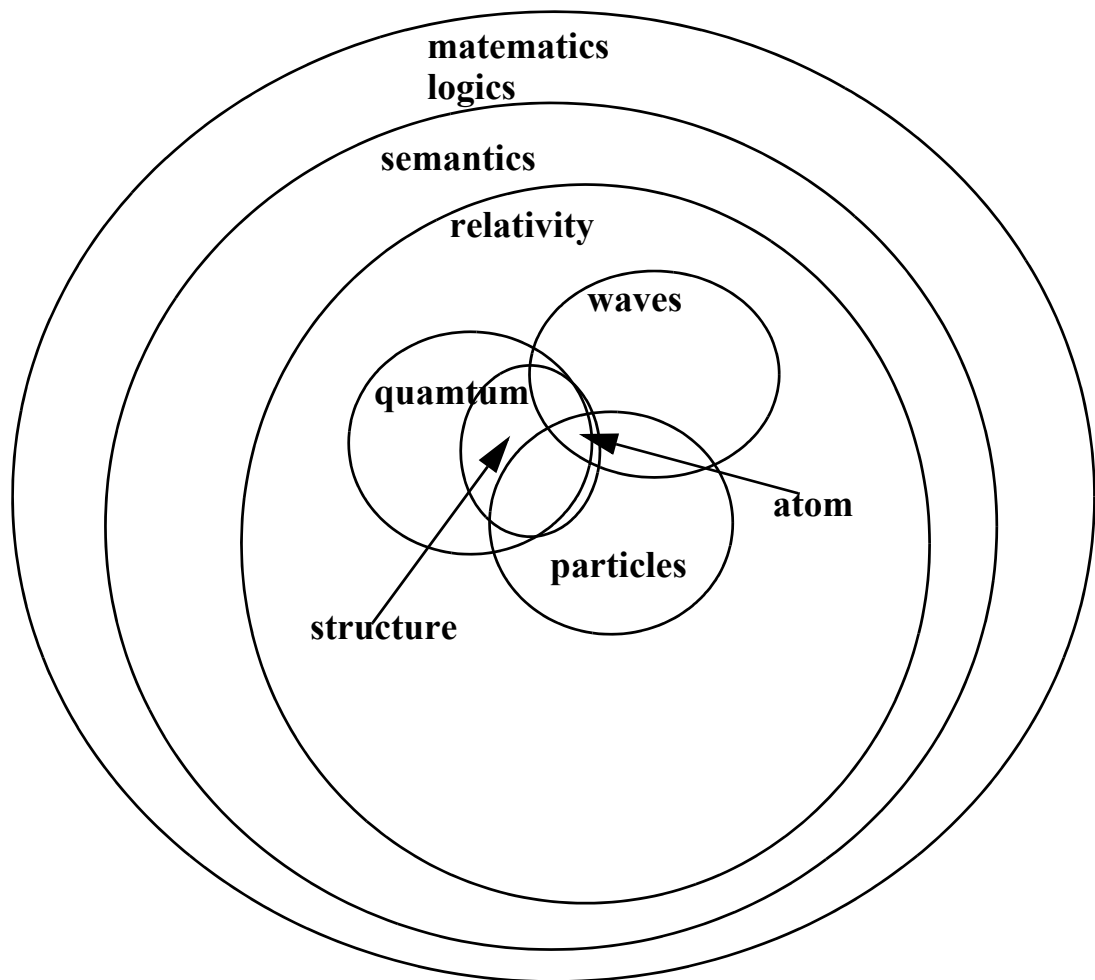


Fig. 1.3.4, *Def - exemplified with programs from Physics*

Often, the illusion is ruling, that our platform not only develops, but actually improve (as a young person in Norway just after the War, we were told that the word *improves*, get steadily better (but our country was just out of the War) . According to what sort of criteria?

Let me cite two cases that could be taken to signify improvements from one period to another.

The complex story also comes to mind, of Galileo Galilei and Cardinal Roberto Bellarmino in conflict with one another over the essential issue of "reality". Paul \*Feyerabend, (pp. 257f.), describes the conflict as one, not as traditionally claimed, between a "modernist" and a "reactionary", but between two outlooks based on responsible attitudes and roles that were determined by the respective professional traditions ,cultures *and* responsibilities. *The Cardinal had no choice*, is Feyerabend's conclusion.

Another case is modern. The excellent work by Antonio \*Damasio on *Descartes' Error* is fascinating for what it offers of insights from a modern medical point of view, but to call Descartes theories *erroneous* is hardly adequate. And we must take into account that Descartes' saw the world in the sectarian light of the Jesuit College of *La Flèche*, with strong Jansenist leanings. But "error"? Was Aristoteles' Physics erroneous - or was it an expression of the age's knowledge and ideas?

Descartes operated on a different platform of information and purpose. So the views are different. But each of the two views can be right within each their frames. Wanting to configure some kind of "progress" here, we would find ourselves on shaky ground.

On the *meta level*, we have a set of *application theories* for what we are going to do (*Parts I and III*), and another set for the *context, the framework and the analysis environments* (*Parts IV and V*), all concerning different levels.

Here is a graph illustrating the build-up of the book (Fig. 1.3.5, *below*), its general *platform*, one type of argument embedded in the next. An equivalent illustration would be to use concentric circles.

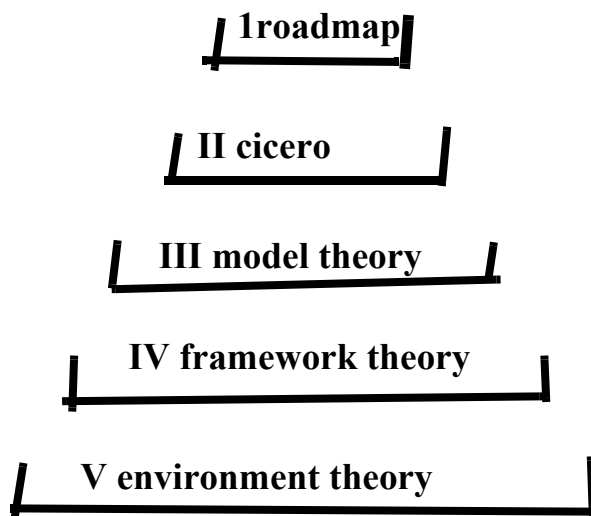


Fig. 1.3.5, *Structure of the book*.

This structure can serve as a *platform* in a strictly local sense in this book: the set of main structural categories on which the book is built and *within* the intended, configural *operations* are being conducted (Fig. 1.3.6, *Mod-Sys Combination*). I have said that the *models* are integrated with the *systems*. For a simple model coordinating *models and system(s)*, in Fig. 1.3.6, I have redesigned, with different and a minor modification, one presented by \*Brambilla, Cabot and Wimmer (p. 55, Figure 5.2, *Model-based testing*).

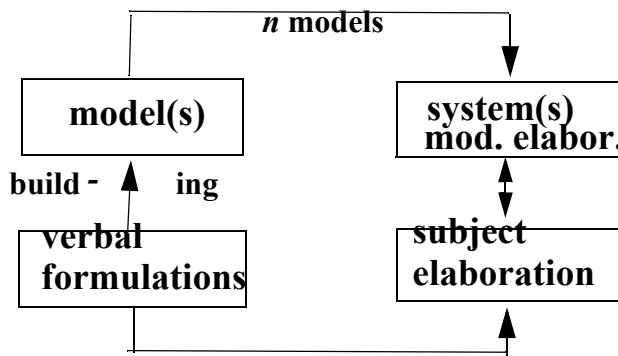


Fig. 1.3.6, *Mod-Sys Combination*.

*Mod.* = *model*.

Basic to the argumentation is a coordination of the two crucial inputs in use here: *models* and *system(s)*; and the selection and use of *definitions and terminologies* developed in connection with them. In my cases of mirroring data-technological features and principles, this issue is crucial.

Frankly, the model tells us just what we knew without it, but *showing* it can set off the subject and alert us. *Showing structure* (Richard Skemp) can be more effective than a string of words. And the configuration does make explicit the relations between words/terms and a system.

\*Brambilla, Cabot and Wimmer bring a *list* (4.1, p. 40) of nine short definitions, some of them containing differentiated indications. Two examples: *System*. *The subject of any MDA [Model-Driven Architecture] specifications. It can be a program a single computer system, some combination of parts of different systems, or a federation of systems* (presupposing the *explanandum* for the explanation). *Model*. *Any representation of the system and/or its environment*. This formulation tells us very little regarding model dynamics, whether they are digitally dynamic or by imagination (as here). Of course, the cited authors *apply* the listed terms in context that so to speak puts more flesh on the bones.

In the book now before you, definitions and terminologies will be developed in the relevant contexts and for the specific purposes. A warning against getting tied up in dictionary definition in cases where there are contextual variants or extensions, is excellently sounded in Banesh \*Hoffmann's *About Vectors* (New York, 1966, 1975: \*SL, *Burden*, p. 29): the definitions undergo a process of development as the argumentation evolves:

*... even then we shall find ourselves not wholly satisfied with the definition. But it will let us start, and we can try patching up the definition further as we proceed – and we may even find ourselves replacing it by a quite different sort*

*of definition later on. If, in the end, we have an uneasy feeling that we have still not found a completely satisfactory definition of a vector, we need not be dismayed, for it is the nature of definitions not to be completely satisfactory ... (\*Hoffmann, About vectors, p.2).*

Is my distinction between a *graphical and a verbal model* obvious? Yes, but it is not clear, nor distinct, nor absolute, only *processual*. And there are many levels on which the two processes merge, are tangent to one another, or overlap. And each of their assumed end products are twice or further removed from any absolute awareness of ours, granted that such a one could be functioning.

But I am not after depth, only functionality that seems to work well without any deep sounding, so I will let that issue go.

Consequently, this book works experimentally on a *systems program based on discrete values*, different from the current Humanist approaches, and in terms of alternative rounds of recording and argumentation. This does not imply any attempt at devaluing the traditional methodologies, which will certainly survive my initiative (and myself).

But there is a fundamental difference here.

Whereas a *systems view* can be logically and logistically developed, modified and corrected upon intake of new evidence and the opening-up of new advances, in the "*disciplinary*" universe, renovation usually is evaluated within the specific paradigm or curricula; if the result is unsatisfactory, one can always switch over to another program. Here one tends to think in terms of fields rather than programs or problem categories, in states rather than processes. As a Humanist colleague told me, when I tried to indicate what I was doing: But we are not discussing such things today! no longer *en vogue*.

The models have to be loaded into some system. A system can be constructed and understood or drafted and probed, the latter alternative often bordering on tracing imponderabilia.

A major problem facing us in the present work is to work out possible, analytically speaking, connections between these categories.

The systems idea arises in many connections. When Habermas and Luhmann's thick book (404 pages densely printed) with the title, *Theorien der Gesellschaft oder Sozialtechnologie - Was leistet die Systemforschung?*, appeared in 1971, I was initially scared. Recently I found it again in our wine cellar and the book makes me sober.

*Let me emphasize that the observations now coming up will sound as banalities to many readers, if not simply inadequate. But to make an argumentation strategically complete and consistent, certain things have to be included.*

My non-digital "systems" are *approximate*, and to be handled, they have to be structured and conceived as mirror-images of real systems.

We start out from an idea, construct our model in a prototype we from this prototype, needed variations, test it, and will usually discover inactive or un-accounted-for fields. This process is a constructive and productive element in model building. Gradually using it, we discover unused fields or logically missing field. Next, we develop on this basis, specified varieties of dedicated models. The model development is the reference basis for our developing awareness of the case or of the type of case and is a laboratory to be kept always active, even when our assignment presents an implemented look. Working out our models and testing them is not a *stage* in our work but is rather *the work*. The models represent the closest we can approach any subject or theme or problem.

The models have to be loaded into some system. A system can be *constructed* and *understood* or *drafted* (or *construed*) and *probed*, the latter alternative often bordering on tracing *imponderabilia*.

*The notions and the functional roles of systems-cum-models in text analysis can be elucidated by using modern digital computer norms and operations as a kind of meta model* (\*4.2, Theory and System - an Overview).

A short note on *systems use* already at this point.

Of course a system is an abstraction, a *roadmap* we construe to pave the way for what to do, and to help us to keep control of some of the complexities we are sure to run into. Thus such a system is the closest we have by which to do things we have in mind.

Take the military system as a test case. There is the ordered *ranking*, one level below the other, with involved action at some of the levels (*kick out the enemy!*). To turn it into a *system*, we need to connect all the levels under one or several significant headings, making the interdependence as complete as seems purposeful, any action or product dependent on the totality. And how "complete"? Adopting the *maximation principle* (\*SL, *Burden, Patterns*), we achieve an artificial totality embedded into which there is the "real" system. Von \*Bertalanffy, West \*Churchman, \*Beam and the two \*FitzGerald (see the references just cited in \*SL, *Burden, Patterns, and the present Bibliography*) discuss real or *Definite* systems, dynamical structures that can be identified in the running machinery of social, industrial, biological and other organisms.

#### 1.4 Introducing Models

*J'ai la clé des événements, un système d'interprétation infaillible* (Ionesco, *Rhinocéros*). Yes, this is the outset formula, useful if quickly relativized and brought into some adequately articulated pattern.

Tempted by intelligent eloquence, let me start with quoting one of my heroes, the actor *Peter Ustinov* (1921 - 2004), from his autobiography, *Dear Me*, regarding plays for the theatre, an analogy certainly highly relevant for what I am doing here:

*The theory which is all too often advanced by the pundits is that there are thousands of wrong ways to write a play, and only one right way. It is nearer the truth to say that, even if there are thousands of wrong ways to write a play, there are hundreds of rights ways, on condition that the personality of the writer is allowed to be an ingredient in the result... In other words, the Academy is, as ever, the temple of mediocrity, and the ideals it imposes are strictly useful only for those with nothing to say.*

Whatever we are saying, the role and functions of our statements should be displayed even when, as in the present assignment, this must take us into complex matters.

Building and applying graphical models is a question of order, priorities and levels. Qualifying my models as tools is meant to emphasize that I am busy with experimentation and that they are not models of "what there is" and how things are, but how we handle them cognitively and analytically. Which means that their use is connected with the main perspective of the book: to work in terms of How rather than What, a study of methodology rather than identities.

Most graphical models can be derived from or referred back to aggregates of Venn diagrams (i. e., using circles in various combinations for expressing the interrelations among terms). They are controllable, they locate and circumscribe, and, as mentioned, they show structure (Richard Skemp) and can be used for pointing ahead. Most important, they simplify, realizing Herbert Simon's requirement for using simplification in our handling of complex subjects.

These qualities of course offer the principal advantages of graphical models in comparison to verbal ones. Better than a verbal introduction, a commented presentation of graphics can introduce a discourse. In Western scholarship, the pyramidal approach is almost taken for given: that of starting from a dominant apex and then to descend and extend the view to graded subordinated occurrences of terms: the ordinary chart illustrating an administration or a business organization; and, in fact, semantics also (Emmon \*Bach).

Having introduced the idea of models at work in this book, *we need a more technical scrutiny of them.*

*Their usefulness depends on functional context and our creative efforts for an operational field within the chosen context. So let us have an*



account on model positions and interrelations as applied in the building of models in the present work (and in others).

I will repeat (from SL, *\*Patterns*) about models concerning the distinction *shape* and *form* as developed by \*Lord and Wilson, *The mathematical description of shape and form* (p. 8):

*Most problems of form have physical and dynamical aspects, as well as geometrical aspects. The material properties of building components belong to the 'form' of a building in a broad sense, and have to be taken into account along with the geometry in the determination of, for example, heat flow. The generation of the form of a living organism is brought about by a complex interplay of physical forces within the organism and between the organism and its environment. In order to restrict the scope of our subject matter to manageable proportions, we have chosen to concern ourselves in the work (except in a few instances) with the pure geometrical aspects of form.*

*... We have chosen the word shape to indicate those aspects of geometrical form which have to do with the external aspect that an object presents to the world. The word form has been reserved to indicate that some aspect of internal structure is also under consideration. For example, we shall call the morphology of a physical field the form of the field, whereas the geometrical properties of the external surface of an object constitute its shape.*

My models can be viewed as more or less firmly related to one another on several levels, but their abstract connectivity remains an open issue: how one with some kind of logic leads on to the next.

*Frameworks*, usually extensive, incorporate several models. I distinguish *frameworks* from *context*, the latter meaning the closest environment for one or several models (\*3.6, *Models in their Context*). This distinction will never be sharp, representing *tendencies*.

My models are *non-digital*, and when I speak of a *model* with no further qualification, I refer to the *non-dig configurations* I am using, next to *verbal models*; whenever referring to these, I shall be explicit about it. My *models* will normally reflect characteristics and coverage of true *dig-models*.

A model can be imagined to have an effect especially for *structure*, at least on two levels:

1. *directly on the cited issues;*
2. *long-term on extensive theory such as is deployed in this book.*

The configurations come in three modalities (all non-digital):  
*Here are the three main model categories.*

1. *Def/InDef* stands for *definite* and *indefinite*, the former referring to Science-related issues, the latter to "softer" scholarship such as History.

Subcategories:

1.1. Operative (fig.) models illustrating dynamics focused on subjects.

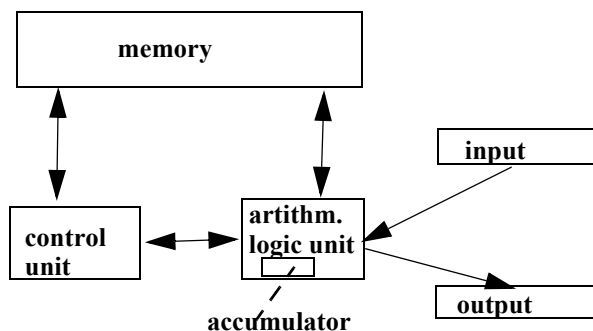
1.2. Operative models without definite focus ("closed"); and

1.3. Survey charts.

2. *Open\_Source* represent my conception of paradigma or category integration, such as between *Def* and *InDef*, not precisely equivalent with the usual concept of *interdisciplinarity* (\*SL, *Patterns*).

I will conclude this *Section* with support from *Herbert \*Simon, Models of Thought. Introduction:*

*There exist a basic reperory of mechanisms and processses that Thinking Man uses in all the domains in which he exhibits intelligent behavior. The models we build initially for the several domains must all be assembled from this same basic repertory, and common principles of architecture must be followed throughout. Thus the strategy is incremental, following the usual principle of dividing the difficulties at the outset and attacking them piecemeal. At the same time, it is a disciplined cumulative strategy, parsimonious in its use of mechanisms and inhospitable to ad hoc solutions. ... the aim here is general theory - a unified explanation of human cognition in all its manifestations.*



**Fig. 1.4.1** *Operating System in a PC structure.*

*The group with memory, input and output, after Tanenbaum and Austin.*

I shall adopt Herbert Simon's formulation regarding models, only substituting *theory experiments* for *human cognition*. To repeat: I am not out to study "man", only tools for approaching some of the category's usages. And I am using a simple digital computer design as my guide (Fig.1.4.1 *Operating System in a PC structure*).

So far about models at this stage.

### *1.5 Loss of Certainties*

My present work is built up on and elaborates some arguments that can be epitomized here .

1. "Objectivity" in the normal understanding is not practicable except where it is not needed, on numbers and simple geometrical figures. All our perceptions are guided by our personal, environmental, traditional and purpose-driven potentialities, tendencies and goals.

2 Using as far as considered relevant, a structured argumentation, will produce *model-fitting patterns* of issues, ideas and arguments, which can mean, in some cases, that a subject-dedicated box in a model remains blank. This would become useful information. There is no issue of circularity here, since the arguments focus on model *positions* rather than models as *explanatory* tools.

3. Hence I apply what I have called *maximation*, for any specific case of argument noting, within given limits, all possible parameters (SL, *\*Patterns*, 4.1, 4.7). An advantage with configurational models structured for maximation, is that blanks so to speak will stare accusingly at us.

4. On the other hand, we must consider that, generally speaking, the more complex a book or a model or an argument is, the greater the potentials for revised versions or alternatives (we all know that).

5. *Object Orientation* is a most useful paradigm serving model interplay (SL *\*Burden*, 5.3., *Object orientation: what is this cross?* Quoting the essential description:

*An object consists of a set of attributes and methods. Methods are groups of instructions with reference to the attributes or even: Object (Blair, Gallagher, and Shepherd, Object-oriented languages. A corresponding distinction between a data base (accumulation of facts) and a knowledge base: data base plus rules for how to handle them: Coyne, Rosemann, Radford, Balachandrian and Gero, Knowledge-based design systems).*

A variable comprising both routines and data that is treated as a discrete entity (*Microsoft, Press Computer dictionary*). Furthermore, ... *what is an object at the conceptual level (the user view) and how is an object realised in practical systems (the implementor's view). At the conceptual level, an object is any perceived entity in the system being developed ...*

Also: *In more detail, an object is defined as follows: - An object is an encapsulation [joined together in a packet or module] of a set of operations or methods which can be invoked externally and of a state which remembers the effect of the methods ... The methods are the set of operations which we are allowed to perform within the context of the object (\*Blair, et al., Object-oriented languages, p. 26).*

Let me repeat:

We have to rely on two kinds of *uncertainty*.

One arises at a basic atomic level, and has been named also *Unschärferelation* (Werner \*Heisenberg).

The other one dominates large sections of the Sciences, generally speaking, including Math. Morris \*Kline's *Mathematics. The loss of certainty*, Oxford 1980, explores this theme. It is central in Philosophy and Literature, too (see upcoming references to \*De Finetti and Luigi Pirandello). Bruno De Finetti published a book entitled *L'invenzione della verità - The Invention of Truth*).

In the *present work*, certain aspects of *Quantum Theories* in Physics are involved. My project is to relate *InDef<inite>* models to *Def<inite>* ones, and I believe that in the world of Physics, the "Definiteness" consisting mainly in the basis in mathematics and some programs of measurement (but not in all of them), we will find the optimal and most reliable anchorage for my *Indefinite* enterprises. Werner \*Heisenberg's *Unschärferelation* or *Uncertainty Principle* reigns in the centre of Physics.

Bruno de \*Finetti, to cite a modern scientist, refers to the field of traditional philosophy as *una sterile arena di acrobazie verbali e di ludi dialettici* (p. 69, translation hardly required) and specifies the criticism (see also \*Bruno and Giorello, summary, p. 10). A comparable criticism we can find in Lucretius' *De rerum natura* (VII, ed. cit., 94) is about *astrology*, with a precise catalog of all the celestial configurations (which still today, even after Galilei-Newton rendered the idea impossible, populate the colored weeklies).

The mirror-images just displayed should reflect the basics as structurally completely as possible, which implies that as many properties and tendencies, etc., as possible of the *InDef<inite>* values can be translated into the *Def<inite>* ones by "fixing" the terms. This means we have to rest content with *approximation* - but so we have in all fundamentals in modern Physics (see for example \*Feynman, *The Character of Physical Law*, pp. 33f., end of Chapter 1). An especially rewarding introduction to *Physics* in a wide perspective is available in Jerry B. Marion's *Physics and the Physical Universe* (1971, for which I refer to the Italian version in the \*Bibliography).

These perspectives are going to be tentatively applied to historical material, mainly Cicero's writing.

The story of the Roman republic, and often also the protagonist's statements about it, is essentially vague and indefinite. So is also the subject before us and the principles in use for tackling it. So things are floating about, with some firmer points in between. More than this we cannot expect from the moment we leave quantities.

The basic idea of the present book is that many factors in the programs of most Sciences, as well as in the Social Sciences and the Humanities, such as History, while being both unavoidable *and* mainly distinct, carry with them heavy doses of *uncertainty*, for Physics in particular, Heisenberg's *Unschärferelation*. This condition makes it plausible somehow to connect the *Definite parameters in Physics (and other Sciences)*, with the *Indefinite ones in such Humanities as History*, the modalities of which are themes in this book. This is the main idea of this book, and also the weakest one.

This meta-parameter can be factorized as follows.

The *InDef-cum-Def* connection is not fully doable, on account of *incompatibility* and *uncertainty*, but can be elaborated in the modality of direction or tendency or potentiality, reminiscent of Heisenberg's *dynamis*.

Now let me extend the view.

*Einstein's Rule* comes as follows: a theory cannot be grounded exclusively on factual observation, nor can the latter be sufficient, for things work the opposite way, since it is the theory that determines the scope of observation: ... *vom prinzipiellen Standpunkt aus ist es ganz falsch eine Theorie nur auf beobachtbare Größen gründen zu wollen. Denn es ist ja in Wirklichkeit genau umgekehrt. Erst die Theorie entscheidet darüber, was man beobachten kann* (quoted in \*Heisenberg, 2006, 37).

This means *system priority, especially in experimentation, as here*.

Herbert A. \*Simon stated the axiom in similar terms: *Such a reliance of administrative theory on common sense was not entirely acceptable to me. Systematic observation and experimentation were badly needed if this field was ever to become scientific. But until someone built a satisfactory theoretical framework, it would not be clear what kinds of empirical studies were called for* (*Models of My Life*, p. 73).

Werner Heisenberg used the terms *dynamis* to indicate fundamental functions in Physics. *Probability physics* meant two things: reliance on a spray of probable facts (in the scientific context, statistically determined), and *something like a tendency towards a specific event. It meant the quantitative conceptualization of the old term of dynamis or "potentia" in the philosophy of Aristotle. This led to a strange kind of physical reality, which hovered between possibility and reality.*

(*Sie bedeutete so etwa wie eine Tendenz zu einem bestimmten Geschehen. Sie bedeutete die quantitative Fassung des alten Begriffs der "dynamis" oder "Potentia" in der Philosophie des Aristoteles. Sie führte eine merkwürdige Art von physikalischer Realität ein, die etwa in der Mitte zwischen Möglichkeit und Wirklichkeit steht*) (Heisenberg, 2006, 17ff. quoted in SL, *Patterns*).

**Mathematics, too, involves uncertainty. \*Eves (p. 150):**

*The notion of mathematics as an assemblage of abstract postulational discourse gives considerable sense to Bertram Russell's facetious statement that "mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true". It also accords with Henri Poincaré's saying that mathematics is "the giving of the same name to different things", and with Benjamin Peirce's (1809 - 1880) remark that "mathematics is the science which draws necessary conclusions".*

The notion of "facts", German *Fakttizität*, is not a constant variable even in Physics.

Having introduced the models to be applied to the *Roman documents*, in the upcoming *Part II*, we shall consider these documents directly, setting up a program for studying some of the writings of Cicero and of the staff of Augustus.

## 2PART II CICERO THE DESIGNER.

### 2.1 Meeting Cicero

Presenting Marcus Tullius, *Cicero* to friends (106 - 43).

At school, just at the end of the War, I found Cicero & Co tedious. In those days, we were taught to be objective and fight against imagination and inventiveness: *Just read the text as it stands!* But no text ever "stood". Let us try another tack on the worthy man, not falling prey to obsolete academic traditions.

Having scanned my book, the Reader might want to know why the space and weightage for the *models* by far seem to outbalance the rather meager notes on the main protagonist, *Marcus Tullius Cicero*.

|All through the present work, and in different connections, I am focusing on *complexity*, finding it more worthy of study than substantive academic fields.

Our responses and reactions can also depend on the subject appearing before us. Ambiguous, shifty and elusive attitudes are well described in *Chapters 9 and 10* in \*Bird and Sherwin's critical biography of Robert Oppenheimer (*American Prometheus*).

Has the incomparable and extremely wide field of US Science not been able to penetrate those walls? David \*Bank's book about *Microsoft* is mainly a story of science-industrial-commercial achievements of a colossal scale and weight *and* failure among the authorities and governmental lawyers to grasp the essentials.

Having no competence either in psychology or in cognitive theory, I shall leave the subject here. But my "message" in this *Section* is to communicate some factors and themes that can be important while remaining shadowy. One such "theme" is *History*; try to define it!

Scanning a text, such as Cicero's documents, cannot be done straight on, directly from our more or less intuitive grasp of the contents. We have to know why we do it, what is the purpose, what kind problems we plan to and *want to* handle, and what may our competences be; and to our working on it, as we see it, hence the criteria and the significance of the project.

This process will determine the form and contents of the subject. We make it *ours*, not *theirs*.

It can be useful to start out from opposite polarities, to the extent that they can be defined as such, which will always be a question of *tendencies* rather than definite values, such as comparing the mature *republican* culture, as outlined above all by Cicero, and the *principatus* developed under Augustus.

"History" has suffered from becoming a public media commodity. University traditions can be monologous and closed. A recent *BBC* program on Muslim Istanbul had some five or six British History professors explaining what we saw. They said more or less the same, all of them, forgetting or bypassing some crucial issues. Describing Sinan's mosques but not mentioning the model for them, Justinian's (6th century) *Hagia Sophia* (a few yards distant from the biggest Sinan mosque), which the Turks transformed into a mosque and which became the model for Sinan's structures. The clever professors focused on the splendor of the Turkish State but forgot the downside entirely: the political and technological chaos. Not even mentioning the big battle at Lepanto on Oct. 7, 1571, which left the *Porte* in a financial and political crisis and which revealed a general lack of maintenance of the fleet, with ships rotting away in the *Istanbul Arsenal*; and the extended dependence on slaves to row the galleys, a risky and expensive practice.

We may be writing *our view of history*, like Edwards and Lynch in their *History of Spain*, making the events and processes contemporary with themselves and matching their attitudes, while pretending to keep an "academic" distance; the perspective canonized by university tradition. But drastically biased. Of course, we are all of us biased, but we have to realize that and work against the tendency, trying to be open about it.

Whether a statement in our historical sources is true or not is immaterial, since the important and telling thing is that the disparagement was considered valid and constructive in its appeal to contemporaries and a probable future, and as a show of rectitude and skill in linguistic expression in the writers, Cicero, directly involved, Sallustius writing at a safe distance.

Pointwise, however, or subjectwise, in glimpses, we can to some extent reconstruct the real historical view, *how the protagonists themselves* looked at things, and adjust our view to it.

Alessandro Barbero, in his monumental (767 pages) monograph on the battle at Lepanto on October 7, 1571, offers an example of how people grounded their observations of apparently straightforward realities on criteria entirely different from ours, with widely different conceptions of the closest realities. (pp. 512ff.).

Evaluating the prospective battle against the Turks, a matter of great fleets of naval forces on both sides joining in sea battles, only two or three top leaders seem to have thought in terms of a battle *at sea* between the two groups of fleets, while generally both Christians and Turks thought in terms of *land combat*, *from one ship to the one close by*, to occupy tactically and/or exploit economically important districts and towns. To some extent,



this view led the Turkish "Porte" to miscalculate the enemy's project, which, as we noted, only the Western *top* leadership understood as a naval battle.

Studying historical subjects we are involved in *terminological issues*. Starting out with a crisis, such as the one involving Catilina in and after 63BC, can highlight some *critical notions and terms*, conveying a vocabulary by which to explore in both directions, backwards and forwards, some writings by Cicero or Sallustius.

*History* as a field of study can profitably be seen in the larger perspective of *Science*, which is a realist proposition, since Physics also involves doses of *Uncertainty* and the bridging over from one to the other is largely a question of terminology.

To make my discussion manageable, claimed "realities" will be treated *as such*, regardless of our informations to the effect that the "reality" was feigned for vicarious motives. So that, when in 100 BC the People's Tribunes propose a new agricultural law and meet strong opposition from the Senate, the legalistic and technical arguments on the part of the Senate will be taken at face value, without recording the probably true motivation of securing the privileges of the Senate members and their families. Also regarding *Cicero*, I take his often rhetorical ramblings as seriously representing his thinking.

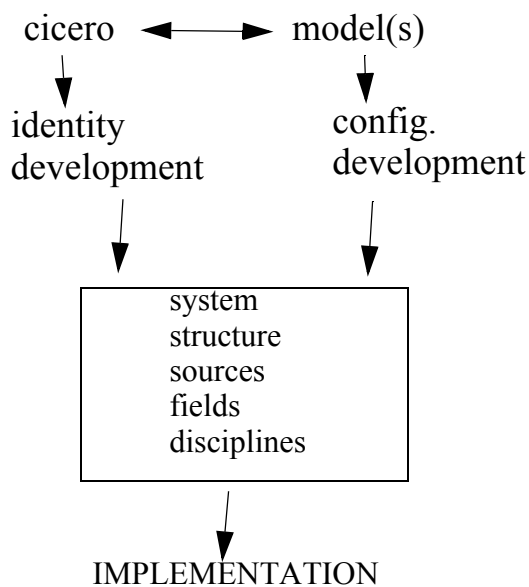


Fig. 2.1.1 *Subject Pattern*

The *models* do not form a background or a basis for the principal subject. They form a cohesive program with the Cicero matters: a tentatively total picture configuring the worthy man in a picture of *Cicero-cum-Models*.

The historical person Cicero is not *there* or *here*, he is on our mind as an abstract configuration.

This picture can be set down in a simple graph (Fig. 2.1.1, above).

Loading "Cicero" into a model is no plain job, seeing that his lengthy ramblings over an enormous quantity of pages would make transferring to a set of models infeasible because of the extreme complexity and many-level organization this would require. The task to distill a controllable mass of verbal terms from his writings, and load them into determinative model expressions, is demanding and will have to be tried out by limiting the view to text examples.

In *Cicero's De Re Publica (Part V)*, chapters xix to xxxv have been analyzed and key words highlighted. The next step now would have been to load them, or some of them, into the above model (*see below*).

## 2.2 Roman Pragmatics

*A compelling motive to historical study must surely always be to profit by that deepening awareness of the true nature of our own problems and possibilities which comes from a real understanding of the past, this Richard Cowell writes in his masterly book, Cicero and the Roman Republic, of 1967 (the fourth edition; original ed. 1948).*

Today, would we be sure about a *true nature* of our problems and about a *real understanding* of the past? In 2016, things take on a different color.

Discussing events on the time-line from Cicero's ideas of the Republic over to Augustus' doctored imperial program can only mean to juxtapose the one with the other, adding, whenever considered useful, some intermediate steps between the two as a third feature on the line: the conflicts associated with Marius and Sulla and with Catalina.

The cited programs of Cicero and Augustus are only imperfectly comparable. Cicero nourished "dreams" about a State long gone and hardly ever existing as envisaged in his model. Augustus made as if he believed in the same ideal, planning to make the passage to dictatorship smoother. Cicero essentially wrote an *Apologia pro vita sua*, which Augustus did not need to imitate.

There were, nevertheless, theories afoot. The Romans were not grand thinkers but big writers

Roman political theory has been studied since the sixteenth century; to say nothing just now about the classical discourses themselves. My focus is on *how to understand the subject within the experimental system* I am testing out. We always explore whatever fascinates us within some system of ours, even when we behave as if we took an "objective" attitude.

This probably is the occasion for leading the reader's attention to a discussion, accompanied by a model, about *policy-making*, in \*George and Bennett, *Case Studies and Theory Development in the Social Sciences*, Chapter 12, Figure 12 - 1, *Knowledge and Judgments for Policymakers*. The central and focused node, *Policy Analysis*, is related to four other boxes, also interrelated: *Specific intelligence and information about the situation* - *Abstract conceptual model of strategy* - *Generic knowledge of the strategy* - *Actor-specific behavioral model* - directed upon the resultant model: *Policy-makers' judgment*.

Roman political writings do not present an articulate system into which we can integrate our observations and interpretations, rather extremes, with Tacitus drily recording events and Cicero inventing or recreating records sprinkled with often tendentious details.

Let me illustrate some of the perspectives in a chart: Fig. 2.2.1, *Political System*, with references to the Cicero documents and to other models. - one way, mine, of modeling such a complex subject.

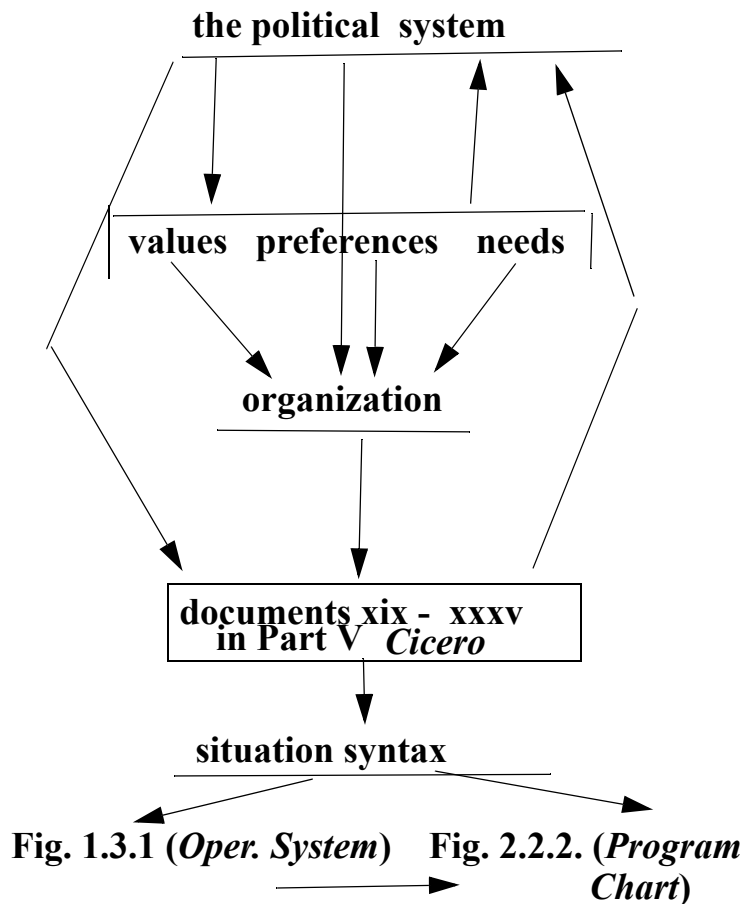


Fig. 2.2.1, *Political System*

Roman political ideas, notions and references are not easy for us to describe. Luigi Capogrossi \*Colognesi (formerly a *Sapienza* professor of Roman Law), in his innovating *Storia di Roma tra diritto e potere* (2009), insists that the <political-social> *notions and concepts in ancient Rome have no direct correspondence in modern political vocabulary* (pp. 11f.).

Elisabetta \*Risari, in her introduction to Cicero's \**Catilinarie*, notes that *A Roma, in realtà, "partiti" nel senso moderno del termine non ne esistevano; la lotta politica era lotta di persone o di famiglie per la gestione del potere e non confronto di partiti con programmi e obiettivi ben precisi* (the gist: no political parties with formulated programs, only persons and families; additive rather than systemic).

The political struggles in Rome, at least on the visible surface, were caused and supported by relations and contrasts among individuals and families more than by principles and philosophies: a circumstance excellently described also in \*Bocchiola and Sartori's *L'inverno della repubblica: La congiura di Catilina*, 2012.

According to Renato \*Badalì (p. 7), ...the first century BC saw a crisis in the Roman world affecting political life, economy, social conditions, and religion (and therefore also culture and art), and this crisis brought incalculable consequences for the future of the whole (then known and considered) world. This situation led to bloody contrasts.

*La squassante crisi politica, economica, sociale, religiosa (e, perciò, anche culturale e artistica), che investì il mondo romano nel 1 secolo avanti Cristo - e che avrà conseguenze incalcolabili per il futuro del mondo intero - sfociò nel contrasto insanabile e sanguinoso tra le due parti che tentavano di conquistare il potere sì da poter affrontare e risolvere un impredicta malessere e una crisi che, lungi dal risolversi naturalmente, andavano sempre più aggravandosi [between Gaius Julius Caesar and Gnaeus Pompeius Magnus].*

Roberto \*Galaverni, in his edition of Horatius's *Sermones* (*Satire* in the Italian edition), focuses on the complexities in the first century of Roman life and politics, which are reflected in the *Sermones*. Horatius, "the most non-systemic and non-theoretical", himself expresses the tendencies of his time and place, never settling down with a definite judgement, accepted the uncertainties as a fact of life (*Scrittore non sistematico e antiteoretico quanto mai. Orazio fa dell'inquietudine, dell'incertezza, delle oscillazioni, della curiosità la sua forza più grande*) (ed. cit., pp. V - VIII).

The captions to be used on a model later on, *Optimates*, *Populus*, *Senatus* and *Res publica* (Fig. 2.5.1, *Rhombic Model: Ciceronic View*) represent the most important institutions.

The first two of these terms need a closer inspection.

According to \*Frey, *optimates* mean *die Besten, Edelsten in polit<ischer> Beziehung, die Optimaten, Aristokraten (im Vergleichnis zur Volkspartei)*. Hans \*Lamer: the conservatives defending the position of the Senate against the *populares* (further on the *optimates* in \*Cowell, *Index*).

The significance of the term *populus* underwent substantial changes, obviously also influenced by political conflicts (as always in such cases) from "nobility" (*Patrizier*) getting closer to the following: *Oft das (niedere) Volk als Stand, Partei im Staate in Vergleichnis zu den Vornehmen, den Optimaten*. This acceptation is recorded also in \*Lewis and Short (further on the *Popular party* in \*Cowell, *Index*). \*Frey translates Horace's *profanum vulgus* as *der Pöbel (odi profanum vulgus = Carminum lib. ter., Carmen I)*.

Let me insist further that facing ancient Roman political philosophy and usage means facing *pragmatism*, rather than Greek *systems thinking*, and, instead of reasoning in terms of more or less pyramidal structures, like modern organization theory and business charts; we must consider *variably and variously interconnected levels and steps*, from domination to obedience, to vying for position between forces on similar levels, from comprehensive to scattered political and partly also social conceptions.

Order and priorities here can never be determined once and for all. It is never very perceptive to claim that a historical narrative be determinant or conclusive; and in the Roman case, especially during the proto-republic and the "Ciceronian" one, things are dramatically shifting and unstable. Cicero covers it all up under his self-centered idealism.

On this rather sketchy basis the two terms, *Optimates* and *Populus*, can be used as follows in the present context; accepting the simplification involved in every short "definition" of any social category anywhere in history: the *optimates*:

*the class of nobility with strong conservative inclinations, supporting the role of the Senate;*

*the populares or populus: a more loosely definable category of "establishment" members, to be distinguished from the generally unprivileged and often poor multitude, the mass of men not considered relevant in an acceptable political picture that was relevant to the Romans.*

In my discussion, some *important aspects of Roman history* have had to be left out of direct consideration for want of documentary evidence. Even without access to directly relevant sources, we can, however, try to realize those that we should have had but haven't. In such cases, comparisons can give an idea of possibly deductible informations.

A *political anthropology* could have much to say about Roman political life, most of which, one must imagine, developed in informal meetings between politicians and friends in nightly conversations. Petronius' *Satyr-*

*icon* offers views of *dopo-lavoro* night-life, but mostly on the Seamy Side with decidedly non-intellectual thematics, rounds of festivities that some would classify as grossly vulgar.

A most articulated narrative - of the more elevated type - we can look to for a *model* concretization, is Eugenio \*Scalfari's book *La sera andavamo in Via Veneto* (*At night we went to the Via Veneto; we = Roman journalists*), Milan 1986. He gives an unsurpassable narrative of problems, programs and protagonists in the 1950-60s. Helped by his story and by some imagination, we can imagine such debates as must have been going on at night in the ancient Roman estaminets, thermae and brothels.

Another missing documentation concerns *influence, inspiration and coercive roles* from supposed key individuals and groups. In poliitics and social conflicts, they did not have the Maecenas of the poets.

Again, Scalfari's cited book can be called upon for indirect support. Despite citing the long "catalogue" of missing perspectives in Benedetto Croce's writings and teachings, considered important by Scalfari's group, *Don Benedetto* is declared a great source of intellectual vitality for the members (\*Scalfari, pp.61ff.). At a later reader's distance, it is hard to grasp exactly in what terms such an influence materialized; our epochal distance from the great man's ideas and our inability to grasp their clarity and importance will affect our appreciation. But the case can indicate the need to respect historical distance: history was hardly static in ancient Rome.

Facing, as we are, a historical process over a relatively long time-span, the question is: how can we record, making available for analysis, the changes of the institutions and their competences and objectives under the Proto-Republic, the "Ciceronic" Republic, and with the advent of Augustus and his *principate*, with the *intermezzo* before O.A. of the struggle between Caesar and Pompeius and the noise connected with Catilina (\*Bocchiola and Sartori, *L'inverno della repubblica*)? We are not *recording* but *recreating*.

Elaborating a document or case in context requires development of a plan or procedure. This *Procedure* will then be an elaboration of the *Inception Theory* (3.1). Fig. 2.2.2. *Program Chart*, presents a (*one*) maximized view of the logistic points in such an elaboration.

A *program* in the present context is an abstracton (as all programs) and can be treated by using the cited models, by which to make *comparable* the claims and argumentations in documents. in terms of complex sequences, differentlchains of observations, arguments and projects (Fig. 2.2.2).

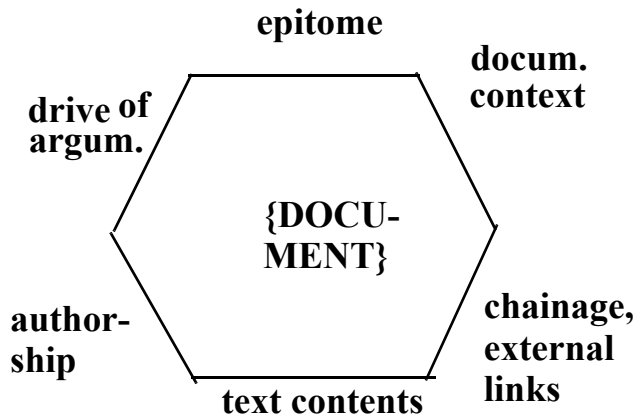


Fig. 2.2.2. *Program Chart. A loosely contrived reminder of some crucial parameters.*

"Epitome" is intended to show that often, usually, summarized impressions of teachings from complete "text contents" can have separate effect.

The figure represents a selection of parameters activated in a document scanning. There are alternative choices in such a process. We will never pick up the document itself, because this is filtered through ourselves, with our capacities and intentions, and it is not defined except in terms of the chosen parameters and is accessible only through such parameters, as those illustrated in the given example or in a more comprehensive list of them.

Noting that "reality" is a context-dependent and purpose-determined notion, the *models* here presented depict *different realities*. Our various realities can be expressed and interrelated in terms of *words* or *graphical models*. The syntax conditions and functions are different in these two universes. Hence, displaying a notional graphical model is *not* a straight translation of the corresponding verbal formulation. The model does *not* substitute the words. No translation is ever exact.

When I face the task of developing a model by which to handle a prose text like Cicero's *De re publica*, I do not entertain illusions of interpreting *him*, of *his writings*, only my *own reading* of it, there being plenty of alternatives. The present assignment is focused on handling *documents*, specifically Cicero's *De re publica*. This centerpiece facilitates to some extent setting boundaries around and limitations to my treatment. Still, the approach will be tentative.

Cicero's *De re publica* attends to *principles of actions* rather than *chronicling events*, which is what the Catilina story is out to do, corresponding to the distinction between *How* and *What*. One can handle the

former on abstract models by reconsidering the *texts*: the latter cases do not directly offer such handles (unless we distort the issue). Let me suggest a simple matrix for this distinction.

<i>HOW</i>	<i>WHAT</i>
Normative	Descriptive
Setting rules	Using rules
<i>ut, uti, sicut, quemadmodum tanquam</i>	<i>res, qui, quae, quod</i>

This *Section* does not pretend to bring a valid overview of Roman political ideas (that would have exceeded my competence, and my purpose), only to highlight certain factors more or less directly relevant for my picture of Cicero (already a complex task).

Regarding the lexical denotations of the political keywords, the *Key Terms*, I have based them mainly on *Cicero's De re publica* and *Paradoxa stoicorum*. He not only covers a large cognitive space in Roman tradition, Augustus employing almost all of them (*almost*), but he also is extremely articulate and informative, presenting his material in an accessible fashion (a trained lawyer, orator and publicist). He also is realistic enough to allow himself to modify standpoints whenever called for it, being markedly undogmatic - while at the same time definitely siding with one of the two main strains in Roman politics of the day, the conservatives, or indeed, aggressive traditionalists.

### 2.3 *Cicero's Program*

Now let me take up again some subjects already broached.

The subject is political events and notions highlighted by the classical writers, limited to the *De re publica* and *Paradoxa stoicorum*, both by Cicero, which seem to cover most aspects. There are two purposes for this. one, to let a Roman have his say on crucial points, thus supplying terms for being used in my experiment.

To compare with critical methods two different document like those of Cicero (in his *De re publica*) and the one underwritten by Octavianus Augustus, the *Res gestae*, is no simple assignment. While Octavianus Augustus' *Res gestae* speaks of politics as *action programming*, Cicero speaks of the *nature of and philosophical basis for the State and the Laws*, while both integrate cases or types of actions and decisions in their fields. In both cases, of course the two personages are the pivotal factors, but a "personage" is a multifarious animal.

Regarding our *modern* political, institutional, administrative and social terminologies, Colognesi insists on there being usually no equivalents



in ancient Rome (\*Colognesi, p. 11). Anna Resta Barrile, in her *Introduzione* to Cicero's *De re publica* (ed. \*Barrile, p. VI), gives a similar comparison between the Greek and the Roman style.

We are closer to the Greeks than to the Romans in wanting, and believing in success, to understand the world in *systems* terms. Thinking in a definitely un-Roman fashion, we can identify systems among Cicero & Co mostly in terms of what in *Communication Theory* is called *noise*.

It is often hard to decide where political noise ends and political thought begins. To speak of political *ideas* in the political life the Rome of Cicero and a few centuries before him, is forcing the issue. Cicero, of course, turned the noise into relatively coherent *pictures of ideas*. In this *Section*, a more general, but also much limited, picture is presented as a background for the discussion of some of the strange man's writings.

Cicero is lavish with propagating his ideas, but a very narrow selection has to be used for the present venture. There being no formal criteria for such a selection from a literary text, and no scale for measuring completeness, the operation necessarily will be a creative act on the part of the researcher, in this case myself. Contrary to the aspirations and convictions of our grandparents: there are no valid or operative definitions of *completeness*, to say nothing about *correctness*.

My choice of a document by Cicero is open to discussion, for it is no legal document, nor a comment on one, but strictly an *utopia* construed upon historical situations, ideas and usages *long gone and filtered through Cicero's* somewhat corrupt mind. I could have chosen the *Annales* of Tacitus, which are historically more manifestly positioned, reliable and precise - *but* much poorer in political terminologies and ideas; and thus less useful for testing methods.

Thus, my analysis can bring into critical view, as I hope, my methodology for analysis, rather than Cicero himself or the epoch. My choice, as I have said, has been dictated by my methodological concern rather than interest in historical narrative.

Concentrating on just the *De re publica* and to some extent also the *Paradoxa stoicorum*, means a limitation, but is justified by the methodological purpose of this assignment. Cicero's *De legibus* brings a great body of information, such as those on finances, and so do \*Colognesi's book on Roman law and \*Cowell's book on Cicero. Attempting to include a meaningful part of these sources, would make my experiment burst at the seams, perhaps, as I imagine, without contributing much to the present limited scope.

To set up an abstract of Cicero's ideas in the cited works is no simple assignment. Augustus' text is more ready for such an operation, being not

much more than a list of claims. It has to be selective, but by what sort of criterium?

Most of the cited book by Cicero is totally unrealistic, conveying a nostalgic and glorified, but incorrectly pictured, Roman History, defying the old and deeply rooted crisis that Cicero had to face all his life - which he ended the usual way, being murdered (in 43 aChr).

In her introduction to *\*Cicero's Orationes in Catilinam*, Elisabetta *\*Risari* notes that here Cicero's *extreme conservatism* emerges, while it also is evident that the deep political and social crisis of Rome had *escaped* his attention or understanding (and of his entourage), or, I would submit, *his willingness to recognize in writing for posterity*.

*Dalle sue parole emerge una posizione di estremo conservatismo, mentre scandalosa appare ai nostri occhi la cecità che dimostra - e con lui numerosi esponenti del partito aristocratico - nei confronti dei gravissimi problemi politico-sociali che segnano indelebilmente la lotta politica a Roma nel secondo e primo secolo a C.*

Here, I would remark that not recognizing a crisis in writing, that is in a medium dedicated to all sorts of parameters next to truthful reportage, does not necessarily mean unawareness. The case to me seems emblematic: writing for the present *and the future* cannot *sic et simpliciter* be matched with the protagonist's present-day awareness and knowledge or be taken as witnessing either positively or negatively. Literature is and remains an artificial medium created with a purpose. Cicero's *extreme conservatism* in writing does not necessarily imply that he was - or had to act - equally stubborn in his political life running its course in daily affairs in Rome. We cannot be sure about his style in the court-room, since he rewrote his lawyer's speeches, such as those against *Verres*, for publication.

This case to me seems "emblematic" also in another respect. Historical cases and situations - but also those around us - are too complex to allow of our setting up *one or a specific number of alternative interpretations and claim truth value for them*. We will always be *creating* them, not being sure we have made full round (granted that someone could tell me what that should mean).

Let me repeat: I take it as axiomatic that seeking for some "truth" the *Philosopher's* way, sucks us into a Cocteauish tunnel of infinite regress. We have better control over the more modest alternative of *handling* our issue under the program of *How*. We read and consult a text being conditioned by certain convictions or determinant programs. In my case the principal idea, to repeat, is the distinction between the *What* and the *How*, understanding or elaboration of a subject or theme, alternatives of practi-

cal research value without being absolutely distinct in relation to one another.

The direct approach to Marcus Tullius is through his writings (to remind us of what is obvious). Here he reacted against the *Stoical* heritage. \*Badalí notes as follows, giving a synopsis, the gist of which is that the Stoics developed a style of presentation of their ideas that was cool, *nüchtern*, and to the point: *antirhetorical*, and not answering Cicero's needs and preferences.

*Ma non fu soltanto l'ideologia stoica ad avere un grosso impatto sulla mentalità tradizionalista romana: le modalità espressive e stilistiche, infatti, adoperative dagli Stoici influenzarono e plasmarono profondamente il linguaggio nei diversi ambiti: filosofico, letterario, giuridico. Questo tipo di espressione si caratterizzava per un impianto sostanzialmente antiretorico, secco ed essenziale, in cui spesso lo stile, denso e concettoso, approdava a conclusioni di concisa e lapidaria sentenziosità. E le affermazioni paradossali, che spesso gli Stoici utilizzavano per meglio dimostrare le proprie tesi, costituivano una tecnica frequente nelle loro trattazioni.*

Attitudes and rules detested by Cicero himself (*antipodi delle scelte espressive dello stile ciceroniano*), by the terms of which he stands out as an emblematic writer and thinker. He was out less to deliver deep philosophy than to influence his readers: he acted as a *politician*, a Roman (as they say today: *semo romani, noi!*), not a Greek. Curious to note: in modern times, you find Italian "philosophical" writers in Sicily, with her Greek heritage (Pirandello an early one of them), rather than in Rome and Central Italy, more pragmatist (Elsa Morante, Alberto Moravia, Ignazio Silone).

Certainly, Cicero was out also to dress up his own image; this sticks out a mile from his writings. In the *Paradoxa*, for example (IV,1 - 27), there is a chapter labelled *Omnes stultos insanire*, in which he criticizes the many sins of the bad men in Roman political life, mostly from the lower social categories, and ends up with considering himself as having been exiled not by civilized politicians (*civitas*), at the time not active, but by evil men: *Italque pulsus ego civitate non sum, quae nulla erat ...*

He is insistent when it comes to the Roman political institutions.

Cicero is consistent in grouping the notions of *Senatus* and *Populus* together. So it seems defensible, at least in an experiential venture, to emphasize those two and connecting them closely with the notion of the *Res publica*.

As I have noted already, the understanding of the term *populus* in Cicero's *De re publica* does not correspond to present-day usage. The term in his text can be translated into an *organization of the optimates*, the category

of property-owners having specific privileges, led by the best among them *and* by the unprecisely determinable class of noblemen.

Different from *vulgus*, which we might translate as *populace*: Webster on the latter: *the common people: the rank and file without wealth or position*. Perhaps we can find the best correspondence in the Russian nineteenth-century *narod* (= the people - before the *Soviets*): *narod bez-molvstviet* - the people (as one body) remains silent (the anti-dramatic conclusion to Pushkin's *Boris Godunov*).

The corresponding category in classical Rome does not seem to be identified or discussed in Cicero's treatise, but so it is in Horace: *odi profanum vulgus* [or *vulgus*] *et arceo* (*Carminum lib. ter., 1*): *I abhor the unhalloed throng and hold it aloof* (transl. by T. E. Page, 1952).

Seen in a larger perspective, this issue of categorization is also one of general attitudes to sorting out things.

The Romans, we have seen, were *category-minded*, while *systems thinking* was a typically Greek modality; the Romans pragmatics, the Greek idealists. Obviously, the distinctions were not sharp or absolute, as they will never be in human affairs, but there were these marked *tendencies* - or *dynamis*, to use Werner Heisenberg's term to remind ourselves that even in science, here Physics, on most of the "advanced" levels, neither conditions nor observations on them are absolute.

*Now let me consider the texts.*

In Cicero's *De re publica*, I have selected for analysis *Chapters XIX to XXXV* in *Part I* of the modern editions of his work,. This rather drastically limited choice should be sufficiently justified by the fact that the present work aims at experimenting on methodology rather than substantive knowledge and grasp.

Staying at a basic level, we can *read Cicero taking him literally*, interpreting his writings *as they stand*, considering them as expressions of his genuine and honest views; *not* attributing to them all sorts of personal defense and show of eminence - admittedly highly likely. He lived in a period of dramatic events, and the heritage about which he is so positive also was riddled with systems noise.

Whatever one may think of his political and historizing "morals", in the present work I have tentatively and surely imperfectly, absorbed the writer Cicero making him a contemporary with ourselves. This perspective surfaces especially in my restructuring his document in a *systems view* certainly totally alien to the views and approaches in the Rome of his day.

To make the *chronicles of Cicero and Octavianus Augustus* (from now on, just *Augustus*) ready for comparison, there are a number of questions before me, primarily the difference between them.

To set up an abstract of Cicero's ideas in the *Republica* is no simple task. Augustus' text is more ready for such an editing, his assistants having laid out the material in synopses with an expert touch worth a modern manager.

*Marcus Tullius Cicero* bet on *argumentation formed in active statecraft, politics and public oratory*, ironically placing *Philosophy* as a weak follower of that tradition and emphasized the *handling* as the true manifestation of thinking (*De re publica*, I, 1,2: *virtus in usu sui tota posita est*, etc.).

Furthermore, the chronicles were written in two different periods and under radically different circumstances, some of them political and social creations by Augustus and his entourage.

The writings have one characteristic in common, however. They both are expressions, regardless of specific contexts, of ideal political *programs*, implicit in Cicero, and in terms of pretended successful implementations in the *res gestae* of Augustus.

In the classical *Wörterbuch der Antike*, published in the city of Leipzig in the fateful year 1933, Hans \*Lamer, synthesizes Cicero's political stand as follows:

*Der schweren Zeit der Bürgerkriege war der politische Idealist, der zeitlebens an die altrömische Ideale und die längst entschwundene Größe des Senates glaubte, nicht gewachsen:*

The political idealist Cicero mistakenly stuck to ancient Roman ideals and made as if believing firmly in the greatness of the Senate, whose role since long had been curtailed.

When analysing Cicero's writings, we have to keep in mind that our subject is *his nostalgic views* and not historical realities.

In Cicero's life-time, we know, great socio-political changes were at work. The Roman *populus*, that is, the privileged *optimates*, retreats as a ruling power behind the mass influx from the Provinces, now increasing dramatically. The progressive role of the military, including newcomers from the Provinces, contributed to pushing the classical forces of the *Senate* and the *Optimates* aside.

Cicero must have been aware of this process but refused to accept it, intending, with his writings, to set the standards back to the former ideal, if not fully real, state of matters. His work was an *utopia*, prefiguring those by *Tommaso Campanella* and *Thomas Morus*, but with a stronger emphasis on the author's personage.

But Cicero did *not* live in the age when Campanella and Morus were daydreaming and paid for it (directly or indirectly). Nor, in his days in Rome, were political analysis and criticism practiced as a literary genre.

Nor did the Romans traditionally and generally think, like many Greeks, in terms of *systems*.

Cicero's *De re publica* presents and discusses the *workings of the State*, ideological links appearing more or less indirectly *into the bargain*. The title *Res gestae* for Augustus' work must be taken literally. We do not find emphasized *ideologies* in him or in Virgilius, Caesar or Tacitus.

Elisabetta \*Risari is sharp in her summing-up of Cicero's political and ideological life and writings, offering some acute observations on his alleged opportunism and propagation of a splendid self-image of one who played a decisive role in saving the State and setting the highest standards.

Reading Cicero, we are reminded of there being two kinds of *History Writing*, of course to some extent overlapping. Basically, we have *reporting*, which presents itself as being "objective" (while we know there are as many "objectivities" as there are schools or writers). The second type is the *dedicated* one, which is meant, more or less clearly and manifestly, to promote some notions or ideas or claims or, indeed, the writer himself or, additionally, his entourage or background. Cicero's works can stand as an archetype of the latter version.

*Now, let us have some reflections by Cicero himself.*

We humans, he claims, have been disposed from Nature to work for the benefit of Humanity and increase human happiness. From this follows that we go on along the same road that has been always traveled by virtuous men, not listening to those who want us to drive back those already advanced (*De re publica*, ed. Brarile, pp. 6ff.):

*Et quoniam maxime rapimur ad opes augendas generis humani studemusque nostris consiliis et laboribus tutiorem et opulentiorem vitam hominum reddere et ad hanc voluptatem ipsius naturae stimulis incitamus, teneamus eum cursum, qui semper fuit optimi cuiusque, neque ea signa audiamus, quae receptui canunt, ut eos etiam revocent, qui iam processerint.*

Cicero (*De re publica*, ed. Barrile, p. 110) also comments on the relations in the fundamental "triangle" (my term), *Senate--People-State* (my summary following the Latin original and the Italian translation). This paragraph can serve as a general introduction to Cicero's story, setting the stage for his argumentation in strikingly neutral, descriptive terms

*At that time our republic was governed in such a manner that the people, while being free, had no authority of decision, since everything, by tradition and by decree, was determined by the Senate.*

*The Consuls, then, even though they were in office only for a year, held real royal power.*

*This truly important rule/norm was rigorously maintained so that the deliberations of the People's Assemblies were not valid unless approved by the authority of the Senate.*

*.... at that time also the first Dictator [here, a military title] was elected, whose powers were much like those of a King.*

*And yet, the highest authority/power, without opposition by the people, was wielded by the Aristocracy...*

*Tenuit igitur hoc in statu senatus rem publicam temporibus illis, ut in populo libero pauca per populum, pleraque senatus auctoritate et instituto ac more gererentur, atque uti consules potestatem haberent tempore dumtaxat annuam, genere ipso ac iure regiam [note by the ediitor]. Quodque erat ad obtinendam potentiam nobilium vel maximum, vehementer id retinebatur, populi comitia ne essent rata, nisi ea patrum adprobavisset auctoritas [note by the ediitor]. Atque his ipsis temporibus dictator [note by the ediitor: a magistrate controlling the other magistrates, appointed only for six months and in especially critical situations] etiam est institutus decem fere annis post primos consules. T. Larcius, novumque id genus imperii visum est et proximum similitudinem regiae. Sed tamen omnia summa cum auctoritate a principibus cedente populo tenebantur, magnaue res temporibus illis a fortissimis viris summo imperio praedictis, dictatoribus atque consulibus, belli gerebantur.*

With the writings published in Augustus' name, the color turns from black to grey.

#### **2.4 Augustus' Program**

The program edited in Augustus name represents a conclusion to the republican ideals in Cicero and a transition to a new State reality while keeping up republican appearances, consolidating new conditions.

No informations regarding experts working out the *Res gestae* seems to be available. Possibly, Augustus wanted the document to appear as his personal work, which of course it cannot have been. It would take men well up in verbal and institutional traditions far back in Roman history to produce a document which included no traps or unimportant items.

The *Re gestae* of Augustus present a specific political action program in course, telling us what he had already accomplished, and he has a long tradition for his pretensions, uses them for new purposes, while leaving sufficient space for ambiguous interpretation, enabling him and his supporters to insist on the less dangerous interpretation any time a conflict should arise. Playing on ambiguity to keep all doors open much like later King Roger II with the efficiently marketing, but ambiguous message in the Cappella Palatina at Palermo (\*SL, *Plura ordinantur ad unum*).

Augustus had at his disposal a vast heritage in political ideas, ideals, observations and handling programs. Of course he or rather his advisors selected what suited him and his aims. He must have had a highly competent set of editors, for the *Res gestae* is a masterpiece of clarity, concentration and tightly packed claims: *and* a simple and striking system for displaying a program that could make modern politicians envious.

Some modern scholars seem to take it for granted that Augustus sat all by himself writing the *Res gestae*. Of course no one in his position could do that, the issues being too unpredictable and delicate and the terms applied to them too open to different and hostile interpretations. He must have employed an expert committee - but preferred to give the impression of a personal contribution. This pretense served to put his authority on display while playing safe.

Reading the document, we have to recall once more that the Romans did not work systemically like the Greeks but in a pragmatic "additive" style.

Now let us take a look at *Augustus'* curriculum of institutional initiatives and honors, culled from his *Res gestae*, which I have sectioned for the present purpose. I shall be summarizing in English the essential formulations which I have numbered from S<ection> 0 to S36, each first-time occurrence, accompanied by Latin extracts and in some cases followed by a short *Comment*. I include this material in the present book without elaborating it, since I intend my book as an incipient venture to be further developed by whomever might like to go on with it.

The text can be evaluated in terms of a political program, offering introductory material for *Political Science*.

*S0 [S - zero !] Rerum gestarum divi Augusti, quibus orbem terrarum imperio populi Romani subiecit, et impensarum quas in rem publicam populumque Romanum fecit...*

About Augustus' achievements with which he subjugated the entire world under the dominion of the Roman people...

*S1 rem publicam* (Aug. by personal decision and financing established an army to free the republic: *excercitum privato consilio et privata impensa comparavi, per quem rem publicam a dominatione factionis oppressam in libertatem vindicavi*) - *senatus - imperium* (Canali: *comando militare*) - *res publica - propraetore - cum conulibus - me consulem... et triumvirum rei publicae*.

*S4 bis ovans triumphavi* - 3 times *egi curulis triumphos* - *appellatus imperator*, 21 times - other triumphs offered by the Senate but rejected by me (*quibus omnibus supersedi*) - for my militari exploits, the Senate decreed thanks offering to the immortal gods, 55 times - and prayers in the Senate:



890 times (yes: *DCCCLXXX* !) - *in triumphis meis* (royal or princely captives) - at the moment of writing this: *consul* 13 times - *tribuniciae potestatis* 36 times.

*S5 dictaturam* offered me by the people and the Senate, rejected. - *consulatum*, annual or for life, rejected by me (bravo!).

*S6 senatu populoque Romano consentientibus ut curator legum et morum summa potestate*, I did not want any appointment that was against the customs of our ancestors (*contra modum maiorum delatum*) - everything that the Senate desired me to achieve, I realized *per tribuniciam potestatem*.

*S7* For ten years I was *triumvir rei publicae*. Until my writing these memories, I was *princeps senatus* for 40 years.

*S8* Being *consul* for the fifth time according to the desire of the people and the Senate - *iussu populi et senatus*, I increased the number of the patricians -*patriciorum numerum auxi* (probably not without personal advantages). *Senatus ter legi (lego, from lex)*, three times I purged the Senate (Ital. translation: *epurai*) (probably not without personal advantages). in his sixth consulate (*in consulato sexto*), together with Marco Agrippa, he carried through a population census (*censum populi*). As a consul he alone celebrated his office (*cum imperio lustrum*). For the third time, now with his son Tiberius Caesar, he celebrated the *lustrum*. With new laws, promoted by himself, old traditions were re-established (*multa exempla maiorum*).

*S9* The *Senate* determined that every four years the consuls and the priests should make offerings and games for my health, and also private citizens should offer prayers at the altars for his health (*Vota pro valetudine mea suscipi per consules et sacerdotes quinto quoque anno senatus decrevit...*).

*S10* By Senate decree, my name was included in the traditional-language (*saliare carmen*) and that my person should remain unviolable and invested for life with tribunal power (*Nomen meum senatus consulto inclusum est in saliare carmen, et sacrosanctus in perpetuum ut essem et, quoad viverem, tribunicia potestas mihi esset, per legem sanctum est...*). Refusal to be made *pontifex maximus* because another person already was invested with the title. After his death, the offer was accepted, with a great mustering of people from all over Italy (*cuncta ex Italia ad comitia mea conflente multitudine...*).

*S11* To celebrate his return, the Senate consecrated a temple.

*S12* By Senate decree, some pretors and people's tribunes with the consul Quintus Lucretius and the most illustrious among the citizens, were sent to meet me in Campania, an honor never decreed on anyone before me (*Ex senatus auctoritate pars praetorum et tribunorum plebi ... qui honos ad*

*hoc tempus nemini praeter me est decretus...*). Comparable rites at his return from Gallia.

**S13** The Temple of Janus Quirinus: issue of keeping it open or closed. *totum imperium populi Romani terra marique - ter per me principe senatus claudendum esse censuit.*

**S14** With the purpose of honoring Aug., his two sons G. and L. *caesares*, who died young, by the initiative of the Senate and the Roman People, were appointed *consuls* at the age of fifteen years, so as to fully assume the magistrature after five years. The Senate decreed that from the day they entered the forum, they were entitled to participate in the meeting of the State councils, *consiliis publicis*.

**S15** Distributing money to the people. In the 18th year of my *tribuniciae potestatis*, being *consul* for the 12th time, giving out money. Also when *consul* for the 13th time.

**S16** Financed agriculture, being the first doing so.

**S17** Continued distributing money.

**S18** Distributed money and corn.

**S19** Building initiatives of Aug.

**S20** Continued list, but in one important case without having his name inscribed: *sine ulla inscriptione nominis mei*. This is worth a comment: thereby Aug. sets himself outside of, and above, the ordinary public works and officials; there is more to come in the next section. As a *consul* for the sixth time, at the recommendation of the Senate, restored 82 temples: As *consul* for the seventh time, restored the *Vie Flaminia*.

**S21** Further building initiatives. As a *consul* for the fifth time, he returned the money offered, thus also every time he was proclaimed *imperator*.

**S22** Gladiator fights (8 times) and animals slaughtered (3500) in the arenas, to the benefit of the people.

**S23** Sea battles for the benefit of the people (3000 men fighting).

**S24** Restoring money used for statues of Aug.

**S25** Restoring peace at sea, etc.

**S26** Initiatives to the benefit of the provinces and abroad.

**S27** Foreign politics.

**S28** Foreign politics.

**S29** Foreign politics.

**S30** Foreign politics.

**S31** Foreign politics.

**S32** Foreign politics.

**S33** Foreign politics.

**S34 In Rome:** In my sixth and seventh *consolate*, after I had terminated the civil wars, by general consent, having assumed control of all affairs of the State, I transferred the power of the State from my power to the free options of the Senate and the People: *per consensum universorum potitus rerum omnium, rem publicam ex mea potestate in senatus populique Romani arbitrium transtulit*. Because of this goodwill from my side, by Senate decree I assumed the title of *Augustus*... and the bestowal of various symbolic confirmations. From this time, I was above all the authorities, even though I was invested with no more power than all my colleagues in every magistrature. *Post id tempus auctoritate omnibus praestiti, potestatis autem nihilo mihi amplius habui quam ceteri qui mihi quoque in magistratu collegae fuerunt*.

**S35** During my thirteenth *consolate*, the Senate and the Equestrian Order and the entire Roman people declared me *Father of the Nation*. *patrem patriae*. Related inscriptions in important places.

*So far Augustus on himself.*

Among the ideological and terminological resources of the Republic from which Augustus could draw, there are especially some *Key Terms* that can be culled mainly from \*Frey, \*Everett, \*Colognesi, and \*Bocchiolo-Sartori.

We can say, however, that Augustus according to his *Res gestae* emerges in two different but coherent roles, that of *embodying the State*, and that of being the chief *executor of policies and decisions*.

The idea behind this document, among other things, is that Augustus' repeated use of certain *titles* must mean that he - and his entourage - considered them especially important for the State, but also for his self-promotion, and that he and his circle by these preferences and his self-attribution in terms of them, defined his unique position as well as the perfect quality of the State as such. This he further emphasized by his intervention into the traditional setup of the republic, when he reduced the number of Senators to 600 (\*Frey, *Wörterbuch, sub voce Senatus*). The accumulation of traditional republican titles conveyed real power to him while he could pretend to be sticking to the old usage.

The *Res gestae* also introduces some new titles for him that emphasizes the idea of a *personal principatus*. All these factors, the very idea of delivering an *autographical* document, can seem an almost provocative act of self-promotion.

The Ciceronic text works out some general principles, with a number of supporting historical and biographical references and it is written by an author who was a lawyer, politician and writer; the present one by experts

on behalf of a head of State (Augustus) and picturing his personal achievements and problems; some of them, at least; he couldn't discuss Livia.

But we can, and can evaluate the doings of the poor girl in relation to her position as an extremely intelligent woman in a male and generally corrupt culture, and having to be loyal to that husband of hers.

The main impression gained by reading the document, is that Augustus assumed most of the traditional titles of the *Republic*, while being personally celebrated in his "additional" role by particular rites and dedications.

The crucial point regarding Augustus' relations as emperor to earlier tradition seems to be emerge in his note in 34.3: *post id tempus auctoritate omnibus praestiti, potestatis autem nihilo amplius habui quam ceteri qui mihi quoque in magistratu conlegae fuerunt*, the key terms here being *auctoritas* and *potestas*. Here, the former term is not only prominent but also rather multifarious, having to be carefully assessed in the context.

Modern scholars, including \*Canali, opt for some *definite significance*, probably feeling obliged to do that; being in the focus of academic evaluations. I do not think there is one.

This evidently is a play on the ambiguity of adhering to civil-servant tradition while having the imperial card in his sleeve to show whenever opportune. Roger II of Sicily could have been his pupil (\*SL, *Plura ordinantur ad unum*). A high-level statesman avoids being clear (just come to Norway!); in Rome he could never be sure what would come next in his way, a triumph or a dagger or a dose of poison.

Some scholars, noting terms cited above, will say: they have nothing to do with the empire! Exactly, that's why they were useful. Augustus and his advisers were careful, saying all the right things without committing themselves to anything. The motivation for clever politicians at all times saying nice things and refusing to answer direct questions. This tradition is active among Norwegian politicians today. They have a conundrum, wanting to stand definitely out in relation to competing parties, while being reluctant to making their positions clear and public.

Reading the *Annales* of C. Cornelius \*Tacitus (ed. by Lidia Storoni Mazzolani, Rome 1995), Augustus arises in a critical light. The cited editor writes that with him, in Rome, *la potestas era divenuto dominatio* (p. 17), an "emblematic" formulation.

And Tacitus, in his extremely succinct Latin, a reaction against the flow of diluted Latin from the Provinces, evaluates this process in the following terms (ed. cit., pp. 28/29; I am using Storoni's parallel Italian translation in support):

*Nihil deorum honoribus relictum, cum se templis et effigie numinum per flamines [especially dedicated priests] et sacerdotes coli vellet. Ne Tiberium quidem caritate aut rei publicae cura successorem adscitum, sed, quoniam adrogantiam saevitiamque eius introspexerit, comparatione deterrima sibi gloriam quaesivisse. Etenim Augustus paucis ante annis, cum Tiberio tribuniciam potestatem a patribus rursus postularet, quamquam honora oratione, quaedam de habitu cultuque et institutis eius iecerat, quae velut excusando exprobraret. Ceterum sepultura more perfecta templum et caelestes religiones decernuntur.*

**A synopsis:** Without having left anything in honor of the gods, he wanted the priesthood to adore himself in the temples. He elevated Tiberius not out of affection and in favor of the Republic, but, knowing Tiberius' arrogance and cruelty, he profited by this example to win personal glorification...

As a young person settled in Rome since 1959, I received my training as an Art Historian, being taught about the greatness of Augustus, the proof of which consisted in the monumental *Ara Pacis* and the splendid *Gemma Augustea* in Vienna. The emperor was a great person, unfortunately troubled by the insufferable Livia. I submit this note not to start on an autobiography but to warn the coming generation: do not trust your elders. Today, you have new tools for information.

### **2.5 A Model for the DRP**

Cicero's *De re publica* (DRP), according to my original project, should have been presented and amply analysed in this *Section*. But I have decided to print the selected *Sections* of Cicero's *De re publica* in *Part V*, hoping that they could be useful to whomever might take it up. Leaving that assignment to readers for testing and evaluation is an expression of the notion that a work is a process. So I have chosen *Chapters XIX to XXXV* in *Part I*.

The discourse before you aims at methodology rather than substantive research, so it has been considered sufficient to limit to a minimum the document references in the models, the central one to be shown presently..

Of course, the model, representing theory, has had to be tentatively built after a rather superficial scanning of the document. This represents a decision about how to go on. The critical phase comes with the implementation, lodging document items into the model. It would be superfluous to insist on the artificial character of such a procedure (of all analysis work).

The connecting rhombic configuration in Fig. 2.5.1, *Ciceronic View*, represents *my picture* of Cicero's general ideas of Roman politics, supported or supplied by his idea of the Senate in connection with the *Populus*

(Optimates), making up the *Res publica*. In many cases, he delivers input material for his argumentation. The configuration as a whole can represent the ideals for which he pretended he was fighting.

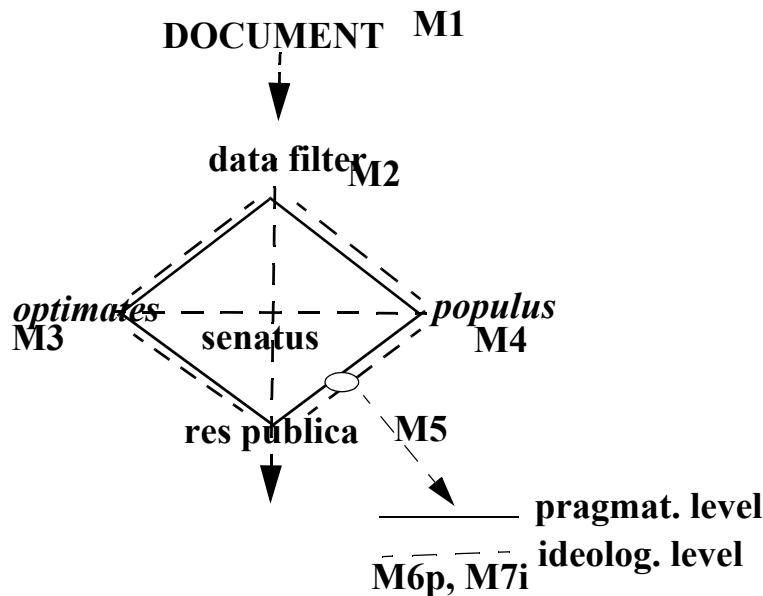


Fig. 2.5.1, *Rhombic Model, Ciceronic View, with categories from M1 to M7 as listed below.*

Let me show the *Rhombic model* (Fig.2.5.1). It can be considered the basic model in this text. The model displays and relates to one another "key terms" in my handling of the political scenario in Cicero's *De re publica*: senate, optimates, people, and the republic. The codes of Mn refer to the upcoming, abbreviated, list of Cicero's statements.

It is a structure, graphically speaking, and it *represents* one, in terms of application. Most graphical models, from flowcharts to upside-down *trees* and business charts, will share this property. The options among them depend only on the practical possibilities of loading whatever we want in there as a reflection of how *we* understand the relevant issues. There is nothing "objective" about them. Let us not be impressed by their *looking* more manifest than our verbal manifestations.

Of course no reality has ever corresponded faithfully to our models however complex we make them. No contemporaries would have accepted them as adequate. Politics need myths, not analytically distilled facts.

*Back to our model.*

The rhombic configuration in Fig. 2.5.1, to be discussed more closely later on, depicts a system that ties together M1 to M7. This linking operation works on two levels, a pragmatic or institutional one, and a political or

ideological one. The configuration illustrates the relationship between the documents and their analysis.

Thus the model represents a *theory*, and hence will contain elements that might turn out to be important even when they cannot at this point be loaded with meaningful content. A complex assignment is never concluded. Using verbal accounts exclusively would leave us without this advantage: few editors or publishers would accept a book listing all the empty places.

The scanning now coming up contains a limited list of examples selected from \*Barrile, while a more complete selection is given in the De re publica selection in the present Part V, Cicero's De Re Publica, and its range of view is strictly limited to the institutional aspects of the De re publica. Thus the presentation brings nothing more than a shortcut version, probably sufficient to convey the idea. Cicero's De Re Publica

Here we go, the captions referring to the model in Fig. 2.5.1, *Rhombic Model (Ciceronic Views)*.

### *M2 input, data filter*

3 DRP, I, XLIV: *sic autem pilam rapiunt inter se rei publicae statum... nec diutius unquam tenetur idem rei publica modus.*

A monarchy can too easily develop irregularities and misuse of power and can be compared to a game with the players throwing the ball among them.

N 10 DRP, II, XXV: *Id enim est caput civilis prudentiae, in qua omnis haec nostra versatur oratio, videre itinera flexusque rerum publicarum, ut cum sciatis, quo quaeque res inclinet, retinere aut ante positis occurrere.*

The ups and downs in the life of the republic must be studied by the experts in political science in order to prevent disastrous developments.

N 11 DRP, II, XXXIII: *nisi aequabilis haec in civitate compensatio sit et iuris et officii et muneris, ut et potestatis satis in magistratibus et auctoritatis in principum consilio et libertatis in populo sit, non posse hunc incommutabilem rei publicae conservari statum.*

The traditional equality among political forces we have seen the last two hundred years and which made some a state of stability must be kept.

N 12 DRP, II, XXXIII: *vincit ipsa rerum publicarum natura saepe rationem.* The alterations in the constitution of the State were not the outcome of rational actions among men but because of a natural tendency towards the perfect form of government (again, the formulation requires a much closer and more articulate summary).

N 13 DRP, III, fr. VI: *est quidem vera lex recta ratio naturae congruens, diffusa in omnis, constans, sempiterna, quae vocet ad officium iubendo, vetando a fraude deterrat.*

Not human actions but natural laws are at the origin of the stability of the State.

### *M6 res publica*

N2 DRP, I, XXV: *est igitur ... res publica res populi, populus autem non omnis hominum coetus quoquo modo congregatus, sed coetus multitudinis iuris consensu et utilitatis communione sociatus.*

The republic is based on the people, but this means the congregation of all according to the laws and common utility (of course this dense formula needs a much more elaborate summary and interpretation).

N6 DRP, II, I: *nostra autem res publica non unius esset ingenio, sed multorum, nec una hominis vita, sed aliquot constituta saeculis et aetatibus.*

Our republic was created not by some special experts but by of majorities from ages of the experience.

N7 DRP, II, XI: *aream sibi sumpsit, in qua civitatem extrueret arbitrato suo, praeclaram ille quidem fortasse, sed a vita hominum abhorrentem et a moribus.*

Not constituting the State out of imagination and philosophy, as with Socrates and Platon, but from the origins of Rome and her institutions.

N8 DRP, II, XXX: *in amplissima re publica enitar, ut cuiusque et boni publici et mali causam tamquam virgula videar attingere.*

Applying the principles of the greatest republic in the world.

M6 N 9 DRP, II, XVI: *non fortuito populum Romanum, sed consilio et disciplina confirmatum esse, nec tamen adversante fortuna.*

Being protected by fortune, <the Republic> was created with wisdom, experience and political maturity.

### *M7 Levels*

N4 DRP, I XXIX: *Itaque quartum quoddam genus rei publicae maxime probandum esse sentio, quod est ex his, quae prima dixi, moderatum et permixtum tribus.*

The fourth type of republic is the best, the other three are monarchy, aristocracy and democracy; a debate prominent in political thought in medieval Europe (\*SL, *Christ in the Council Hall*, 1974).

*So far* the selections of Latin quotations from \*Barrile that have been entered into the model in Fig. 2.5.1, *Ciceronic View*.

### *2.6 Imposed Limitations*

The reader should note that my present shortcut references to authors in the bibliography, probably sufficient in this experiment, can only serve as an introduction to her/his careful analysis.



This is a case in which also the *limitations of model references* surface. Unquestionably, \**Barrile*'s entries are central and consistent, and so are those by \**Badali*, but they so to say work at the very basis of the republican system, bypassing a number of ideological and legislative extensions to it. Illustrating, on a model, its limitations in terms of blank nodes, thus displaying the model's *specific* applications, is just as useful as showing its coverage capacities. Constructing a model, we restrict our expectations from our analysis of cases or programs, the expectations being our *inception theory*.

At this point it would have been appropriate to include also comments from Frank Richard \**Cowell*'s *Cicero and the Roman Republic* (chapters 5, 6 and 7). However, I shall bypass these texts here. My motivation for this reduction of my original plan is the book's primary purpose as a theory experiment rather than a substantive study; to embark on the latter course, I would certainly not be professionally equipped. Focusing on models is the solution for whomever, as our teachers said, is *busy with much and expert in nothing*. Occasionally, however, such shortcuts can reveal things that can prove useful or, at least, stimulating.

Some further remarks on my chosen procedure (or process; for the distinction *process - procedure*, see \**Buchler*, pp. 1ff.).

The present analysis has Cicero's *De re publica* as object. This is a prose text and as such a *literary* one, especially so on Cicero's pretensions to being a great writer - demonstrated also in his juridical discourses, like those against *Verres* (who tortured us at school), which he seems to have heavily rewritten for publication.

The motivation for using *just one model for Cicero* lies in the fact that his *De re publica* quite clearly represent *his personal views, hopes and idiosyncracies*; they do *not* describe contemporary politics and society. He collects positive and negative historical examples, evidently with the one purpose of backing up his own evaluations and preferences, and "explaining" his own shortcomings, which must be considered constantly through the *De re publica*. He writes like an accomplished author, seeking literary variations whenever possible, but with the thematic logistics and logics worthy of a lawyer, which in fact he was.

He also must have written his many works with the intention to guard himself in a dangerous society, avoiding being explicit whenever possible.

Thirdly, Latin-Roman tradition does not develop or adopt *systems*, in the Greek tradition, rather *series* of pieces expressing awareness of this or that, with heavy biographical ingredients. While there will usually have been some rules for systems, for this kind of series there are few or none. Reading the ancient Roman documents, the impression supported by \**Colognesi*'s masterful investigation, is that the Roman system was deeply dif-

fferent from the Greek, being mainly a pragmatic, rather than systemic, one. The Romans did not contribute much to mathematics. Reading Cicero, however, leaves one in doubt about his cultural status. After all, he was well trained in Greek culture.

There are xlvii chapters in *Part I* of Cicero's *De re publica*, so the question is how much of it I should consider adequate and sufficient for the projected analysis. To economize, I have chosen to limit my attention to his *Part I*, chapters xix - xxxvi.

The central ideas to be distilled from Cicero's *De re publica* can be summarized by the following schema:

1. Continuity of the republican character of the State;
2. oligarchy, the optimates should rule;
3. but with the consent of the "reasonable" and property owning sections of the people, they being treated well;
4. the *Senate* should be and remain the *primus motor* in the system.

Cicero at the same time was politically careful, keeping his predilection for the Senate in the background in order not to provoke contemporary politicians, fearing they might damage him (and they did have a hired assassin murder him).

Cicero presents and backs up his *personal* and rather dated conception of Roman politics, insisting, for example on the importance of the Senate, which had since long gone into a decline. He also keeps the term *populus* constantly in mind, apparently to support his personal program.

The term *populus*, continually repeated in Cicero's text, is problematic, having different references, between nobility and ordinary men, differentiated from period to period but also by context. This gave Cicero a good leeway he could enter when in trouble, which he constantly was. Of course *Senatus* and *Res publica* also underwent changes, but less dramatic, being institutions not men. Nevertheless, the following definition in *De re publica*, XXV, must stand: *non omnis hominum coetus quoque modo congregatus, sed coetus multitudinis iuris consensu et utilitatis communione sociatus.*, etc.

Cicero's text contains both positive and negative evaluations of historical cases and opinions, plus his own advisory statements. Of course all three categories bring messages about important notions, actions and opportunities or needs, as evaluated by him. When citing negative cases, he clearly wanted to show that the opposite solution is preferable.





### 3 PART III A THEORY OF MODELS

#### 3.1 *Inception Theory*

The entire work, constantly focused on models and their use, cannot be configured as trees or flowcharts, rather as a geometrical, unorthodox *matrix*, in which "everything is related to everything": this implies *repetitions at many points*.

In this *Section* we take up again the thematics indicated in the heading to *PART I, INCEPTION THEORY*, developing further some of subjects there.

The models in use in the present work, in their build-up, represent an *Inception Theory* for the contents and internal relations that are *determinant*. The model consequently arises as *determinants* for the further procedure, settling the categories on which our analysis has to rely. With a traditional *verbal* approach such a visually clear and argumentatively consistent picture normally does not arise. This loss in clarity also implies more vaguely perceived categories and relations among them - and allows us to go on without worrying too much about precision.

My claims here are not absolute, quite obviously, but they represent marked tendencies. Conceived categories and relations among them - and allows us to go on.

*Building a model* of some complexity, especially of the figuratively "dynamical" ones, will often be a stepwise occurrence. If this follows a well-devised project, each stage will absorb - figuratively speaking - what is intended, *and* will usually reveal blanks waiting to be filled with contents. This process can be thought-provoking and alerting us to ideas we have bypassed or disregarded. Thus the writing can be productive.

I modestly have tried to adopt Descartes' strategy of using simple models for the investigation of more complex curves. In addition, I let myself be influenced by *Herbert \*Simon*:

*Research in problem solving has shown that the efficiency of problem-solving efforts can often be greatly increased by carrying out the search for a solution, not in the original problem space with all of its cluttering detail, but in an abstracted space, from which much of the detail has been removed, leaving the essential skeleton of the problem more clearly visible; and further: 'Simple' theories are generally thought preferable to 'complex' theories. A number of reasons have been put forward for preferring simplicity, but the most convincing is that a simple theory is not as easily bent, twisted, or molded into fitting data as is a complex theory" (Simon, *Models of Thought*, 1979, pp. 31, 234, resp.).*

Our models, too, have to be relatively simple.

Fig. 03, *Comprehensive Model*, is extremely detailed and complex, and my excuse for delivering it, is just that splitting it up into minor sections would require much more space in the book. Even more complex and "complete" models with intersecting arrows in criss-cross patterns could have been made, and more details be lodged in, as in Model 1 in \*SL, *Burden*, covering two pages (101, 102).

Almost any graphical or verbal configuration or description can represent, more or less precisely, a *program*, *subject* or *idea*. At the same time, comparing some variants can alert us to problems or imprecisions, to parallel but not identical coverage patterns More or less the same statements or arguments can be configured with a matrix, a set of Venn diagrams, a tree or a flowchart.

Working with the models on our material, we develop an *Implementation Theory*. The difference between graphical and verbal models surfaces.

Building a *verbal model*, we mentally form sentences and plot them down word avfter word, creating a *linear* configuration. Constructing or using it, we can - and usually will - think in terms of factors spread out over a space, but we cannot manipulate such a model by shuffling its components about; having to rewrite the proposition, always tied up in a linear modality, possibly keeping each version available for final selection. The categories involved will always arise in a row or line and their spatial and priority interrelations can only be imagined or written out as a comment to the verbal model.

The modus here is thinking and arguing in terms of *integrated visualized patterns, such as* tiles fitting into a field. Whereas with the flowchart or roughly pyramidal patterns, each term, at least the dominant ones, would appear *once and in the right position*, in a tile pattern, the same terms will have to appear any number of times, but in different company. The *addiditve* principle.

*Digitally* operative models, like those in *Management Information Systems* (general survey, \*Parker, \*Davis and Olson), do three things of particular relevance in the present connection: *denoting, charting and moving patterns of data; producing products or results; testing them in an environment.*

My *non-dig models* simulate these operations.

1. identify and locate factors in the game;
2. identify interrelations and ranking here;
3. handling processes involving them (2.)
4. and/or being generated by them.

This process of mapping over from digital realities to some dumb configuration (*que ne se bouge pas!*) can be further (than in the present work) de-

veloped by distilling material from the rich literature on *Management Information Systems* (on the back cover of \*Parker's big book, 828 pages, of 1989, seven other relevant titles are listed, all with the same publisher, McGraw-Hill).

Several publications have been just briefly cited. This is a result of my assignment to supply relevant information in a work that experiments in the midsts of a huge field of more or less relevant publications, a step in a search. In our present info-world, any contribution can be useful - provided it reaches out to a larger public than just a few academics.

I submit these notes also to set off the distinction between the four cited books primarily focused on Model Theories, in the present Section; and the Model Tools (\*3.2 etc.) , directly exploring the relations InDef evidences versus Def ones, with the support of models, which, of course, have to be carefully dimensioned and crafted.

In *Section 1.3, Platform Issues and Terms*, I have noted some relations in the group *Def<inite> - /InDef<inite>*, based on interpretation of the former taking into account its possible surrounding field of relevant notions.

The view can now be shifted over to looking at a possible extension of the latter (*InDef*), elaborating an embedding field of significances.

In their *Figure 72*, p. 91, \*Lord and Wilson give some examples in the category, as they call them, of *Critical Points of Algebraic Curves and Surfaces*: six short lines with different curvatures, each accompanied by the corresponding equation for their crossing the *baseline at zero*. Thus, mathematically exact points have extensions that are *approximate in the figure*. The case can be taken as representing - perhaps only *illustrating* - the idea of combining *InDef* and *Def* configurations or subjects (Fig. 3.6.2, *A Composite Network*).

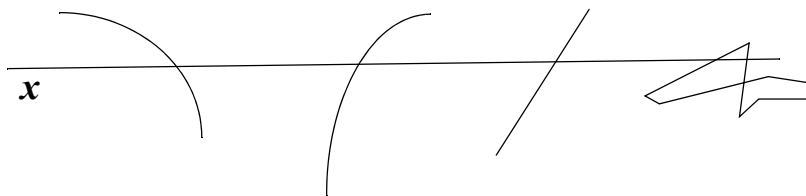


Fig. 3.1.1, *Critical Points, simplified after Lord and Wilson.*

*Programming*, means to work on a selection from some pre-established tentative theory-represented by some graph or, indeed, a verbal formulation.

On the basis of my observations so far, I have to establish a *general framework* for the present assignment, in which to situate the game.

I shall have to respect the following requirements-

1. A *vocabulary* to be used also in the substantive work: words, numbers, or both.
2. *Model clarity*, available for description, dissection and relation to other models, distinction between *Def* and *InDef* programs and models.
3. Ensure that *programs* consist of distinguishable parts or sections.
4. Determine how these (3) *interrelate and interact*.

A *Systems Tree* can bring out the order I prefer for this *Section: structure, range, application*.

Some comments on the upcoming Fig. 3.1.2.

The *root* represents *inception theory* and some basic conditions, mostly described in *Part I*. The key to the *root* features lies in the combination of *Def* and *InDef* properties.

The model represents a typical analytical *framework* in that it assembles and interrelates subordinated theories and their potential effects, with the *root*, comprehending, in terms of a "logistical" plan, while not always literally, *all arguments that are considered essential*. An essential feature in the entire discourse is illustrated by the operative values of the terms *Structure, Range, Application*, and the interrelations between them.

A problem attached to this model regards the *interfaces* between the noted programs and units on one hand, and our appreciation and use of them, on the other. I am here speaking of *interface* in the "transferred" modality of the entire present handling of models. The problem suggested here, defies clear formulations and have to be taken *cum grano salis*, but are supplied just in order to note a possible extension to my program.

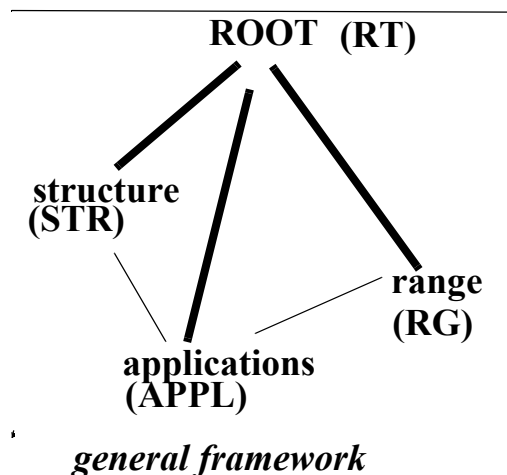


Fig. 3.1.2 *A System of Arguments*

Functionally on the abstract configuration level, the model in Fig. 3.1.2 represents *several interfaces*. So does, in a *running digital* program, the rela-



tion between these features and the user. In our "reflected" cases this issue is less tangible, but to be kept in mind.

Nevertheless, the "real" type of cases must be taken into account, even if our interaction with the systems is mental rather than digital.

The idea of *interface* came up with computer science, especially in the context of MIS (\*Parker, \*Davis-Olson).

\*Parker, speaking of *Object-Oriented languages* (p. 223), notes that *In some cases today, the user interface has become more important than the underlying capabilities of the product.*

\*Davis-Olson supply tech comments in numerous places in their book. Of direct and applicable value are especially their comments on p. 236:

*Probably the most critical component of a management information system, is the interface between the system and its users. For the user, the system-user interface is the only part of the system which is meaningful; the rest is invisible. Many systems which support planning and decision making... require that the decision maker have an interactive dialogue with the system. Many clerical functions are performed in a manner dictated by computer requirements. Since the design of system-user interface is thus critical to good information system design, an understanding of humans as information processors will provide useful guidance for interface design.* And the authors refer to the Newell-Simon model of the human as an information processor (D.-O. supplying a graph - *Model of a human as information processor* - of this process in their Fig. 8 - 1).

Whatever the outcome of these propositions, we still operate with and within *systems* with *heuristics* entering the game..

Regarding my experiential perspective, there is some support to be found in Physics, in terms of *heuristics* as presented by Walter \*Isaacson in his biography of Albert Einstein (pp. 94f.): *a hypothesis that serves as a guide and gives direction in solving a problem but is not considered proven.* Regarding experimental modalities, some support is to be found in *Physics*, in the notion of *heuristics* (\*Simon, *ibidem*, *Index*).

What is the *rule system* behind the *applied system* in the present experiment? When I say there isn't one, the negation turns out to be making sense. I have misquoted Paul Feyerabend's *Anything goes* by supplying, *provided it works*, and this is the gist of the matter. Whether the "thing" goes or not, this is the subject of the entire book.

The rationale and functionality behind or supporting the *working* of something cannot be generalized, at least not with any profit whatever, since "something" cannot be generalized except in terms of - *something*. What I am saying is hardly good philosophy, but probably a usable *program*, the limitations of which have to be accepted.

There cannot be any universal rules for our options in this work, which depends or *will* depend on the following factors (at least):

1. personal user inclinations;
2. stated and implied purpose;
3. variable information;
4. audience setup and capacities;
5. subject background and context;
6. language and interdisciplinary idioms
7. reception variations.

In addition to the issues just noted, there is the one regarding the *range* of the works.-

In his *Kant's Analytic*, Jonatan Bennett shows us a diagram over Kantian terms which I reproduce here. Of interest in the present context is the general value and application of such a diagram, rather than the specific reference to Immanuel Kant (Fig. 3.1.3).

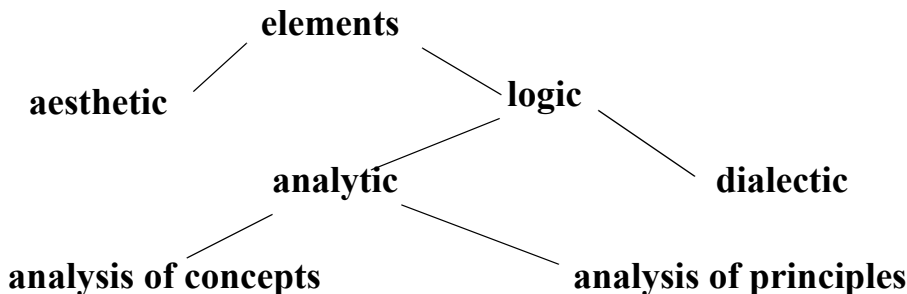


Fig. 3.1.3 *Bennett's diagram.*

From this general perspective I would claim that the seven nodes in Bennett's model can be re-arranged in a number of patterns. Determining a certain *meta-rule* for the system would hardly be advisable nor, probably, possible. The options are logistic rather than logical, and here freedom reigns among us.

In the present work, I am applying *my "analytic" modality*, one among numerous and hence with no great pretensions: *anything goes, provided it works*. As I see the landscape, the ideological curriculum of the *Krems Institute (Institut für Mittelalterliche Realienkunde)*, does realize a *multi-program* that is elsewhere not much more than a set of proclamations.

Calling my assignment *an experiment*, I am not out to advertise modesty, but declaring that *uncertainty* is integrated in the build-up of my system and the models integrated in it (*Def* and *InDef*). And here is a critical point: can we accept this uncertainty, and claim support from the fact that the same applies to Physics? Back to this later on.

Now I shall present an introduction to our context which is focused on *Systems, Networks and Interface Values*.

*Scanning our documents*, we will find many cases in which

1. we cannot be sure about which one to prefer among the likely priorities of ranking;
2. we will find cases for which the relevant category chart will remain incompletely "filled" with content;
3. there will be cases in which it seems relevant to fit a text into a model while this remains a hypothesis (or more crudely, a hunch);
4. finally, some influence from personal inclinations cannot be avoided, but can turn out to be a resource.

Speaking of *direction* leads me over to the programs for *interface* parameters. The literature here appears under the common title of *Management Information Systems* (MIS), and I shall refer to two publications with that heading, \*Davis-Olson and \*Parker.

This is the place to be specific about the *more elusive aspects* in my enterprise. I have briefly referred to the *Uncertainty* principle in Physics (\*Marion, 12.7; Von \*Weizsäcker, 7.3, *Wahrscheinlichkeitspostulate und Quantentheorie*; \*also SL, *Patterns*). This is an issue of *measuring quantities* under certain conditions, and need not occupy us at this point.

Next, we have the crucial property of *approximation*, a notion that is central in most sciences. In Russell's formulation: *All exact science is dominated by the idea of approximation*. Heisenberg's notion of *dynamis* is closely related to the idea as expressed by Russell. This applies even to the most "exact" paradigm we have: *the Calculus*.

Explanation is a by-product of systemization (\*Radnitzky, II, 102). I will take the idea a bit further and say that *explanation is systemization*. For we have to let the notion of chain explanations go that are couched in terms of the chain from "premise to conclusion", except in fully formalized cases. Rather than chains of "cause-effect", we have to operate with interrelated fields, preferably in a more or less precise and dynamical *matrix* or *network*.

*Networks* for real use normally appear as abstract patterns. If we want a readable picture of a network with the details at display, the book about *Microsoft* by David \*Bank (2001) provides an excellent occasion. Just a tit-bit from the 287 pages book:

*It was inevitable that a common Software platform would take hold in televisions, handheld devices, and other consumer electronics. The horizontal model would separate the hardware makers from a Software provider, just as it had in the PC business. Positive feedback loops would dictate that there would be a single winner (p. 25).*

In many respects, network running is intimately connected with *organizational* structures, functions and theories; so let me dwell for a moment on this subject.

Here, I would have liked to include a careful reading of an old but still important book, Wright \*Mills' *The Sociological Imagination*, but the character of the book defies a shorthand treatment such as could be included here. And I am less concerned with general sociology than organizational practice.

### 3.2 Modeling Our Documents

The present work is focused on the use of graphical models, so we have to develop the idea of model application presented in the following *Sections*.

Using graphical models means using visual images, and a few words on that subject can be in order.

The use of *imagery as an operative tool and explanatory model* dovetails with the paradigms and contemporary practice of *geometrization*. The latter, when brought to its full consequence, leads to *the introduction of the infinite* (\*Blay, *Introduction*), and Giordano Bruno's preoccupation with this (*Dell'infinito, universo e mondi*, 1584) can be seen in the same perspective (\*Saiber).

In line with established tradition (to quote from SL, \**Pattarns*), <Giordano> Bruno uses *imagery* for important cognitive operations; as noted by Sturlese, Gatti, Saiber and many others; the point has always been considered a central one in G.B. You *see* light, darkness (by *not* seeing anything) and half-shade. Here he was in good contemporary company, namely that of his later opponent, Cardinal Roberto Bellarmino: humans, whatever they know through senses or reason, they know in the shape of images: *Homo quidquid cognoscit sive sensu, sive intellectu, per imagines cognoscit* (1583); something that was well known to medieval and later teaching institutions, in which explanation and learning to some extent were based on graphical models (for the use of graphic models, see the two books by Arthur I. \*Miller;, also Gisolfi-SL on the *Praglia* Monastery).

Normally, it seems, an illustrative picture - of an horse, say, or of St. Peter - will call forth a larger range of interpretations and conceptualizations than the matching verbal expression, and correspondingly a higher complexity (SL, *Iconography and Ritual*, 1984, 148ff.).

Arthur \*Miller, in his *Imagery in Scientific Thought*, offers an important chapter, 4, *Redefining Visualizability*, pp. 127 - 183, on the subject indicated in the title. Inside the strictly modern-*Physics* perspective, there is much to be gained in general terms from his reports and arguments. His work has been crucial for what I have just noted.

Let me start with displaying the most comprehensive model, *Comprehensive Chart* (Fig. 3.2.1).

The original model, a rhombic graph within a rectangle, with the Republican categories considered by Cicero specifically, is now embedded in a modern model representing *one* possible view. A possible republican theory process is inserted on the top of the model. "Mixed" refers to a constitution the three government forms (this theory was alive throughout the Middle Ages; cf. \*SL, *Christ in the Council Hall*).

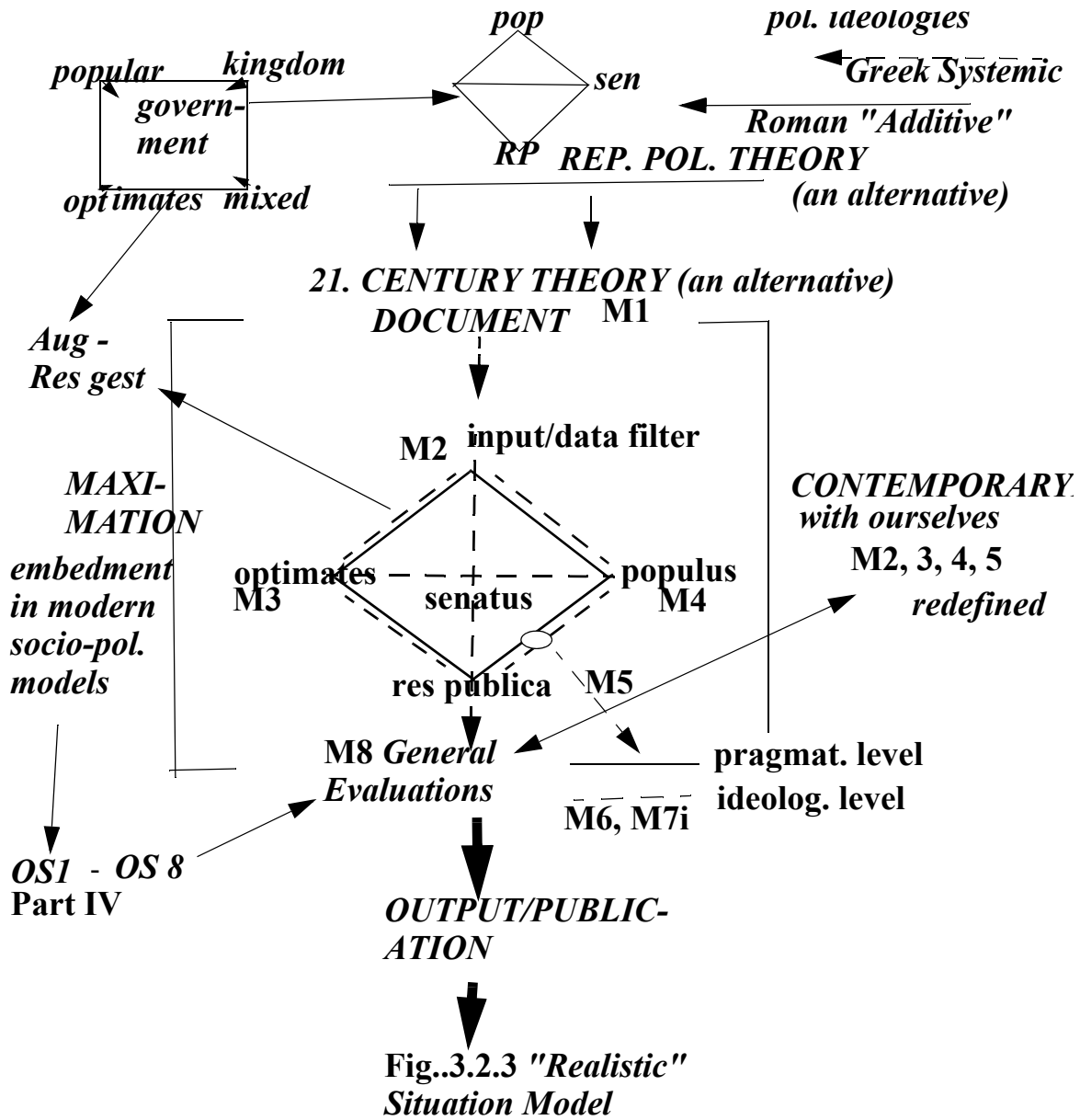


Fig. 3.2.1, : Comprehensive Chart: the central configuration is repeated in Fig. 3.2.2, Ciceronic View. The codes Mn refer to XXX see Fig. 3.2.2.

The things to note are

1. that the socio-economic categories and power structures here are intended to be such as are studied in modern Sociological, Anthropological and Economic literature; and
2. that we tend to read a specific section of History in terms of what followed next, hence Augustus' *Res gestae*, sticking to the useful illusion that things develop in some logical order.

The model, then, does not do much more than stating the obvious. A model imperfectly representing Ciceronic notions and ideas, approximately such as we ourselves understand and report them, has been brought up to

date, leaving go of any illusion that it has been or ever can be approached in any dressing of objectivity (Fig.3.2.2, *Ciceronic View*).

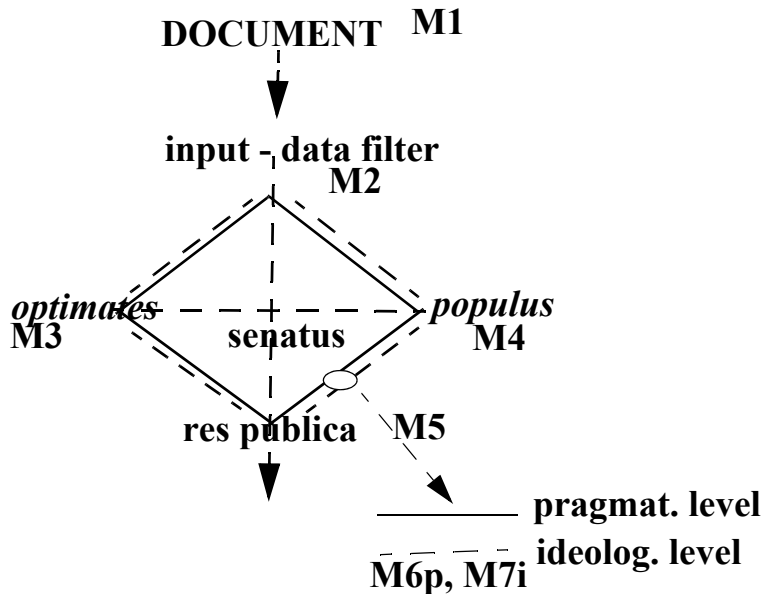


Fig. 3.2.2, *Rhombic Model, Ciceronic View*. The codes  $M_n$  refer to 2.5.1, *A Model for the DRP, in Part II*.

The model of course, is not definitive or conclusive; merely a step or stage on a partly known, partly planned roadmap.

Is the model a good one? In another work, I have developed some simple criteria for answering that question, for which there cannot be conclusions, merely indications. Let me quote from *\*SL, Patterns*:

*What kind of analytical value should we demand from a model? A model may be considered analytically productive, provided that*

- a) it brings surveyable order among elements, while evidencing problem relations between them;*
- b) it can absorb new data and insights,*
- c) it can be modified, enlarged, or adapted upon intake of such resources, and*
- d) if, by such intake parts of it are disrupted, it still lends itself to repair and restoring of its consistency, and*

*if the system under the circumstances just mentioned (a, b, c, d) is capable of generating new theories that demand and can elaborate new empirical material (expanded formulation from \*SL, Iconography and ritual, pp. 160f.). Analytic reality has to take, step by step in the process of analysis, some bounded and fixed form, be it in a list, a flowchart or in some kind of graphic model. It is necessary to be aware of the problems attending the use of such*

*models. Their consistency can only be assessed by the way they can be made to integrate with one another in a manner that seems to produce reasonable pictures of the cases at hand. At the same time the model unavoidably fixes positions and interrelations rigidly, at least for each step, and this is strictly incompatible both with the idea that there may be several levels for the functioning of any specific factor or relation, and with the processlike character of any situation* (end quote from SL, *Patterns*).

In the present work, Cicero's and Augustus' *self-created public images* are in the focus, without considering the notional realities. Facing them will never get us beyond gross simplifications and pre-determined parameters, but let me propose a simplified image which, at least, can represent basic alternatives.

A model's relations to "reality" cannot be accurately assessed, since what we call Reality is too complex, vaguely perceived, differently understood and accepted among people, and fluctuant over time. *And* because no model will cover more than portions that happen to interest us.

We cannot construe *one* model to cover such pictures. We would need a group of them, distributed over different, butbunsure and partially unpredictable levels. Could the single "submodels" in such a system be geometrically and dynamically connected, one leading over to the next, or entirely different; dependent upon some specifically dedicated logic or simply - which is usually seen - choosing from the rich gallery in the literature?

Whichever approach we might prefer, the outcome will be and remain an *artifice*. Verbal models will also be artificial, but their *ad hoc* character less striking than in geometrically distributed configurations. The program offered in this *Section* can best be implemented by referring directly to the protagonists, Cicero and Augustus.

In the wilderness of ideas and actions, Augustus' *Res gestae* introduces an ideological program, actively supported by the new political situation created with the *principatus*. The model in Fig. 3.2.3, "*Realistic*" *Situation Model*, conveys an hypothetical picture, one among many possible ones, of the recordable historical factors and situation, with the partial disruption of the republican State, the entire picture covered up or reinterpreted by Cicero, to fit his views, in his *De re publica*. *Col.* and *Cow.* refer to the works by \*Colognesi and \*Cowell.



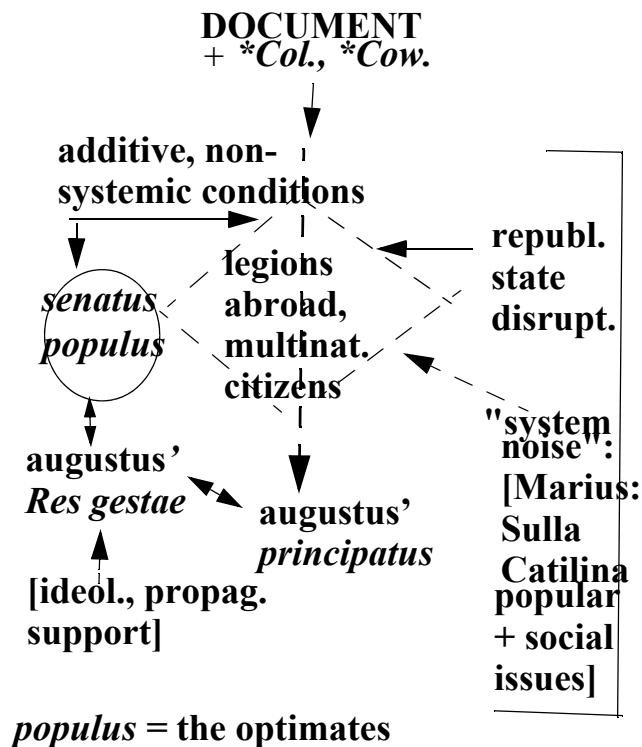


Fig. 3.2.3 "Realistic" Situation Model

The two classical forces, *Senatus* and the *Optimate*-defined *Populus*, having lost their impact, linger in a political limbo, but are useful for Augustus' propaganda. When in the present assignment I focus on these entities, the choice is rooted in Cicero's propagandistic writings. Roman "realities", as emerging from \*Colognesi, *Storia di Roma tra diritto e potere*, present an entirely different, much more intricate picture depending, of course, on changing political, social, military and territorial conditions; excellently conveyed by this scholar.

The idea of the *State* is being blurred and even more unprecise than Cicero pretends to configure it.

The "system noise" in Fig. 3.2.3 refers to the disruptive proceedings and events under Marius and Sulla and under Catilina, for which subjects, see the following studies (all in the \*Bibliography): Cicerone, *Le Catilinarie*, ed. Elisabetta Risari, Milan 1993; Cicerone, *Contro Catilina*, ed. N. Marini; Sallustio, *La congiura di Catilina*, eds. R. Scarcia and L. Canali; and the moderns: Bocchiola, M., and Sartori, M., *L'inverno della repubblica. La congiura di Catilina*; Colognesi, *Storia di Roma tra diritto e potere*; Cowell, *Cicero and the Roman Republic*; P. Heather, *The Fall of the Roman Empire*.

Out of the grand turmoil Octavianus emerges with increasingly dominant position, powers and adherence. Reading his (much simplified) "story" in 2.4, *Augustus' Program*, we shall note that he retains or restores

most of the republican institutions, accentuating the roles of the Senate and the *populus* (= *Optimates*, not "people" in post 19th-century understanding); covering up (or so he must have intended) his new program aimed at giving him, assuming the epithet *Augustus*, a *primus inter pares* power with the accent, ritually confirmed, on the *principatus*.

### 3.3 *Open\_Source and Roadmaps*

With some "substance" behind us, the next consideration is the thematical context.

My models arise and are applied in *roadmaps* and under the perspective of what I have dubbed *Open\_Source*.

No illusions about my mastering my *program and roadmap* completely. There aren't any criteria for completeness.

Let me introduce the subject with a quotation from Walt Whitman's *Leaves of Grass (Song of the Open Road, 1881)*:

*You road I enter upon and look around, I believe you are not all that is here,*

*I believe that much unseen is also here.*

Yes, but my scope is a limited one but will now be further indicated.

We know that *outcome predicted by a theory cannot be required in a precise modality* because of the fluctuating and vaguely bounded nature of almost any one among them, but we can *move towards* a stage or situation previsioned by the theory. A theory in non-exact fields (granted that Math and Logic *are* exact), then, can at best, and approximately, represent a *roadmap*.

The idea and technique of *approximation* is central in Science, and my program for *Open\_Source* research is connected with it, in fact, depending upon it. Heisenberg's notion of *dynamis* is closely related to the idea as expressed by Russell, that all exact science is based upon the idea of approximation.

Some point already made, and a few new ones, will now be considered.

The *Open\_Source paradigm* indicates a program envisioned for considering research paradigmas of different characters, aims and capacities, *rather than* the usual vague notion of *interdisciplinarity*, which presupposes definitions of the disciplines, which vary from one place or time to the next, and are constantly in the process of change, *and* are too comprehensive to permit being handled as stable subjects or notions. I am evading the issue by proclaiming a program of *Open\_Source*, meaning, simply and negatively, that I do not respect the established academic boundaries and try to circumvent them.

The outcome: just practiced, with no depth.

"Progress" or "development" here cannot be modelled on the idea of shifting vogues: *this is not what we discuss today!* - but on capacities of capturing new fields, using improved models and relating them to more neighboring paradigmas and research activities: in one word: the drive towards, in terms of Heisenberg's *dynamis*, the *unattainable goal* of completely fusing the *InDef*<*inite*> with the *Def*<*inite*>. Containing and accepting *uncertainties* mirroring those in Physics, our *InDef* works, at least in this respect, are already reflecting the Sciences. It is, as in most Science, a matter of *ap proaching*.

The notion of *mirroring* remains to be considered.

The most tricky *limitations involved in the Open\_Source* paradigm can be illustrated by reflecting, while not directly copying, business and industrial *Management Information Systems* (\*Part V, OS1). This complex field, as described in \*Davis and Olson, \*Parker and the other dedicated publications, cannot be directly transferred to my program, since those systems and processes are data-driven and direct intervention and control of active business facilities. Again, the Open\_Source model is looks like valid *approximation*.

The present agenda needs some more attention.

To repeat: my efforts are based on and introduced with graphical models, conceived of as *theory-bearing configurations*.

A Historical picture always conveys *our/mine* perception, conception and ideas of relevance and coverage. Nothing is absolute, unequivocal and constant excepting numerical calculations and cases for which we *decide* to attribute more or less permanent values .

Most graphical models can be derived from or referred back to aggregates of *Venn diagrams* (content-bearing circles intersecting, embedded, tangential to one another, etc.). They are *controllable*, they *locate* and *circumscribe*, and, as mentioned, they *show structure* (Richard \*Skemp) and can be used for *pointing ahead*. Most important, they *simplify*, realizing Herbert \*Simon's criterium of simplification of complex subjects. So here I might have set up a system of Venn diagrams, applying the terminologies following upon it (2. *Terminology*, acc. to the \**Microsoft Dict.*).

These qualities of course offer the principal advantage of graphical models in comparison to verbal ones.

When Einstein insisted that a work should start out from a theory, he put his authority behind a common but not always recognized wisdom, developed into norm in certain environment programs (more in SL, \**Patterns*): *It is, Einstein insisted, fundamentally the theory that determines what we can observe (Erst die Theorie entscheidet darüber, was man beobachten kann)* (quoted several times by Werner \*Heisenberg, among oth-

ers, in his *Der Teil und das Ganze*). When facing a task, we always have an idea, however vague and inconsistent, frequently starting out with a *hunch*, about the subject we are going to handle. This is more or less the wisdom in the so-called *Personal Construct Theory* [PCT] (discussed at some length in \*SL, *Patterns*, 4.3.7).

Building models demands, after having developed some general theories, to shuttle back and forth between collecting some info, developing preliminary ideas and predictions about it, and tentative designing aimed at lodging the items significantly and operatively adequate into the models.

For a process of events and developments over time and across complex fields, there is no single approach that will be sufficient. We shall have to posit some stages or steps.

What I am dubbing *imponderabilia* will usually start out from some definite, definable notion, idea, data or quantity. Then literally wandering out into a wilderness only partly penetrated by light, we reckon with this wilderness without, honestly, being able to grasp it. At the extreme end of the imponderabilia, we have the literary *Stimmungsbilder* like the initial site descriptions in Baldassare Castiglione's *Il Cortegiano*, Manzoni's *I promessi sposi*, and Tchekhov's *Dama s'sobachkoi* (*Lay weith the lapdog*).

Here, I shall borrow some cues from \*Abler, Adams and Gould's *Spatial Organization*, a publication subtitled as *The Geographer's View of the World* (1972).

They are working with fields and areas: the *How* rather than the *What: action rather than location* (I am aware that this distinction would not hold if evaluated critically, but it can work pragmatically). The cited authors present a *Theoretical Structure* (their Figure 2 - 11) in which a little geometrical configuration representing *theory* is related to a field in which are indicated *event, experience, construct, law*. As we [the cited authors] intend to use the term <theory>, theories are structures composed of laws and the rules by which those laws are put together.

All program statements (and conceptions of them) and program-related argumentation are *artificial* and never "complete", simply because there are no criteria by which to measure completeness or finality.

The observations just cited should, in accordance with the general scope of the present book, also be related to what can be dubbed purely scientific norms. *end I: O\_S*.

### 3.4 Problematics Developed

To come up here are some intermediate reflexions on some subjects already broached.

Let me return to David \*Bank's 2001 bok about *MicroSoft*, a book aptly named *Breaking Windows*. The discourse deeply penetrates the nature, functions, products, failures, competition situations, and internal exchange of plans, ideas and "cultures" of the largest ever data company, and how current US legislation, not too well up on the matter, could block innovation in a field under constant development.

An important source for Bank's book is the *e-mail* traffic between the directors (also some employees) in the company departments: this is an unusual asset in a monograph, taking us into the depth *and* extension of the company.

Thus Bank's book offers an unique occasion to penetrate the deeper levels of a large organization, offering the best possible raw material for a *Theory of Organizations* (\*Part V, OS4), widely extending depth and scope in many existing studies and models.

| The drive of my program, let me repeat, is to assess the notion and practice of working in an *Open\_Source* modality (\*3.3), which means combining *Def* and *InDef* programs, connecting Social and Historical studies with Science programs.

In the *InDef* as well as the *Def* cases, shifting our position beyond numbers, and reflecting methodological and structural patterns there, whatever we observe, configure, imagine, grasp or understand, is an *artif-icium* created by ourselves, when writing, hoping the reader will get the intended gist of it and, possibly, can expand the vision.

Whatever we face, we will, more or less consciously, methodically, and definitely do as I have just indicated. Somehow we seem to capture and handle a topic or an idea by *acting on it*, processing it conceptually and analytically. Models, therefore, are *actograms*.

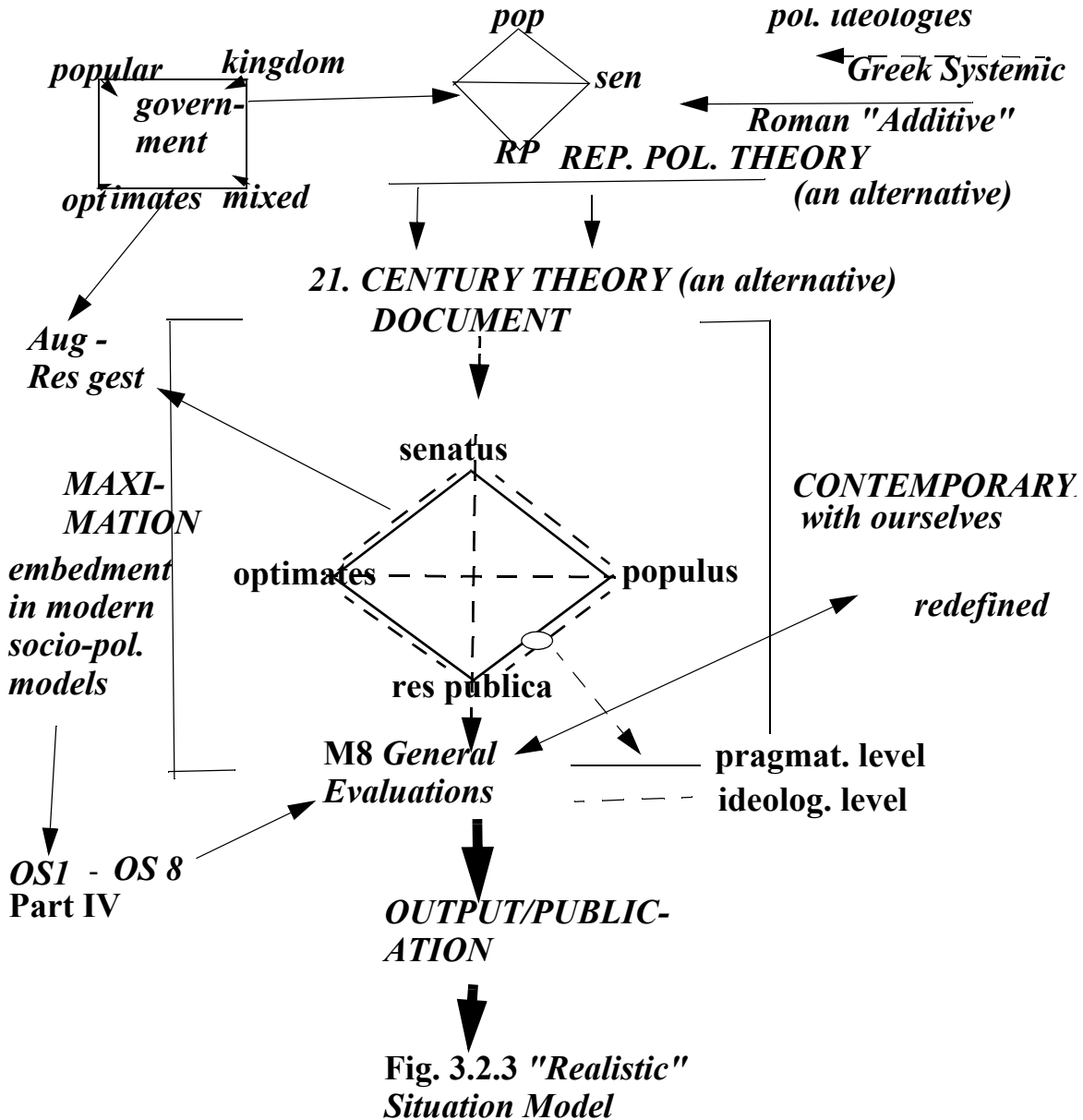


Fig. 3.4.1= 03, *Comprehensive Model*.

Now let me bring once more a model that represents the main substantive work in the present work. The *graph* (Fig. 3.4.1) conveys a summary of the theory-development.

It will be noted that the model is a *complex* one. Generally speaking, the more complex a book or a model or an argument is, the greater the scope for improvements and the potentials for revised versions or alternatives, but an increasing mass of details also leads to further enquiries.. So the model is *experimental*, nothing more than that.

Then there is the *inside-out* approach - let me say, working one's way conically from a minute apex - picking out a *concentrated* theme or historical moment, and integrating it into a wider context, such as in Javier \*Cer-

cas' *Anatomía de un instante*, spending 462 pages on the description of the aborted military coup in the parliament of Madrid 23 February, 1981, which lasted a couple of hours and was blocked by King Juan Carlos' refusal to receive the coup leaders. This book is important for warning against using abridgements and summaries on complex events (and it offers splendid reading).

We do not need to work with ideas regarding *cognition*. Not focusing on *Meaning in Mind* (the title of one of the many cognition books), whatever goes on in one's somewhat fuzzy brain (for which see also \*Damasio), I shall stick to paperwork and computer files and explore *operative* contexts for the written word, aware that distinctions here cannot be sharply drawn, being an issue of approaches, of tendencies, perhaps \*Heisenberg's *dynamis*.

Whatever we think we can say about *cognition*, we should not bother too much about it, but take as a basis or a platform that we set before ourselves a *plan for a drive in some specific direction* - so that the direction counts for more than any terminal and hence more than the notional subject or theme.

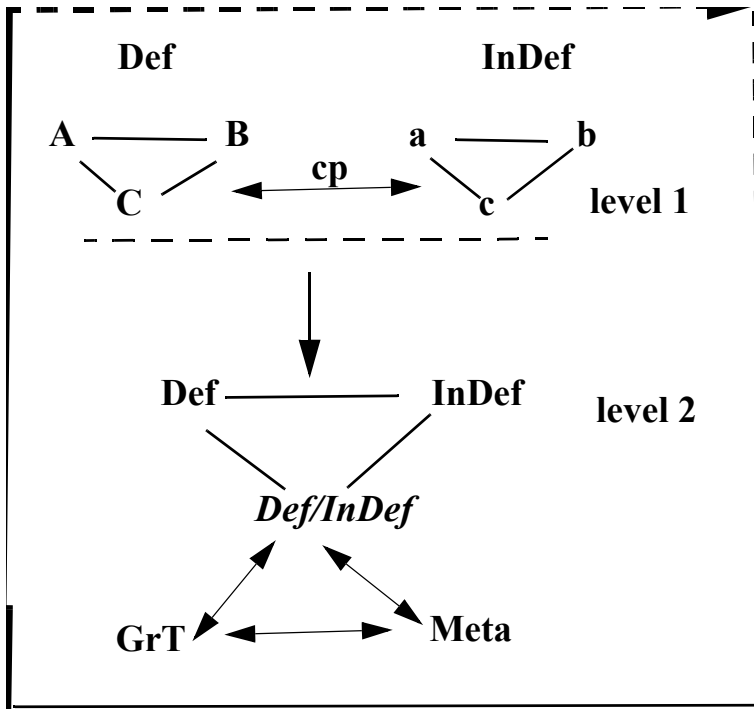
This probably is the right place to introduce the idea of *imponderabilia*, programs, that oscillate between the parameters of the *InDef* <inite> and the hunch (\*SL, *Patterns*).

Now let me specify further my concept of a *system*, which has been adumbrated in the preceding *Sections*. The idea of *system* at the deepest level is rooted in *mathematics*.

There is no System that exists somewhere. We create it in order to be able to handle and control our theme, program or set of subjects and objects. There are no "inbred" rules for setting up one. We have free choice of alternatives, as long as the created configuration answers our needs and purposes and that it works by rules that are implied in our project; *and* that the project needs reformulation if the system collapses or threatens to break up.

*Machinery*, as a concretization of mathematical operations, can be understood in systems terms, offering two different states.

When not running, it represents a *Structure*. Working, it relates dynamically to its former (stable) state and to the environment, earning the name of a *System image* (generally and fundamentally on machinery, also in systems and level terms, in R. L.\*Gregory, *Mind in Science. A History of Explanations in Psychology and Physics*: \*SL, *Patterns*).



**Fig. 3.4.2 Crossplatform Chart - Def/InDef ,**  
**A, B, C; a, b, c, = models handled, resp.,**  
**by Def and InDef procedures; cp = Cross-platform.**  
**GrT = Ground(level)Terms. Meta, see below.**

While the entire present experiment can be considered as a system, it contains a number of subsystems, some separate and some intersecting. One of them is displayed in the model in Fig. 3.4.2, the *Crossplatform Chart*, with the following codes: *level 1*.subdivision in terms of *Def<inite>* and *In-Def<inite>*; elaborated models: A, B, C: a model of some case handled by *Def* programs; and another one for *InDef* with elaborated models a, b, c. *Level 2* represents a development of the entries in *level 1* and the two factors (*Def* and *InDef*) are being correlated, producing two categories of conclusive terms (basic and meta).

The tech words, such as *Def*, indicate actions on some machinery or process, as the units in Turing's numbered strips. The definite words, such as A, B, on the other hand, denote position in some system without dynamics being necessarily involved.

Modern computer language employs numerous words originally standing for significances with a vast array of primary and secondary meanings and applications, many of them of literary interest. If volume considerations had permitted it, this would have been the place to enter the data into an analytical model. There is a vast choice in the literature



(\*Davis-Olson, \*Parker, \*Italiani), Any chosen one is but one among many alternatives: no absolute parameters here.

We have to face parameters of rationality and probability arguments. The notion of the *Def<inite>* values and programs contains interior alternatives, not to say contradictions. Being expressed in terms of Mathematics -> Physics, classical math is basic but is accompanied by probabilistic math. The term is used by De \*Finetti and others. For De Finetti as for Poincaré, the (modern) development of Physics had broken the isolation of scientific prediction, approaching it to normal, private-life predictions and previsions); ideas shared by Giovanni Papini and others, and dramatically expressed by Luigi Pirandello.

The machine image of man doesn't work. Of course I am referring to \*Sowa's Conceptual Structures, optimistically subtitled Information Processing in Mind and Machine, as if the two "partners" were really - partners.

Against what I am claiming here, one can submit that I have myself attempted to make the *InDef* reflect the *Def*. So what?

The latter is considered a reflection of the former, both being loaded, handled and used in discrete digital units. So are our machines, at least the classical ones. In the present assignment, I am not comparing the cases, only the models extracted from them.

\*Sowa and others show upside-down trees and flowcharts to configure how we handle conceptual structures.

Do we really mentally follow or pursue chains of links like that?

Or is there another more adequate model for our mental behavior, one of roughly concentric rings?

Let me quote from SL, *Patterns, on Systems*. - 1.2.1, *Description and representation as tools*

A program for handling the issues just recorded involves decision on the alternatives of *description and representation* versus *causal explanation*; the two former terms taken in their garden-variety: somehow depicting, giving a *system-oriented image* of something. Since *explanation is a byproduct of systemization* (G. Radnitzky), or better: *systemization is explanation*, systemic matter is the only kind we can grasp and handle, and since our objects are products of systematic analysis, we can let *causal* explanations out of our purview, as far as non-quantifiable subjects not amenable to being automated, are concerned.

*Description* is a process by which the features of an object and the structure they form, are rendered accessible and workable by verbal, visual or numerical means, with the purpose of achieving tractable pictures of the object.

On the other hand, we can say that *representation*, a subcategory of description, I take to mean transposing or transferring a description of the *structure*, over to a different verbal or visual expression such as, for example, a *graphic model*, with the purpose of displaying its buildup clearer. This is in agreement with my idea that *abstraction* does not work one way only (from the concrete to the less so) , but should be taken to mean transfer from any one format to another (\*Fig. 3.4.3, *Procedures*).

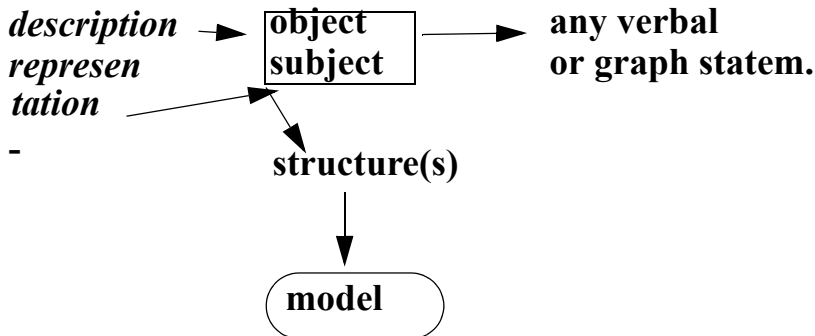


Fig. 3.4.3, *Procedures*

My program so far outlined is ultimately focused on an argument we could call facing realities, implying here that "reality" is no manifestly established notion; chiefly so when, as in the present venture, I am trying out configurational models on them.

Let me go on with the program for this work as being centered around the idea of systems, presenting and discussing various minor systems expressible in charts and other configurations.

We can speak of an operative reality in the present exercise, a field which stands as basic and relatively firm. In the present case this is the definition, evaluation and application of my models. Qualifying my models as operative is meant to emphasize that they are not models of *What* things are, but *How* we handle them cognitively and analytically.-

One advantage of using graphical models over pure verbal procedures, despite the limitations involved, is that comparisons between texts can be more precise. This process of course presupposes a set of larger systems ideas into which the actual elements must be fitted.

The principal one is that of a basic, foundational and hypothetically all-comprising picture developed for having integrated in it, socio-political systems; the idea being expressed and made manageable in terms of models

This procedure will work regarding History, which must, as I have noted, be handled as if it were contemporary with our handling it; no time

distance being available in analytical terms. You can tell that so and so happened  $n$  years ago, but you cannot show it. Again a case of distinguishing between the What and the How.

I assume that this selection in the cited order will convey some crucial ideas of his regarding possible common basics for Def and InDef scholarship. But not to extend my discourse beyond reasonable limits, I shall bypass this program here, and proceed to developing the notion of *systems*, the notion having to be developed as we go on.

Systems are artificial constructs and so are most of the top emergents in Physics. So what we can handle at such levels, can be described graphically, digitally and verbally, not strictly speaking defined, in absolute semantic or logical terms.

When History is being described, as here, in terms of a reflection of the *Def<inite>* paradigmas, this is not a matter of *What* they might be, but of *How* we describe them - and accordingly act when facing them.

Inventing and building a model can be the fulcrum in an inception theory, and developing and elaborating it the central factor in our application theory. By this rule, models can be the most important productive and informative agents in our work. An important paradigma here is *Open\_Source* work.

There are  $n$  ways to frame a question and many of them can be adequate. We usually know more less where we are at any given moment, but we rarely have more than a narrowly limited vision of the surroundings and the alternatives.

Systems can be embedded in larger ones and contain smaller ones. So we have to develop some rules for a grammar of models.

Most models and graphs being in use in the present work can be considered as *frameworks* when they appear in a group of two or more. One of them can be so considered for the items loaded into it. Around these entities, frameworks of various paradigms will usually be constructed or found already present. The point is: boundaries arise where we determine them to. The term *framework* is editorially useful, not much in analytical sense.

Graphical models usually require a definite framework, but to be efficient, they should not take up much space. A matrix over several pages has to go in favour of a regular verbal account. I do consider the model just displayed as the maximum of acceptable complexity. But I do not have any reliable and applicable metric for evaluating the dimensions here.

Noting that "reality" is a context-dependent and purpose-determined notion, the *models* here presented depict *different realities*. Our various realities can be expressed and interrelated in terms of *words* or *graphical models*. The syntax conditions and functions are different in these two uni-

verses. Hence, displaying a notional graphical model is *not* a straight translation of the corresponding verbal formulation. The model does *not* substitute the words.

Historical conditions and events have to be made manageable by being understood, which means being *translated* or *transferred* to some systemic terms. My point here is that by whatever excellent prose account we apply, a historical situation or process is not being understood in an operative sense unless integrated into some systems view.

I will consider *understanding* as an ability to situate a statement, term or program in some preestablished *system*. The system itself is a product of rational choice according to project, purpose, aims, etc. and for which no further rules can be settled in advance. In more detail:

1. The program for exploration, recording and working out, is available for being integrated in some describable and manageable system which is being axiomatically accepted;

2. a program, according to Webster, 4 a : a plan of procedure : a schedule or system under which action may be taken toward a desired goal : a proposed project or scheme.3. the program uses some or all of the system's parameters or information potentials;

3. Any elements or features that do not fit into the system are considered pragmatically as unimportant and to be bypassed or put on record as potentially relevant.

4. Awareness Organizing. Programs such as the one presented here can have, whatever their merits and faults, an effect that I might call *Awareness Organizing*, an effect alerting us to topics, themes or sequences that we now see embedded in an organizational pattern, a sound one or one that provokes us to modify it, thereby activating the Program itself.

5. The list (1. - 4.) represents nothing more than a general project or action plan, not pretending to be "philosophically" or logically valid, important or necessary; setting up this list is experimental, with no great pretensions, giving a sketch of my proceedings. It can be useful if it draws criticism, thus leading to changes.

My observations and argumentation owe much to the Sciences.

Today at least we know this: that few things even in Physics are "objective" and can be directly grasped; that, beyond certain measurable and experimentally established entities, we nilly-willy *construe* facts and chunks of whatever we have before us, grasping the subject indirectly, filtered through layers of inbred and customized attitudes, interests, capacities and competences.

My elaboration of texts by Cicero in *Part II*, is nothing but a systemization of what happens more or less consciously and inavoidably when rea-

doing a text carefully. Of course, I try being "conscious", but the old adage of knowing oneself is outdated at least since the *Quantum* revolution, which took almost all human faculties in its grasp.

Let me get a learning from *Cicero* himself (*Paradoxa stoicorum*, ed. \*Badalí, p. 118). From where should we take advise? *Etiamne in minimis rebus? Etiam si, quidem rerum modum figere non possumus, animorum modum tenere possumus* (even in minor cases? Certainly, since we are not able to establish a firm criterion for the definition of all things, we can <at least> set up criteria for our attitude to them).

### 3.5 Models Embedded in Systems

With this heading I intend the close-up systems, usually extensive, in which models are made to operate, figuratively in the present book. Furthermore, I distinguish *systems* and *frameworks* from *context*, the latter meaning the closest environment for one or several models (\*3.6, *Models in their Context*).

The first task with a view to developing this program, is to to distinguish the features of *shell* and *carrier* related to the position of models as a phenomenon in the present book.

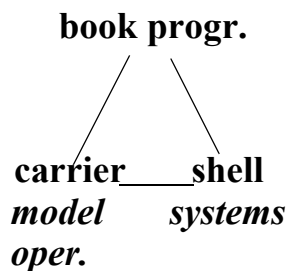


Fig. 3.5.1 *Book/System*

Pinching and slightly redefining the twin-term, *shell and carrier*, used by David \*Bank (of the *Wall Street Journal*) in his book about *Microfoft* (*Breaking Windows*, 2001, p. 111), I will say that the entire program of the present book consists of two levels, a *shell* of developed systems determining the status, modalities and range of the models, and a *carrier* containing the model operations (Fig.3.5.1, *Book/System*); The two lower units on the figure denote a *platform* (in one interpretation).

Basic to the present assignment is the direct comparison between factors usually regarded as incommensurable: models from *Science* and models from the Humanities, such as *History*. There are many levels on which the two processess merge, are tangent to one another, or overlap.

My work is not technically *model-driven*, digitally running and working, but, as will soon be clear, *model-supported*, my *non-digital* type of model being rather an indicative or pragmatic application, conveying *direction* or *tendency*, Consequently, my queries, when applying the *Def/InDef* paradigm developed here (definite, indefinite), will be of the *How* category rather than the *What*.

The problematic aspects of the *Def/InDef* couple will be a recurring subject, but at this point I can state as follows:

Here are some further observations on *model application*.

We can say that the assets of a graphical model are (at least) two:

1. It distributes spatially the relevant entities and categories, so that their interrelations are evident and can easily be modified or deleted;
2. It can - and usually will - include and position verbal expressions, thereby 2.1, effect direct links with verbal expressions in accompanying language (English, German,.. whatsoever); and 2.2, keep the graphical structure, which should express the essence of an idea or observation, while the contents can be conveniently manipulated or altered in the same larger context.

\*Brambilla &Co supply the following distinctions (pp. 1f):

*A huge branch of philosophy of science itself is based on models, Thinking about models at the abstract and philosophical level raises questions in semantics..., ontology..., epistemology..., and philosophy. Models are recognized to implement at least two roles by applying abstraction:*

- *reduction feature: the models only reflect a (relevant) selection of the original properties, so as to focus on the aspects of interest; and*
- *mapping feature: the models are based on an original individual, which is taken as a prototype of a category of individual and is abstracted and generalized to a model [configuration? to avoid using in the definition the term that is defined].*

The \*Brambilla &Co book is mainly concerned with models of the *digital* category, but these subjects are wrapped up in arguments of a more intuitive kind, and here I have extracted some useful observations and notes.

We recall Herbert Simon's program, just cited, to simplify an issue, removing some of its *cluttering details*:

Richard \*Skemp, in his *The Psychology of Learning Mathematics* (pp. 83f.), makes the point

*Verbal thinking... is internalized speech... The use of pronounceable symbols for thinking is closely related to communication; one might describe it as communication with oneself. So becoming conscious of one's thoughts seems to be a short-circuiting of the process of hearing oneself tell them to someone else. This view is supported by the common observation that actu-*

*ally doing so to a patient listener (thinking aloud) is nearly always helpful when one is working on a problem. Visual thinking is a much more individual matter; and the relation between these two kinds of imagery will be discussed further in the next chapter.*

And Skemp goes on with his next chapter, (vii) *Helping to Show Structure*, this program forming the nucleus of his important book.

One aspect of how my InDef program can reflect the Def, ones is evoked by the programs for paralel processing. With our models we can build systems of parallel trajectories or trails to follow; another variant: Serial. These can be studied separately and in conjunction with one another. Verbal modelling is tied up in linear configurations, forcing us to take one after the other.

With the graphical models we can build systems of parallel trails, which can be studied separately and in conjunction with one another. Verbal modelling is tied up in separate linear configuratons. \*Minsky and Papert.

My central question needs a further consideration: can words or groups of terms be treated as pictures, not asking for deeper "meanings", and be evaluated only for positions in some system? (see also Part III, 3.2 A Basic System).

If so, can strings of word be treated as complementary to graphical models?

The question arises in several contexts.

In the present work, the Def<inite> values and procedures, related to the InDef<inite> values and procedures, should preferably act, heuristically, as frames of reference for my InDef approaches (frames of reference in Physics: \*Alonso and Finn, pp. 30ff.: Richtmyer et al, pp. 46ff.).

This program, however, cannot be fully implemented because in many of the seemingly solid parameters, factors of indterminacy will enter the game.

The essential teaching to be culled from them is to work process-oriented rather than subject-oriented, and, as a corollary, that there are no definite conclusions or results. For we can probably handle indeterminates or imponderabilis in a process, and with less precision and efficacy as isolated entities.

The bulk of the complexities involved here can be bypassed by the technique of focusing on terminologies rather than ideas - provided the the two can be kept separately. The argument consists exactly in trying to

achieve this. There are no absolute criteria for success here, so a pragmatic attempt will have to be evaluated by pragmatic standards.

A problem regarding the focusing on terminologies rather than ideas is that in Cicero, where they will be mostly applied, they will often appear as if isolated. His terms can be compared with their application in other writings, but the Romans mostly took them for granted, and we have no means for achieving a higher degree of precision here (Classicists may correct me here).

No verbal formulation is ever sufficient; partly because there are no criteria for what this would mean. Nor is any graphical model sufficient. But using a graphical configuration, one line of applications can be supplemented by another one for one and the same issue or case or statement, and the overall picture can come out more articulate and more manageably.

Starting out from language, then, we can build graphical models; and the present work is meant to be developed around them.

### 3.6 *Making Models Work*

My *system* is a metaphorical tool, *not* a formal system whose *consistency* can be evaluated and proved by asking if there is at least one topically relevant factor that has no place in it (to adopt the normal definition of systems *consistency*).

The upcoming chart (Fig. 3.6.1, *Conjunction Schema*), which displays the *structure* (not the subdivision in *Parts*) on which the *present book* is built, shows a combination of four configurations, in fact, an *operation field*: *Observational*, *Organizational*, *Combinatorial*, and *Perceptual*. Depicted, and related to one another, are the four main phases in the building of models and charts in the present context.

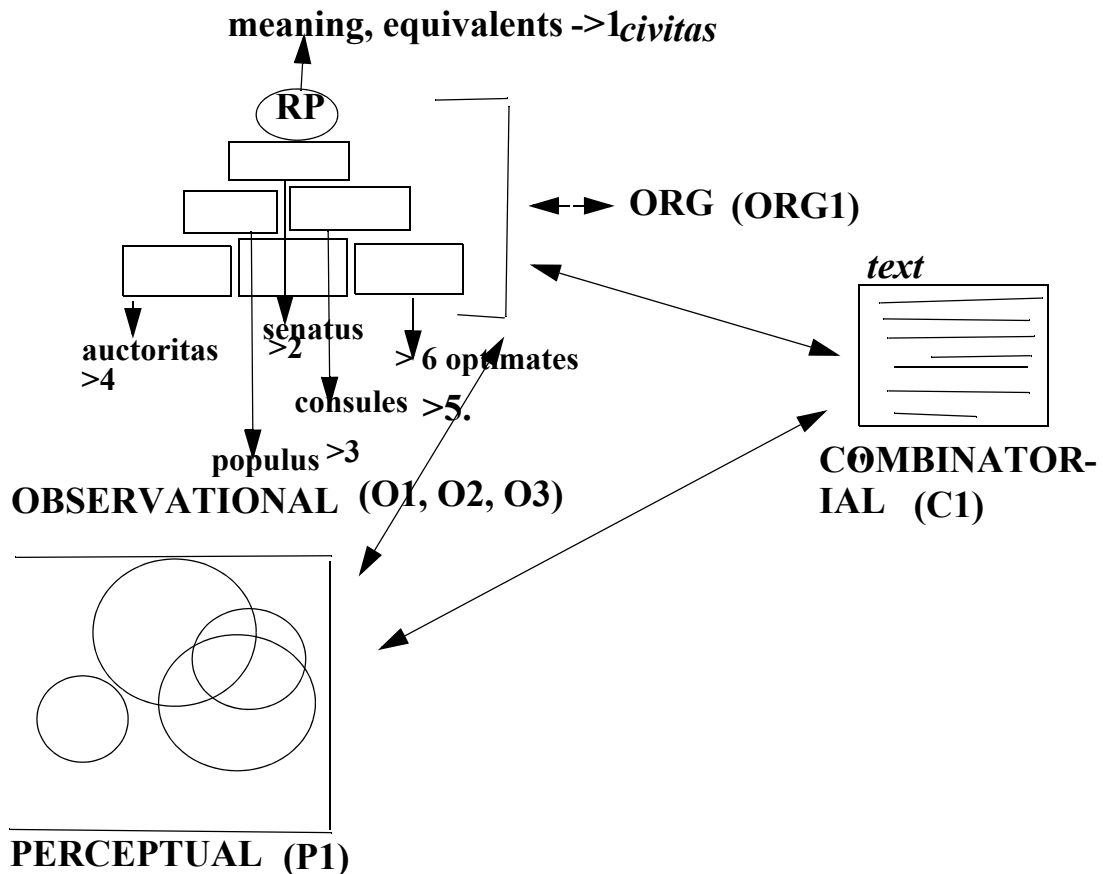
The first part, *Observational*, gives a program map of subjects and their interrelations in an upcoming or hypothetical elaboration, usually set in relationship to an organization model (ORG). This group gives a maximized picture of the central historical issues of this book.

The next figure is labelled *Perceptual*, the idea being that we elaborate mentally whatever comes up in our observations, and that this will include some *imponderabilia*, while the boundaries between the entities are not always sharp or clear, hence a system of *Venn diagrams*.

The third, *Combinatory*, presents the image of a written text, such as the *present document*, intended to coordinate the other entries, starting out from *Observation*, while elaborating the entries intellectually.

The ORG entry on the schema represents specific organizational issues that are handling the items noted in the *observational* configuration.





**Fig. 3.6.1, Conjunction Schema.** *RP = the Roman state: res publica. 1, civitas indicates the larger socio-political framework. ORG indicates elaboration of organizational issues in the observed system.*

We should here need a more careful description of the entries in the *Conjunction Schema*. Specific categories are connected with the parts in the chart, in the following order, referring to the sections in the upcoming schema:

**1. Observational:**

**O1 - model types, codes**

**O2 - structure(s)**

**O3 - contents**

**2. Perceptual**

**P1 - models embedding perceptual system**

**3. Combinatorial**

**C1 Items working connectedly, creating overarching configurations. Crucial terminology.**

**4. ORG**

**Organizational structures and functions in the *Observation field* (1).**

Having presented the idea and "prefigured" the implementation, which would demand too much space, I shall go on.

The intercom between the *InDef*<*inite*> and *Def*<*inite*> parameters rests on *single terms or words* for *InDef*, rather than literary formulations or texts, since this parameter represents the indefinite polarity in the game. The *Def* part is available for regular logistic handling, since here we can use terms, notions and programs in Physics and Math.

The crux here is of course how these entities can be brought to a common level. *This is the crucial point in this book*, and I do not pretend to having the final answer..

That is to say that the *InDef* more or less consistently will come out as an appendage to *Def*.

Having noted that we have to renounce on certain features, and simplify, as with almost any analytical argumentation or statement, especially *theory, our studies* of History and of essential sections in *Physica*, are amenable to being directly coordinated (Von \*Weizsäcker, *passim*).

This will mean that what we gain in clarity is lost in nuances and flavor. But the interrelation and interconnection between the two parameters cannot be satisfactorily established directly between them, incommensurable as they are.

We shall need a *third factor* linking *Def*<*inite*> and *InDef*<*inite*> up, as a *tertium comparationis*. We are at the moment on the right turf, that is the *computer*, and can set up an experiment in that context. For modern data handling combines the *hard* and the *soft* values, digitally and discretely conceived models with language signs such as normal words.

In the following paragraphs, I shall suggest a *tentative* model for a configuration-cum-function which in computer science is called an *Operating System* (from now *OSys*). For our approach to this notion, we have the excellent publication by Sacha \*Krakowiak, appropriately named *Principles of Operating Systems*.

An *OSys* is like a spider sitting in the center of the web, surveying it all, cathing whatever turns up as tasty, and digesting it, dispelling the rest. The discriminatory function is crucial: the selectional capacities are necessary in an *OSys*.

For the stated *experimental* purpose I have to build a *Composite Network* (Fig. 3.6.2) relating, as I just mentioned, my present assignment to well-established *uncertainties*. The rules governing the model are mainly four.

1. The model can be constructively be compared to the famous *Turing Machine*. It can be imagined as consisting of one section with reality rele-

vance, and another one working indefinitely, with no inbuilt factor to set a stop.

2. The Turing Machine is an infinite strip with numbered subdivisions. My model is no strip but a more complex structure, consisting of numbered or named boxes, which should not make an operative difference.

3. Like the Turing Machine, my model could have worked technically if it were a hardware construction, except for the undefined terminus.

4. The model, to serve its purpose, should be able to figuratively (and experimentally) integrate the *Def/InDef* dilemma, thus referring to Physics.

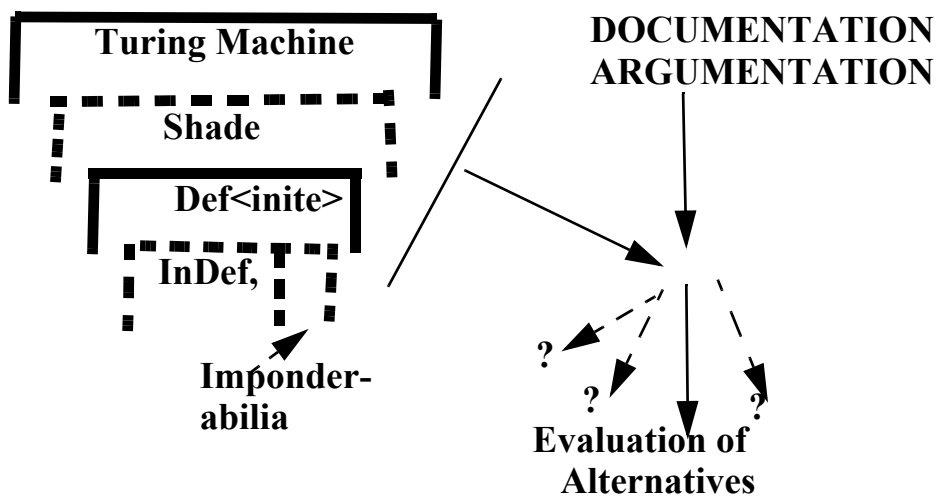


Fig. 3.6.2, *A Composite Network: Def/InDef Anchorage*. The "Shade" illustrates an interposed reflectional mechanism abstraction based on Giordano Bruno's ideas, representing our interface. The "imponderabilia" are notions oscillating between Def/InDef and free literary norms (see below).

There remains the consideration, perhaps "fact", that *Physics* is basic to everything we do and think. Physics were renewed with the *Quantum* revolution and with some of Einstein's discoveries. The Section, *Teilchen, Felder, Wechselwirkung, 1. Offene Fragen*, in Von \*Weizsäcker's book on Physics leaves us without illusions about a determinate basis in Physics. We cannot do anything minimally interesting and hope the outcome is definitive.

So I would be classified as a *relativist* by Margaret S. \*Archer (provided she had heard about me). According to her (pp. 20ff.), *relativism* presupposes (at least) two parameters, *truth condition* and *successful translation*.

These qualifications are relevant, as I see the matter, in strict logics, but not in linguistics or emotionally colored thought and verbal interac-

tion, nor in all parts of Physics. We will, above the rather dubious level of "basic" constructs, hardly ever be precise and to the point, since there are no agreements about *precision* or *the point*.

Perhaps the greatest advantage in using *graphical, designed models* is that they force the idea of *categorization* upon us, usually provisional, let me remark, an idea too easily remaining passively in the background, if at all present, when we rely only on verbal models.

László \*Méró has published an interesting book with the title, in the Italian version, *I limiti della razionalità*, generally telling us that they are narrow. But to define boundaries or limits, you have to argue rationally. Rather than trying to fix these limits, we should start out investigating rationality and its applications to see how far we can get, where we are sliding into the *imponderabilia*. Anyway, his book is a contribution to the general trend, an early stage of which was \*Heisenberg's proclamation of the *uncertainty principle*.

Typically, so-called *emergent properties* will merit consideration here; so I am referring to SL, *Patterns* (\*4.4, *Emergence and Object*) about this notion, from a paragraph regarding also another important parameter, *Object Orientation*.

To quote from SL, *Patterns* SL, 4.3.2: Pretended attributions to *Science* or sections of it presupposes ideas about *where to place it*, in physics, mathematics or elsewhere? Thus Fischer claims that the quantum idea of *uncertainty* (Heisenberg) was in reality especially revolutionary, *philosophically* rather than physically (*Die Unbestimmtheit war tatsächlich besonders revolutionär, und zwar mehr aus philosophischen als aus physikalischen Gründen*) (Fischer, 2002, 91; for Max Planck's fundamental role, see Fischer, 2007; an excellent account on *The Uncertainty Principle*, in \*Bowler and Morus, pp. 265 -270). Can "Physics" and "Philosophy" be distinguished and kept apart so definitely?

To repeat an argument from SL, *Patterns*: *Physics* is not exclusively a "hard" science, and such an experience as the development of *quantum theory* and the related debates as reported in Selleri's *Die Debatte um die Quantentheorie*, may encourage me to *accept probabilities as the final outcome*, rather than hunting around for definite conclusions, and also a vectorial mode of seeing things, dealing with *directions, tendencies and propensities*, rather than hoping to come up with something converging upon a centre or orbiting around it .... Furthermore, and this seems the most useful aspect of "interdisciplinarity", Niels Bohr's often faltering approaches and Werner Heisenberg's mixture of "hard" and inspirational discovery of the nucleus of the *Uncertainty Principle* (\*Heisenberg, 1969,

96f.), must have a sobering effect on claims to be *wissenschaftlich* in any definite sense.

### 3.7 Models in their Context

I distinguish *context* from *frameworks*. Of course, these dimensions cannot be precise, but they can serve pragmatically, the former meaning the *closest* environment for one or several models. In other words, we are narrowing down the view, taking a closer look.

Let me now set my models and the systems idea in a *narrow context* (as distinct from a larger *environment*, for which, see 3.4 *Frameworks for Models*). We have seen that in the present work, *models*, graphical as well as math and verbal, are being used for mainly two purposes:

1. *statically*: configuring theory for *describing* situation, status, reality or models of it;
2. *dynamically*: as tool for *denoting* directions, processes, methodologies, procedures.

Facing the problematic relation, provided there is one, between *InDef*, and *Def* subjects, took me gradually over to the field most useful for the test, *Physics*, which in turn led me to earlier ideas of mine.

*First*, that by opting for the principle of *How*, rather than *What*, the items are being loaded into a dynamical system which represents the end term, *the process itself becomes the outcome of the entire operation* (for the distinction *process - procedure*, see \*Buchler, pp. 1ff.).

*Next*, to debunk the current idea of *Interdisciplinarity*, since I am *not* connecting disciplines or academic "schools" but *methods and operative modalities - an Open\_Source perspective*.

Pursuing this perspective, I have tentatively approached models in Physics and the Sciences. Speaking about Science, not only human relations: we embark upon *conceptual experimentation* and *evaluating processes*. There are no conclusions here, because, to cite \*Feyerabend, *Anything Goes - adding: provided it works*.

When applied to what we are used to consider *real cases, conditions* or *situations*, my models drastically simplify the subjects. But so will even the most "detailed" and "specific" verbal model, while the tie to linearity and idiomatics easily will obscure the structure even more severely.

Next, there is the issue of coverage and relevance.

Even in a *program focused on Classical Latin literature*, alien models can be introduced whenever they can make our handling of the subject in focus more articulate and efficient. I shall use Physics for this purpose, since this field relies on interconnected entities, by Feynman classified as "Babylonean", rather than flowchart-like systems à la Euclid (\*Feynman,

*The Character of Physical Law*). I shall be referring to Physics because here we are in a real-world scenario; whatever can happen by our handling here, should be applicable also so a InDef field like a program for History. Our picture - or pictures - of Physics can serve, better than the verbally overloaded and unsurveyable mass of Humanist writings.

No story of *Physics* can be complete, simply because the field itself will never be so, nor defined in terms acceptable to scholarship generally, remaining a subject for approaches and developments: features, though, that we can follow with some precision. A chosen structure, therefore, reflects some specific pictures of Physics, never *The Discipline of Physics* totally; some picture of realities, a few among which can be studied directly and manipulated (and with experiments). We shall note that a major divide in the publications to be cited, goes between those that are working bottom-up and those with top-down approaches.

Can I construe a correct picture of Physics? Of course, not, for there isn't one.

Our thinking mostly goes by various kinds of abstracting models. Seeing some of my comparisons between entities in historical material, readers may rightly react negatively, if they take the comparisons at face value.

But I am not comparing the cases, only the models extracted from them. How can one access a case without doing so through one's mental and intellectual setup and functioning?

Let me cite what appears as *The Text Book*, \*Alonso and Finn's Physics (1138 pages). The book starts out with The Structure of matter, Measurement and units, Rectilinear motion, Curvilinear motions, Circular motions, Force and momentum, etc., and subject of perhaps more focused interest only in Chapter 19, pp. 483ff., The principle of relativity.

Documentation and argumentation with graphical models, with their allocation of themes and visually appreciable interrelation, share some of the parameters in Physics. Verbal models fail on that account.

A major advantage with combining verbal and configurative (graphical) modeling is to capture the complexities attestable in most documents, while at the same time making demonstration relatively simple and surveyable. We understand simple work better than complex, not to say complicated. Assisted by graphics, we can avoid many verbal acrobatics and pitfalls such as are affecting some branches of scholarship. The cited combination can display how things are playing out and offers scopes for and articulation of problems that cannot be brushed aside because the space structure of the models demands some action here.

Developing a model or some other system becomes a process with increasing ranges of awareness, with feedback upon us. The significance,

range and application of the *Key Terms* are less simple than emerges from my use of them. There are terminology-relevant observations, without using my terminology, in several contributions in \*Pettit and McDowell, *Subject, Thought, and Context* (1986) *passim*, especially Jennifer Hornsby, *Physicalist Thinking and Conception of Behaviour*, pp. 95ff. In this connection, Gerald Vision's *Modern Realism and Manufactured Truth* (1988) is especially rich in perspectives and challenging ideas. I would have discussed these contributions carefully here, but then my experiment would burst at the seams. Also I do not want to bypass *The Construction of Reality* by \*Arbib and Hesse (1986, 420 pages).

We have to gain some control over what we are doing, and can evaluate the result as they turn up, especially since we do not *find* the programs and responses, but *create* them, working, as Gerald \*Vision's book title states. ... *Manufactured Truth*.

The very first words of his *Preface* indicates the *trajectory* :  
*We are witnesses to an age in which the comfortable assumption that reality is 'out there' to be discovered is being, or has been, replaced in philosophy by the adage that all conceptions of reality are saturated with our mental projections, if not wholly products of cognition. According to the new creed, our notions of reality are the upshots of conceptual contributions, indigenous purposes, 'ways of worldmaking', social and and economic mileux, semantic practices, the assumptions of prevalent scientific theories, or even our fertiule imaginations.*

Following this lead, we have to accept an amount of *uncertainty* in our trajectory (insisting on what is obvious!). The fact that Uncertainty is accepted basically in Physics, the Calculus and certain numerical series, does not give us direct support, but can offer models which can prove useable and useful when we intervene creatively, manufacturing our realities. Demonstrable unceretainty or *Indefinitess* in our arguing and model application can turn out as an asset, because it helps us to bypass our traditional learning about final results and conclusions.

The formalized notion of *Uncertainty* was launched in Physics in the 1920s by Werner \*Heisenberg and others. Recently, it has turned up again, in a created universe of mathematics modelling: *Perceptrons - the simplest learning machines* (\*Minsky and Papert, p. vii.), one among the recent contributions teaching us to be aware of and accept *complexity*.

James \*Gleick has a mass of fascinating but not very precise information on complexity in his book *Chaos*, and \*Gell-Mann offers some simple (!) figures on complexity in his *Jaguar* book. He draws up eight points and shows that the two simplest configurations are when no lines are

drawn between the points and when lines are drawn between all of them, the complexities consisting in the "intermediate" cases when lines are drawn between some of the points. This I would call a *recordable complexity*.

But the movements of the worm wiggling in water is hardly recordable by normal observational methods, representing a chaotic pattern. Even though analyzable with advanced methods, the overall image seems closest to normal human mental states at the crossroad between countable order and chaos or *imponderabilia*.

The general perspective in \*Brambilla, Cabot and Wimmer, *Model-Driven Software Engineering in Practice (MDSE, 2012, 165 pages)*, is definitely digitally-modern, but there are plenty of proposals and part-programs in it than can be useful also in a wider perspective and on a less digitally established technical level. This work present a good illustration of the complexites in modern paradigms.

The authors supply a high number of useful and challenging graphical models, such as one on p. 10: Fig. 2.2: *Overview of the MDSE methodology*, relating procedure steps to the cited methodology, one of the contributions to *pattern formation* in the cited book.

On pp. 14f. the authors go beyond basic model sover to *meta-meta-models*, announcing that *metamodels basically constitute the definition of a modeling language, since they provide a way of describing the whole class of models that can be represented in that language* - a statement indicating the significance of a *language* such as is used in the context. Developing this idea, they arrive at their notion of meta-meta models (illustrated on their Fig. 2.4 , *Models, metamodels, and meta-meta models*).

The rather unpleasant notion of meta x 2 or 3 refers to the existence that I cite elsewhere in the present work, of models that are embedded and also embed other models.

My surely unsatisfactory report from the cited work at least can indicate the main message and the range of formalization. The book can be useful precicely for efforts *not* geared in formaliztion terms, simply (as I see it) because one can see here that the formalizations seem to cross the border between normal human grasp and understanding and pure computer digitalization. The MSDE book, in my opinion, is *pragmatically* useful by defining borders and boundaries. We are not informed unless we have, at least provsionally, an idea of the limitations to the info process.

There are the *boundary conditions* to be considered. The term is \*Simon's (*Models of My Life*, p. 83, and elsewhere in his publications, most particularly in his *Reason in Human Affairs*, 1983):



*The important lesson I learned... was that my conclusions depended at least as much on certain assumptions about boundary conditions as on the central assumptions of economic rationality that lie at the core of neoclassical theory. By "boundary conditions" I mean the assumptions that have to be made about which indirect effects of a change in taxes [his case, but the idea can be transferred] the human actors would take into account in making their decisions and which they would ignore.*

Herbert \*Simon, in his, overall strategy, opted for realism, addressing the need to include the *human factor* in the game, avoiding entrenched positions and, of course, paying for it by refraining from definite conclusions.

Some of the advantages arising with the more complex *situation-focused bi-dimensional* models, such as those in use here, fail to arise in certain graphical models in common use, such as the *trees* turned 180 degrees in use in linguistics (Emmon \*Bach, and elsewhere). Herbert \*Simon, *Models of Thought*, p. 148 (in a contribution with two collaborators), shows a *horizontal tree structure* (his Fig. 1): *A Problem Maze*.

Such models do not normally indicate *context and drive*, thus being less efficient in documentation and argumentation.

For a model to be efficient in the sense just indicated, it must show *space extension* and *time*. Remaining neutral over these dimensions a model lets go of considerable potentials - and perhaps even *analytical realism*.

As a consequence of the perspectives just stated, a certain amount of *instability* must be accepted for the promoted observations, claims, configurations *and* conclusions in the present work. By virtue of this, my book can stand as a useful example.

Let me supply a few more notes on the notions of "relativity" and uncertainty, citing them as they arise in \*Bruno and Giorello's *Introduzione to Bruno De \*Finetti's work* (p. 20). We their references, we are situated in the centre of recent attitudes to scientific reasoning.

*Come per Poincaré, così per De Finetti sono gli stessi sviluppi della fisica ad aver rotto "il magnifico isolamento della previsione scientifica", riavvicinandola "alle comuni previsioni o congetture della vita privata".*

For De \*Finetti as for Poincaré, the (modern) development of Physics had broken the isolation of scientific prediction, approaching it to normal, private-life predictions and previsions; ideas shared by Giovanni Papini and others, and dramatically expressed by Luigi Pirandello.

Bruno De Finetti (p.35) quotes the *celebre* passage in Pirandello's *Uno, nessuno e centomila*:

*Ci fosse fuori di noi, per voi e per me, ci fosse una signora probabilità mia e una probabilità vostra, dico per se stesse, e uguali, immutabili. Non c'è.*

*C'è in me e per me una probabilità mia: quella che io sento, e una probabilità vostra in voi: quella che voi sentite; le quali non saranno mai le stesse, né per voi, né per me.*

Not aspiring to be a Pirandello translator, let me convey the gist. Probability is not outside us but inside us, and the One for me is not the same as the One for you.

Finding the following observations on the subject provocative *and* pivotal, let me quote them, offering then a summary (De \*Finetti, p. 77, himself an internationally respected statistics expert):

*E ora che la verità si è svuotata, quella consacrazione [traditional parameters] è un ostacolo. Oggi l'apparenza della meccanica statistica, della teoria dei quanti, della meccanica ondulatoria, ha messo in discussione la causalità e il determinismo, rompendo il magnifico isolamento della previsione scientifica per ravvicinarla attraverso gradualità concessioni alle comuni previsioni e congetture della vita pratica. Non vi è più, nella previsione scientifica, una certezza assoluta, vi è soltanto una certa probabilità che può al massimo divenire tanto grande da meritare il nome di certezza pratica.* And a reference to David Hume follows.

*My summary:* Today, "certainty" is an empty notion, remaining only as a statistical entity, and, with reference to modern Physics, is a question not of absoluteness but of probabilities. The allusion to post 1900-Physics is evident.

Let me refer to a publication on certain aspects of *Physics* for evaluations of the *Def<inite>* model values, noting that they are not always as "hard" as one could be led to believe.

Carl Friedrich von \*Weizsäcker's *Aufbau der Physik* (1988, orig., 1985, 662 pages) is far too extensive for me to attempt a summary, so let me just give an indication citing a series of chapter titles: pp. 30ff. : *c. Wahrscheinlichkeit, d. Irreversibilität Evolution, Informationsstrom, e. Da Gefüge der Theorien, f. Abstrakte Quantentheorie, h. Deutungsfragen*; and a chapter (pp. 423ff.) on *open questions*; Chapter 11 on the problem of interpretation of Quantum Theory (*motto: Was weiß ich, wenn ich weiß – knowing, what do I know?*); finally, Chapter 13, *Beyond Quantum Theory*).

The book also contains a series of full-page graphs showing: *Diagramm 1.* The articulation of the book chapters; *Diagramm 2.* A short journey through the book; *Diagramm 3.* the interrelations between the theories; *Diagramm 4.* a reconstruction of the determinant ingredients of Quantum Theory.

It is because post-1900 *Physics* presents relativational (thus, to avoid saying relativistic!) features at the very base level, that I am going to stay with the subject for a while.

Physics combine both media, the verbal and the math one (we know that). The Math assignment is to assess quantities, measure relationships and formalize operations by using meaningless signs (letters, numbers curves and configurations), the verbal to relate these units to communicable "realities", these in the sense of being recordable and manipulable using human languages and non-formalized, illustrative models (like the atom model of 1911 by Ernest Rutherford).

To make *Physics programs available as a term for strategical operations*, we have to simplify the picture, selecting the kernel paradigmas.

There can be many models for studying Physics at the meta level: not as a group of methods but as a program or a *subject*.

|One can look at the issue through several optics:

- as a field
- as a dynamical system
- as a process
- as a series of interconnected statements

To analyze the literature available today after these criteria would require too much space (and exceed my competence), so I have to reduce the scope to a survey of the *Table of Contents*, comparing the listed thematics, using the in various accounts of the subject.

Let me refer to five books on *Physics*:

1. Richtmyer, Kennard and Cooper, *Introduction to Modern Physics* (767 pages; 1955; I have the sixth edition, 1980); 2. Arthur Beiser, *Perspectives of Modern Physics* (608 pages, 1969); 3. J. B. Marion, *Physics and the Physical Universe* (698 pages, 1971); and 4. C. F. von Weizsäcker, *Aufbau der Physik* (1988), not a text book but a theoretical analysis of the field in most of its aspects now in consideration (662 pages); 5. the most recent and biggest one: M. Alonso and E. J. Finn, *Physics* (1138 pages, 1992).

Let us see how the notion of *Physics* is being *introduced*.

*Richtmyer & Co* start with 1. The Heritage of Modern Physics, 2. Introduction to Relativity, 3. Relativity and Four-Vectors, 4. Atoms and Molecules, 5. The Origins of Quantum Theory...;

*Beiser* with 1. Special Relativity, 2. Relativistic Mechanics, 3. Particle Properties of Waves, 4. Wave Properties of Particles (the two "conflicting" parameters), 5. Atomic Structure...;

*Marion* with 1. The Structure and Language of Physics, 2. Length, Time and Mass, 3., Galaxies and Atoms, 4. Movement, ...

*Alonso and Finn* with 1. The Structure of Matter, 2. Measurement and units, 3. Rectilinear Motion, 4. Curvilinear Motion, 5. Circular Motion, 6. Force and Momentum.

This short survey at least seems to indicate two things: that the order of *presentation*, that is, customizing for the benefit of the reader/user, is radically variable from one book to the next; and that the *general notion* of Physics is not entirely definite or consistent. This idea can be further underpinned by references to how *Mathematics*, basic to Physics, is being developed, presented and studied (but I bypass that).

\*Wittgenstein in his *Bemerkungen über die Grundlagen der Mathematik* (p. 347 in the cited edition), focuses on the indirectly valid notion of *Math*:

*Aber werden wir nicht von der Regel geführt? Und wie kann sie uns führen, da ihr Ausdruck doch von uns so und so anders gedeutet werden kann? d. h., da doch verschiedene Regelmäßigkeiten ihm entsprechen. Nun, wir sind geneigt zu sagen, ein Ausdruck der Regel führe uns, wir sind also geneigt diese Metapher zu gebrauchen - our rules are created by ourselves, how then can they work objectively? quis custodiat custodes?*

To extend the picture of physical *Uncertainty* or *Indeterminacy*, the following references can be cited, in addition to the much more detailed discussion in SL, *\*Patterns*.

An important physical reality is the *simultaneous* emergence of alternatively waves and particles in one and the same medium, according to how we approach it: this shift in evidence depends not on the matter itself but on our way of analysing it. This is the *wave-particle duality*. \*Bolles once more offers a valid epitome (p.62): the situation is as if one had been *hit by a bullet*. *And yet it is clearly a wave moving through the whip carrying energy as it flows. The wave packet is duality made briefly visible, displaying the properties of units and waves together.* A more "professional" description of the dependence of our observation is offered by Von \*Weizsäcker (pp. 252f. and 336f.).

Edna E. \*Kramer (*The Nature and Growth of Modern Mathematics*, 758 pages, pp. 235f.) gives a concise description of *the principle of indeterminacy*:

*In 1927 Heisenberg advanced the theory that it is impossible to fix both the position and the velocity of an electron with perfect precision, that if we increase the accuracy of one of these measurements, it automatically decreases the precision of the other. If our measuring tools were perfect, or nearly so, this would not be the case. Our instruments are part of the universe we are studying, and they share its characteristics, one of which, according to the quantum theory, is the discreteness or lack of continuity of matter and energy. This makes ever-so-fine subdivision of units of measure not only a practical but [also] a theoretical impossibility. The smallest possible subdivision of mass is that of an electron, and the smallest unit of energy the "quantum".*

*Such are the notions from which Heisenberg deduced the principle establishing the indeterminacy of velocity. This issue does not arise in classical mechanics ....*

Theories not only do develop and *change*; the old ones can be kept but modified along with new ones.

In his Chapter 6, pp. 219ff., Von \*Weizsäcker discusses *Das Gefüge der Theorien* (the structure and internal relations in the theories), how in the historical development of theories, internal changes affect a system, so that older theories as we know them are influenced by newer ones (further \*Heisenberg, later also Thomas Kuhn).

Our understanding of a theory depends on mathematical structure formally taken and, what also brings in a relativizing factor, by our understanding - *Semantisch*, as VW writes - in terms of our mental setup. Under the heading of relativity, VW distinguishes between conceptions of models, starting with Roberto \*Bellarmino (!). On p. 585, VW discusses the status of theories, and the fact that nothing is permanent but subjected to change, *Alles fließt*.

The fluctuant character of theories and knowledge acquired through physical theory also affects our relation to *rationality and what we mean by this term*.

Lászlò \*Méró has published an interesting book with the title, in the Italian version, *I limiti della razionalità* (translation hardly necessary). His book is a contribution to a general trend, an early stage of which was Heisenberg's *uncertainty principle*.

Gerald \*Vision's *Modern Realism and Manufactured Truth* brings another contribution to the idea of a general uncertainty announced by Luigi Pirandello and Bruno De \*Finetti, and later extensively developed by Morris \*Kline in his *Mathematics: The Loss of Certainty*.

Some other treatises on Physics can be consulted on the issues just mentioned.

\*Richtmyer, Kennard and Cooper, *Introduction to Modern Physics*, sixth edition, opens with Chapter 1, 44 pages on *The Heritage of Modern Physics*, then, with Chapter 2, gives an *Introduction to Relativity*.

\*Marion, *Physics and the Physical Universe* (of which I have an Italian edition), starts with 25 pages on *The Structure and Language of Physics*, and then goes on with *Length, Time and Mass*, and in Chapter 3, *Galaxies and Atoms*, starting on p. 403 with *Relativity*.

Von \*Weizsäcker, in his *Aufbau der Physik*, starts with an introductory chapter 1, on theory, from methodological approaches over the value and application of theories, to Quantum subjects. Teil 1 is entitled *Zeit und Wahrscheinlichkeit*, Teil 2, pp. 219ff., *Die Einheit der Physik*.

Of course, these comparisons are somewhat oblique, since for example the last-cited work (662 pages) is no textbook but offers a penetrating analysis of the theory-based build-up of Physics.

The cited works, and specially my use of them, should be evaluated in some of the perspectives in Paul \*Feyerabend's *Wider den Methodenzwang* (443 pages). His book must have been "revolutionary" when it was published: Frankfurt-am-Main, 1983. His consistent and well-documented debunking of classical norms and "truths" univerrally current some time ago is thought provoking and funny to read. But also demanding.

In their book on *Robert Oppenheimer*, \*Bird and Sherwin (p. 75) give some notes on the relations between *Mathematics and Physics*.

Oppenheimer told Niels Bohr that he had run into difficultiess, and Bohr asked if they were mathematical or physical, to which the former replied, *I do not know*. Bohr: *Too bad!*

Years later, Oppenheimer commented upon this discussion, noting that there are two different tendencies, not absolute ones, of course, of recording conclusions among the physicists: a *verbal* one (Niels Bohr) and one starting out from *mathematical formalisms* (Paul Dirac). Oppenheimer, according to the cited authors, really was a verbal physicist, in the style of Bohr.

In the Sciences, as in most other fields, such as Sociology and Economics, *Information* of course is a central preoccupation.

From the notions of the twin-operated *Science*, with the focus on *structure* displayed for operation and communication there is no wide gap over to *information theory* : the fields touch or even overlap at many points and in many issues of a more general theoretical nature.

A platform that is certainly relevant, if transposed to a workable conceptual universe, also for the material at issue in the present work, can be subsumed by the commonly used term, *Management Information Systems*, the subject of a book by G. B. \*Davis and M. H. Olson (D&O), a title that uses the current and usual denomination of a universal program: *MIS* (also \*Parker).

Recent treatises on the subject of *MIS* offer nunerous choices, and as D&O note, *there is no consensus on the definition of the term "management information system"* (p. 5), but I prefer the D&O one since it is written by two individuals and one of them being a woman, the latter usually working by criteria different, and often more pointed, from ours.

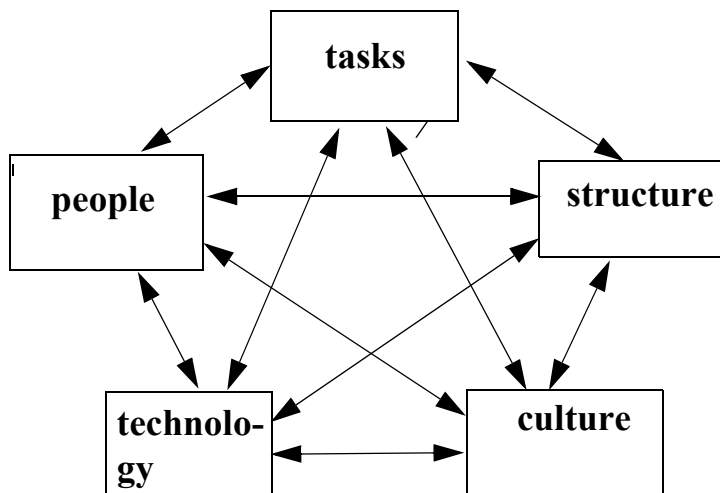
Under the heading *Computer-base User-Machine System* (p. 7), the authors note:'

*Conceptually. a management information system can exist without computers, but it is the power of the computer which makes MIS feasible. The*

*question is not whether the power of the computer should be used in management information systems, but the extent to which information use should be computerized. The concept of a user-machine system implies that some tasks are best performed by humans, while others are best done by the machine. The user of an MIS is any person responsible for entering input data, instructing the system, or utilizing the information output of the system. For many problems, the user and the computer form a combined system which results obtained through a set of interactions between the computer and the user.*

Going further with the discourse, it must be noted that there are *two dimensions that must be determined as fundamental for any model operation of the kind tested here: framework embedment and the related adaptation and maximation of scopes and fields of coverage.*

Having discussed the notion and configurations of frameworks in earlier publications, I will just note that a model representing a framework and situated within some not definitely or clearly bounded framework of other models, patterns, environments etc.



**Fig. 3.7.1, Five Paradigmas, cross-level chart with 20 directives (from Davis & Olson).**

Provided that we can consider the five entities on Fig. 3.7.1 as if being located on one and the same level, the model conveys a workable picture of a large, *maximation, framework*, with twenty specific interactions denoted by the twin-headed arrows.

Certainly, the codes cited on the model are not commensurable nor unilevel. The model forces the issue by knocking into one parameter widely different notions on several levels, making them look tightly coupled. Dis-

turbing? On one account, the logical one, yes, but less so on the pragmatic: confessing that our models are useful especially when they force the issue, creating figuratively runnable procedures which do not correspond to realistic operations; not so bad, since *realism* is a fiction, while creating *pictures* can lead us in certain directions where new observations can be made.

Thus the range and coverage of the models are subjected to a maximization process, in line with the Wodehouse Wisdom: *Always think of everything!*

*Maximation* has been discussed in my earlier publications, so let me simplify the reference. In SL, *\*Patterns* I noted:

*No illusion should be harbored that analysis can ever cover an entire configuration space like the one on hand. We shall never know which specific sections of it we do encompass in our hypotheses. The only solution available is to maximize (also 4.7) in the sense of drawing up a systematic account of as many probable parameters or coordinates as seem to work in an analytic sense of the term (4.1.1).*

The burden of the present Section has been to evaluate notions regarding our recording of "facts" and their relative values and procedures for utilizing them for some stated purpose.. The subject is cited in a great number of connections, supporting the notion that indefinite "truths", in Physics (Von *\*Weizsäcker, Faktizität, ad vocem*).

A few quotations will convey the idea:

V W's reflections *ersparen uns aber nicht der Opfer vertrauter Vorstellungen das nicht weniger radikal ist als im vorangegangenen Abschnitt.. das Opfer des grundsätzlichen Begriffs der Faktizität. Wir stellen die so entstehende "Theorie der Ereignisse" zunächst in thetischer Form dar, gleichsam wie einer erzähltes Märchen.*

*Ein Ereignis im strengen Sinn ist ein gegenwärtiges Ereignis [!], etwas, was soeben geschieht. Die Quantentheorie als begriffliche, allgemeine Theorie kan nur formal-mögliche Ereignisse beschreiben. Im Prinzip werden sie immer durch Zustandsvektoren dargestellt, selbst wenn wir nur statistische Gemische solcher Vektoren kennen...*

And VW. goes on to discuss probability functions (p. 607). Briefly summarized: An event is strictly speaking contemporary (with us). *Faktizität*, realities emerging as a quality laid down, prescribed, positive, arbitrary. Support by Quantum Theory which, however, describes formally possible states.

The complex story also comes to mind, of Galileo Galilei and Cardinal Roberto Bellarmino in conflict with one another over the essential issue of "Reality". Paul *\*Feyerabend*, (pp. 257f.), describes the conflict, not as



traditionally claimed, between a "modernist" and a "reactionary", but between two outlooks based on individually conditioned responsible attitudes and roles that were determined by the respective professional traditions and cultures. *The Cardinal had no choice*, is Feyerabend's conclusion.

But "realities" are rooted not only in fundamentals in Science (\*Heisenberg) or roles in Society (Bellarmino), the conviction also emerges from wider perspectives in techno-paradigmatic scholarship and Humanities.

*L'invenzione della verità (The Invention of Truth)* is the title of Bruno de \*Finetti's book already cited and here further considered, along with very substantial comments. by the two modern publishers, Bruno and Giorello. The work is rich in logistic perspectives for theory-building and application, with references to other "relativists", such as Jules-Henri Poincaré, Giovanni Papini and Luigi Pirandello.

*Bruno de Finetti (1906 - 1985)*, an Italian probabilist, statistician and actuary, himself joked about his name, presenting his work on definitory issues as *Definetting*. He *definitely* has something unusual to say in his *L'invenzione della verità*, republished in 2006 by Giordano Bruno (not the first one!) and Giulio Giorello (*see also De Finetti's La prévision: ses lois logiques, ses sources subjectives, 1937*).

The ideas thus conveyed can be closely related to a number of *notions of indefiniteness* that I am discussing in this experimental text, and a survey of Bruno De Finetti's recent, but posthumous, publication of the text from the 1930s, will justify my selecting the book for a more detailed report.

Bruno and Giorello's introduction, *Scienza senza illusioni (Science without illusions)*, almost a short book in itself, is a complex one.

Their introduction goes from p. 9 to 55, and their comment with a further development of De Finetti's ideas, goes from p. 147 to 179, with the bibliography of De Finetti's writings (360 titles), pp. 181 to 202, and D. F.'s book itself, pp. 57 - 146. A bibliographical-biographical *Premessa* by Fulvia de Finetti (his daughter) goes from p. 57 to 62.

Logistically, the relevant ideas in the De Finetti publication can be subsumed under two main categories:

1. The *What-How* issue; and
2. "truth" or "reality" arising in terms of one or more *processes*, rather than conditions or programs with some definite focus.

The key terms selected here can all be interpreted as *processual concepts*: *Verità* (Truth in a process modality), *Prevision*, *Probability*, *Operationalism* (well known from Bridgman, in DF, pp. 53f.), with *Probability* as the priority or head term in the DF context.

Naturally, DF connects the idea of *Probability* with Physics, Heisenberg being a prominent representative (DF, p. 31).

As we have seen, Bruno and Giorello note how, for DF. like Poincaré (also pp. 18ff.), modern Physics has disrupted (*rotto*) "*il magnifico isolamento della previsione scientifica* (no need to translate) (pp. 20, 30ff.), bringing Physics closer to the regime of our normal, "Human" previsions and conjectures. This idea is further developed under the heading 4. *La probabilità è questione di feeling* [sic] pp. 22ff.). Further on *probability*, pp. 27, 36f.. On pp. 17f., *mathematics* is singled out to show how *truth (Verità)* is *incompensibile*, unintelligible.

### 3.8 Mimicking Digital Models

We now embark upon the *central operations on our models* in non-digital format, that is, models in *non-digital* construction, but in their shape, coverage and many functions literally mimicking possible and true *digital models*.

A *dynamic model* is one from which sub-models, retaining the basic structures, can be developed with a view to items that are subordinated or collateral to those in the parent model. I shall not implement this idea here, limiting my reference to one single *Situation Model* (Fig. 3.2.3 "*Realistic*" *Situation Model*).

The assets of a graphical model are (at least) two:

1. It distributes spatially the relevant entities and categories, so that their interrelations are evident and can easily be modified or deleted;
2. It can - and usually will - include and position verbal expressions, thereby 2.1, effect direct links with verbal formulations in accompanying language (English, German,.. whatsoever); and 2.2, keep the graphical structure, which should express the essence of an idea or observation, while the contents can be conveniently manipulated or altered within the same larger structure.

My work is not *model-driven*, digitally worked and working, but *simulation-driven*, my type of model being rather an indicative or pragmatic application, conveying *direction* or *tendency*, my type of model being rather an indicative or pragmatic application, conveying *direction* or *tendency*. Consequently (as I see it), my queries will be of the *How* category rather than the *What*.

There are, as has been noted, two kinds of models in use here, by reference, true *Dig<ital> models* and the mimicking *NonDig-<ital>* ones.

The rationale for using them in couples is the complex and experimental idea that the latter can be used in workable relations with the latter.

Distinguishing *Graphs* from *Models*, I use the simple criterion that the former is a schematic picture illustrating a subject, theme, proceeding, etc.,

while the latter is, to repeat, a *figuratively or technically operative unit*, in my cases, the former of them.

*One level down*, we can illustrate the framework in which the models and their context are explored (Fig. 3.8.1). The Roman numbers refer to the *Parts* in the book. The stepwise increasing semi-boxes are meant to indicate that one unit is embedded in the next, in downward direction. The construction of the book is aimed at being constructed with stepwise larger and encompassing shells. We could also have used a kind of Russian-doll principle, with one model inside another.

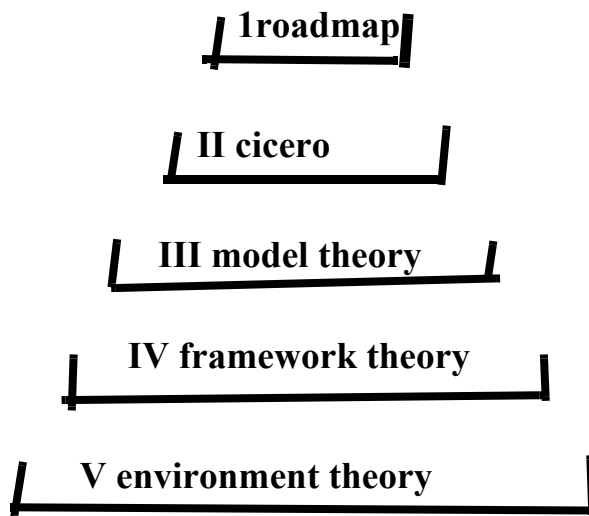


Fig.3.8.1 *Contents distribution in the book.*

The *models*, to return to them, are the tangible representatives of the theory dominating my work, and I obey *Einstein's rule* of starting there. Indeed, we approach all issues with a more or less precise and elaborated theory in mind, perhaps a mere hunch. Secondly, presenting the models will give the reader a set of positions and a structure as framework for what is coming up.

An advantage of the network models used in this assignment, is that we have before us a surveyable and relatively well-conceived web of units, while they can be selectively attributed with importance and range; the internal order available for re-distribution; *and* which emphasize the analysis priorities - accepting Herbert Simon's advise jto work with simplification, as he expressed the idea, avoiding *cluttering details*.

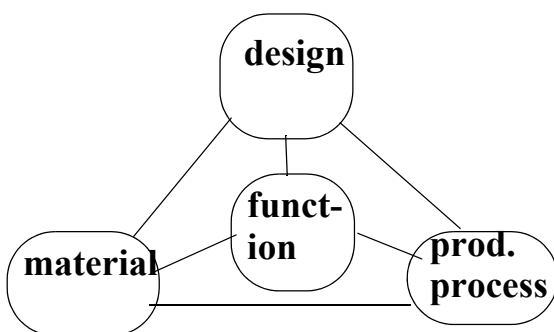
Another factor is the important consideration that by working as proposed, we do start out with a selected general picture developed across an *inception theory* and the *application theory* expressing a *system*; one that embeds the models. The working moral is simplification, realizing that

some features will not be recorded, but also aware that this is exactly the fate of any theoretical approach.

Nor can implementing my *Def/InDef* program be complete, since the soft part offers no reliable or well-defined handles or boundaries, remaining vague and approximate. Handles here have to be constructed or rather construed. So I do insist on this work being *inchoative* and *experimental*, not out to conclude or to convince anybody. But if *tendency* - Werner \*Heisenberg's *dynamis* - is accepted in Physics, I feel free to try it out in the present exercise.

Now let us have some comments on the question of *reality approximation* as set down in *models*. Models representing *production* can serve here, since we should not hold on to the illusion that anything we do is just to be *found there*. We do *create* it.

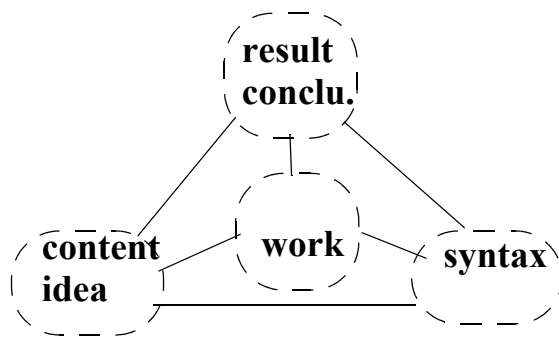
I shall use a set of interconnected configurations, starting with one of them in Fig. 3.8.2, prototype for the others and due to Karsten \*Jakobsen (*Modern Design Principles in view of Information Technology*; formerly Rector at our Inst. of Technology, NTH), but precisely redesigned for the present job, followed by two examples of application.



*Fig. 3.8.2 fig. 4 in K. \*Jakobsen redesigned, with exactly interrelated original captions. Def<inite> values.*

In the caption to this model, Jakobsen notes as follows:

*When searching for solution alternatives which satisfy the functional requirements for a product [the topic is industrial production], it is essential to create harmony between design (form), material and production process.*



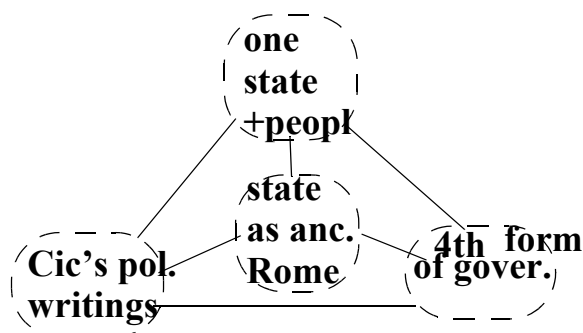
**Fig. 3.8.3, the KJ model with New general contents.**

Attached to the *Def<inite> model* by Karsten Jakobsen, just displayed (Fig. 3.8.2), the two "copied" JK models (Figs 3.8.3 and 3.8.4), categorized as *InDef<inite> models*, carry simple contents, the idea being just to display the principle. Jakobsen's cited article in his *Modern Design Principles in view of Information Technology*, also brings a much more developed and complex model: his Fig. 3, but I cannot see what we should gain by elaborating that highly articulate and many-level graph.

The captions in the upcoming *Cicero model* (Fig. 3.8.4) are taken from the Cicero quotations in 5.4, *Cicero's De Re Publica*, a group of terms further elaborated and extended in another model (Fig. 3.8.5, *Group Model*).

The captions to this model would be: *One State and one people - Cicero's political writings - State ideally after the ancient model - the forth (composite) form of the ideal government.*

The two adapted models in the present Section, Figs 3.8.3 and 3.8.4, do not offer much that is new, but can serve to bring home the idea of *model grammars, a spatial distribution of closely interrelated models that offers a platform for further scrutiny.*



**Fig. 3.8.4 the KJ model with contents from Cicero.**

The model is *embedded* in a larger system, as in Fig. 3.8.5, *Group Model*, the larger system functioning as a framework for the original model.

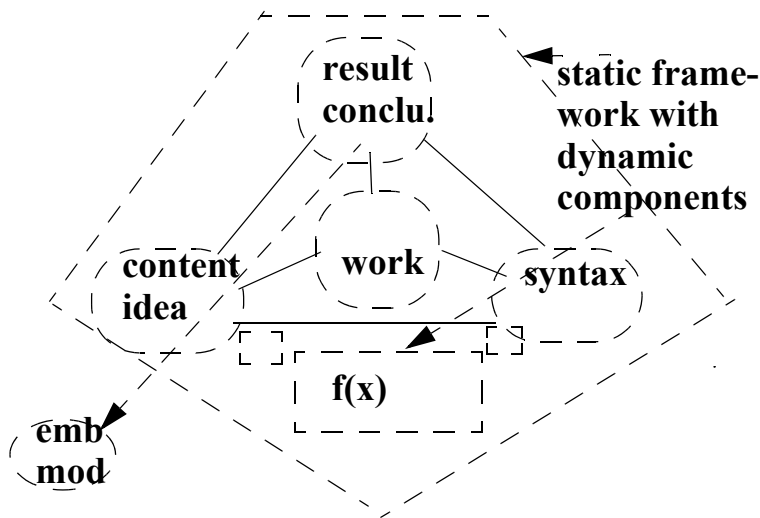


Fig. 3.8.5, *Group Model*, the larger model system functioning as a framework for the model in Fig. 3.8.3. *EmbMod* = embedded model in *Result, Conclusion*.

The series of similar models just displayed illustrates a composite pattern one can build in graphical terms, also with the possibility of keeping one structure for expression different terms, ideas or contents. We cannot achieve this with verbal tools.

When in this work, as in earlier ones, I try to make *graphical models* and *verbal models* work together, the real difficulty lies rather more with the latter than the former.

\*Wittgenstein has a point when he notes, in his *Bemerkungen über die Grundlagen der Mathematik* (p. 333), as follows.

*Wie weit kann man die Funktion der Sprache beschreiben? ... Wie weit kann man die Funktion der <sprachlichen> Regel beschreiben? ... Das Schwere ist hier, nicht bis auf den Grund zu graben, sondern den Grund, der vor uns liegt, als Grund zu erkennen* - the problem is less to search for basic values, more to recognize the basic values we have before us.

*Graphical models* can be relevant exactly for that kind of recognition.

Argumentation related to the show we have just had, will touch *philosophical* problems and ideas, but I am not going to get myself lost in the wilderness of schools and directions surrounding us since the earliest times and efficiently denounced by *Erasmus of Rotterdam*.

Poking fun at the schools, Erasmus, in his *Praise of Folly* (*Moriae encomium*, 1511, Chap. 53), reduces speculative Philosophy to its real self: *Iam has subtilissimas subtilitates subtiliores etiam reddunt tot scholastico-*

*rum vitae...*; and he lists paradigms from which it is more hopeless to extricate oneself than from the famous Labyrinth: the *Realists*, the *Nominalists*, the *Tomists*, the *Albertists*, the *Occamists*, the *Scotists*; and these are not all of them, he notes, only the most famous ones.

We are not much better off today, for \*Seiffert and Radnitzky's *Handlexikon zur Wissenschaftstheorie*, München 1992, presents an even longer list, including also, it has to be respectfully noted, numerous Science-related programs.

On the opposite side of the relativistic stand, we have the blind belief in the *Sciences*, only very recently subjected to some skepticism in the general public (but since long discredited among scientists, e.g. in the *Quantum world*). Many years ago, a professor of physical chemistry at the University of Basel, Max \*Thürkauf, brought a related message, in the language of the mid-seventies, in his book *Sackgasse Wissenschaftsgläubigkeit* (the *cul-de-sac* of naive faith in science as an absolute, read: non-human, concern). Thürkauf also presented his views in a full-page article in the *Neue Zürcher Zeitung*, p. 23, of 6 Oct. 1976.

In Classical culture, the issue must have seemed simpler and more definite than I tend to make it here, since Cicero is able to tell us what follows (*Tusculanae*, Book II, § 1): In philosophy it is hardly likely that we know some notions without being led to the rest, or almost so, for those few must be the product of a selection among many, and whoever begins grasping something, thereupon cannot fail to be equally occupied with studying the rest (I have profited from the Italian version of this extremely brief and difficult text in Cicero).

Cicero speaks in professional terms and is considering written studies in philosophy. Written statements of course can be isolated and counted, not so ideas. Today we accept the function of fractalization far beyond this and far into literary creations not explicitly dedicated to basic questions. The vaguely perceived but strongly felt ideal of *interdisciplinarity* has complicated such processes even further.

### 3.9 Creating Models

Should not the subject of *creation* come first in the present series of *Sections*? No, for we have to decide initially what we mean by a model and how it is supposed or determined to be working. A study of the creating can reveal shortcomings, some of them correctible at a recursive look, others being left for reasons of doubt.

In this *Section*, I explore the criteria and rules for *codifying* the program and analysis parameters as *InDef*<inite> for "soft" paradigmas and

*Def<inite>* for Scientific ones, discussing their implications and application modes and range.

The subject, then, is a *network model in general terms*. Such a model represents, among other things, *theory*, and it must be activated at the outset.

Here the idea of *direction* is crucial because we hardly ever initially have a clear and *modelable* (please excuse the misnomer) idea about where we want to go and can arrive, and, consequently, where we locate our models and make them useful. The march of ideas also depends on situation and personal inclinations and opportunities.

This loosely vectorial mechanism, only partly a matter of conscious choice and determination on our part, can be at odds with our internal set-up *and* with the tools available today. In the traditional Humanities, we were taught that *you know where you are heading*, and the differences between academic schools consisted mainly in different previewed and more or less neatly classified aims and goals.

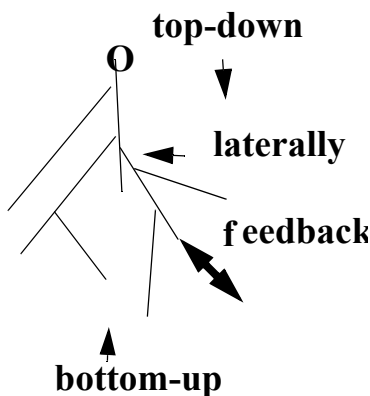


Fig. 3.9.1 *A System with five approaches; the origin of the system O.*

Working in such *continuity programs* of definite fields, it was possible to maintain this illusion, which is being weakened when pursuing a line with no well known terminus or conclusion, which is mostly the case when tied to *system-based and system-expressing models*. The former type works, let us say, linearly, while the latter will include a problematic amount of *branching points*, recursive paths, feedback loops and alternative top-down and bottom-up drives (Fig. 3.9.1).

In the *intuitive probability framework of analysis* proposed in the present work, this idea must be applied not only to Physics, but also to Historical studies. There is no alternative. Both embody processes.



Historical causality-arguments leave us sinking ever deeper into the quagmire of infinite regress where one station is as good as the next. Trying to quantify a *causality* relation, Heisenberg notes, would take us to the end of the Universe (\*Selleri, 31):

*Die Kette von Ursache und Wirkung könnte man nur dann quantitativ verfolgen, wenn man das ganze Universum in das System einbezöge - dann ist aber die Physik verschwunden und nur ein mathematisches Schema geblieben.* - The causality-effect chain could be monitored quantitatively only by counting in the entire universe, but then physics disappears and we wit back with a purely mathematical scheme

At the same time, we cannot head-on face an intricate subject in all its complexities, but, to cite Herbert \*Simon, have to simplify it, removing some of its *cluttering detail*:

*Research in problem solving has shown that the efficiency of problem-solving efforts can often be greatly increased by carrying out the search for a solution, not in the original problem space with all of its cluttering detail, but in an abstracted space, from which much of the detail has been removed, leaving the essential skeleton of the problem more clearly visible;* and further:

*'Simple' theories are generally thought preferable to 'complex' theories. A number of reasons have been put forward for preferring simplicity, but the most convincing is that a simple theory is not as easily bent, twisted, or molded into fitting data as is a complex theory* (\*Simon, *Models of Thought*, 1979, 63, 325, resp.)

The *Turing Machine* (devised by and named after Alan Turing) probably represents the most simple program handling unmeasurable complexities, being designed to operate abstractly on numerical models. The Turing machine is a mathematical model *not of computers, but of computation*.

An ordinary machine is also an *abstraction* (\*Gregory, elaborates this notion), and can serve excellently for general analysis. As we have seen, I am using the operative system of a computer for such a case (Fig. 3.9.2, *Operating System in a PC structure*).

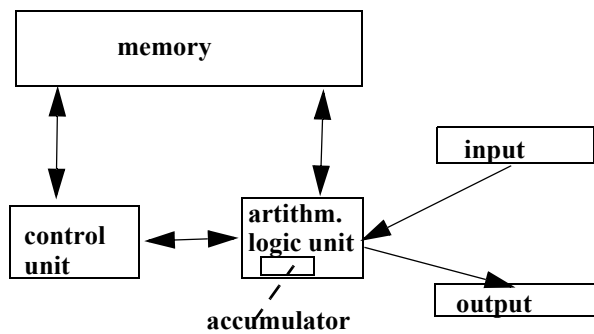


Fig. 3.9.2 *Operating System in a PC structure.*

Then the specific choice of machine isn't important. And that is the point: *computation is computation*, freeing the program from physical dependencies. This is the idea that Alan Turing brought to bear.

\*Fetzer specifies (pp. 39f.): *The basic notion of a Turing Machine is fairly simple. It is a device that consists of a mechanism for making a mark on a roll of tape, which functions as a memory for the system. The mechanism can perform just four types of operation, It can make a mark; it can remove a mark; it can move the tape forward; and it can move the tape backward. The tape itself is divided into segments (or "cells"), each of which may or may not be marked, and must be of unlimited length. No matter how much tape we use, there is always more.*

The Turing machine, then, is an *imagination*, and it configurationally combines a *real* machine (tape, marks), and an *irreal* one, which is *infinite*.

We cannot make it work mechanically, because we cannot have a factual device working infinitely. But we can make it *depict* a working function. This is exactly how I imagine my combination *Def/InDef* can be functioning.

*We can now carry the ideas over into general theory.*

\*Gell-Mann, in his book, *The Quark and the Jaguar. Adventures in the Simple and the Complex*, reflects on the passage *From Learning to Creative Thinking* (pp. 261ff.), and I find some of his ideas not unfamiliar but well formulated, in fact, an eminent synopsis:

*A successful new theoretical idea typically alters and extends the existing body of theory to allow for observational facts that could not previously be understood or incorporated. It also makes possible new predictions that can some day be tested. [let me note that in the present context, we can only "predict" but hardly test].*

*Almost always, the novel idea includes a negative insight, the recognition that some previously accepted principle is wrong and must be discarded (Often an earlier correct idea was accompanied, for historical reasons, by*

*unnecessary intellectual baggage that it is now essential to jettison). In any event, it is only by breaking away from the excessively restrictive received idea that progress can be made.*

*Sometimes a correct idea, when first proposed and accepted, is given too narrow an interpretation. In a sense, its possible implications are not taken seriously enough. Then either the original proponent of that idea or some other theorist has to return to it, taking it more seriously than when it was originally put forward, so that its full significance can be appreciated.*

*Explanation and finding causes of historical events and processes, as I intended to do with *Sixtus' bulla* (\*SL, *A Model*), does not belong to my self-imposed job. I am out to explore *how*, not *why*, certain writers expressed themselves, and what eventually to profit by this in terms of methodology; nothing more.*

The quest for *The right* answer or solution even in complex matters, attestable in some quarters, should be confronted with the handling of the issue in Physics, as explained in Feynman's *The Character of Physical Law*, or with the equally resulting alternatives in *Quantum theory* between *matrix* (Heisenberg) and *equation* (Schrödinger). The Quantum theory is not an obvious paradigm of absolute value. Feynman, cited by Von \*Weizsäcker (p. 110), has so formulated this theory, that it emerges as a probabilistic proposal (*hat eine Formulierung der Quantentheorie angegeben, in der explicit wird, daß sie nur eine neue Wahrscheinlichkeitstheorie ist.*).

Physics, as we formulate it (the only one graspable) is not a reality but an artifice and a subject of action rather than a set of definitions (excellently explained in \*Feynman's *The Character*); a dynamical web of parameters rather than a manifest field; modalities of actions rather than types.

*From my considerations so far, it should be evident that the present book is an attempt to record and describe projects, tools and capacities that in the final count are elementarily Human.*

A *structured representation* of digital networks and the functions, capacities and operative handles of an essential *Von Neumann computer* can serve as an adequate model for Human intellectual and response patterns. The idea is not new (\* *below*), but possibly here framed in a specially basic version.

Since my models are tools for and expressions of my arguing and thinking, the grammar and structuring of their use and interconnections, should be important. But the typology in use here rests on the patterns of subjects explored in the book, not on any general principles. Hence, speaking of a *syntax* would not be meaningful nor functional.

| My discussion has circled around a so far invisible center, one which colors our cognitive life: the digital universe with the *computer* in core po-

sition. The nucleus can be configured in the model whown in in Fig.3.8.2 *Operating System in a PC structure*. The group with memory, core functions, input and output is redesigned after \*Tanenbaum and Austin.

The *Operating System (OS)* - Fig. 3.9.2 *Operating System in a PC structure* - works in a wide environment as a nucleus with extensions and dependencies (Fig. 3.8.3, to follow). The OS thus can illustrate, in a much simplified, version, some crucial functions of our *brain-cum-mind* and the reactions to external conditions and inputs.

The point now is that the minimized configuration in Fig. 3.9.2 should be integrated in the larger patterns made up by *computer operations* and their functional environment (Fig. 3.9.3). I say *closest* because the larger contexts have been and will be central issues all through this book, for which, in fact, the book itself is a model.

Quite obviouly,then, the *pseudo-matrix* in Fig. 3.9.3, is a *pars-pro-toto*, intended to illustrate the principle of the *machine with its close environment*, functions and covering range (some, at least).

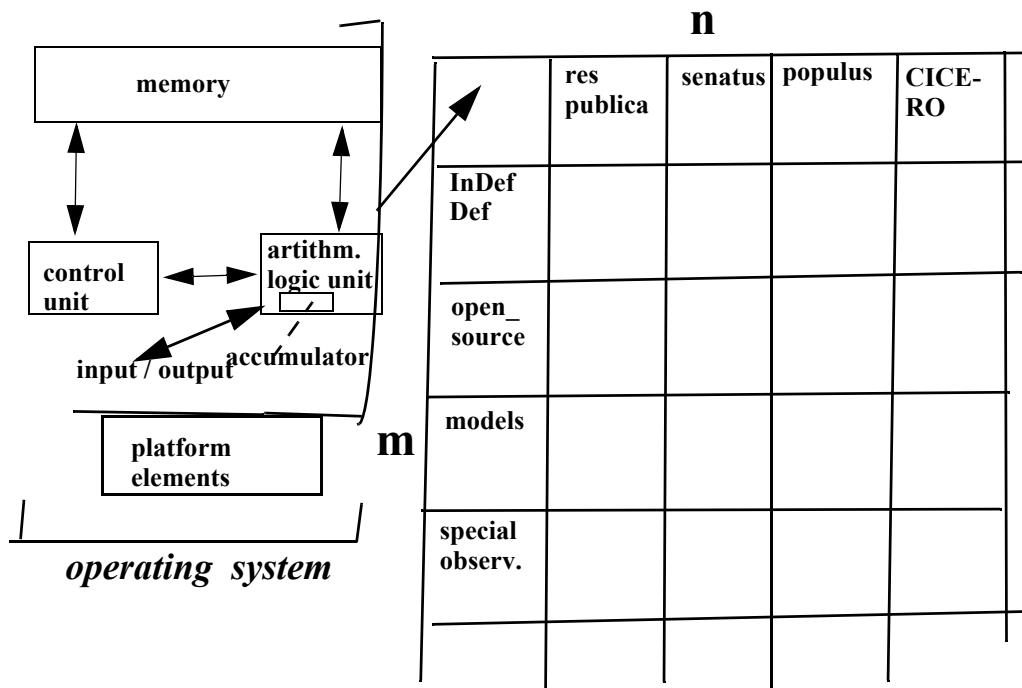


Fig. 3.9.3, *Pseudo-Matrix incorporating Fig. 3.9.2, Operating System*.

The *n* subjects are related to *m* principles or parameters. Interrelations between the *m* and *n* elements determine the structure. The qualification of platform with "elements" is due to the fact that the definitions of a *platform* vary, but usually indicating the entire *Operating System* (\*Bank, p. 62). This tech-structural image is not sufficient in any project. But no one is so,

and can hardly become so. But as an abridgement of the central issues, it can probably pass.

Having established a tentative rule and proceeding, some further comments on the issue of *typology and grammar*, can be adequate.

My main source here is Sacha \*Krakowiak's *Principles of Operating Systems* (MIT, 1989, 469 pages).

At this point, a general comment.

It can seem going too far in a book on *non-dig models* to delve so much into the technicalities of *real* digital systems. But today and probably more tomorrow, people who would look at my present book will generally be so advanced in the digital world that my unprofessional musings will alert them to the *real digital universe* and raise associations producing critical feedbacks regarding any non-dig use of models. On account of such potential extensions, I have to consider wide boundaries to my *process-focused* efforts.

The very notion of non-dig *models* such as are traditionally in use in Organization, Management and Social Theory, defies the idea of sufficiency and completeness. We have to keep in mind, and develop, the *programmed relevance area of non-digital models* (with *digital* ones, the going is mostly predictable because of pre-programmed automation).

The *non-dig models* (to stay with them) can be branching out in several directions and manifest themselves at different levels, not all of these extensions having to be counted as active features, for the moment, at least.

This means that the computer model (Fig. 3.9.3, *Pseudo-Matrix*) can represent the present book entirely, the model forming a *grid* or *skeleton* of the arguments.

Now, with the intention to extend our notions of digital systems, which after all remain the standard build-up of my *non-dig* models, let us consult \*Krakowiak's highly informative and structured book, *Principles of Operating Systems*.

From my *non-dig* position, looking at Krakowiak's model now to be *described* (not reproduced), will have to be mentally extended to comprise the larger environment evoked, more or less definitely, by any program activated by the model.

On p. 196, Fig. 6.3, he shows the *Execution context of a process*. Here, a *dictionary* stack with *identities* is linked up, across a field with *interpretation rules*, via alternative *access paths*, with a *context* consisting of alternative *objects*.

On his next page, Krakowiak gives a list of different types of *objects*, again not directly transferable to my program, but once more with potentially relevant ingredients. He applies the following distinctions:

1. *Objects internal to the procedure*, 2. *Local objects*, 3. *Remanent and global objects*, 4. *External objects*, and 5. *Parameters*.

The last item merits a closer attention, since the noun is widely in use, also in the present book. Thus Krakowiak:

*Parameters. Formal parameters are identifiers used within a procedure bound, at the earliest, when the procedure is called [called up, alerted, activated]. Objects to which they are bound are called actual parameters; they are provided by the calling procedure or are external objects. Binding between formal and actual parameters may take different forms depending on the rules defined by the programming language: call by name, by value, or by reference....*

*Virtual functions*, such as virtual memory, also are attributed to computers.

In his Chapter 9, pp. 329ff., \*Krakowiak discusses *Memory Management*, starting out with *Virtual Memory*.

*For a virtual processor (or for a person, which comes down to the same thing) virtual memory is the medium used for all information that is potentially accessible. It is therefore, more precisely, the set of all locations whose addresses may be generated by the processor....*

*The information accessible to a processor is defined by*

- *All the information it can name in its program, a set of objects*
- *All naming information , or names*
- *A mapping between names and objects.*

*For a user writing a program in a high-level language, names and objects are defined by that language, These names and objects differ from those handled by the physical processor. The program must therefore undergo a series of transformations called binding...*

And K. supplies a chart showing these interrelations, which I have redesigned and renamed here (Fig. 3.9.4, *Transformation Chart*).

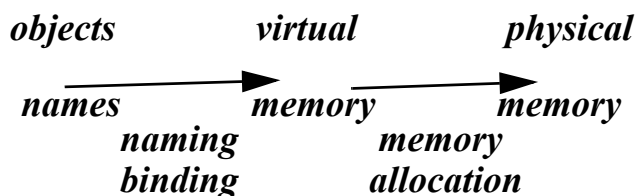


Fig. 3.9.4, *Transformation Chart*, Krakowiak.

\*Tanenbaum and Austin's *Structured Computer Organization* (6th. ed., Harlow 2013, 769 pages), in their *Section ,1.1.3, Evolution of Multilevel Machines* , pp. 8ff., *note*:

*Programs written in a computer's true machine language (level 1) can be directly executed by the computer's electronic circuits (level 0), without any intervening interpreters or translators. These electronic circuits, along with the memory and input/output devices, form the computer's hardware. Hardware consists of tangible objects - integrated circuits, printed circuit boards, cables, power supplies, memories, and printers - rather than abstract ideas, algorithms, or instructions.*

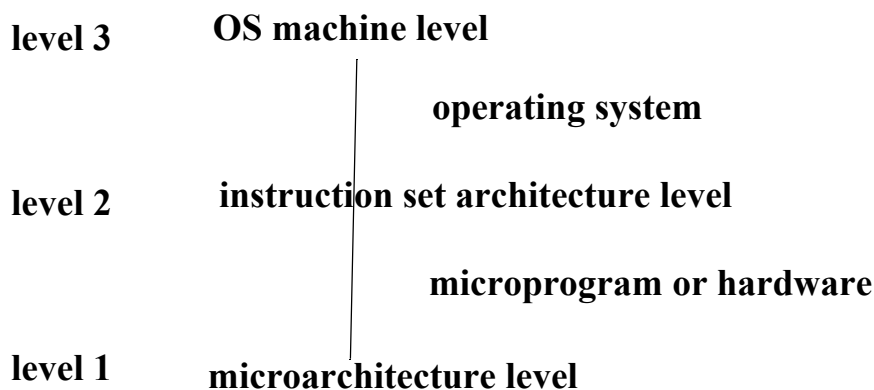
*Software, in contrast, consists of algorithms (detailed instructions, telling how to do something) and their computer representations - namely, programs. .... [however]*

*... a central theme of this book [the cited one] is that Hardware and Software are logically equivalent.*

*Any operation performed by software can also be built directly into the hardware, preferably after it is sufficiently well understood. As Karen Panetta put it: "Hardware is just petrified software". Of course, the reverse is also true: any instruction executed by the hardware can also be simulated on software. The decision to put certain functions in hardware and others in software is based on such factors as cost, speed, reliability, and frequency of expected changes. - These are some of the problems facing Microsoft in its critical years (\*Bank).*

*Two important Parts in \*Tanenbaum and Austin convey detailed informations about the CPU (Chapter 2, pp. 55ff.) and the Operating System Chapter 6, pp. 437ff.) (OS)..*

*About Processors (2.1): The organization of a simple bus-oriented computer... contains the CPU (Central Processing Unit) which is the "brain" of the computer. Its function is to execute programs stored in the main memory by fetching their instructions, examining them, and then executing them one after another. ...*



**Fig. 3.9.5, Systems Levels, after Tanenbaum and Austin.**

Introducing *The Operating System [OS]- Machine Level* (pp. 437ff.), the authors start out with noting that

*the theme of the book is that a modern computer is built as a series of levels, each one adding functionality to the one below it. So far, we have seen the digital logic level, microarchitecture level, and instruction-set architecture level. Now it is time to move up another level, into the realm of the operating system.*

*An operating system is a program that, from the programmer's point of view, adds a variety of new instructions and features, ... Normally, the operating system is implemented largely in software, but there is no theoretical reason why it could not be put into hardware, just as microprograms normally are...*

\*Tanenbaum and Austin illustrate the *systems levels* with their Figure 6-1, on p. 438, which I have redrawn as Fig. 3.9.5.

Having spent so much space on computer and computation features and techniques, a question remains to answer: *so what?*

My idea here is not new, that of *using computer and computation as a model for Human intellectual and mental behavior and capacities.*

Herbert \*Simon develops the idea in several contexts, and Richard \*Gregory in his *Mind in Science. A History of Explanations in Psychology and Physics*, elaborates, with great care and richness of observations, the issue with machine principles; and more recently, Antonio \*Damasio with his medical and physiological perspectives, and, more math-related, \*Minsky and Papert with their *Perceptrons*. \*Sowa's *Conceptual Structures* also elaborates the comparison man-machine.

My references to the complex subject do however seem somewhat different. At least, I am trying to stay close to the stepwise and layered operations of computation as recordable directly on the machine and its "internal" programs, *not* including applications programming, the peripherals and extensions. But the divide here is not sharp.

Having taken the classical *Von Neumann computer* as my principal model for the structuring and handling of the subjects in this book (Fig. 3.9.2, *Operating System (OS) in a PC structure*), I should note that there is a particular *vectorial quality in computer operation.*

Let me start with a comment in \*Patterson and Hennessy's *Computer Organization and Design. The Hardware/Software Interface* (5th ed. 575 pages plus Appendices, 2014).

In their *Chapter 1.4*, pp. 16ff., some internal computer functions are explained, illustrating in a figure the central section in a computer: Control, Datapath, Processor, Memory, and Input, Output; and peripherals:



**Computer Interface and Performance Evaluation, one function pointing over to the next.**

The cited book is excellent for what it contains, but the contents are wrapped up in extensive consumer smalltalk and the presentation is continually interrupted with "paedagogic" inserts with cartoon-like figures.

Thirty years of teaching at our Polytechnic have taught me that student are better served by, and usually prefer, plain simple going without youthful picturing. This is probably so because the point of studying is not merely to learn the items and techniques, but just as much to acquire the habit and ability of facing such complexities as will dominate almost any serious work in Science *and* acquiring the ability to present them. Covering up the intricacies with funny stuff, usually distracting, is no option.

In his *Microsoft* book, David \*Bank (p. 178) comments on the problematic issue in the consumer perspectives of keeping good balance in the efforts within some divisions in the company: a question of direction preferences.

*the five divisions would be designed around the needs of particular customer groups, rather than the sometimes arbitrary distinction between pieces of Microsoft's own technology... An authority in the company emphasized the notion that software was changing from a product to a service; translated for the present connection: from a state to a process.*

The two vectors, internal tech-focusing versus external user focusing, represent alternatives also in the structuring, however loosely coupled, of a book like the present one. Here, two qualities, strictly technical aspects must be somehow balanced against average user access. This is rather a normal issue, that of any textbook.

### **3.10 *A Metatheory of Models?***

*Theories* are usually subdivided into *Substantive* and *Meta*, but the latter aspect, to the extent that it can be sharply defined, frequently overlaps with the substantive one, on one and the same level. This subdivision, elaborated in Nagel and Newman's book *Gödel's Proof* (1958), is rejected by others, among them Douglas Hofstadter (*Gödel, Escher, Bach: An Eternal Golden Braid*, first published in 1979), because there are too many cases in which the distinction does not apply. According to him, if I have understood him correctly, a theory ready for handling is an elaborated replication of the basic theory "out there". Nor is it the way I am using suchlike terms, as I do not claim for them an absolute and distinct meaning, rather an indicative or pragmatic application, conveying *direction* or *tendency*.

The *Microsoft Computer Dictionary* lists 13 entries under *Meta*...

For further observations, we could consult three relatively recent publications: \*Minsky and Papert, *Perceptrons*, 1988 (MP); and \*Brambilla, Cabot, and Wimmer, *Model-Driven Engineering in Practice*, 2012 (BCW); and, finally. \*Cammarata, *Reti*, 1990 (SM).

In addition, we have the following works:

Several contributions in \*Pettit and McDowell, *Subject, Thought, and Context* (1986) *passim*, especially Jennifer Hornsby, *Physicalist Thinking and Conception of Behaviour*, pp. 95ff. In this connection, Gerald Vision's *Modern Realism and Manufactured Truth* (1988) is especially rich in perspectives and challenging ideas.

The cited publications do not "cover" one another, while the main subjects of the publications are definitely different. But from a general methodological standpoint, their fields of attention interlock. Before pursuing this plan, some general notes on *terminology* are required. Terms are, mostly, abstractions, and here BCW offer a description that can illustrate the present subject. The authors start their *Introduction* with a set of definitions, the first paragraphs of which I am quoting here.

*The human mind inadvertently and continuously re-works reality by applying cognitive processes that alter the subjective perception of it. Among the various cognitive processes that are applied, abstraction is one of the most prominent ones. In simple words, abstraction consists of the capability of finding the commonality in many different observations and thus generating a mental representation of the reality which is at the same time able to:*

- # generalize specific features of real objects (generalization);
- # classify the objects into coherent clusters (classification); and
- # aggregate objects into more complex ones (aggregation).'

*Actually, generalization, classification, and aggregation represent natural behaviors that the human mind is natively able to perform...*

Creating a *graphical model of the non-digital type* used in the present work,, we have to start with categories and determine their mutual relationships. The process amounts to drawing up a theory, however sketchy and fragmentary, while making the degree of completeness and defectiveness, and the *coverage capacity*, visually evident. Such a model does, to apply a term developed by Richard Skemp, *show structure* (\*SL. Burden, pp. 158f. for Boltzmann and Skemp; pp. 30f. for visualization versus verbal accounts).

Sticking to *non-digital graphical models*, there are several among which to choose. There are no definite or specially useful rules for our selection among them.

A *text structure* will often (normally?) be operated on at two levels.

1. There is the text *as it stands* (already a complex affair; but I shall desist from playing a game that doesn't lead us much further); then
2. the text *as read and absorbed*. Bypassing here the individual differences, there are some that reign unchallenged. In my youth, we were taught to *write objectively* (but nobody understood what was meant by that).

Javier \*Cercas in a book of 462 pages elaborates the second point in his *Anatomía de un instante* (Barcelona 2009; about the aborted *coup d'état* in Madrid in 1981) with an Introduction, *Prólogo. Epílogo de una novela* (pp. 13 - 31). The key formulation here goes as follows (p. 14):, speaking of the coup leader, colonel Tejero: *Aunque sabemos que es un personaje real, es un personaje irreal; aunque sabemos que es una imagen real, es una imagen irreal* - albeit his being a real person, still he is an imaginary person, etc.; a view applicable to the whole dramatic story.

A graphical models has to be *built*. which will occur within some *Inception Theory*, forcing us to develop a picture as complete and articulated as we are able to (at that moment). This exercise will often result in having before us some blank spaces or nodes in the model, alerting us to notions we have missed out. Prose procedures do not do that efficiently.

1. one of the two (or several) models can seem preferable, and this can be problematic; we should need some theory by which to decide; the risk of circularity hovers in the close background:

2. but we have no given rule, only theoretically construed and purpose-dedicated rules; and when, as is usually the case, the move to set up the rule and set up the theory dovetail if not overlap, where are we?

3. a comparison between two or several "similar" models can show that the issue is indeterminate: there being no definable boundaries to how many variants, geometrically speaking, there can be for one and the same model concept or program.

4. We have to decide on this query by distinguishing between an *illustration* rather than a *determinative description* of the theme or subject, by which we can, at least in terms of analogies, manipulate items included in the model. Doing so, the model represent a simplification and some short-cuts.

5. In the latter case, some principled, analytical *and* workable model *theory* can make the decision feasible; it seems all to be an issue of *operation*, whose course may be clear while the objects operated on are not definitely distinguishable. Full circle, back to pt. 1 again.

Can someone show me a way out of the conundrum?

In their *Model-Driven Engineering in Practice* (2012), Marco \*Brambilla and co-writers give a definition of a *Modeling Language* (pp. 57f.). Their Figure 6.1 illustrates the relations between *Semantics*, *Abstract*

*Syntax*, and *Concrete Syntax*, the interconnections between Semantics and the abstract and the concrete syntaxes, and the flow of *representations* from the former to the latter. Their chart is intended for digital environments and is not directly relevant for the present context. But it can illustrate relationships that will always underlie even non-digital modeling.

### 3.11 *Experts on Models*

Here is a presentation of a few authoritative views on *models*.

Richard Feynman, in his *The Character of Physical Law* (p. 39), distinguishes between *form* and *model*. This distinction should be applicable in math and physics, but hardly in the present program, in which there will often be fuzzy boundaries between operable (configuratively) models and *imponderabilia* (fluent, instable but often incisive mental factors in Humans); and where there are no *forms* available for quantification and calculation.

From the rich modern literature on *models* in one fashion or another, five books stand out by sounding both depth and extension, and keeping a high level of analysis: Herbert \*Simon's fundamental and trail-blazing *Models of Thought* (1974); Margaret A. \*Boden's *Computer Models of Mind* (1988); Mary \*Morgan's *The World in the Model* (2012); \*Brambilla, Cabot and Wimmer's *Model-Driven Software Engineering in Practice* (2012); and \*Tanenbaum and Austin's *Structured Computer Organization* (2013).

Let me present them in the stated order, noting, however, that my capacities and space conditions do not allow me to convey more than tentative introductions.

In the case of Simon's *Models of Thought*, I am tempted to recall that I bought it in February 1981 in our Polytechnic bookshop and that my scanning and scattered readings of the 524 pages book initiated my re-direction from history and architecture studies over to a steadily more intense search in the fields of theory of the kind discussed in my recent publications. I mention this because Simon was an excellent communicator, mostly accessible also to laymen like myself. He also possessed a good sense of humour, with one contribution under the title of *How big is a chunk?* (1974).

*Models of Thought* contains 35 contributions, some by Simon alone and quite a few in collaboration with other people in various psychological, sociological and data fields; Simon was considered a typical *team collaborator*. He has been proclaimed the *Father of Artificial Intelligence*, and justly so, but he wasn't alone, and there are other developers behind this program, among them Alan Turing (with the *Turing Test*) and via tech pro-

gramming, John Von Neumann (we still call a PC a *Von Neumann Machine*),

An articulated and informative supplement to Simon's formally scientific opus is his autobiography, *Models of My Life* (1991, 415 pages). Here he describes crucial moments and parameters in what we might call the modernization of mid-disciplinary research.

Listing the chapter headings in Simon's *Models of Thought* will convey sufficient info about the book, preceded by a quote from the *Preface* (p. ix)

*The information processing revolution that has occurred during these years has completely changed the face of cognitive psychoogy. It has introduced computer programming languages as formal ("mathematical") languages for expressing theories of human mental processes; and it has introduced the computers themselves to simulate these processes and thereby make behavioral predictions for testing the theories. These new methodologies have enabled us to describe human cognitive processes with precision in terms of a small number of basic mechanisms organized into programs (strategies) and to use these descriptions to explain a wide range of phenomena that have been observed in the psychological laboratory.*

Here are the Chapter headings, each containing a number of contributions:

1. *System Principles*
2. *Memory Structures*
3. *Learning Processes*
4. *Problem Solving*
5. *Rule Induction and Concept Formation*
6. *Perception*
7. *Understanding*

Margaret A. Boden's *Computer Models of Mind* (1988, 289 pages), with the subtitle *Computational Approaches in Theoretical Psychology*, was published under the Cambridge heading *Problems in the Behavioural Sciences*. At that time, computer modeling was a widely discussed and publicized theme, while her book gave the field a new start, providing an intensely and richly documented and critical discourse, starting out with the following formulations (from the *Preface*).

*This book asks how computer models have been used, and might be used, to help us formulate psychological theories about the mind [submitting, it seems, that there are other theories of mind also]. The models and concepts discussed here were selected for their psychological significance, not their technological promise. This is not a sharp divide, for even technologically motivated work may involve matters of psychological interest; "expert*

*systems", for instance, raise questions about how people store and communicate knowledge, and how it is transformed as expertise grows. However, I have concentrated on computer models whose psychological relevance is comparatively direct....*

Boden of course is well up in the literature, and she includes (pp. 165 - 171) a *Critique of Newell and Simon*. She notes that *some objections to Newell and Simon's work rest on differences about the value of their - or even of any - computer-modelling methodology*, and her chapter 8 has the title *Is computational psychology possible?* and under the heading *Reasoning and rationality*, she delivers a section titled *Can there be a theory of problem-solving?* - again a typical Simon subject.

She also offers a penetrating criticism of "popular" programs such as *Connectionism*, including a theory of vision; and she develops the *Classroom* model for some of the connectionist functions (pp. 78 ff.).

The recent book - *The World in the Model* - by the British methodology and economy specialist Mary S. \*Morgan (Cambridge, Eng., 2012, 421 pages in A4 format), imparts ideas regarding models derived from her qualification as an economist, bringing the complex and rather forbidding subject articulately before the eyes of non-experts, like me; and her book is a *gefundenes Fressen* for anyone who might desire a closer look at ways in which interdisciplinary fences can be penetrated.

I shall list the headings of the chapters:

1. *Modelling as a Method of Enquiry* - 2. *Model-Making: New Recipes, Ingredients, and Integration* - 3. *Imagining and Imaging: Creating a New Model World* - 4. *Character-Making: Ideal Types, Idealization, and the Art of Caricature* (where she discusses the famous quadruple portrait of Louis-Philippe as a pear) - 5. *Metaphors and Analogies: Choosing the World of the Model* - 6. *Questions and Stories: Capturing the Heart of Matters* - 7. *Model Experiments?* - 8. *Simulation: Bringing a Microscope into Economics* - 9. *Model Situations: Typical Cases, and Exemplary Narratives* - 10: *From the World in the Model to the Model in the World*.

It is quite obvious that my notes now coming up can give just an inkling of the ample book.

Speaking (pp. 402f.) of the economist's "tool box", Morgan notes:

*... diagrammatic and mathematical models did offer quite a distinctive instrument in this tool box. The difference between the model-based discipline that economics has become and the earlier manifestations of the art of political economy relies on the fact that models are designed to offer accounts at a lower level, a generic or typical level, whereas the more general "laws" of demand were neither so easily evidenced nor manipulated. Models ... offer materials in a format that can be more easily operationalized at a relatively*

*closely focused level. ... And she quotes from Marx W. Wartofsky (1968, 1979):*

*I cannot mean by a model anything quite as narrow as either an imitative version of something already existing, as in scale models, or simply a prototype or plan for some future embodiment. At best, these are what models may look like but not what they function as. To stretch the term 'model' even further, let me suggest that what I mean by models is not simply the entity we take as a model but rather the mode of action that such an entity itself represents. In this sense, models are embodiments of purpose and, at the same time, instruments for carrying out such purposes.*

Morgan continues (p, 404):

*... because models operate at a less general level rather than laws, they tend to embed the normative element at a level closer to practical matters... Indeed, it is this integration of the normative and positive aspects in models that prompts the way they are taken into the world and used directly as recipes to make the world, and to change the behaviour of its people, as economists think it and they should function - that is, according to their models...*

And further on p. 405 (Morgan):

Under the heading *Seeing Small Worlds in the Big World:*

*There is a significant perceptual and cognitive shift in this historical shift to modelling. Economists began by expressing small worlds in their models, but by and by, those models came to be the things that economists found or saw directly at work in the world. This has heralded a change in economists' view of the world, and that change came not just from the new form of expression, but from working with these objects.*

*We know historically that modelling involved a change in language and format of expression to create new working objects that represented the economy in models that held certain qualities of smallness, typicality, manageability, and expressiveness. The modelling revolution meant not just that claims were more closely specified and argument was more rigorous, but rather that economists made new versions of the economic world for themselves, and regardless of how these model were created, it was through working and arguing with these new versions of the world that economists came to their new understanding of the economy and how it worked.*

Obviously, I cannot keep such a specialist level as she does in her book. But I do consider it an excellent example of how old home truths are being recast in new, more spacious and cutting-edge forms, with several novel observations.

The book by \*Tanenbaum and Austin, *Structured Computer Organization* (6th ed., 2013, 769 pages=, is discussed in several places in the

present work. It conveys an exceptionally informative - and fascinating - account of the subject adequately indicated by the title.

The *fourth work* to be noted (but not discussed here), with *model-dedicated* programs, can be considered an offspring of, while working more abstractly, than Simon's *Model* book just discussed. This is clear from the title of the co-production by Marco Brambilla, Jordi Cabot, and Manuel Wimmer, *Model-Driven Software Engineering in Practice* (2012, 165 pages), appearing in a series labelled *Synthesis Lectures on Software Engineering*. The term used in the book title is a standard one, abbreviated as MDSE.

In all the cited works, the kernel of research and studies have a soft underside, like the proverbial hedgehog, and the nineteenth-century discoveries in Physics also have one.

The conceptions and practices regarding *Physics* were affected by such relativizing attitudes.

*This modern physics will require, at each instant, a revision and a re-evaluation of previous ideas and principles; and: ...physics, like most sciences, is a dynamic subject where nothing is taken for granted or is a dogma* (\*Alonso and Finn, *Physics*, 1992, pp. 2 and 4).

If this is the state of Math-based Physics, it would seem awkward - or misinformed - to pretend that "results" in our *InDef* programs could be manifest or permanent.

Are the theories of Physics clear and manifest, taking into account, of course, their dose of \*Heisenberg's *Unschärferelation*? \*Feyerabend (p. 380) comments:

*Nichts hindert uns mehr, zur Position von Mach und Einstein zurückzukehren: es gibt keine allgemeine Theorie der Wissenschaften, es gibt nur den Proceß der Forschung und Faustregeln, die uns helfen, ihn weiterzuführen, die aber ständig auf ihre Brauchbarkeit hin überprüft werden müssen* (no generally valid and usable theory of *The sciences*, only serviceable rules which, however, need repeated revision).

A discipline that works at the junction of verbal and formalized programs is *tactic theory* (Emmon \*Bach, *Tactic Theory*). This is theory about our mental, intellectual and traditional resources as they are expressed in human language, with a dose of formalisms included. The theory in principle bears directly upon what I am trying to do in the present experiment, although there are crucial differences. Not to draw out my discourse beyond reasonable limits, I am not going to work in any of Bach's many insights and paradigms, limiting myself to refer to this systemic and eloquent handling of a complex subject. But he makes important observations that I cannot simply bypass.



**We are facing**

- 1. words and their lexical significances;**
- 2. linguistic frameworks;**
- 3. different relevance pattern(s) (let me submit: as with word with *almost* identical significances as in Russian and Polish).**

**\*Bach includes in his book an instructive section modestly labelled *Something about Method* (pp. 15 - 18). While his definitely linguistic arguments defy my competences, some of his notes on the *display values of models* may be accessible to me, but less directly relevant for the present work: so I have to renounce on offering a closer record of his argumentation.**



## 4 PART IV FRAMEWORK THEORY

### 4.1 *Theory and System - an Overview*

So far I have surveyed some *parameters regarding the frameworks and contexts for models*. The *theory basis and environment* for this must now be subjected to further considerations, particularly regarding *systems*. It is inevitable that some point already made will be repeated in this *Section*. *Models and the Theories for them do dovetail*.

*The present assignment is about an ad-hoc, dedicated system and not a discussion of the so-called Systems Idea or corresponding generalizations.*

A *system* must be evaluated and utilized *from the outside*, identifying and localizing the boundaries and outlines and working one's way centripetally.

A rich literature dedicated to socio-political systems is available and generally well-known (some are cited in *Part V*). The discourse about them tends to start out, quite classically, from general ideas of *comprehensive systems*, in some cases perhaps meriting the label of *meta-systems*, on which basis specifically relevant subsystems are being developed. Methodologically speaking, this program description seems satisfactory.

But we can always ask if it is satisfactory in terms of richness, coverage *and* reality embrace. To enrich the program, we should need a comprehensive, detailed and conflict-encompassing field investigation as testing ground. But we rarely find one that is satisfactory.

The relation system-reality is a complex one since any understanding we might achieve of surrounding realities is filtered through a web of more or less clear and conscious, more or less elaborated web of system-like concepts stored in our minds and brains (in the plural!). The advantage of developing *systems analysis* (in the non-tech version used here) is to clarify and bring to the visible surface whatever we have in mind, making it amenable to reshufflings.

The system-related problem now facing us affects a *focus-cum-method* distinction that I have been using in two or three preceding publications: the difference between the *What* and the *How*. In my present program, there is another category of real systems like the ones we think up ourselves; *InDef<inite> systems*, the most important asset of which is not to present a product or result but to serve as a *tool for analysis, adjusting or corrective intervention and theoretical decision*. Most *Def<inite> systems* involve or imply *InDef* systems, while the latter also can work independently. The *InDef* perspective leads on to general Human and Social issues.

A reference to \*Delattre's *Théorie des systèmes et épistémologie*, 1982, using the Italian edition, can highlight the idea of *system* in this context.

Backed up by an impressive bibliography, this French scholar discusses *systems* such as they are modelled in terms of existing categories of systemic structures to be identified in real life: *the traditoinal notion of a phenomenon or abstract object*. He works from this point of departure towards a *general systems understanding and general application*.

But such an attempt evaporizes under the impact of our having to prefer the *How* over the *What*, since any penetrable discussion of "whats" leads us into an infinite regress. One can classify actions, not so objects unless they are purely quantifiable. Actions, mental or digital, run a planned course and at some point terminate.

What I am claiming here is supported not merely by mu hunch but even more decidedly by my *programmatic* reliance on the *Quantum Experience*, in which actions perform excellently while producing "facts" that are incompatible with one another (particles or waves according to one's performance on one and the same "object"). The term *heuristics* is relevant here, we certainly never reach beyond that category.

Adopting the systems view just outlined, a series of traditional terms and notions go by the board, by being irrelevant or inadequate, such as: *causality, conclusion, end result, explanation, fixed level* (distinguished from *operative levels*), *functionality, objectivity and priority*, the removal of which leaves us with a simpler and more manageable picture.

Before grappling with the further steps in the program, let me present the five views of a system expressed in a tree available for the *top-down*, the *lateral*, the *bottom-up approaches* and the *feedbacks* (Fig. 4.1.1).

The five approaches represent different procedures. The top-down runs over the entire system, the bottom-up will pick up some branches, connecting them finally to the top, while the lateral approach can come to see selected branches in isolation. The feedback can cover all the variants.

I would not claim that the figure represents "understanding" the system, which is no clear and valid parameter. *Operational access* means to have integrated whatever we have in focus into a *system* one can construe, describe and apply.

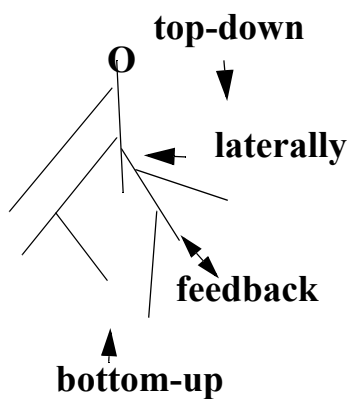


Fig.4.1.1 *A System with five approaches; the origin of the system indicated by zero.*

The idea of *system* at the deepest level is connected with *mathematics* and *symbolic logic*, both being *operative* and *operational* entities. So is my idea of *Def<inite>* statements and notions, which I have proposed as being mirrored in or reflected by *InDef<inite>* paradigms. The con-

nection here cannot be conclusively fixed because one of the terms is not so and cannot be made to become so. Experienced and practicing scientists can object to the link, even if I claim that it functions pragmatically, in the sense that the notional connection can produce *images* that function as such, and that *images* or *pictures* are what we can apply in most cases.

In modern (post-Russell) mathematics, we have something called *propositional functions*, described by Howard \*Eves in his *Foundations and Fundamental Concepts of Mathematics* (pp. 147ff.):

*... though not a proposition, <it> does have the form of a proposition, such as  $x$  is a  $y$ , which can be true or false according to the definite meaning loaded into the units. I mention this because the propositional function implies a picture of model structures into which we can load specifics.*

In his Chapter 6, *Formal Axiomatics*, Eves explains the math parameters in which the following parameters occur: *primitive terms*, *postulates or axioms*, and *theorems*. Finally, he offers the following epitome of the general notion of mathematics:

*The notion of mathematics as an assemblage of abstract postulational discourse gives considerable sense to Russell's facetious statement that "mathematics may be described as the subject in which we never know what we are talking about, nor whether what we are saying is true". It also accords with Henri Poincarè's saying that mathematics is "the giving of the same name to different things", and with Benjamin Peirce's (1809 - 1880) remark that "mathematics is the science which draws necessary conclusions".*

There are however several additional observations we have to take into consideration regarding *networks*, a large category of configurations having one property in common: an  $n \times m$  structure with "boxes" containing dedicated contents (when they are not empty) .

To build a feasible *network*, we have to apply *terms* and not *objects*. For a network to qualify as *Social*, names of people are not adequate. Social, political, religious, economic, etc. *categories* have to be applied.

\*George and Bennett in their *Case Studies and Theory Development in the Social Sciences* (2005) offer a wide and careful overview of modern Sociology. I am not following their curriculum since I am working on Historical material which is not available for modern case studies. But the book has potentials that could be useful even here.

\*Borgatti, Everett, and Johnson have produced an interesting discourse on *Analyzing Social Networks* (2013). Their work sets me wondering whether we are analysing networks between the named Nora-Hedda-Anitra, etc., since they use personal *names*, or rather between their *actions* upon each other; in which case the exploration would shift over to parameters that required attention to theoretical levels. Without taking levels into account, we seem to be working on *nets* rather than *in networks*. We have to start out abstractly with configuration-related *problems*, such as sociological and social ones, developing theory from that.

Theory as a category is not always clearly bounded. Experiences and conceptualizations of everyday nature can be seamlessly linked up with formalizable theories, such as we find in Science. P. S. \*Cohen, in his no longer "modern" but highly usable and, I would say, basic, *Modern Social Theory* (1968), notes as follows (p. 2):

*If theories go beyond facts, do they have a connection with reality? In fact, we would have no experience of reality worth recording, were it it not for theories. The most elementary theories which we use unconsciously, are those embedded in our language; for all language must use certain universal categories; and to use a universal category is, in effect, to use a theory. ... Without universal categories there can be no communication.*

Whatever we approach, we will have loaded into our consciousness some preparatory hunch, ideas about what we are going to face., and which in turn affects our new experience. *Personal Construct Theory (PCT)* (discussed at some length in \*SL, *Patterns*, 4.3.7) elaborates this idea in environmental and social contexts.

Subprograms of the present theory (research paradigms and programs) are the following programs/parameters:

1. Distinguishing between *Def*, *InDef* and *Imponderabilia*; and between;
2. Applying *Words* and *Models* interrelated; as well as
- 3 *What* and *How*. We have better control over the more modest alternative of handling our issue under the program of *How*. Handling must have a subject, while it does not logically or customarily demand a sequel or an environment. This should make an argumentation relatable to graphical, hence bounded, *models*. I take it as axiomatic that seeking for

some "truth" the Philosopher's way, sucks us into a Cocteauish tunnel of infinite regress.

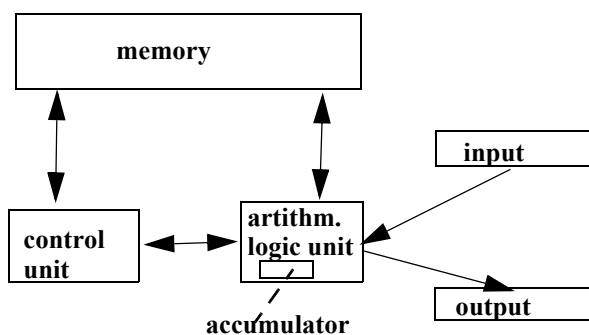
Application fields are constituted by

4. Document(s); the analysis and elaboration integrated in the program just outlined. A central tenet is that we do not find processes, that they are not there, but must be created by ourselves out of the elements that can be there, but that are accessible only through our processing.

My assignment is limited, using a few documents, to assessing the potentialities in combining verbal and graphical models in historical discourse. Connected with this purpose is the one of assessing the opportunity of bringing in resources from modern systems paradigmas.

Modern computer language employs numerous words originally standing for significances with a vast array of primary and secondary meanings and applications, some among them of literary interest. Examples already cited are: *-browser - feedback loop:- code;- shell - platform - user interface or UI, - application - operating system, as Windows or Apple), software (manageable data and digits); hardware (the physical machinery and appendages, like disks).*

These tech words indicate or circumscribe *actions* on some machinery or process, as the units in Turing's numbered strips. The defidicated words that we use in arguments or other fields, on the other hand, denote position in some system *without dynamics being necessarily involved*. For these terms and notions to function usefully, they presuppose embedment in some system, often arising in computation, but being independent on machinery, like the letters printed with and old typewriter.



**Fig. 4.1.2 Operating System in a PC structure.**  
*The group with memory, input and output is redesigned after Tanenbaum and Austin.*

Now let me look more closely at the *central operative* issue in the present work, the relation *Def/<inite> x InDef<inite>* models, evaluated by a comparison with the theoretical links in an *operating system* (Fig. 4.1.2,

*Operating System*) in computers; a subject not directly relevant in the present work, but valid as a model.

This model offers much more than numerical and graphical standards, namely a *functional model or network* which can be used as an analogy to render my rather vague *Def/InDef*-applications more controllably, but figuratively, functional. The crucial awareness here is that this is an illustration of a system that functions dynamically, is digitally operable, adaptable and fully describable.

An operating system *in effigie* can be applied in the present environment.

Let me quote from the *Wikipedia*:

*An operating system (OS) is system software that manages computer hardware and software ,ware resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function.*

*Time-sharing operating systems schedule tasks for efficient use of the system and may also include storing software for cost allocation of processor time, mass storage, printing, and other resources.*

*For Hardware functions such as input and output and memory allocation, the operating system acts as an intermediary between programs and the computer hardware,[1][2] although the application code is usually executed directly by the hardware and frequently makes system calls to an OS function or be interrupted by it. Operating systems are found on many devices that contain a computer—from cellular phones and video game consoles to web servers and supercomputers.*

*Examples of popular modern operating systems include Android, BlackBerry 10, BSD, Chrome OS, iOS, Linux, OS X, QNX, Microsoft, Windows,[3] Windows Phone, and z/OS. The first eight of these examples share roots in UNIX.*

An operating system (OS) is system software that manages computer hardware and software resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function. For the subjects just cited, the book about *Microsoft* by David \*Bank is especially instructive. Let me sum up from his book.

Time-sharing operating systems schedule tasks for efficient use of the system and may also include storing software for cost allocation of processor time, mass storage, printing, and other resources.



For hardware functions such as input and output and memory allocation, the operating system acts as an intermediary between programs and the computer hardware, although the application code is usually executed directly by the hardware and frequently makes system calls to an *OS* function or be interrupted by it. Operating systems are found on many devices that contain a computer—from cellular phones and video game consoles to web servers and supercomputers. So far my summary from Bank's book.

Bypassing the wilderness of interpretations of our faculty of *understanding* and our practicing it in general philosophy, I shall let myself be guided by *related debates in Physics*, notably in \*Heisenberg and \*Selleri, where the *functionalities of systems* are a central concern, and, related to this, but redefined, the notion of *causality*.

Traditionally, at least in the Humanities and Social Sciences, the idea of *causality* is often being taken seriously. The history of modern *Physics* offers a notable case. According to \*Isaacson (pp. 94f.), Planck and Einstein were, at least, agreeing on one notion, that of *causality*. *In one of our planet's little ironies, Planck and Einstein would share the fate of lying the groundwork for quantum mechanics, and then both would flinch when it became clear that it undermined the concept of strict causality...* This attitude did condition Einstein's aversion against \*Heisenberg's *Unschärferelation* or *Uncertainty principle* (we note waves *or* particles in one and the same operation, depending on our method of observation).

Radical Physics, inspired by Heisenberg and others, developed a less definite version of causality. We can probably say that traditionally, causality operates from A to B along a line of awareness and argumentation, while another version is that of internal dependencies in a matrix.

The idea of *causality* is irrelevant.

#### 4.2 *Pattern Formation and Complexity*

The present work is all about *complexity* and *frameworks* for complex cases, since we are involved in many relevant aspects on several levels and situations. And regarding the models themselves, if they do not exhibit complexity, certainly my decisions about them involve a good dose of it.

How to choose among large models that defy efficient survey and utility and smaller ones that can never pick up more than fragments?

In my program for History study, I have avoided great complexities by not focusing on Political Theory, generally speaking, but merely on the potentialities of *ad-hoc observations on Roman political notions*. The point is to see if and how the subject can be profitably approached with a combination of verbal and graphical models with observable *patterns*.

This is the place to report some observations on *The Power of Theory* (pp. 89f.) in \*Gell-Mann's *Jaguar* book.

*Pattern recognition comes naturally to us humans; we are after all, complex adaptive systems ourselves. It is in our nature, by biological inheritance and also through the transmissions of culture to see patterns, to identify regularities, to construct schemata in our minds. However, those schemata are often promoted or demoted, accepted or rejected, in response to selection pressures that are far different from those operating in the sciences, where agreement with observation is so critical.*

With graphical models upon the scene, *framework* issues arise directly, and with them, tolerance limits for pattern formation and complexity.

Some *models* in use here bear visual (but not formal) resemblance to a mathematical *matrix*. The Fig. 4.2.1, *Pseudo-Matrix*, accommodates *Key Terms*. The quantity of boxes is *pars-pro-toto*; and can never be "complete", since there are no criteria for completeness; naming only the four most important ones in the political vocabulary and terminology of Roman public life in the indicated time-span. The model does not indicate interconnections between the terms. such as the obvious one between *res publica* and the other numbered three. This is so because few or none interconnection can be excluded.

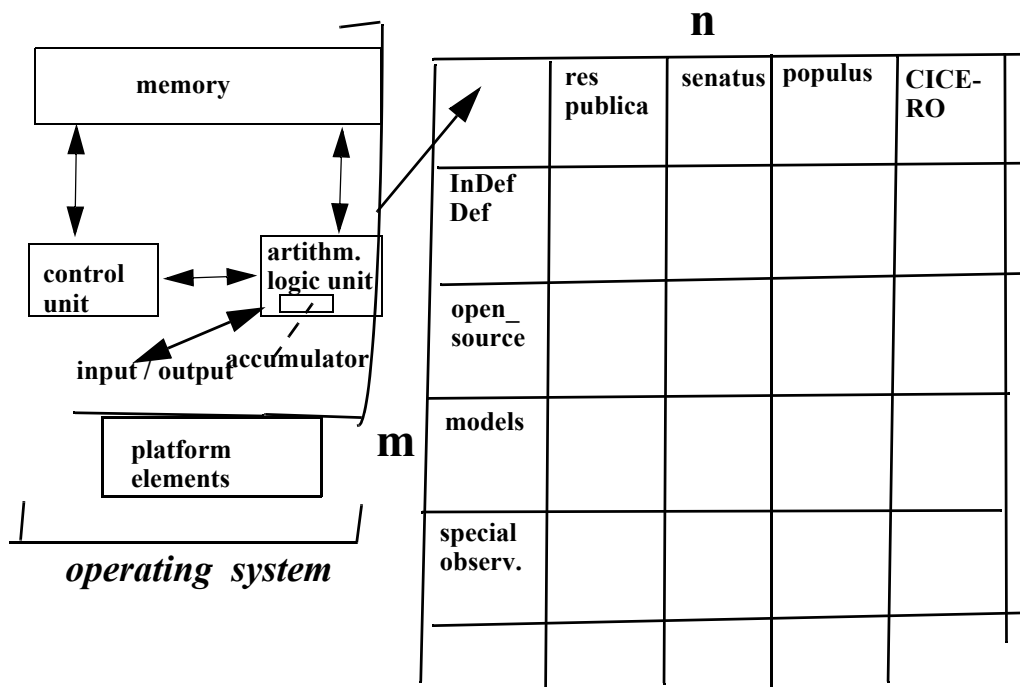


Fig. 4.2.1, *Pseudo-Matrix incorporating Fig. 3.9.2, Operating System.*

Let me note some crucial programming features in the cited book by \*Brambilla, Cabot and Wimmer (2012), to wit that the bearing ideas here *probably* can be transferred to my *Def/InDef* notions.

There are *three principles* under the heading *Model-Driven Architecture (MDA)* (p. 39) that look relevant:

# *Models must be expressed in a well-defined notation, so as to enable effective communication and understanding of the system descriptions for enterprise-scale solutions* - clearly not applicable here.

# *Systems specifications must be organized around a set of models and associated transformations implementing mappings and relations between the models. All this enables organized design based on multi-layered and multi-perspective architectural framework.* A modelling "moral" can be derived from this passage.

# *Models must be built in compliance with a set of metamodels, thus facilitating meaningful integration and transformation among models and automation through tools.* The meta-models here are digital ones, my "mirror-image" of this would be those programmed in my present *Part II*, but of course the "link" is a weak one.

Under the heading of *Criticism of MDSE* (see above for the abbrev.), the authors quote from Friedrich Steinmann:

*Models have their greatest value for people who cannot program [which applies perfectly to my case, in which programming is a mere literary exercise]. Unfortunately, this is not because models are more expressive than programs... but because they oversimplify... Even though (over)simplification can be useful sometimes, it is certainly not a sufficient basis for creating a satisfactory end product.*

Here is Brambilla & Co's reply.

*It is true that models are appealing because they are simplified representations of reality. This is exactly their definition. Not a weakness, but a strength. Model simplify reality, but the final outcome is that several real solutions have been devised based in these studies on simplified models...*

We have seen Herbert \*Simon advocate *simplification*, bypassing the *cluttering details*.

In the *artificial world* today around us (always, but now recognized and exploited), *complexity* is a prominent ingredient, because the new sciences highlight existing complexities better than earlier methodologies, and also because the same activities have made new visions active among us (here, again! I will refer to David \*Bank's book on *Microsoft*).

We probably cannot have *complexity* before us in the present contexts without getting some *imponderabilia* into the bargain. They form a vaguely outlined class of occurrences and awareness that I shall not try to outline

with precision. I should count in here some very rationalistic-looking writings that fail, because of personal idiosyncracies or publicational conventions, to *try* to come up with consistent pictures. A drastic example we have in the earlier biographies on Johann Sebastian Bach, which present him as if he was mainly a religious composer, despite his colossal non-sacral production next to his official duties in the church (mainly, Philipp Spitta and Albert Schweitzer), a picture now radically corrected by Klaus Eidam (*Das wahre Leben des Johann Sebastian Bach*, München 1999, 430 pages).

To obtain an image of *complexity*, we can bring a bottle of wine up from the cellar. Wine really is never "static", so handling and drinking it as an image of our mental and intellectual status and activities can provide a good illustration.

Let us select a bottle with wine from the grape *Aglianico* (aljànico; perhaps originally *elenico* = *greek*). Wine is made from this grape on the plains to the east of Naples *and*, not much further eastwards, on the slopes of the dead vulcano, Vulture. Both wines can be excellent, but generally quite different in taste and storage capacities.

The quality, taste and life curve of any grape, and discriminately this or that variety, depend on a wide and multifarious matrix of soil, climate and time conditions, year, maturity curve, growth characteristics of the type; and then the wine making and external and human influences, age of the wine, conditions of storing and handling, selling and traveling, and the manner of serving, the type of glass we use (most important), that we are left to wonder how two bottles of declared identity can be more or less comparable.

The notion of *complexity* can be studied also in artificial programs or entities, including *Artificial Intelligence* (\*4.5).

In connection with various aspects of *artificiality*, *complexity* has been investigated mostly by Herbert Simon, in his *The Sciences of the Artificial* (3rd. ed. 1996; the original editon of 1969). Needless to say, this work became a cornerstone of *Artificial Intelligence*, a rich and important set of programs delevoped in the computer world.

The third edition of Simon's classic is from 1996, and I suspect that this could hardly be the main theme of a book today, after a more decisive shift over to more articulate digital fields. On the other hand, titles apart, Simon does offer a mass of penetrating observations subsumed under that heading, subjects such as *Complexity*, *Computer issues*, *Hierarchies*, *Organization*, *Rationality*, *Representation*.

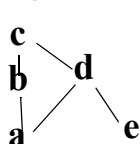
But there is also a section on *complexity* in \*Gell-Mann's recent book on science philosophy, *The Quark and the Jaguar*. He illustrates the idea of complexity with six figures with dots variously interconnected (p. 31)., dis-

cussing *the length of the description* as a criterion, which I fail to grasp since even in one language the description of one item can be of varying length.

Most cases of recordable complexities emerge from *networks*.

In their *Section 1.2, What are networks?*, \*Borgatti, Everett and Johnson explain what is meant by *networks*. But, as far as I can see, they do not give a functional explanation of the crucial *interconnecting lines* in their networks; represented by straight lines, nor of the interconnected nodes. In some of their figures the number of interconnected nodes is so high that the illustration defies analysis. Their Fig. 13.3 illustrates interconnections among 19 named women, without specifying their individual and situational characteristics and roles, nor indicating levels. Their Fig. 5.11 illustrates *collaboration ties among 960 scientists*, shown as a dense black cloud around which some single pins can be seen sticking out as on a porcupine; an illustration more relevant for political propaganda than for analysis.

What do the connection lines mean? A simple example is Borgatti's Fig. 2.1.



*Borgatti, Fig. 2.1.*

The models in Borgatti consists of tiny nodes connected by irregular patterns of straight lines, in arrangements different from one model to the next, with *no indication of general structur or system, with a totally fluctuant geometry*. Thus the elements of analysis are straight lines and nodes, with *no rule* for the way they are patterned: each pattern being different, the relations between the protagonists apparently having been simply mentally imagined: but there *is* a relationship between two taxpayers in a community: that of having to pay taxes to the same community institutions. Interesting? The figures in Borgatti et al. are *illustrations* not *models*.

For analysis-relevant *trees*, we have examples in \*Italiani-Serazzi, Fig. 8.3, showing derivations from one node to the next: *Esempio di albero di derivazione*.

The critical issues are the model *nodes* as well as the connecting *lines* between them. The networks as used in the cited publication are *raw representations*, rather than subjects for *analytical programs*, since the approach is *direct* with no theoretical foundation clearly proposed and developed. On which level are we? on a linguistic, sociological, class-political, age-group? etc.

In our thinking, perceiving and reactions, we can also, in addition to the approaches just listed, be influenced by some idea or awareness that

are only vaguely understood and perceived: being *in the shadow* of whatever is relevant. Some of these factors I am labelling *imponderabilia*.

Giordano Bruno developed this program (he did not use this term!), and I have, in SL, *\*Patterns*, to some extent exploited his idea. Here is a summary.

I have been discussing those factors that clearly relate to Bruno's *method of cognition*, as they are worked out in his book, *De umbris idearum* (The shades of ideas/concepts/notions/thoughts). In this *Section*, the subject is the foundations of his theory; for the working of his *umbra*, see 1.3.1 in my cited book.

*In terms of what kind of methodology did Giordano Bruno approach and treat whatever interested him?* this is my question; an enquiry concentrated on his *De umbris*, since he is unpredictably shifting focus, accent and perspective from one book to the other (at times from a chapter to the next), while sticking to the couple of *light and shade*. He seems to be groping in many directions in order to *catch a falling star*, to adopt an image of John Donne's.

In the present discourse, I am not primarily concerned with the use of light, shade and darkness on the *interpretive* level, which in this connection is accidental (as the Aristotelian *Peripatetici* would probably say); nor the philosophical *content* in Bruno's writings, but *how he develops his themes* (being fully aware that the distinctions are not absolutely neat).

It is what happens on the *methodological* level that I am trying to understand; the *circumstance that he does use such a configuration for a cognitive framework*, which is a methodological one. Bruno uses it as a *model* of the reality he is out to explore, as a handle it offers with which to grasp essentials of the world and the universe. Thus Bruno pioneered our present-day idea of models. He also develops and uses a graphical model (reproduced in my cited contribution).

The above-cited geometric outline model (-----) may turn out to work. Our normal mental setup does not seem to be accustomed to separating an object out from its application as well as its usual context. But in many research programs, we need such a separation.

Here, we have recourse to heuristics, in the present kind of case, we can invoke *object orientation* (1.4 *Loss of Certainties*). I suspect that one reason for the impenetrable nature of Bruno's philosophy was that heuristics were not programmatically in use, or at least not commonly accepted as a technical device, so that he did not distinguish among the approaches.

The *De umbris*, irrespective of the difficulty just identified, does not seem to concern primarily *objects* as such. Rather Bruno prowls around for *methods*, for approaching and knowing them. The title of the book is *De*

*umbris idearum*, shadows of something through which he perceives or takes cognitively hold of whatever interests him; that is, shadows carrying implicitly light, of some object whose universal ingredients are called forth through the process of oscillation between shadow and light.

Taken at face value, the idea of illustrating sight and understanding in terms of *light* by contrasting it to darkness and *shadow* is as natural and commonplace as the underlying notion of accentuating one thing by contrasting it to another. Indeed, a similar idea is briefly hinted at in Thomas Mann's *Buddenbrooks* (10 Teil, Chapter 5), the alternation of light and darkness denoting the protagonist's alternating lack of understanding, vague adumbration and sudden insight. But Bruno does not let us get away that easily.

#### 4.3 Science Dynamics and the Non-Prof Reader

The quest for the *right* answer or solution in some disciplines should be confronted with prevailing attitudes in 20th-century Physics, as explained at great length in \*Feynman's *The Character of Physical La*. He presents several alternative methods for achieving one solution or result, and illustrated with the equivalent alternatives of using the *matrix* (Werner Heisenberg) or the *equation* (Erwin Schrödinger) in *Quantum* theory.

*Werner Heisenberg* is one of the very few modern scientists who has made his theoretical works accessible to ordinary people like myself, stimulating our attempts at developing *Open\_Source* approaches.

So let me just refer to two of his contributions, both in \*Heisenberg, *Der Teil und das Ganze*, Chap. 3. in the cited publication, *Der Begriff "Verstehen" in der modernen Physik*, pp. 39ff., and *Atomphysik und pragmatische Denkweise*, Chap. 8, pp. 114ff. Collateral publications are two related, directly and indirectly, to *Artificial Intelligence*: \*Cammarata; \*Minsky/Papert.

In 1996, John Horgan published a book that caused some sensation, *The End of Science* (321 pages). Here, he lists paradigm after paradigm, predicting their *débauche* as constructive programs.

Similar books could have been written several times earlier, for example after Galileo Galilei's observations, or those of Newton.

Horgan offers interesting evaluations of works by Popper, Dennett, Feyerabend, Gell-Mann, and others, while not citing directly Heisenberg or Herbert Simon. There is much on *Gödel's Theorem* (noted just to indicate the range of the book).

Often Horgan tells us more about scientists than science, his treatment of the "insufferable" Gell-Mann (pp. 211 - 15), and the comportment of the latter and his disparaging statements about colleagues .

Horgan's treatment of this scientist does not inspire confidence about his evaluations of the rest of scholarship he analyses. He has not grasped - not having enough time for it, perhaps - the depth and the wide range of Gell-Mann's book. If the latter in a lunch interview happens to say strange things, perhaps he needed a moment of irresponsibility, and perhaps Horgan did not impress him. And we have no information about Horgan's interviewing methods.

Of course, Horgan is a journalist and must address a wide range of people. But his picture of an *end of Science* should be taken as a shell for communication rather than an argument about research ventures. Since "Science" is a multifarious complex of ideas, discoveries and publications, and is under constant change, only journalistic focus can explain Horgan's coloring of the issue. "Science" has "ended" many times, with the pre-Galilei period, and when Planck as a young man was told by his professor not to study Physics, since nothing new could now be discovered, and Heisenberg got a similar teaching. Both nevertheless became chief protagonists in a deep renewal of Physics. And today, we begin again worrying about the notion of *reality* and *knowledge* in such a "basic" region as Physics..

Worry about the future of Science has been often aired. Before the advent of the *Quantum* universe, people were told that nothing new could emerge from Physics. In the late 18th and early 19th centuries, mathematicians worried about the future of their discipline, as is well recorded by Morris \*Kline at the end of the first volume of his *Mathematical Thought from Ancient to Modern Times*, and particularly in his *Mathematics. The loss of certainty*, Oxford 1980.

We might say: It is not Science that ends but programs and denominations that end up yielding to novel ones that indicate shifts in knowledge and perspectives. Is this not a sign of an alive Science?

Harsh disagreement also is a sign of dynamics, as when Roger Penrose's book about the *King's new clothes* was notionally eliminated by some colleagues from the agenda of decent science (\*SL, *Burden*). So what? Do we want Science and other Scholarship programs to turn into Robert Musil's *Mann ohne Eigenschaften*? Not wanting that, let me introduce some aspects from Horgan's book, *certain to create controversy* (E. O. Wilson).

Horgan debunks some works that I have cited with respect in the present contribution (Gell-Mann, for instance), while not citing Herbert Simon, which can be considered an omission.

But let me focus on some of his arguments.



The limitations of our machines (pp. 179ff.): Horgan critically cites Daniel Dennett who *seemed to doubt whether even superintelligent machines would ever fully comprehend themselves. Trying to know themselves, the machines would have to become still more complicated, they would thus be caught in a spiral of ever-increasing complexity, chasing their own tails for all eternity.*

My question here would be: How could we *define* full comprehension? One barrier consists in the simple circumstance that most of our criteria of understanding do not come out bare, crude and uncontaminated but rather muddled up in their midsts and their fringes, turned into images full of noise or *imponderabilia*. So the query is an empty one, while machines, such as we know them today, never "understand" anything at all, just acting on command expressed in strings of 0s and 1s.

Horgan's book is important *provided* we interpret his program as regarding the *end of present-day Science*, being well prepared, by a couple of millennia of more or less science-paradigmatic activities running their course, for steadily new conceptions and understandings of a large field that can only be subsumed under some heading like *trying to obtain knowledge and understanding of the world and our life and trying to determine the contents and edge of these two nouns, knowledge and understanding* (a "definition" not to be quoted, please!).

My claim that the boundaries between Science and the "softer" paradigms are not definite but shifty and opaque, can be substantiated by the observation, that much that is considered *scientific defies precise numeration, experimentation and measurement.*

Horgan cites one relevant perspective (p. 103), noted by David Schramm: *Even if somebody comes up with a really beautiful theory, like superstrings theory, there's not any way it can be tested. So you're not really doing the scientific method, where you make predictions and then check it. There's not that experimental check going on. It's more just mathematical consistency.*

In numerous cases, crucial *and* productive ideas have been launched from some initial hunch, Niels Bohr model of the atom a famous example. Heisenberg claimed that believed more in his models than in the "reality" they expressed.

In the course of looking through the present work, the reader will have come across notes on various forms and manifestations of an elusive notion called *complexity* (elusive except in math or pure geometry - as in \*Gell-Mann). Here, the artificial character of our documentation above a certain level and our recording and argumentation is evident. Today, I be-

lieve, no one would demand, as some of our grandparents did, that we should present things *as they really are*.

Gell-Mann's is a hypothetical general image of Science, and Science, we know, lives off hypotheses next to records. Who would take his book as being out to proclaim absolute truth? Scientists are humans and perhaps can need, at least for some time, to convince themselves of the utter definiteness of their findings, just not to let themselves be disturbed by doubt in their process of going further with their search. They also are economic entities: wanting support, don't let me show them my doubts, for I can go on with this for a while, and I need money and a professorship at Cape Cod. To conclude, whoever explores, and accepting it, the *diversity of the universe* (Stephen Hawkin), at least does not simplify.

\*Gell-Mann's *The Quark and the Jaguar. Adventures in the Simple and the Complex* (New York, 1994, 392 pages) is an "adventure" in modern and quantum physics, and here he manages to present and explain in normal human language, so one like me has no problems with reading the book, some of the most intriguing aspects of recent science. My space is too limited, and so are my competences, to render justice to this masterpiece.

Considering the importance of Gell-Mann's book, nevertheless I shall cite some of the entries from his Table of Contents (pale and "elegant" print, not for elderly people).

*Information and Crude Complexity, - The Power of Theory, - What is Fundamental? - Simplicity and Randomness in the Quantum Universe, - Adaptive and Maladaptive Schemata, - Transitions to a More Sustainable World*, collected in four Parts: I, THE SIMPLE AND THE COMPLEX, II, THE QUANTUM UNIVERSE, III, SELECTION AND FITNESS, IV, DIVERSITY AND SUSTAINABILITY.

In this way, Gell-Mann's book spans the distance from pure theory, in part quantum-wise, over to biological life (epithomized in the big animal).

Many among us want to consider, perhaps determine, the position of what we are doing in the larger context of scholarship or other frames, pointedly that of normal life, even when our work does not fit in with traditional conceptions there. Leaving aside the non-determinate *imponderabilia*, we can relate all the Sciences, including verbal-cum-model history studies, to Mathematics and Physics: chemistry, informatics, model-driven social studies, medicine, biology, and others.

It is the reliance on *discrete and systemically ordered units* that makes the difference, in whichever larger context we load them.

This relation between discrete units and processual fields should be explored in terms of possible fundamental structures, such as, for example, between the factors in a group I have promoted all through my later works,

connecting the alternatives of the *What* and the *How* (analytically workable though often overlapping or otherwise interrelated).

Can these perspectives be better understood and used for retrieving a basis for them in the Sciences?

For the present assignment, such parameters certainly cannot be used directly or be transferred totally intact. But often we have to rely on *focus and direction*, rather than more or less completely realizing an intended result or outcome. We recall that Werner Heisenberg emphasized the argumentative validity of tendency - *dynamis*, as he called it (SL, \*A Model).

Process is the key word. We do participate in a complex of both tightly and fragmentarily constituted models, in processes that are, to some extent, at least, products of university structures, programs - and financing.

Young people today have discovered the advantage of digital media as a tool for personal intercom, a field unhampered by university curricula and norms. They will be discovering that, furthermore, they can learn important things bypassing the academic courses. Just take the subway. Many of them are scanning their little something-pods, not saying a word to each other. Antisocial - a *Verlust der Mitte*?

On the contrary, in our days of proclaimed but not much practiced interdisciplinarity, the new generations are implementing an idea we elders can have imagined but shy away from practicing. They are discovering features in the world, and gaining info and using communication paths not available in traditional media. This means new demands and new technologies. and possibly new frontiers.

#### 4.4 *Sciences of the Artificial*

To end this *Section* about models, we shall take into consideration a special technical program that so to speak hovers at the margin of model handling: *Artificial Intelligence*.

This *Section* title is taken from Herbert \*Simon's important book, cited several times in the present work. His book covers a wide field but centers, one might say, around the idea of the *artificial*, including *AI*.

Simon has a series of paragraphs on *computer data structures* (pp. 17 - 23), the first one with the subtitle *The Computer as Artifact*.

He starts with noting that *No artifact devised by man is so convenient for this kind of functional description* [referring to his discussion so far} as a *digital computer* (readers will note that I have taken his advise: \*Fig. 3.4.4, *Operating System in a PC structure*). Under the Subheading *Computers and Thought*, Simon sets down a principle, both fascinating and, as I see it, too restrictive:

*As we succeed in broadening and deepening our knowledge, theoretical and empirical, we discover that in large part their [people's] behavior is governed by simple general laws, that what appeared as complexity in the computer program was to a considerable extent complexity of the environment to which the program was seeking to adapt its behavior.*

*This relation of programs to environment opened up an exceedingly important role for computer simulation as a tool for achieving a deeper understanding of human behavior. For if it is the organization of components, and not their physical properties, that largely determines human behavior, and if computers are organized somewhat in the image of man [!?!], then the computer becomes an obvious device for exploring the consequences of alternative organizational assumptions for human behavior...*

Simon's argumentation here seems to be available to a rather special kind of understanding: *if a computer acts like a man, then it acts like a man. If in our study of man, we extract organizational patterns that resemble those on our machines, then the machine becomes an image of man.*

Is this an argument about *analytical models*? No, because an analytical model "models" something if it translates the original into a different media structure, *not of it replicates the original in media structurally congruent*. If the computer is evaluated as a replication of our intellectual behavior, then we look at the latter in terms of the former, *not* translating the picture into a different language, only a different medium or material.

*Artificial intelligence* is artificial but not intelligence; it is a dumb but efficient machine operation, an enormously useful and interesting one.

I remember Hubert Dreyfus visiting us at the Norwegian Institute of Technology (*NTH*) reading aloud for us, to my disappointment, an article he had published earlier and with which we were familiar.

The gist was that in perceiving an idea and elaborating it mentally, we will make big jumps or leaps from one stretch to the next along the parameter line, bypassing less important lines, while a computer, being a dumb slave of technology, must do all the stages in a mindless run (comments in \*Leower and Rey, pp. xxxiii and 90f.).

I do believe that a process of reasoning adopting this shortcut can be labeled "intelligent", but the criterion needed in the present context is "workable", process-oriented rather than quality-oriented.

Javier \*Cercas notes: *no era la realidad quien creaba las imagines, sino las imagines quienes creaban la realidad (Anatomka de un instante, p. 36)*: it was not reality that created the pictures, but the latter that created the former. The notion that we filter "reality", "truth" and "realities" through the complex web called our *mind*, is generally understood today. Artifice, imagery and uncertainty rule the game.

Artificial? Of course, as are all our conceptions above pure numerical values as well as "solid" actions (*hitting someone*, as Wittgenstein characteristically put it). Having recourse to *artifice* also is determined by the predominant factor of *uncertainty*. We are forced to create our world, hoping we can manage it. The idea is not new.

Giordano Bruno developed ideas that seem radically "modern" ; and his English interlocutors didn't understand the difference between his ideas and those in Ficino's writings, which formed Bruno's point of departure. In Bruno's *De umbris idearum*, the shadow is *not* a physical or conceptually contemplated object in focus, it is a *model for a cognitive process*, which has a time dimension, and which shall be *used on objects*.

We read and consult a text being conditioned by certain convictions or determinant programs. In my case the principal idea, to repeat, is the distinction between the *What* and the *How*, understanding or elaboration of a subject or theme, alternatives of practical research value without being absolutely distinct in relation to one another.

Let me repeat: I take it as axiomatic that seeking for some "truth" the *Philosopher's* way, sucks us into a Cocteauish tunnel of infinite regress. We have better control over the more modest alternatives. Handling must have a subject, while it does not logically or customarily demand or require a sequel or an environment. This should make an argumentation relatable to graphical, hence bounded, *models*.

A *web* of rather intricate and loosely interconnected subjects remains to be considered.

We *create* our programs and our understanding of the involved terms and systems.

1. On a notionally fundamental *operative* level we have ideas, words, pictures, symbols, numbers. Then:

2. The *pragmatic propositions* (eschewing deep philosophical ones), operating on certain levels on which systems can be built around them.

3. A *conceptual system*, not technical or mathematical, but model-based, conveying *images* of such definable systems.

Having exposed myself to such risky ideas, let me seek a safer harbor in Herbert Simon's *The Sciences of the Artificial* (3rd ed.,1996).

On p. 3 Simon notes:

*... those things we call artifacts are not apart from nature. They have no dispensation to ignore or violate natural law. At the same time they are adapted to human goals and purposes. They are what they are in order to satisfy our desire to fly or to eat well. As our aims change, so too do our artifacts - and vice versa. If science is to encompass these objects and phenomena in which human purpose as well as natural law are embodied, it must have means for*

*relating these two disparate components. The character of these means and their implications for certain areas of knowledge - economics, psychology, and design in particular - are the central concern of this book.*

And Simon continues (p. 5):

*We have now identified four indices that distinguish the artificial from the natural; hence we can set the boundaries for sciences of the artificial:*

- 1. Artificial things [I wish he could have found a better name than things] are synthesized (though not always or usually with full forethought) by human beings.*
- 2. Artificial things may imitate appearances in natural things while lacking, in one or many respects, the reality [!] of the latter.*
- 3. Artificial things can be characterized in terms of functions [the what or the how], goals, adaptation.*
- 4. Artificial things are often discussed, particularly when they are being designed, in terms of imperatives as well as descriptives.*

On page 6 Simon goes on to discuss *The Artifact as "Interface"*, and on the next page: *Functional Explanation*, where he supplies a note:

*A generalization of the argument made here on the separability of "outer" from "inner" environment [a crucial idea in Simon's work] shows that we should expect to find separability, to a greater or lesser degree, in all large and complex systems, whether they are artificial or natural. In its generalized form it is an argument that all nature will be organized in "levels".*

*Vabbene!* But I have problems with the *inner and outer environments*, since this distinction to me seems dependent on the actual perspective directing any working process, activating views that can easily conflate the two "environments".

The present subject can be followed up by consulting Silvio \*Cammarrata's *Reti neuronali*, an introduction to the modernized version of artificial intelligence.

*Networks* being central in modern cognitive and digital theories and practice, let us consider if and, eventually how, the *present program* could be elaborated and usefully accommodated in network terms. This agenda will be limited to some main lines, in consideration of the space a substantive discussion would require.

In the present assignment, we are handling texts that do *not arise as systems*, rather as juxtapositions of a number of more or less tightly coupled fields, to be analyzed in terms of a *Network Model* with adjacent nodes. Historically, such a model appears to correspond to the Roman "additive" conception of society and politics., versus the Greek systemic pictures.

These operations can be considered as *artificial* in the sense that they do not arise from strict definitions of the cases, but from my logistic ideas, competences (for what they may be worth) and intentions. The cases are not *there* but will have to be approached though the factors just cited. A strictly "objective" approach is a dream never come true.

The gist of what I am saying is not new; frequently, well-known things have to be restated in order to keep the flow of the discourse. It is, simply, that we *create our criteria* and the selected objects that depend on them; and that such "creations", perhaps most of them, are shared by others, making up a so-called culture (\*De Finetti, with \*Bruno and Gorello's *Introduction*). Gerald \*Vision's book with the telling title, *Modern Anti-Realism and Manufactured Truth*, 1988, belongs to this category. So does the next publication.

Let me cite from the description of AI in \*Minsky and Papert's bok offered by the publishers (better than I could do).

*Artificial-intelligence research which for a time concentrated on the programming on Von Neumann computers, is swinging back to the idea that intelligence might emerge from the activity of networks of neuron-like entities. Minsky and Papert's book was the first example of a mathematical analysis carried far enough to show the exact limitations of class of computing machines that could seriously be considered as models of the brain.*

*Now the new developments in mathematical tools, the recent interests of phycisists in the theory of disordered matter, the new insights into and psychological models of how the brain works, and the evolution of fast computers that can simulate networks of automata have given Perceptrons new importance (also \*Damasio)..*

The book offers an instructive introduction to the crucial points in the development of data use and manipulation since the 1940s; five paragraphs: 1940s, *Neural Networks*; 1950s, *Learning in Neural Networks*; 1960s, *Connectionists and Symbolists*; 1970s, *Representations of Knowledge*; 1980s, *The Revival of Learning Machines* (pp. VIII - XV).

Herbert \*Simon (*Models of My Life*, p. 63) records a conflict between political scientists:

*The new behavioral political science evoked great resistance from traditional political scientists. The noise of the battle at times grew loud, and this struggle, like most, produced more than a little confusion. Politcal theorists felt threatened and took to the barricades, not recognizing that there was room for more than one venture in the domain of poltical science... The battle is long over, and we are all winners.*

The notions of *Truth* and *Validity* are creations within such a culture, and Science according to the now prevalent orientation, is also a creation.

This anti-absoluteness gives us a great freedom. But what about the responsibility? That we argue within some relatively clear established system with a degree of consistence that seems to function within the same culture. A circular argument, this one? Certainly, circularity is the only criterium we have of validity (in cases that cannot be tested experimentally).

Let me repeat: Shifting our position beyond *numbers*, whatever we observe, configure, imagine, grasp or understand, is an *artificium* created by ourselves, when writing, hoping the reader will get the intended gist of it and, possibly, can expand, modify or reject the vision.

#### 4.5 Terms in Abstract Environments

Readers who find that the upcoming account suffers from imprecision will be right. But so they would be considering the entire present book. Being too old to have a career ahead of me, I can be straight: We have no criterion, except those that we choose, prefer and establish, for our ideas as they might be positioned in seemingly rational systems or patterns. Always on the move!

In the present *Section*, I note some parameters regarding our use of word and terms, thus entering into a colossal field where I can only be a visitor. But within the limited scope of this book, some notes can be relevant. The survey is, of course, tentative.

In the Sciences, *theory* links up observational data and testing or verification by specific theory-based methods, many among them referring to or based on *models*. In the following, I would prefer to avoid using the term *theory*, since the cited conditions do not arise. But finding no better denomination, I shall use the word *theory* with the reservation just noted. Readers will soon discover the difference.

Terminologies reflect the verbally stated scientific theories, often on account of precise locations in models. But in our context, tangential to Science but not closer, the question of verbal structure is different.

Functionally, my terms are derived from *Def*<inite>contexts, such as Physics, while applied mostly to programs definitely *InDef*.

The (*config*) *models* do not work digitally, like the *executable* ones, but by reflection and imitation, being *pictures* of some operations in digital models. They include such parameters as are relevant under this condition, and are being employed *as if* some dynamical interactions take place within them and connected with them. These models *illustrate* our/my recording, argumentation and external connections.

The *charts* can have a look identical to that of such models but are intended to *not imply* internal dynamics, merely static interconnections and



relationships, like topographical maps or plans. Under changing circumstances or context, their function can shift.

Now let me look specifically at the issue of commonly accepted *model types*.

There is a vast choice of graphical models for digital or comparative use. *\*Minsky and Pappert's* cited book is exceptionally rich in graphical models. Characteristically, or should I say, logistically, the configurational models are linked up with articulate Math models, often via Physics.

An arbitrarily edited catalog of *2D non-digitally-run models* could look like this (large collections of references in *\*Abler, Adams & Gould, \*Davis and Olson, \*Krakowiak and \*Parker*):

Modelling persons by their names does not work, as I have noted, while doing so with categories may work, such as in the following little model (*uncle, nephew, their mother*, Fig. 4.5.1).

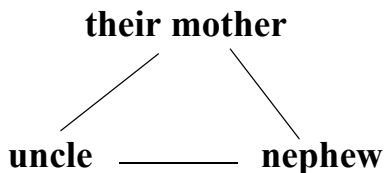


Fig. 4.5.1, *Relationships*

Here is a list

1. *Relational, non-focused charts; some showing interactions, some in which they have to be understood.*
2. *Venn Diagrams, two or more circles variously separate, tangential, overlapping or including, often embedded in differently shaded rectangular boxes (shown in Seymour Lipschutz, Topology, available in a number of languages)..*
3. *Upside-down trees (ubiquitous).*
  - 3.1 *the lines with captions, or*
  - 3.2 *with boxes.*
  - 3.3 *same, developed laterally.*
4. *Flowcharts (sciences, planning, architecture).*
5. *Floating (illustratedly) interrelation charts (society groups, business, science).*
6. *Circular or oval separate fields containing points interrelated from one to the other, or to several, by lines or arrows (topological functions).*
7. *Matrix or matrix-like (sciences);*
8. *disc staples:*
9. *circular (or oval, etc.) fields connected with lines.*

10. "Freely" constructed models or charts (social sciences, research, political and commercial presentation, present book).

In addition, we have *illustrative models*, such as some reproduced in \*Bowler and Morus: Fig. 2.2, *The Ptolemaic Universe*; Fig. 2.3, *The Copernican Universe*; Fig. 15.2, *Kepler's Geometrical Model* of the solar system: in fact, a box in perspective drawing, containing various gadgets. The distinctions are not too manifest. What to say about Fig. 2.5, in the same publication, showing Descartes' *Model of the Mechanical Origins of Magnetism*? A geometrical, symmetrical shape, complete, however, with tiny worm-like spirals moving around in the patterned courses. This is a conflation of an abstract design and a naturalistic picture. Or Simon Stevin's model reproduced in \*Simon's *The Sciences of the Artificial*?

The "moral" is that literally anything goes, so that any shape can function, while of course usage and traditions are determinant. Of course models cannot be exact like numbers or logic symbols.

#### 4.6 Thinking Digitally

(A Sketch for Further Consideration)

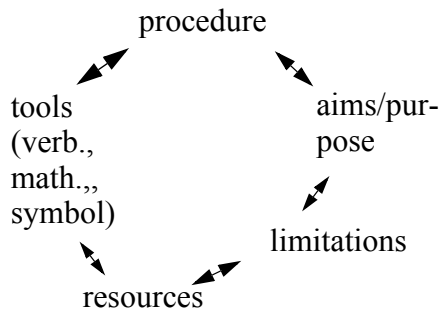
Wanting to look ahead, I will conclude the present *Part IV* with a short preview of a subject I have frequently approached on the foregoing pages, *method* and *methodology* as distinct programs. Here is a sketch for further discussion.

With it, I would discuss the incomparable Paul Feyerabend's two penetrating, important while provocative books on the same subject; *Against Method* (1975) and *Wider den Methodenzwang* (1986). I would also exploit the ideas, programs and models in a trailblazing work on digital argumentation, which my ideas somehow are intended to reflect on softer evidence: Marco Brambilla, Jordi Cabot, and Manuel Wimmer, *Model-Driven Software Engineering in Practice* (2012).

Thinking digitally is preferable to thinking analogically when working with analytical models; points rather than lines and curves. Even the *designed curves* of the Calculus represent flows of *points*, with no basic-level continuity.

|Starting out with *theory* by hunch-evaluation of subject and goal; following Einstein's "rule".

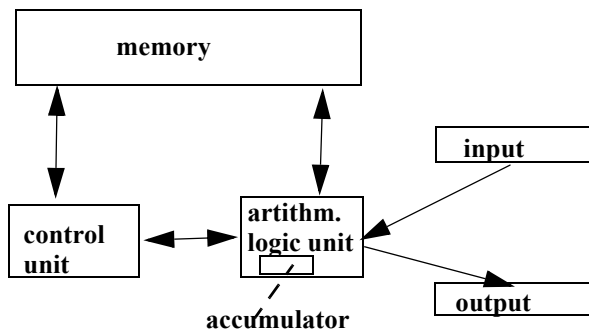
Introducing the subject, let me present a preliminary or raw version, a graph of the interconnections to be studied at closer quarters and more systemically (Fig. 4.6.1, *Preview*).



**Fig. 4.6.1, *Preview of Method System.***

**Methods** are processual and developing combinations of the factors illustrated in Fig. 4.6.1, to be adapted according to case, purpose and conditions. The configurations now coming up, are *general, non-dedicated* versions (Figs. 4.6.1, 4.6.2, 4,6,3).

The graph in Fig. 4.6.3 is not to be taken "literally" as an analytical model, rather as a set of roadmaps for further but *never completed* visits to the vast landscape. The Reader can take the present *Section* as a sign of my fundamental *Uncertainty* and conviction that we can never conclude in any absolute sense when working with issues like the present ones.



**Fig. 4.6.3, *Computer Operating System (from SL, \*Downloading); redesigned after Tanenbaum and Austin.***

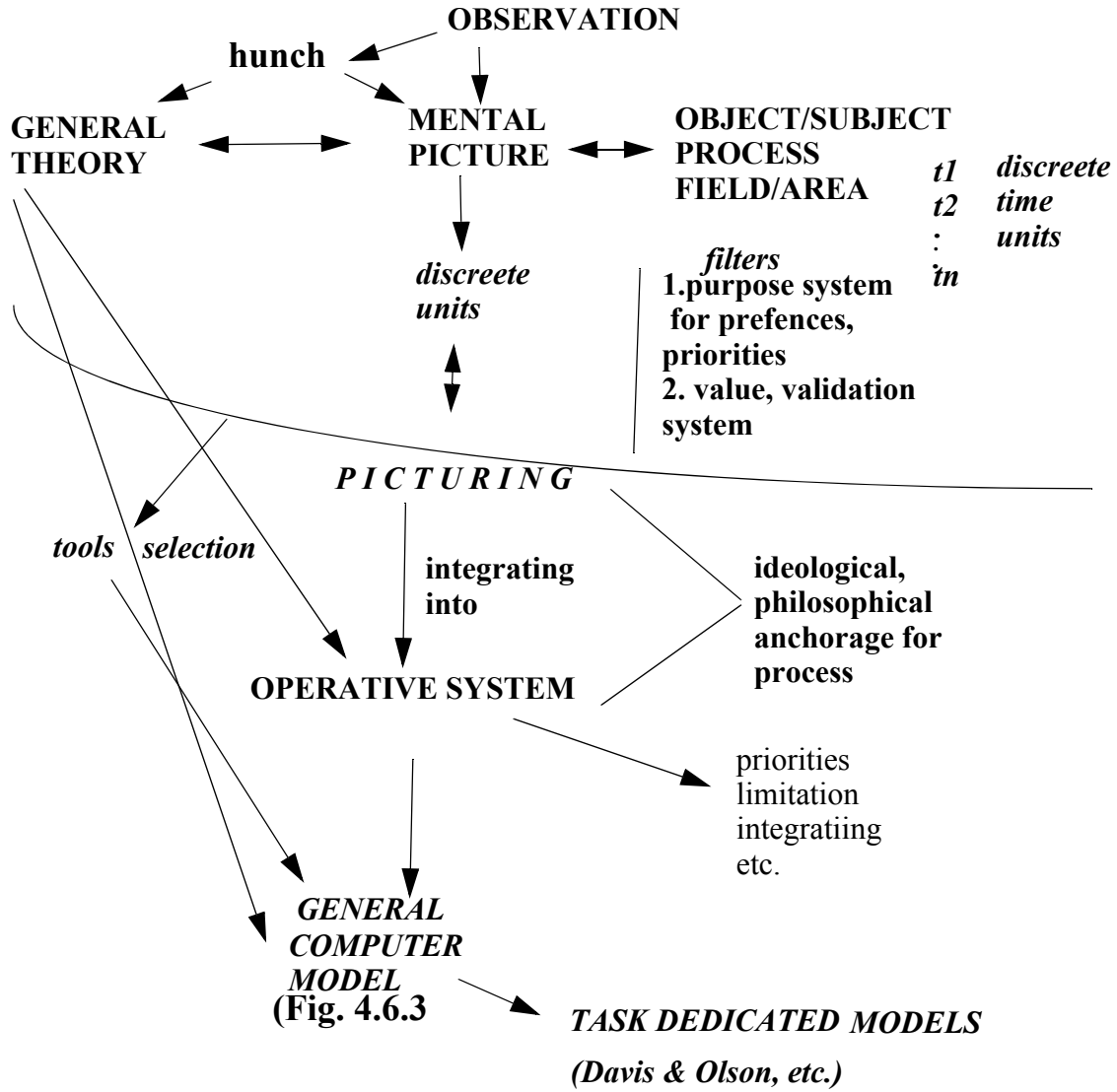
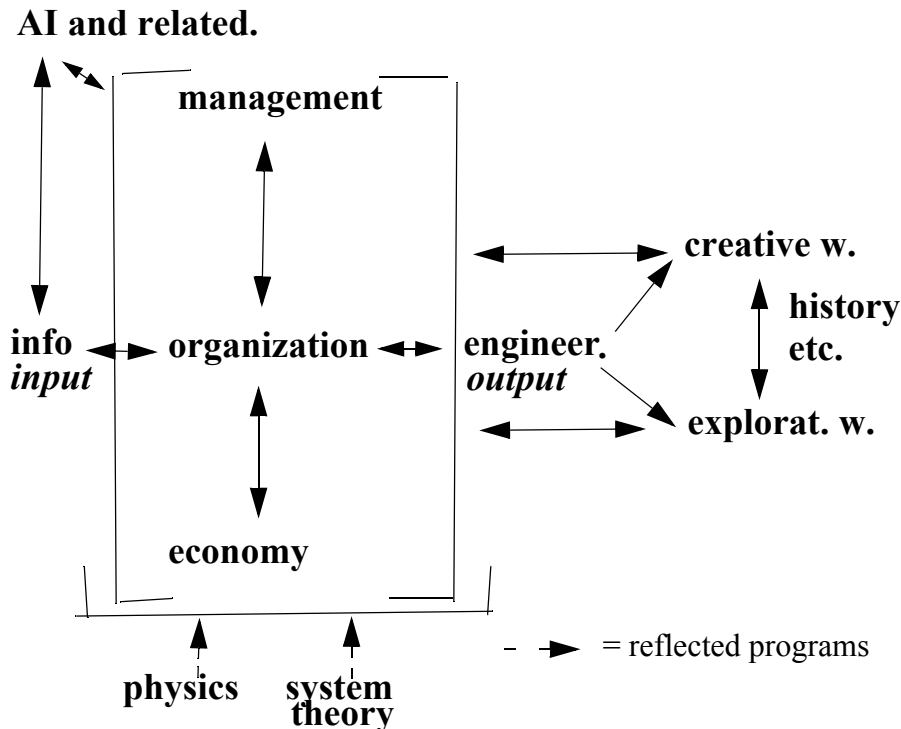


Fig. 4.6.3, General Chart with Models Integrated.

## 5 PART V ENVIRONMENT THEORY

### 5.1 A Meta-Model and Six Perspectives

Let me review, with unavoidable repetitions, some research fields that have not been integrated into the material explored in the *four preceding Parts*, while they certainly either hover in the background or lie closely at the periphery of the chosen topics; starting out with a *meta-model for the theory embodiment in the present book* (Fig. 5.1.1).



**Fig. 5.1.1 Meta-Model of Present-Work Productive Structure.** Double arrows = possible feedbacks. *W* = works. Info includes Informatics. AI = Artif. Intelligence. Each unit can be expressed/represented by operative models, MIS and Social systems are reckoned as belonging under Management. The reflected programs are such that contribute partially to the model complex.

Let us have a *catalog of the items in the Metaodel* in Fig. 5.1.1, starting from the base (with *Physics* and *System*), which refer to places in the present work, to SL, \*Patterns, and other publications. I am collecting these references here, not to disrupt the flow in what follows.

Some of the publications are explored more closely below, in OSn. Here, a summary.

- *Physics*: numeros models with internal interrelations in and related to Physics in Von \*Weizsäcker; also \*Marion: the new standard work: \*Alonso and Finn.

- *System(s)*: *ibid.*, and in the present work, numerous references, among them, to the publications listed here and after this session.
- *Economy*, \*Morgan, *The World in the Model*, also generally on models.
- *Organization*: SL, recent publications, references to \*Silverman and others.
- *Management*: \*Davis and Olson; and \*Parker, both books centering on *Management Information Systems* (MIS).
- *Info*: \*Italiani/Serazzi (revised ed. 1988), a classic and no longer adequate, but a splendid introduction; most of the cited publication, particularly relevant in \*Davis/Olson and \*Parker.

But note that I do not consider *information* (= interpreted and applied *data*) generally, only specifically *applied and dedicated info: Management Information Systems* (MIS).

- *Engineering*: \*Dieter, *Engineering Design*; a systemic-theory-oriented work (not architectural).

Most of these subjects are discussed in SL, \**Patterns* and are *here* considered as being loaded into the *Meta-Model* just displayed.

There are certain premises, most of them already discussed, that I take as axiomatic. Some points are repeated here.

1. Whatever we can understand and describe that is not purely numerical, is rooted in ourselves, in the present case in myself: character, experience, environment, intentions.

2. This means that an ever so chronologically distant document, like the one by Cicero, is *contemporary with us/me*.

3. Object Orientation: (\*1.5 *Loss of Certainties*).

4. *Maximation*. Adopting the *maximation principle* (\*SL, *Burden, Patterns*), we achieve an artificial totality embedded into which there is the "real" system. I apply what I have called *maximation*, for any specific case of argument noting all possible parameters (SL, \**Patterns*, 4.1, 4.7). An advantage with configurational models structured for maximation is that blanks in what we have considered or know, is that blanks so to speak will stare accusingly at us.

5. *Explanation is a by-product of systemization* (\*Radnitzky, II, 102). This means that I have to run *my Cicero* through a modern-style systemization that was entirely alien to Cicero and his Roman contemporaries (more acceptable among the Greeks).

Studying Cicero, it is *my Cicero* (or the one of some branch of present-day scholarship which I take as my platform) I am studying. But I would not do that properly, or in an adequate context, were I not to take certain *datas* into active account. I am working in 2015/6, surrounded by electronic gadgets, and cannot pretend that I am a Roman from Republican time;

I do not believe in the silly idea of imagining oneself in a distant historical situation, *any* situation beyond us. At the university, we were always told to keep *historical distance*, but not how to go about it. There is but one solution left for us: to accept the dreary facts.

Here is a list of research programs that can make up an *example* of an *Open\_Source* collection. The numerical order is immaterial (see Fig. 5.1.2).

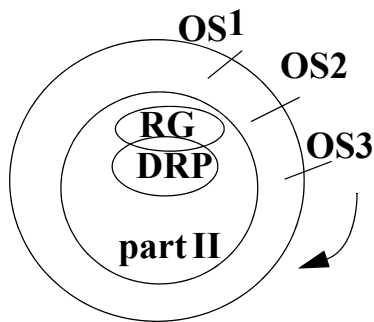


Fig. 5.1.2 *Open\_Source Collection*

The group of Diagrams show: *DRP* = *De re publica with comments*; *RG* = *Res gestae with comments*, partly overlapping and integrated as an internal group in Part II, the whole integrated in the programs *OS1* to *OS8* (for *OSn* = *Open\_Source*).

A list of six programs to follow, numbered *OSn*, for *Open\_Source*.

#### 5.1.1OS1 Management Information Systems

The standard abbreviation for this complex field is *MIS*, offering observations and notions that I have used elsewhere in the book..

Let me repeat: *Management Information Systems* is the title and subject (*MIS*) in books by \*Parker (828 pages), G. B. \*Davis and M. H. Olson (693 pages), and a number of others. The two cited books cannot be sufficiently explored in the present work. The present references to *MIS* are "reflected" ones, again an attempt to create a mirror-image of a field not directly relevant and applicable to my project, the field being developed for *digital working* and for *industrial and business production and delivery*. But it can be profitable to take a peep across the neighbor's fence.

I shall not get myself involved in more details in this topic, merely noting it as a possible resource, having depended on it for some of my models.

#### 5.1.2OS2 Science Systems

My justification for venturing into the complex world of "Science" is that whatever we do in conceptual and argumentative terms, somehow must

take paradigmas of Science as a guide and model. This for me is axiomatic and can only be underpinned by what I can deliver on these pages (I am not claiming any amount of "originality", but I have to state *my* basis, whatever its defects).

Out to make a consistent picture, I will have to repeat some points made in preceding *Sections*.

Since a *System* as we normally interpret and use it obviously depends on our mental and intellectual setup, handling of ideas and notions constituting it, there are few or no absolute rules for defining it or for our approach processes. The term is widely in use and for quite different contexts and with widely varying definitions.

Herbert A. \*Simon developed the term *bounded rationality*, well presented in his *Reason in Human Affairs*, Stanford 1983, esp. pp. 19ff. His ideas match up with those of Kurt Gödel (1931) and in 19th-century Physics (in particular Werner \*Heisenberg's *Indeterminacy* principle).

"Science" of course is a conceptual, political and financial construct, and so also are out attempts at emulating ideas or processes involved there. My "Systems" are indefinite, and, to be handled, have to be structured as mirror-images of *real systems*, meaning by that, systems as we find them in Logics, Mathematics and Physics. This involves some limitations, but is preferable to the many other limitations that *configural exploration* imposes on us. It also, and most fundamentally, means that we are working consciously, actively and deliberately with *artificial constructs*.

Such programs, the present one, too, can be summarized as follows.

1. On a fundamental conceptual, argumentative and communicative level, that is, on *operative levels*, we work with ideas, words, pictures, symbols, that is, at least twice removed from whatever measurable "realities" we are facing and handling.
2. These are *pragmatic*, not philosophical propositions, operating on certain levels axiomatically identified and on which *systems* can be built (built: they are not there to be found). Example: a car (American: automobile) mechanic should know how the cogs and wheels etc. are interconnected and work together, and as \*Gregory said, he will "see" the entire machine working, but he does not need to understand these operations from a standpoint of physical mechanics.
3. A *conceptual system*, such as those that I am trying out in this work, are not tech or math, but images of the notions listed in pt. 1. They are definitely *artificial* even when pretended to reflect or illustrate chunks of "reality".

A few notes on *artificiality* are due.

For my *model constructions* in the present work, I may perhaps claim support from R. C. \*Gregory (cited in \*SL, *Patterns*):



*There is nothing new in this idea of turning a perception model into a research model: The status of perception may be very like that of scientific hypotheses. What we see is affected by what is likely; and we can be driven into error by following assumptions which are not appropriate for the available sensory data, to quote the neurophysiologist Richard L. \*Gregory (Mind in Science,, pp. 395ff.).*

Herbert A. \*Simon has a book with the title *The Sciences of the Artificial* (I am using the 3rd. edition of 1996, the first is from 1969).

Citing from the *Preface to Second Edition* (included in the third one): *The thesis is that certain phenomena are "artificial" in a very specific sense: they are as they are only because of a system's being molded, by goals or purposes, to the environment in which it lives. If natural phenomena have an air of "necessity" about them in their subservience to natural law, artificial phenomena have an air of "contingency" in their malleability by environment.*

*The contingency of artificial phenomena has always created doubts as to whether they fall properly within the compass of science. Sonetimes these doubts refer to the goal-directed character of artificial systems and the consequent difficulty of disentangling prescription from description. This seems to me not to be the real difficulty. The genuine problem is to show how empirical propositions can be made at all about systems that, given different circumstances, might be quite other than they are.*

And Simon submits a personal note: *Almost as soon as I began research on administrative organizations, ... I encountered the problem of artificiality in almost its pure form.*

This is *gefundenes Fressen* for my project, the central tenet of which is that we always work with artificial situations, processes and subjects.

Today we are aware of facing, not *the Science*, but *Patterns of Science*, meaning precisely identifiable and localizable clusters of parameters we categorize as scientific; rather than a large, vague and imprecisely defined area which is loved (if not hated as in certain countries) by financial authorities and by academic usage.

This discriminate attitude has a long pre-history. Let me cite one early example of it, Hans Sedlmayr's *Verlust der Mitte*, 1948, a book which showed us that our brave and good parents had missed a point.

Today, many elderlies look with displeasure at the youth sitting side by side in the subway or a shopping gallery not saying a word but scanning their *Something-Pods*. But this new behavior makes me optimistic. These young people find an enormous and uncensored (mostly) mass of information there, leaving political propaganda out as irrelevant or uninteresting. Perhaps we are approaching a society in which the de-politicized factor becomes more important than today. Do we move towards

*technocracy?* The tendencies are there already. Come to Norway and try to distinguish between the many political parties. The differences are idyllic, the Right calls itself blue, the Labor red, but they do not differ on crucial points. US politicians would probably say we are all *Socialist*.

Apart from such "modern" exposées, we have a long tradition for what I will call the *Double-Deck* awareness. We find it in scholarship but also in literature, and we can start out with that. We tend to swing back and forth between analysis-created awareness and community-inspired ideas and hunch somehow mirroring the awareness. Perhaps "we" always did that.

There is an excellent case in the so-called *Querelle du Cid*, regarding Pierre Corneille's drama, *Le Cid*. \*Niderst (pp. 86 -108) gives an exceptionally detailed story of this partly ridiculous, partly very serious "quarrel" that involved an impressive number of writers and politicians, several of them offering "corrective" versions of the drama, with *le grand cardinal*, Richelieu, initially amused but soon worried, and finally blocking further discussions.

The "quarrel" was superficial on the surface (where else?), but was deeply rooted in contrasting views of literature and culture (as shown in \*Niderst's important book). This double-level status is the point of my citing the *affaire* here.

Consulting \*Isaacson's splendid study (p. 113) of the life and work of Albert Einstein, I find anchorage for my idea of trying to stay in contact with the Sciences:

*Also, there was his grounding in philosophy: from Hume and Mach he had developed a skepticism about things that could not be observed. And this skepticism was enhanced by his innate rebellious tendency to question authority.*

The distinction between *observables* and *non-obs* entities is crucial not only in Physics. It corresponds in general terms to my *Def<inite> and In-Def<inite>* determination, with the former based in Math.

### 5.1.30S3 *Social Sciences*

Now let me refer to the central but vast and vaguely outlined field of *Social Sciences*.

One big problem here is that of communitation, since notoriously *arguments* do not play any decisive role in politics, while politics often will color the social sciences. When in Norway we had the debate regarding our entry or not into the *European Common Market*, a colleague of mine was elected chairman of the *Yes* movement. He claimed: *we shall win the battle with arguments!* But in politics, arguments are no more determining than

the coating on a cake is for the product as a whole. This layered pattern also is typical of social issues. The most important factors are often those that we cannot capture in any methodologically adequate way. Political approaches are mostly literary.

It doesn't seem possible, at least not advisable, when *discussing Science*, to bypass some of the issues in modern Sociology. Wright \*Mills, in his steadily reprinted and still most relevant book (250 pages), *The Sociological Imagination* (first edition 1959), supplies some notes on this interdisciplinary theme.

The following quotation will convey the flavor of Mill's book representing the transition from traditional to modern sociology (p. 11).

*It is not only information that they need - in this Age of Fact [!], information often dominates their attention and overwhelms their capacities to assimilate it. It is not only the skills of reason that they need... What they need, and what they feel they need, is a quality of mind that will help them to use information and to develop reason in order to achieve lucid summations of what is going on in the world and of what may be happening within themselves...*

Let us look at the vaguely outlined field.

*First*, the *Social Sciences* embrace both the *Def*, and the *InDef* paradigms, to stay with the terminology used in the present work, and this offers useful hints, both substantially and methodologically.

*Secondly*, all parameters on the agenda in the present work are human, *social at some levels*. So I have to take Mills' book seriously.

There is no "objectivity" for handling such matters, only *points-de-vue* that depend on our background, upbringing, education, inclinations, opportunities, purposes and planning.

Concentrating on the mental, conceptual and ideological areas, we have to acknowledge that the dominant factors guiding our doings are artificial in the sense of needing, or more or less consciously claiming, theoretical and analytical models, however rudimentary, for their description and handling. To keep up the illusion that our approaches are essentially factual and direct would also be artificial, but much less efficient and productive.

Connecting some among the comparable ideas in Bohr and Einstein would require connecting entities that defy definition and formalization, so that here we have *illustrative* rather than *analysis-driven* interrelations.

We should have to decompose the figures down to one of their different *roles* with specific characteristics, following the lead of modern sociology as expressed, among others, by Knorr-Cetina (S-L, \**Burden*, IV, 6 pp. 184ff; available on the present site.). Some of these ideas are in the back-

ground of my thoughts about what I call *Inception Theory for a universe of theoretical models of configural and verbal nature (Part I)*.

In an *organization*, interaction between members will be technically direct, at least on corresponding levels in the hierarchy. But abstract factors will accompany the actions, and these are available for being integrated in a universe of theoretical models of configural and verbal nature (no novelty to say this). Several academic disciplines, such as Philosophy, have been busy trying to classify these factors.

But the only classification of them that is manageable, is in terms of defined, coherent, comparable abstract *models*.

I shall supply some further notes on the fields just listed.

Wright \*Mills delivers an exceptionally "complete" and critical view of modern ideas in Sociology - by the standards of the 1950s, but still today evocative at least for non-professional people like myself who can take a fresh look at those ideas. Less formalized than \*Borgatti et al., *Analyzing Social Networks*, a highly interesting contribution (*see below*), the Mills book stays close to the traditional ground, which one has to in order to break up the same ground. Networks were not uppermost in the minds of people of Wright Mills' generation, not being used to the data universe. At an international "inter-university" conference in Florence in 1995 (I think it was) I asked a British mathematician about his "field", and he predictably answered *number theory*. Sociologists today might tend to answer *networks*.

Wright \*Mills (pp. 162f.) considers the use of History in sociological research.

*More important than the extent to which historians are social scientists. or how they should behave, is the still more controversial [hardly today] point that the social sciences are themselves historical disciplines. To fulfill their tasks, or even to state them well, social scientists must use the materials of history. Unless one assumes some trans-historical theory of the nature of history, or that man in society is a non-historical entity, no social science can be assumed to transcend history. All sociology worthy of the name is 'historical sociology'.*

I bought Mills' book at our Polytechnic back in 1978 and it opened up a new world for me. The introduction to his chapter 8, on *Uses of History*, gives a good impression of what he stood for, and I will quote the entire paragraph.

*Social science deals with problems of biography, of history, and of their intersections within social structures. That these three - biography, history, society - are the coordinate points of the proper study of man has been a major platform on which I have stood when criticizing several current schools of sociology whose practitioners have abandoned this classic tradition. The*

*problems of our time - which now include the problem of man's very nature - cannot be stated adequately without consistent practice of the view that history is the shank of social study, and recognition of the need to develop further a psychology of man that is sociologically grounded and historically relevant. Without use of history and without a historical sense of psychological matters, the social scientist cannot adequately state the kinds of problems that ought now to be the orienting points of his studies.*

Of course my attitude corresponds to these observations, since I consider all >History as *contemporary*, captured and digested by ourselves.

Persons and groups of them must be *decomposed* and splitted up into levels that can be analytically tractable, as shown by Knorr-Cetina and others. At analytical levels, there will also have to be criteria for the *connecting lines*. These should be available for translation into meaningful and analyzable connections among the entities in focus, such as transferring the data to *matrices* or some level-structured configuration, of which sociological and data-digitalization literature abound.

Let me quote some passages from my *\*Burden* (available on the present site) regarding the cited concepts, represented by various authors such as Knorr-Cetina, Cicourel and Collins (Knorr-Cetina and Cicourel, *Advances in social theory*, pp. 139ff., 150 - 56, also with the quotation of Collins below): ... *there appears to be no theoretical justification for taking the individual for granted as a simple, elementary unit of social action ... ; rather we have to deal with a multiplicity of selves constituted in communicative interaction ... Today we are confronted with the notion of multiple identities which appear to be insulated rather than to be functionally integrated into just one person, or one individuality.*

Thus the macro-micro problem - how to make the multitude and the individual work on the same analytical level? - is solved: macro- phenomena are made up from aggregations and repetitions of many micro-episodes (Collins). According to Ritzer (Ibid., p. 493.), Knorr-Cetina (1981) accepts interactional domains, grants greater role to consciousness and macro-level phenomena, and, like Collins, *makes the case for a radical reconstruction of macro theory on a micro-sociological base, she is also willing to consider the much less radical course of simply integrating micro-sociological results into macro-sociological theory ... I... believe in the seeming paradox that it is through micro-social approaches that we will learn most about the macro order... (K.-C.).*

Smelser also comments on the macro/micro problem (Smelser, *Handbook of sociology*, 1988, pp. 87 - 93, 106ff., 119ff.). *Theorists have been led by this focus on transformation [linkage between macro and micro]: an analytic one sustained by invisible processes in the larger system. This analytical link-*

*age is achieved by the application of 'transformation rules', like voting procedures, to individual action] to consider individual action not as objects for analysis in their own right but as initial conditions for the operation of structural mechanisms. In this way, structural explanations - about the rules of constitutions, ... the dynamics of organizations and intergroup relations ..., the system of prestige allocation ... - have begun to replace utility arguments within the rationalistic micro tradition (Smelser).*

Worry about the future of Science has been often aired. Before the advent of the Quantum theories, people like Max Planck and Werner Heisenberg were told that nothing new could emerge from Physics. In the late 18th and early 19th centuries, mathematicians worried about the future of their discipline, as is well recorded by Morris \*Kline at the end of the first volume of his *Mathematical Thought from Ancient to Modern Times*.

Adam \*Podgórecki and Maria Loz (Woz: excuse my transcription of Polish letters, an l with a crossing line meaning W), *Multi-Dimensional Sociology*, London 1979), offer an exceptionally clear and penetrating account and criticism of modern Sociology, and outline some new perspectives. But I shall go on.

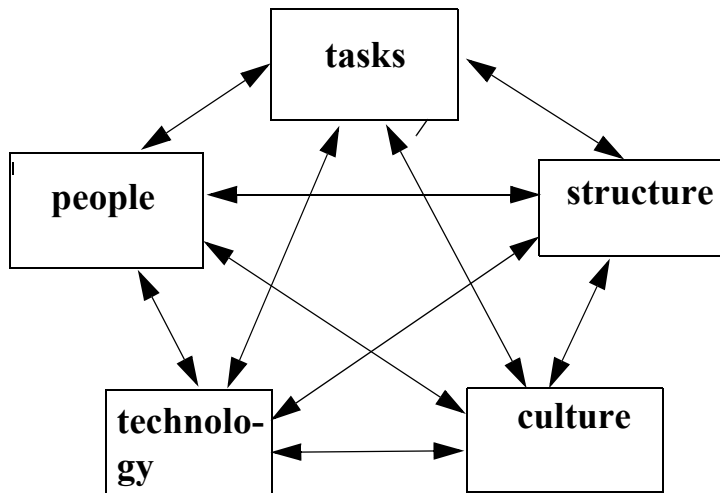
The closely related category of "culture" is as rich as it is vaguely defined. I shall emphasize one group of initiatives and works, namely those published by the *Medium Aevum Quotidianum* - the name indicating precisely the program of the *Institut für Mittelalterliche Realienkunde* in Krems a/d/Donau. Number 49 (2004), for instance, in this series contains a typical and important contribution: Helmut Hundsbichler, *Reiseerfahrung und Reflexivität. Spätmittelalterliche Religiosität als Kontext kultureller Kontraste*.

A book by the Institute's editor, Gerhard Jaritz (to who I gratefully dedicate the present work), *Zwischen Augenblick und Ewigkeit. Einführung in die Alltagsgeschichte des Mittelalters* (1989), is more amply referenced in SL,\* *Patterns, Part I*, initial paragraphs. The book has much more to offer than the "Introduction" announced in the title could lead one to believe.

Tendencies to isolate "culture" from the main body of social sciences and activities will be discouraged by studying the *Organizational Subsystems Model* in \*Davis & Olson (their Fig. 11- 8; here Fig. OS3-1) as commented by the cited authors.

They note (p. 354) that *many management theorists add organizational culture as a fifth element [with task, technology, structure, people]. The significance of the model displayed here, they note, is that, because of the strong interdependence, a change in one component inevitably has effects, planned or unplanned, on the others. The implicit approach of many tech-*

*nology designers is to focus on the task and technology subsystems and completely ignore their effects on people and structure. A lacuna filled with the presented model? I am not so sure.*



**Fig. OS3-1 "Culture" in Context (from \*Davis & Olson).**

The model in Fig. OS3-1 suggests the following two factors: *directed dynamics* through the system, and *prioritized goals or aims or conclusions*. There are ten double-direction arrows, making twenty potential data passages. However, there is *no predominant direction or flow*, rather a variable pattern of *intercom* relations. Insisting that all the codes (people, etc.) are on the same level, the model can be considered as fundamental, but perhaps in an illustrative sense rather than an analytical one.R

Now let me present some relevant publications:

From \*Minsky/Papert (expanded edition, 1988) some information can be cited that can contribute to the present project.

*From the Prologue:*

*The book is about perceptrons - the simplest learning machines. However, our deeper purpose is to gain more general insights into the interconnected subjects of parallel computation, pattern recognition, knowledge representation, and learning. It is only because one cannot think productively about such matters without studying specific examples that we focus on theories of perceptrons.*

*From the backcover:*

*Artificial intelligence, which for a time concentrated on the programming of Von Neumann computers, is swinging back to the idea that intelligence might emerge from the activity of networks of neuron-like entities.*

\*Cammarata's *Reti neuronali* (1990) is claimed, probably rightly, to contribute to new research on *Artificial Intelligence*.

Two relatively recent work, one on economy and models, the other on modern science generally, merit some further attention, since they bring up to date such central themes.

Mary S. \*Morgan's *The World in the Model* (2012) - 421 pages and too rich in perspectives for me to give an adequate survey - opens up with *Modelling as a Method of Enquiry*, and a section *From Laws to Models, from Words to Objects*. Economy, she notes, has recently changed radically: *Today, in the twenty-first century, if we go to an economics seminar, or read a learned scientific paper in that field, we find that economists write down some equations and maybe draw a diagram, and use those to develop solutions to their theoretical conundrums or to answer questions about the economic world. These manipulable objects are the principal starting point in economic research work: they are an essential input into simulations, and they form the basis for much statistical work. Economics teaching is similarly bounded: students learn by working through a set of models...*

Morgan emphasizes the work by the Norwegian economist Ragnar Frisch (Nobel Prize), showing two of his models (1933), one a matrix, the other one a set of interrelated boxes; this strikes me as very "modern". He was our venerable neighbor in the *Domus Media* of the old downtown University of Oslo, with the early nineteenth-century buildings, with Holger Sinding-Larsen's concert "Aula" later added, its three main walls covered with large paintings by Edvard Munch.

Not only economy but the entire spectrum studied in the present work, must be evaluated in the context excellently presented by \*Bowler and Morus in their *Making Modern Science* (2005; 529 pages).

Listing some selections from their *Index* will give an impression of the coverage and range of this highly acclaimed study: *applied science - atomic theory - brain and mind - cognitive science - Copenhagen interpretation - cybernetics - experiment in human sciences - history of science - Michelson-Morley experiment - objectivity of science - operations research - physics .. theoretical - Planck's constant - quantum mechanics - recapitulation theory - scientific method - sociology - wave-particle duality*.

#### 5.1.4OS4. *Space Organization*

A great complex of studies in area topography and use, urban structures and corresponding administrative and political issues can be subsumed under this heading.



At the local levels, we are engaged in the questions regarding *Spatial Organization*, to cite the title of an important publication by \*Abler, Adams and Gould.

They introduce their work with some general considerations, among which I will highlight the following entries:

Part 1: *Order, Science, and Geography* - Part II: *Measurement, Relationship, and Classification* - Part III: *Location and Spatial Interaction* - Part IV: *Spatial Diffusion Process* - Part V: *Spatial Organization and the Decision Process*.

The three authors note in their *Preface*, among other things; *Underlying our approach to the analysis of human activities in terrestrial space is our belief that human geography is a social and behavioral science. We think the principles which govern human spatial behavior are generally applicable all over the world. Obviously, some elements of human spatial organization are attributable to unique factors, but we feel that what is common in the ways people perceive and organize space is more important. Thus, in presenting the principles of geography, we chose to concentrate on the circularly causal relationship between spatial structure and spatial process. People generate spatial processes in order to satisfy their needs and desires, and these processes create spatial structures which in turn influence and modify geographical processes* (whatever they mean by geographical processes).

A study of a very special "area" is Amund \*Sinding-Larsen's study of the Tibetan capital city, Lhasa: *Lhasa community, world heritage and human rights*. As we can see from the title, the approach is a "modern" one in that area evaluations are not only traditionally structural with administrative, housing, business, communication and traffic records and evaluations, but include "human" intake. Granted, it would be awkward to study Lhasa without extending the view to the human-political aspects. The cited article is but a summary of a massive volume he has published locally for a Norwegian doctorate, but which I hope will be available internationally.

#### 5.1.5OS5 Industrial Design

The discipline of *industrial design* in Europe and the US start out, if not always in practice, at least logistically, from the *tech* parameters, and from there developing more design-formal aspects. The picture is often fuzzy because of unproductive and confusing attempts at combining technology and artistic parameters. Not so the following ones.

Birgitte \*Cech's *Bergtechnik der frühen Neuzeit* (in the important *Krems* series) conveys, as I believe, an exceptionally wide-ranging account starting out from a local industry. She emphasizes in her *Einleitung* that

this is an interdisciplinary subject (*Thema mehrerer interdisziplinärer Forschungsprojekte*). As I (modestly, this is way off my field) see the contribution, it presents a highly relevant example of what I call an *Open\_Source* approach.

Under the same general heading I would classify a publication by our former Rector at the *Norwegian Institute of Technology*, Karsten \*Jakobsen (ed.), *Modern Design Principles*.

This is another stimulating example of a work starting out from a limited but well-defined subject, working it's way out into the larger compass. In fact, I have developed one of my central models from this publication (their Fig. 4, my Fig.s 3.7.4ff. ).

The cited publication brings 17 contributions under the following headings: *Basic Design Principles*, *Solution Principles*, and *Aluminium in the Car Industry*. The leading articles (as I see it) are by Wolfgang Beitz (*Design Steps and Principles*; pp. 9 - 26) and Jakobsen (*Functional Requirements in the Design Proces*; pp. 41 - 52s.).

Jakobsen starts his Preface, *Introduction and Definition of Scope*, with citing L. Bruce Archer (1965): *The traditional art of design - that is, selecting the right material and shaping it to meet the needs of function and aesthetics within the limitations of available means of production - has become immeasurably more complicated in recent years. While user needs were simple, materials few, and manufacturing methods relatively crude, the designer was able to adopt rules of thumb to meet them. No Longer so! But focusing on processes rather than directly on products, is an alternative.*

The collection is mainly focused on complexity, adopting systems analysis on a high level of performance.

The cited work is about *production*. But so are theory works like the present one, re-coursing, we can say, processes for producing workable models and their literary appendages. This is bound to remain a recursive, even bootstrapping process.

Let me quote Jakobsen, p. 53.

*The process of product development is a recursive process in the sense that a five-step procedure calls upon itself as the different levels of the product to be designed are uncovered as "chinese boxes", Thus the functional tree cannot be completely specified at the begining of the product development process, but must be developed gradually as each level is uncovered, and the process of determination of functional requirements (or rather requirement specification) and of creative thinking (solution generation) are progressing stepwise parallel as a dualism, rather than as a two-phase sequence.*

These activities and those already cited in this *Part* owe much to *organizational* ideas, more or less brought to the surface.

### 5.1.6OS6 Organization Theory

This subject or field has been referred to several times in the present book, while of course this field and social science dovetail on many points.

\*Silverman's *The Theory of Organizations* (1970) brings organization models into the social sciences, accentuating the *structuring* effect upon social life; "organization" taken in a wide understanding (Chapter 1. *Organizations: Problems of Definition*, pp. 8ff.). He notes (p. 222):

*Seen in this light, social relations within organizations arise out of the interaction of the participants and may exhibit varying levels of consensus and conflict and of co-operation and coercion, according to the nature of expectations and ends of the actors.... The Action approach thus seeks to tackle both the 'micro' problem of the orientations and behaviour of particular actors and the 'macro' problem of the pattern of relations that is established by their interaction.*

A by now classical book on sociological theory, is Percy S. Cohen's *Modern Social Theory* (1968). It offers a systematic account, with the following chapter headings:

*1. The Nature of Sociological Theory; 2. The Central Problems of Sociological Theory; 3. Functionalism or the "Holistic" Approach; 4. The Action Approach; 5. Social Action, Interaction, Structure and System; 6. Social Structures and Social Systems; 7. Explaining Social Change; 8. Direction of Social Change; 9. Conclusions;* and on p. 167 a diagram on *Consensus theory* and *Conflict theory*, surely paradigms linked together by more or less common goals, aims and values.

A critically penetrating and highly instructive awareness of real-life organizational issues is opened up for us by David \*Bank in his book on *Microsoft* (2001, 287 pages). Of course, *connectivity* was a central issue here:

*Connectivity. People are willing to sacrifice features for connectivity. ... inside Microsoft, people knew there was a lot more to be done to fully adapt Windows to the Internet. And he lists the six most urgent issues, which, however, did not require(d) a browser to be part of Windows.*

Relations among people, classes or groups of them, are usually predominant in organization theory, but Bank's book shows us an extremely multifaceted organization with intricate and often very close connections between people and technical and communication complexities, and contrast with other firms and organizations - and the distance (from Seattle, but also in terms of understanding) Government in Washington DC.

*Do you want a text book on organization theory? Bank's is the book, to be read three times, finding new aspects and discovering further details in*

each round, regarding organizations: the administrative and economic issues, functions, problems, shortcomings, public and political relations, and the almost dramatically determinant, incisive *and* noise-creating Human Factor (*noise* of course in the system significance).

## 5.2 Learning Lessons

I will end this writing with a quotation from *Walt Whitman*. In 1948, I bought his *Leaves of Grass*, and made the discovery, always a guide since then, that you can have good poetry that is free of the hexameters we learnt in our school Latin, an intuitive prehistory of the programs of *uncertainty* addressed in this book:

*Stronger Lessons* (1888)

*Have you learn'd lessons only of those who admired you, and were tender with you, and stood aside from you?*

*Have you not learn'd great lessons from those who reject you, and brace themselves against you? or who treat you with contempt, or dispute the passage with you?*

The basic idea in the preceding work is to be prepared to take the blame and to accept the consequences of *not being sure of anything*.

But *uncertainty* is one of the prerequisites of *creativity*, and this program can work well as long as we opt for developments rather than conclusions.

As a young person at home in Oslo I was constantly told that this or that was *scientifically proved*. "Culture" was loosely understood as a field of mixed spiritual and mental activities, while *Science* was *absolute and mandatory*. Information from early 20th-century Physics did not seep into the homes of the bourgeoisie, as when Einstein expressed a more acceptable *and useful* idea in the following terms, according to \*Heisenberg, *Der Teil und das Ganze* (p. 116):

*Vielleicht macht Ihr den Fehler, die Naturgesetze für absolut zu erklären... (perhaps you are committing the error of taking the laws of nature as absolute - at face value, we might say).*

Working within a set academic field, and accepting it, scanning and exploiting the publications we need, isn't very demanding.

But when facing publications ranging from "Humanities" to Physics and Social Sciences via data programs or printed matter, then certain images arise, not very clearly and often uprooting. Starting at them with a loosely knit plan will lay bare some issues and problems with which to grapple. From here, the alternatives open up and the task then is to find how things play out and which goal to target, a matter of more or less well-motivated and intuitive choice. I am insisting on this kind of process in or-

der to debunk any illusion about objectivity and impersonal profiles in the work on complex matters.

The deficiencies also seem to arise with the circumstance that our subjects-in-focus are twice or even more removed, away, crossing some more or less definite borderlines.

Having developed a plan or project, I must relate what I read or scan to that. But my brain shows me a *picture* of the plan in the twice-removed modality that I can grasp it as a list of shifty and situation-embedded items. It is via points in this list, and complex interactions among them, that I distill the notional essence.

Then another barrier comes into view: the methodological *language* with its enormous and consequently nebulous jungle of alternatives. We hardly fix a term without its being surrounded by a cloud of alternatives.

Growing up in a society where there was *Right* or *Wrong*, I have grasped the notion that things and values do not remain constant or absolute. My pretensions for the present book have been dimensioned after that. I cannot - and will not - try to create anything but some substance in a step or two along an interminable path, one among many possible ones. I am insisting on these banalities because there is much in scholarship which is presented as if being or attempting to be certain or even conclusive.

Physics has taught us a different story, that of *Uncertainty*. Adopting this standard gives us more freedom and more risks, and can incite us to opt for *How* things come out rather than *What* they might be.

The moral here would be that *Open\_Source* approaches are indispensable and that our Universities, at least in the presently dominating medieval patterns, have to go, leaving space to more flexible *and* less pretentious ones. The *Internet* can show us ways among which to choose.

In the concluding remarks to his book on *Microsoft* (p. 262), David \*Bank notes that *the infrastructure for the digital age will be based on competition on the merits and a common code of open interfaces*.

This means *Goodbye to All That* when it comes to *definite* planning according to established principles and rules.

### 5.3 Model Coordination

I shall not end this book with a conclusion, but with a look ahead, with a wide open roadmap.

Using *graphical models*, the contents can be infinite or indefinite, but the model frame remains firm and inflexible, a notable disadvantage, but an unavoidable one,

Concluding *verbally*, there is no clear or definite framework, while the contents, even when unprecisely formulated, are limited within boundaries that are open to *imponderabilia*.

It can seem that only real, functioning and analyzable *machinery*, like an operating digital system (Fig. 1.3.2, *Operating System in a PC structure*) or one in steel and rubber, can turn out to provide us with a reliable *and* usable model.

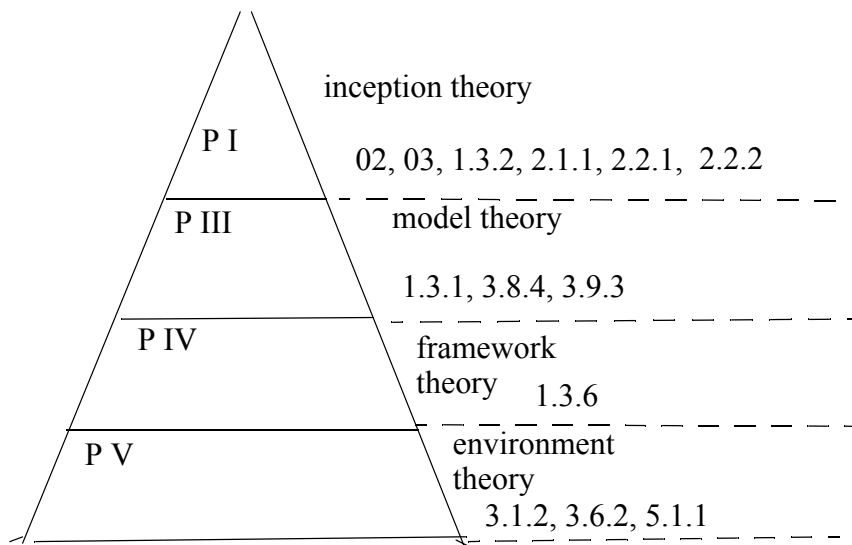
It is only in literary fiction that we can have a definite ending, a Shakespearean *All Die*, or an *All Marry*, from the weeklies.

Achieving or finding a *product*, the *process* will usually be terminated, but this is by decision or planning, not by inherent logic or logistics, an outcome determined by the professional, social or political necessity of handing in for publication, or attaining a scholarly degree or position in society.

So far, I have not said a word that is not well known, but I have had to do this in order to set up a conclusion to a book with obvious material limitations; in a shape that is generally familiar (the *triangular chart*, coming up), but here in a version adapted to my project of concluding this book with another roadmap.

Having grouped several models in five of the levels discussed in the present book, I need to scan them in a systemic coordination; models floating in open sea are less useful than those assembled on an island. We can board an island, not the sea.

It would have been possible also to collect all the important models in one mega-model, to display the interrelations between them, but such a mega-model would require more than a full page; and perhaps the advantage of showing it would be minimal.



Arabic numbers refer to Figures in the text body  
 P I, etc. refer to the Parts in the book.

*The captions in the Davis and Olson Fig. 1-2 come as follows, corresp. to the four zones:.*

- P I: MIS for strategic and policy planning and decision making
- P III: Management information for tactical planning and decision making
- P IV: Management information for operational planning, decision making, and control
- P V: Transaction processing Inquiry response

**Fig. 5.3.1, Coordination of models in the present work with a MIS model adapted from Davis and Olson, their Fig. 1-2, p. 7.**

**In the chart in Fig. 5.3.1, the more important models in the four theory Parts are listed according to their positions in the book structure.**

**This tentative conclusion to my work on the models can be used to direct a critical look at my choice, application and development of graphical models in it. Let me round off my discussion with presenting a model of historical studies (Fig. 5.3.2), which I have used in my work on Sixtus IV.**

**A Historical scenario depends (while not exclusively) on factors that can be partitioned into three interlocking parameters, *sense, motivation* and *significance*. Domingo Ynduráin in his edition (23 reprints) of Quevedo’s *El Buscón* (p. 45) alerted me to this idea with his considerations of *sentido* and *significación* (but the model is mine).**

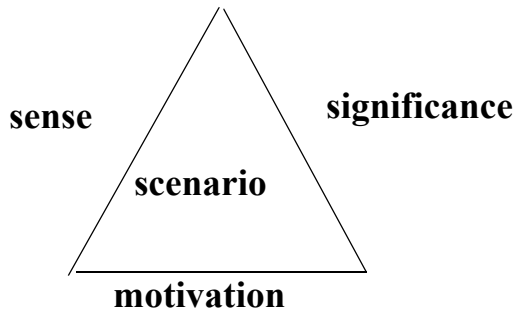


Fig.5.3.2, Scenario graph.

Let me illustrate the principle with a graph, Fig. 5.3.2. The *scenario* could be this:

Pope Sixtus IV orders: *Remove that dead cat from the street in Our city of*

*Rome.*

The *motivation*: Thus to avoid health damage *and* scaring away the pilgrims who bring money to the city.

The *sense*: Clean streets for better health and comfort.

The *significance*: An ordered society, the Pope being the lord and by the statute confirmed as such, and reforming Rome.

Of course the *significance* would have to be extended to comprising political, dynastic and ecclesiastical notions, but we let that be.

## 5.4 DOCUMENTS

### 5.5 Cicero's *De Re Publica*

Cicero's *De Re Publica* (DRP) has always in modern times been presented in a state of numbered subdivisions which are not classical and which, to my mind, create some unnecessary difficulties in scanning the text flow. But I shall keep this editorial standard to facilitate references to the various published versions in Latin, English and Italian.

Some entrances with personal names have been left out, my justification being that the *entire document represents Cicero's view and opinions* positively or negatively. This *Section* contains Chapters xix to xxxv in Cicero's *De re publica* (DRP) I have kept the traditional chapter subdivisions (xix ff.), while supplying paragraph numbering (1. 2, ...) within each paragraph.

There will be cross-references between the document, section-wise with English summaries, and the Latin Model. The reference numbers will *not* be entered into the model, but listed separately.

#### *DRP xix*

1. quaero, quae tu esse *maiora* intellegis? Dicam mehercule et contemnari a te fortasse, cum tu *ista caelestia* de Scipione quaesieris, *ego autem haec, quae videntur ante oculos esse, magis putem quaerenda.*



2. quaerit, quo modo duo soles visi sint, non quaerit, *cur in una re publica duo senatus et duo paene iam populi sint?*

3.... mors Tiberii Gracchi et iam ante tota illius ratio tribunatus *divisit populum unum in duas partis*,... .

4. ...tenent nihilo minus illis mortuis senatus alteram partem dissidentem a vobis auctore Metello et P. Mucio neque hunc, qui unus potest, concitatis sociis et nomine Latino, foederibus violatis, triumviris seditotissimis aliquid cotidie novi molientibus bonis viris locupletibus<que> perturbatis, his tam periculosis rebus subvenire patiuntur. ..

5. Quam ob rem, si me audietis, adulescentes, solem alterum ne metueritis; aut enim nullus esse potest, aut sit sane ut visus est, modo ne sit molestus, aut scire istarum rerum nihil aut, etiamsi maxime sciemus, nec meliores ob eam scientiam nec beatiores esse possumus; senatum vero et populum ut unum habeamus, et fieri potest, et permolestum est, nisi fit, et secus esse scimus et videmus, si id effectum sit, et melius nos esse victuros et beatius.

*DRP, xx*

1. Quid esse igitur censes... discendum nobis ut istud efficere possimus ipsum, quod postulas? ... Eas artis, quae efficiant, ut usui civitati simus; id enim esse praeclarissimum sapientiae munus maximumque virtutis vel documentum vel officium puto.

2. Quam ob rem, ut hae feriae nobis ad utilissimos rei publicae sermones potissimum conferantur, ... rogemus, ut explicet, quem existimet optimum statum civitatis..

3. Deinde alia quaeremus; quibus cognitis spero nos ad haec ipsa via perventuros earumque rerum rationem, quae nunc instant, explicaturos.

*DRP xxi*

1... non solum ob eam causam fieri volui, quod erat aecum de re publica potissimum principem rei publicae dicere, sed etiam quod memineram persaepe cum Panaetio disserere solitum coram Polybio, duobus Graecis vel peritissimis rerum civilium, multaque colligere ac docere, optimum longe statum civitatis esse eum, quem maiores nostri nobis reliquissent. Qua in disputatione quoniam tu paratior es, feceris, ut etiam pro his dicam, si, de re publica quid sentias, explicaris, nobis gratum omnibus.

*DRP xxii*

1. Tum ille. Non possum equidem dicere me ulla in cognitione acrius aut diligentius solere versari quam in ista ipsa, quae mihi, Laeli, a te proponitur.

2. Etenim cum in suo quemque opere artificem, qui quidem excellat, nihil aliud cogitare, meditari, curare videam, nisi quo sit in illo genere melior, ego, cum mihi sit unum opus hoc a parentibus maioribusque meis relictum, procuratio atque administratio rei publicae, non me inertiores esse confitear quam opificem quemquam, si minus in maxima arte, quam illi in minimis, operare consumpserim?

3. Sed neque his contentus sum, quae de ista consultatione scripta nobis summi ex Graecia sapientissimique homines reliquerunt, neque ea, quae mihi videntur, anteferre illis audeo.

4. Quam ob rem peto a vobis, ut me sic audiatis, neque ut omnino expertem Graecarum rerum neque ut eas nostris in hoc praesertim genere anteponentem, sed ut unum e togatis patris diligentia non inliberaliter institutum studioque discendi a pueritia incensum, usu tamen et domesticis praeceptis multo magis eruditum quam litteris.

*DRP xxiii*

1...Non... dubito, quin tibi ingenio praestiterit nemo, usu quidem in re publica rerum maximarum facile omnis viceris; quibus autem studiis semper fueris, tenemus.

2. Quam ob rem, si, ut dicis, animum quoque contulisti in istam rationem et quasi artem, habeo maximam gratiam Laelio;

3. spero enim multo uberiora fore, quae a te dicentur, quam illa, quae a Graecis nobis scripta sunt, omnia. Tum ille: Permagnam tu quidem expectationem, quod onus est ei, qui magnis de rebus dicturus est, gravissimum, imponis orationi meae.

4. ... Quamvis sit magna, tamen ea vinces, ut soles; neque enim est periculum, ne te de re publica disserentem deficiat oratio.

*DRP xxiv*

1.... Faciam, quod vultis, ut potero, et ingrediar in disputationem ea lege {c'k}, qua credo omnibus in rebus disserendis utendum esse, si errorem velis tollere, ut eius rei, de qua quaeretur si, nomen quod sit, conveniat, explicetur, quid declaretur eo nomine, quod si convenerit, tum demum decebit ingredi in sermonem; numquam enim, quale sit illud, de quo disputabitur, intellegi poterit, nisi, quid sit, fuerit intellectum prius.

2. Quare, quoniam de re publica quaerimus, hoc primum videamus, quid sit id ipsum, quod quaerimus.

3. ... Nec vero,.. ita disseram de re tam inlustri tamque nota, ut ad illa elementa revolvar, quibus uti docti homines his in rebus solent, ut a prima congressione maris et feminae, deinde a progenie et cognatione ordiar verbisque,

4. quid sit et quot modis quidque dicatur, definiam saepius; apud prudentes enim homines et in maxima re publica summa cum gloria belli domique versatos cum loquar, non committam, ut sit inlustrior illa ipsa res, de qua disputem, quam oratio mea;

5. nec enim hoc suscepi, ut tamquam magister persequerer omnia, neque hoc polliceor me effecturum, ut ne qua particula in hoc sermone praetermissa sit... Ego vero istud ipsum genus orationis, quod polliceris, expecto.

*DRP xxv*

Es igitur, inquit Africanus, res publica res populi, populus autem non omnis hominum coetus quoque modo congregatus, sed coetus multitudinis iuris consensu et utilitatis communione sociatus. Eius autem prima causa coeundi est non tam imbecillitas, quam naturalis quaedam hominum quasi congregatio; non est enim singulare nec solivagum genus hoc, sed ita generatum, ut ne in omnium quidem rerum affluentia.

*DRP xxvi*

1. ... <quae>dam quasi semina, neque reliquarum virtutum nec ipsius rei publicae reperiatur ulla institutio. Hi coetus igitur hac, de qua exposui, causa instituti sedem primum certo loco domiciliorum causa constituerunt; quam cum locis manumque saepsissent, eius modi coniunctionem tectorum oppidum vel urbem appellaverunt delubris distinctam spatiisque communibus.

2. Omnis ergo populos, qui est talis coetus multitudinis, qualem exposui, omnis civitas, quae est constitutio populi, omnis res publica, quae, ut dixi, populi res est, consilio quodam regenda est, ut diuturna sit.

3. Id autem consilium primum semper ad eam causam referendum est, quae causa genuit civitatem. Deinde aut uni tribuendum est aut delectis quibusdam aut suscipiendum est multitudini atque omnibus.

4. Quae cum penes unum est omnium summa rerum, regem illum unum vocamus et regnum eius rei publicae statum.

5. Cum autem est penes delectos, tum illa civitas optimatum arbitrio regi dicitur.

6. Illa autem est civitas popularis (sic enim appellant), in qua in populo sunt omnia.

7. Atque horum trium generum quodvis, si teneat illud vinculum, quod primum homines inter se rei publicae societate devinxit, non perfectum illud quidem neque mea sententia optimum est, tolerabile tamen, ut illud alio possit esse praestantius.

**8. Nam vel rex aecus ac sapiens vel delecti ac principes cives vel ipse populus, quamquam id est minime probandum, tamen nullis interiectis iniquitatibus aut cupiditatibus posse videtur aliquo esse non incerto statu.**

*DRP xxvii*

**1. Sed et in regnis nimis expertes sunt ceteri communis iuris et consilii, et in optimatum dominatu vix particeps libertatis potest esse multitudo cum omni consilio communi ac potestate careat, et cum omnia per populum geruntur quamvis iustum atque moderatum, tamen ipsa aequabilitas est iniqua, cum habet nullos gradus dignitatis.**

**2. Itaque si Cyrus ille Perses iustissimus fuit sapientissimusque rex, tamen mihi populi res (ea enim est, ut dixi antea, publica) non maxime expetenda fuisse ille videtur, cum regeretur unius nutu ac voluntate;**

**3. eodem modo si Massilienses, nostri clientes, per delectos et principes cives summa iustitia reguntur, inest tamen in ea condicione populi similitudo quaedam servitutis; si Athenienses quibusdam temporibus sublato Areopago nihil nisi populi scitis ac decretis agebant, quoniam distinctos dignitatis gradus non habebant, non tenebat ornatum suum civitas.**

*DRP xxviii*

**1. Atque hoc loquor de tribus his generibus rerum publicarum non turbatis atque permixtis, sed suum statum tenentibus. Quae genera primum sunt in iis singula vitia, quae ante dixi, deinde habent perniciose alia vitia; nullum est enim genus illarum rerum publicarum, quod non habeat iter ad finitimum quoddam malum praeceptum ac lubricum.**

**2. Nam illi regi, ut eum potissimum nominem, tolerabili aut, si voltis, etiam amabili, Cyro, subest ad immutandi animi licentiam crudissimum ille Phalaris, cuius in similitudinem dominatus unius proclivi cursu et facile delabitur.**

**3. Illi autem Massiliensium paucorum et principum administrationi civitatis finitimus est, qui fuit quodam tempore apud Athenienses triginta tyrannorum consensus et factio.**

**4. Iam Atheniensium populi potestatem omnium rerum ipsi, ne alios requiramus, ad furorem multitudinis licentiamque conversam pesti...**

*DRP xxix*

**1. ...taeterrimus et ex hac vel optimatum vel factiosa tyrannica illa vel regia vel etiam persaepe popularis, itemque ex ea genus aliquod eflorescere ex illis, quae ante dixi, solet, mirique sunt orbes et quasi circumitus in rebus publicis commutationum et vicissitudinum;**

2. quos cum cognosse sapiens est, tum vero prospicere independentis in gubernanda re publica moderantem cursum atque in sua potestate retinentem magni cuiusdam civis et divine paene est viri.

3. Itaque quartum quoddam genus rei publicae maxime probandum esse sentio, quod est ex his, quae prima dixi, moderatum et permixtum tribus.

*DRP xxx*

Scio tibi ita placere, Africane; saepe enim ex te audivi; sed tamen, nisi molestum est, ex tribus istis modis rerum publicarum velim scire quod optimum iudices. Nam vel profuerit aliquod ad cog...

*DRP xxxi*

1.... et talis est quaeque res publica, qualis eius aut natura aut voluntas, qui illam regit.

2. Itaque nulla alia in civitate, nisi in qua populi potestas summa est, ullum domicilium libertas habet;

3. qua quidem certe nihil potest esse dulcius, et quae, si aequa non est, ne libertas quidem est.

4. Qui autem aequa potest esse, omitto dicere in regno, ubi obscura quidem est aut dubia servitus, sed in istis civitatibus, in quibus verbo sunt liberi omnes?

5. ferunt enim suffragia, mandant imperia magistratus, ambiuntur rogantur, sed ea dant magis, quae, etiamsi nolint, danda sint, et quae ipsi non habent, unde alii petunt;

6. sunt enim expertes imperii, consilii publici, iudici delectorum iudicum, quae familiarum vetustatibus aut pecunis ponderantur. [ ]OK

7. In libero autem populo, ut Rhodi sunt, ut Athenienses, nemo est civium, qui ....

*DRP xxxii*

1. ...populo aliquis unus pluresve divitiores opulentioresque exitissent, tum ex eorum fastidio et superbia nata esse commemorant cedentibus ignavis et imbecillis et adrogantiae divitum succumbentibus.

2. Si vero ius suum populi teneant, negant quicquam esse praestantius, liberius, beatius, quippe qui domini sint legum, iudiciorum, belli, pacis, foederum, capitis unius cuiusque, pecuniae.

3. Hanc unam rite rem publicam, id est rem populi, appellari putant. Itaque et a regum et a patrum dominatione solere in libertatem rem populi vindicari, non ex liberis populis reges requiri aut potestatem atque opes optimatum.

4. Et vero negant oportere indomiti populi vitio genus hoc totum liberi populi repudiari, concordi populo et omnia referente ad incolumitatem et ad libertatem suam nihil esse immutabilis, nihil firmissimum;
5. facillimam autem in ea re publica esse posse concordiam, in qua idem conducatur omnibus; ex utilitatis varietatibus, cum aliis aliud expediat, nasci discordias;
6. itaque, cum patres rerum potirentur, numquam constituisse civitatis statum; multo iam id in regnis minus, quorum, ut ait Ennius, "nulla regni sancta societas nec fides est".
7. Quare cum lex sit civilis societatis vinculum, ius autem legis aequale, quo iure societas civium teneri potest, cum par non sit condicio civium?
8. Si enim pecunias aequari non placet, si ingenia omnium paria esse non possunt, iura certe paria debent esse eorum inter se, qui sunt cives in eadem re publica. Quid est enim civitas nisi iuris societas?

*DRP xxxiii*

1. Ceteras vero res publicas ne appellandas quidem putant iis nominibus, quibus illae sese appellari velint.
2. Cum enim "regem" appellent Iovis optimi nomine hominem dominandi cupidum aut imperii singularis, populo oppresso dominantem, non tyrannum potius?
3. tam enim esse clemens tyrannum quam rex importunus potest; ut hoc populorum intersit, utrum comiti domino an aspero serviant; quin serviant quidem, fieri non potest.
4. Quo autem modo adsequi poterat Lacedaemo illa res, cum praestare putabatur disciplina rei publicae, ut bonis uteretur iustisque regibus, cum esset habendus rex, quicumque genere regio natus esset?
5. Nam optimatus quidem quis ferat, qui non populi consensu, sed suis comitiis hoc sibi nomen adrogaverunt? Qui enim iudicatur iste optimus? doctrina, artibus, studiis, <audio. Quando>...

*DRP xxxiv*

- 1.... si fortuito id faciet, tam cito evertetur quam navis, si e vectoribus sorte ductus ad gubernacula accesserit.
2. Quodsi liber populus deliget, quibus se committat, deligetque, si modo salvus esse vult, optimum quemque, certe in optimorum consiliis posita est civitatum salus, praesertim cum hoc natura tulerit, non solum ut summi virtute et animo praesentent imbecillioribus, sed ut hi etiam parere summis velint.
3. Verum hunc optimum statum pravus hominum opinionibus eversum esse dicunt, qui ignorantia virtutis, quae cum in paucis est tum a paucis

iudicatur et cernitur, opulentos homines et copiosos tum genere nobili natos esse optimos putant.

4. Hoc errore vulgi cum rem publicam opes paucorum, non virtutes tenere coeperunt, nomen illi principes optimatum mordicus tenent, re autem carent eo nomine.

5. Nam divitiae, nomen, opes vacuae consilio et vivendi atque aliis imperandi modo dedecoris plenae sunt et insolentis superbiae, nec ulla deformior species est civitas quam illa, in qua opulentissimi optimi putantur.

6. Virtute vero gubernante rem publicam quid potest esse praeclarius? cum is, qui imperat aliis, servit ipse nulli cupiditati, cum, quas ad res civis instituit et vocat, eas omnis complexus est ipse nec leges imponit populo, quibus ipse non pareat, sed suam vitam ut legem praefert suis civibus.

7. Qui si unus satis omnia consequi posset, nihil opus esset pluribus; si universi videre optimum et in eo consentire possent, nemo delectos principes quaereret.

8. Difficultas ineundi consilii rem a rege ad plures, error et temeritas populorum a multitudine ad paucos transtulit. Si inter infirmitatem unius temeritatemque multorum medium optimates possederunt locum, quo nihil potest esse moderatius;

9. quibus rem publicam tuentibus beatissimos esse populos necesse est, vacuos omni cura et cognitione, aliis permissio otio suo, quibus id tuendum est neque committendum, ut sua commoda populus neglegi a principibus putet.

10. Nam aequabilitas quidem iuris, quam amplexantur liberi populi, neque servari potest (ipsi enim populi, quamvis soluti ecfrenatique sint, praecipue multis multa tribuunt, et est in ipsis magnus dilectus hominum et dignitatum), eaque, quae appellatur aequabilitas, iniquissima est.

11. Cum enim par habetur honos summis et infimis, qui sint in omni populo necesse est, ipsa aequitas iniquissima est; quod in iis civitatibus, quae ab optimis reguntur, accidere non potest. Haec fere, Laeli, et quaedam eiusdem generis ab iis, qui eam formam rei publicae maxime laudant, disputari solent.

### *DRP xxxv*

1. ... e tribus istis [forms of government] maxime probas? S. Recte quaeris, quod maxime e tribus, quoniam eorum nullum ipsum per se separatim probo anteponoque singulis illud, quod conflatum fuerit ex omnibus. Sed si unum ac simplex probandum sit, regium probem...{lacunas}

2. ... hoc loco appellatur, occurrit nomen quasi patrium regis, ut ex se natis, ita consulentis suis civibus et eos conservantis studiosius quam..... {lacunas}.. sustenari unius optimi et summi viri diligentia.

3. Adsunt optimates, qui se melius hoc idem facere profiteantur plusque fore dicant in pluribus consilii quam in uno et eandem tamen aequitatem et fidem.

4. Ecce autem maxima voce clamat populus neque se uni neque paucis velle parere; libertate ne feris quidem quicquam esse dulcius, hac omnes carere, sive regi, sive optimatibus serviant. Ita caritate nos capiunt reges, consilio optimates, libertate populi, ut in comparandi difficile ad eligendum sit, quid maxime velis.

### 5.6 Terms in Cicero

Here is a list of key terms intended to help readers in looking critically at my handling of the document (*DRP, n*).

The terms are cited in the original grammatical form, irrespective of the original sentence structure.

*II. civitatis gubernatio - civitatibus iura - constitutae civitati publico iure et moribus - urbibus consilio atque auctoritate*

*III. re publica - civibus - civitatem nostram - nostro consilio*

*IV. consulato - populo Romano - civium causa*

*V. rem publicam x 3*

*V. rei publicae x 5 - consul x 2 - gubernare - gubernacula - rerum civilium*

*VII. re publica x 6*

*VIII. re publica - rerum civilium - instituenda nova et a nobis inventa ratio magno opere*

*IX. rei publicae*

*X. in senatu - hominum ratio - de re publica*

*XIII. rem publicam - domos nostras - maioribus - consuli*

*XIV. consul - tanto opere admiratus - sphaera solis*

*XV. consul - legatus noster*

*XVII. rebus humanis - civili nexi - communi lege naturae - imperia consularisque - libertatem - doctissimorum hominum in concilio adsunt*

*imperium - magistratus - regnum - humanitatis artibus*

*XIX. re publica - una republica duo senatus et duo paene iam populi*

*tribunatus divisit populum unum in duo partes - senatus - triumviris*

*bonis viris - senatum et populum ut unum habeamus, et fieri potest*

*XX. usui civitatis simus - rei publicae sermones - esse optimum statum civitatis*

*XXI. aecum de re publica potissimum principem rei publicae dicere - rerum civilium - statum civitatis... quem maiores nostri nobis reliquissent - de re publica*



*XXII. opere artificem - a parentibus maioribusque meis relictum, procuratio atque administratio rei publicae - ex Graecia sapientissimique homines reliquerunt*

*XXIII. re publica - istam rationem et quasi artem - de re publica*

*XXIV. ea lege - quoniam de re publica querimus - docti homines - in maxima re publica*

*XXV. res publica res populi populus autem - multitudinis iuris consensu et utilitate communione sociatus*

*XXVI. virtutum ... rei publicae - Hi coetus... loco domiciliorum causa constituerunt... - vel urbem - omnis civitas... const. popul... res publica - ut dixi, populi res est - causa genuit civitatem - multitudine atque omnibus - regnum eius rei publicae statum - civitas optimatum - civitas popularis - in populo sint omnia - horum trium generum - reipublicae societate devinxit - a principes cives vel ipse populus - incerto statu*

*XXVII. regnis nimis expertes - communis iuris et consilii - in optimatum dominatu vix particeps libertatis - omnii consilio communi ac potestas careat - per delectos et principes cives summa iustitia - nihil nisi populi scitis et decretis agebant - ornatum suum civitas*

### **5.7 Chronology**

*State, Politics and Relevant Literature: A Summary Chronology. This chronology is selective with the purpose of supporting the items in the present document.*

#### *Ante Christum Natum*

**133** Tiberius Gracchus launches an agrarian reform making ownership extend to the landless. Opposition from the Senatorial oligarchy.

**132** murder of Tiberius Gracchus

**125** Fulvius Flaccus proposes to extend Roman citizenship to all residents in Italy. In 122 repeated by Caius Gracchus.

**123** the People's Tribune Caius Gracchus proposes laws supporting the people and the middle class (cavalieri)

**119** the People's Tribune Caius Marius proposes laws against corrupt election procedures.

**106** Cicero born

**100** the People's Tribunes propose a new agricultural law and meet strong opposition from the Senate.

**92** the Roman Censors decree the closing of the schools of rhetoric, reputedly corrupting the youth.

**91** the Social War: "italic" people denied Roman citizenship. 89 ended with concession.

**88** First Civil War: Marius commander, against Sulla, who flies.

**87** Sulla to Greece, Marius to Rome, where he eliminates S.s supporters.

- 84 - 82 Sulla to Rome, defeats Mario's supporters.
- 79 Sulla retires from the dictatorship.
- 78 the *tabularium* initiated.
- 70 Pompeius and Crassus have themselves illegally elected consuls.
- 63 the nobleman Catilina starts a revolution but this is discovered in time by the consul Cicero.
- 63 Catilina beaten at Pistoia.
- 61 Julius Caesar proprietor in Spain, the basis for his ascendancy.
- 60 Caesar, Pompeius and Crassus constitute the first triumvirate.
- 59 Caesar consul.
- 58 Cicero exile in Salonica.
- 58 Caesar sets *acta diurna* with laws, nominations and other notices on public walls for the citizens to see.
- 57 Cicero recalled to Rome.
- 56 triumviri determine the areas: Gallia to Caesar; Spain and Africa to Pompeius; Syria to Crassus.
- 48 Cn. Pompeius Magnus dies, defeated by Caesar (born 106). First triumvirate with Caesar and Crassus. The sons, Cn. and Sextus continue the conflict with Caesar.
- 49 Pompeius flees to Greece. The Senate confers the title of dictator to Caesar.
- 46 - 33 Triumvirate Octavius, Antonius, Lepidus. Lex Titia.
- 46 Caesar victorious over an army of Pompeius. Cato suicide.
- 44, murder of C. Iulius Caesar (born 100)
- 44 Octavius takes the name of Gaius Iulius Caesar Octavianus.
- 43 Cicero murdered
- 38 Oct. marries Livia.
- 35 C. Sallustius Crispus dies (born 86).
- 33-32 so-called *coniuratio totius Italiae*, consolidation of Oct.'s power.
- 32 emerging distance between Antonius and Octavianus.
- 31 Battle of Actium
- 30 death of Antonius and Cleopatra
- 29 reconditioning of the Senate, and first census-taking
- 27 "restoration" of the Republic.
- 27 Octavianus takes the title of Augustus.
- 23 Aug. receives *tribunicia potestas* for life.
- 19 Aug. accepts *imperium consulare*.
- 19 death of Publius Vergilius Maro (born 70).
- 12 reconditioning of the Senate.
- 6 Tiberius accepts *tribunicia potestas* for five years.
- 2 Aug. *pater patriae*.

*Post Christum Natum*

4 Tiberius *tribunicia potestas* for ten years.

6 *Aerarium militare*.

14 death of Aug.

14 new reconditioning of the Senate.

14 - 37 Tiberius

16 death of Livius Patavinus (born 50 aChrn)

37 - 68 Nero

54, ca. C. Cornelius Tacitus born.

65 L. Annaeus Seneca dies.

73 Plinius Senior dies (born 23)

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From roughly the time of Nero (37 - 68).

My hunch is that the “novel” was written in support of the censorious attitude of Augustus against immoral practices, while at the same time being a readable, and, for some, an exciting novel. Hitting two birds with one stone.

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