DOWNLOADING HISTORICAL PATTERNS

Cicero at Machine Level

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

INTRODUCTION

J'ai la clé des événements, un système d'interprétation infaillible.

(Eugène Ionesco, Rhinocéros).

1. Having before us a valid proposition about a subject, theme, idea or project, there will nearly always be alternatives equally valid for an understanding and interpretation. Tempted by intelligent eloquence, let me quote 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 any argument favoring multiplicity:

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.

2. No proposition in tis book is definite or definitive, it will always be a stage in a process.

3. Delimiting or setting boundaries for complex notions is always arbitrary.

4. Single terms or words can be handled *both* by verbal and graphical means. Sentences will usually defy such attempts. So the *bitrack* option seems to be limited to *basic units*.

5. A methodology such as combining Hard and Soft (*Definite* and *Indefinite*) values remains supported by directly (notionally so) practicable criteria, without my seeking some philosophical or semantical depth.

6. Every level is a meta-level for another one. Setting levels is a creative act. The "law" of infinite regress reigns generally.

7. No general statements like the present ones (1 to 6) can be definiive or conclusive.

8. This is certainly no deep philosopy, only an area of thinking and arguing that profits from the fact that human language is imprecise and slippery. Using it to handle numbers makes the numbers also so. Graphical models are an imperfect corrective here, and I shall be experimenting with them.

9. A constant and I hope consistent policy is to work in terms of actions, expressed by the particle *How,* avoiding substantive queries expressed by *What.* This policy means that an important contribution like Crispin Wright's *Frege's Conception of Numbers as Objects* (Aberdeen 1983) is not directly relevant, and that I am not obliged to take a stand on questions like "What is an object?".

10. In the present work, it is simply the dimensional interrelations between the two formats called model and system that justifiy the distinction. A relatively complex model can act as the system for interior subdivisions in it.

11. *To conclude* so far.
The book is subdivided in two levels: the main one for *theory,* and integrated in it, selected *substantive* material (3.8, *Close-Up Views*). Of course, since here we work with words and not numbers, the two levels to some extent dovetail or are tangentially related.

This state means that many definitions and generalized claims and programs are considered as having relative validity, reflecting, or so I believe, across intermediate paradigmas, reflecting Heisenberg's principle of *Uncertainty* (to come up later on) and submitted to the condition of *approximation.* The present *roadmap* may be experimentally relevant and passable, but it will remain *one among numerous alternatives equally valid. Liv Erstad S-L* has always expressed similar convictions, even before our collaboration began.

Balzac got the point in the terms of his culture:

***tous est bilatéral dans le domain de la pensée. Les idées sont binaires* (*Illusions perdues*).**

The book - completed in November 2016 - substitutes the unfinished version, "Downloading Marcus Tulllius", which was prematurely laid out on the net and has been removed.

The main perspective now is another one: no longer focusing on explaining Historical events, but on how we can approach the process of History as a theory concern: not an explanatory model but a programming one.

My project arises from my dissatisfaction with aspects of the traditional separating categorization of our research ventures, the Humanities as distinct from the Sciences.

I am using 1st person singular to make clear that I do not claim membership in any comunity of agreements, and not make others co-responsible for my experiments.

My dedication to Professor Gerhard Jaritz does not take it for granted that he will endorse the present experiment, but I hope he can accept my attempt as a tribute to him. He has since long been a central scholar in the exceptional interdisciplinarity pioneered by the research and publications at the Realienkunde Institute at Krems a/d Donau (Medium Aevum Quotidianum), an activity that has been my principal source of inspiration for many years.

Let me renew the expression of my gratitude for the fundamental and supportive role of Liv Erstad Sinding-Larsen. She has been my university for all the essentials. Mon bonheur comença quand mon âme fut prise (Pierre Corneille).

Another friend to whom I am sincerely indebted, is Senior Engineer Knut Rø at the Norwegian Institute of Technology (NTH, now NTNU).

***The book*, to return to that, is not pretended to come up with any definitive claims, just to propose one kind of roadmap (roadmap, a path with a vectorial direction but no observable or predictable terminus) among many possible ones.**

It is my conviction that, above some aspects of pure numerical arguments, we cannot deliver anything definite or definitive and should not pretend to do so. As long as we depend on verbal and linguistic idioms, we will stay on experimental levels. If "Uncertainty" is basic to Physics, our more or less verbalised and configural versions of scholarly programs can hardly be expected to be definite or definitive. We shall always be on the road.

With a problem-focused text, some system of visual organization should follow along, in terms of graphical models or systematic lists. Relying merely on verbal formulations, we can easily deceive ourselves (and the reader) with an idiomatic appearance of order.

There will be many cases of repetitions, partly because a subject can arise in different contexts, but also because they can be useful in an unprinted book accessible only over the net. I enjoy a freedom that no responsible publisher could offer me, but with some disadvantages.

The main perspectives and basic approaches form the thematics of this Part I. The elaborations of them will come in Parts III and IV, respectively the central and the peripheral paradigmas and programs. My exper-

imental white mouse, named Cicero, comes into view in Part II.

I have thought it useful to offer ample bibliographical informations connected with the cited publications. A book can serve as a working instrument.

There will be unanswered questions and documentary material not fully utilized. The book is not "finished", so it offers material for those who might carry the work further or come up with better alternatives.

For my particular use of the terms System and Model, please see 1.5, The C-System a Tool, top.

For a survey of the principal models, see 3. 6, The Central Paradigma, top.

CONTENTS

PART I POSITION AT NOON

1.1. *Heuristics for Busy People*

Few among us can afford the time to read books completely. The central themes and ideas in this one can be grasped by reading the present Section and 2.5, *Cicero at Machine Level*.

Models can give concentrated views or extractions helping the heavily burdened to grasp the ideas, to see if they are worth more attention.

The main perspectives and basic approaches form the thematics of this Part I. Elaborations of them will come in Parts III and IV, respectively the central and the peripheral paradigmas and programs.

Three graphs will now be displayed for an introduction to the main discourse:
Fig. 1.1.1, *Position at Noon*
Fig. 1.1.2, *Display Map*
Fig. 1.1.3, *Resources for the Book*.

First, a picture of my *general approach* (Fig. 1.1.1, *Position at Noon*). Pinching the title from Eric Linkater's book, *Position at Noon,* simply means that, like the *Observer*, modestly myself, on the drastically simplifying diagram, I am trying to be finding myself at a midpoint where the curve tips over, hoping from this position to get a view of two environments meeting there that are different but which I shall be trying somehow to connect: *Definite* values to the left, and *InDefinite* values on the right.

The model displays a process: relying on the ultimate uncertainties in Physics (Heisenberg) concerning History, we can hope, by focusing on the less definite parameters in the cognitive evaluations of Physics, to link the two parameters or methodologies up with one another. The model is not illustrative of concrete matters, merely a proposition.

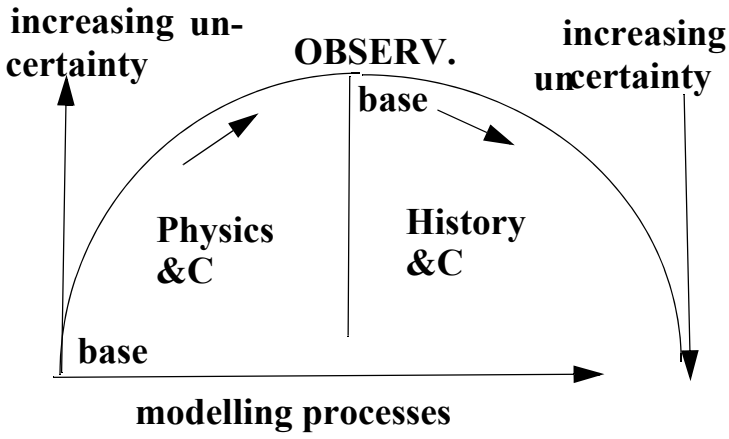

Fig. 1.1.1. *Position at Noon: Interdisciplinarity or Open_Source Approach, with the Observer in surveying position.*

Accepting the simplification of the diagram, one could, at least for a start, note as follows: *Science:*

historically starting from the solid base (with proofs etc.), the field has moved steadily *in the direction of indeterminateness or uncertainty* (a subject for this book): the more developed research programs are, the wider are the scopes and so also the alternatives with increasing doses of uncertainty.

Next, *History*, which, as a field, can start out with some degree of definiteness (data and documented events and processes), appears as gradually vaguer in our determination and evaluation of it, a process intensified by developing terminology and methodology; opening up increasing alternatives. The further our studies of History reach, the more the uncertainties increase. As Herbert Simon (*Models of My Life*) noted:

the past cannot be recaptured. Memory is overlaid with later memory, mangled by self-justification and self-pity, guarded by self-interest, rent by great gaps of forgetfulness.

There are two survey graphs over the general build-up, 1.1.2, *Comprehensive Chart* ; and 1.1.3, *Resources for the Book.*

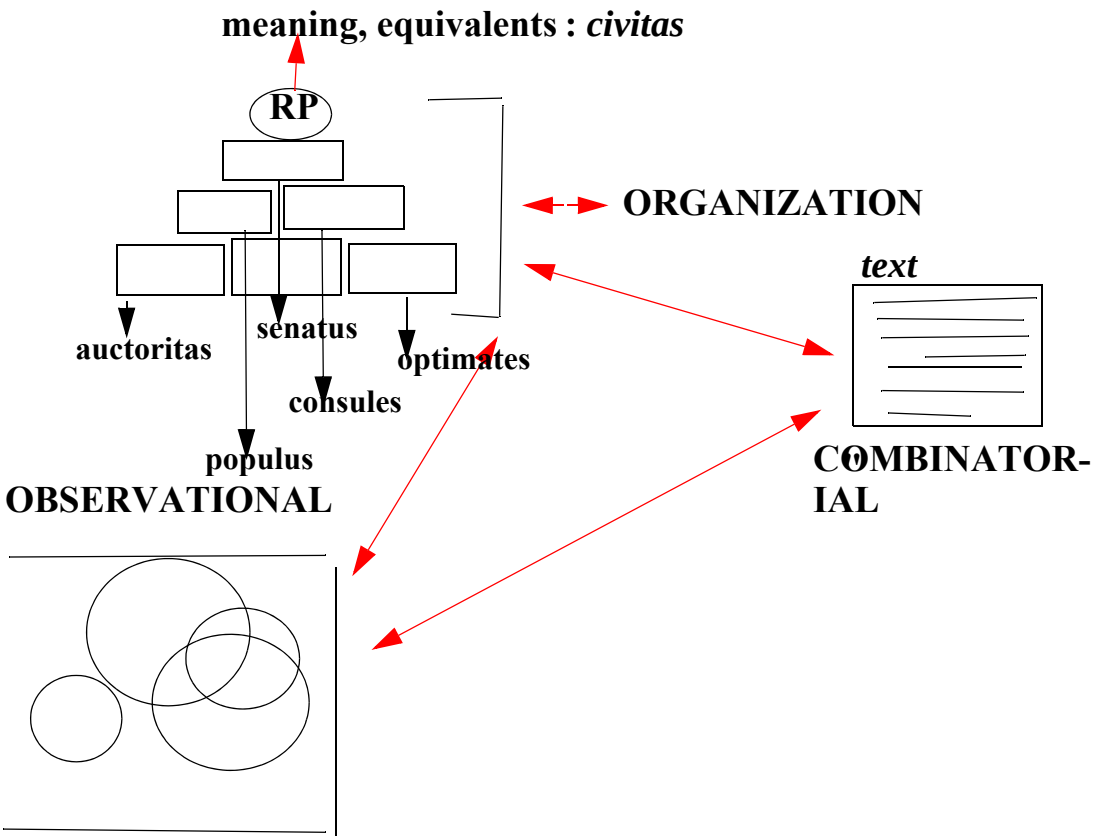

Fig. 1.1.2, *Display Map*

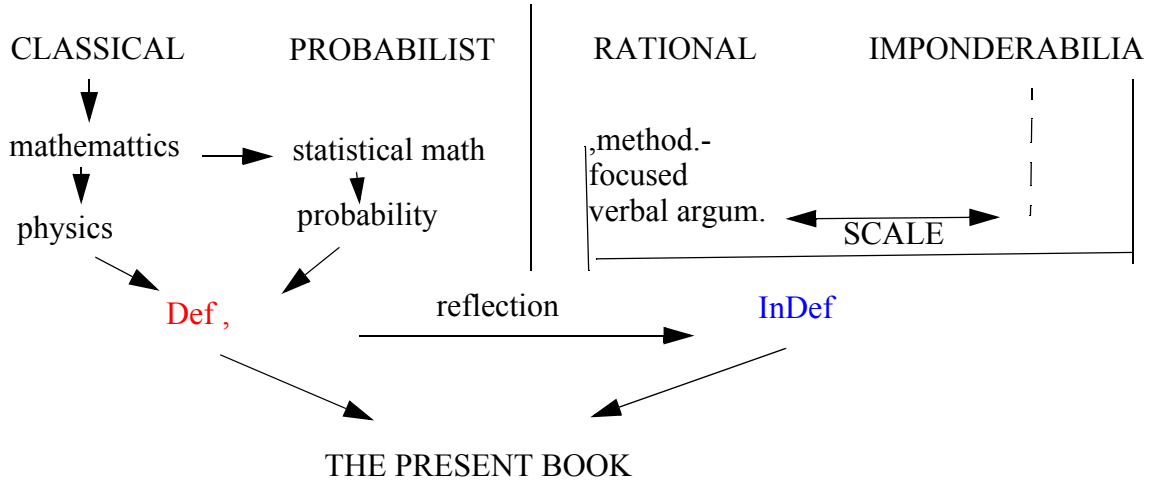

Fig. 1.1.3, *Resources for the Book*.

The graph *Resources for the Book* (Fig. 1.1.3) presents a general picture of the main subjects matters discussed in the book, showing the framework basis or background for the subdivisions of models into *Def<inite>* and *In-Def<inite>* models, respectively reflecting conditions in Science, such as Physics, and Humanities, with the focus on History.

The left-hand group shows the two principal Science programs, the *Classical* (including the *Quantum Mechanical*) and the *Probailistic.*

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

So far a pictorial *Introduction* to my attemps at handling objects that in their nature will remain unstable and unpredictable.

The trail to follow further is to *develop a methodology* for program, project, subject and general criteria for *description*, such that the *entire analysis program in the present book,* is a description. While single words and concepts can be relevant in a non-dig model, verbal sentences cannot.

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

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. Also, using models is a help to identify and localize the white spots on our map or chart.

I shall need to broach some well known ideas, hoping to make the picture sufficiently consistent.

There is no *the History* or *the Science*. or *the Sociology*, only *theirs or my History,* etc., no question of right or wrong. The big issue is what kind of models we intend to use and what entries and how much we can load into our models, without making them too big and complex to be useful for two purposes: 1. creating platforms for conceptions and arguments, and 2. for dynamics in further research. While the models are operative units, they have to be integrated in some *system* in order to be confronted with each other and for me to achieve a debatable structure.

We are always on the move. The Sun reportedly will keep us alive for another million and a half years, so there is no hurry.

1.2, *Human Driven Data Handling*

Modestly, I have tried to transfer to my domain *Descartes*' stated strategy of using *simple models for the investigation of more complex ones*.

In one's thinking, one should start with *les objets les plus simples et les plus aisés à connaitre, pour monter peu à peu, comme pour degrés, jusques à la connaissance des plus composées* (*Discours de la Méthode,* ed. E. Gilson, p. 18).

Herbert Simon* gives the same advise.*:

***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.).**

Of course, the conundrum remains: which one is the essential skeleton?

A survey of the major steps in the present observations and argumentation can be given in the form of the graph in Fig. 1.2.1 (*MetaGraph - MIS).*

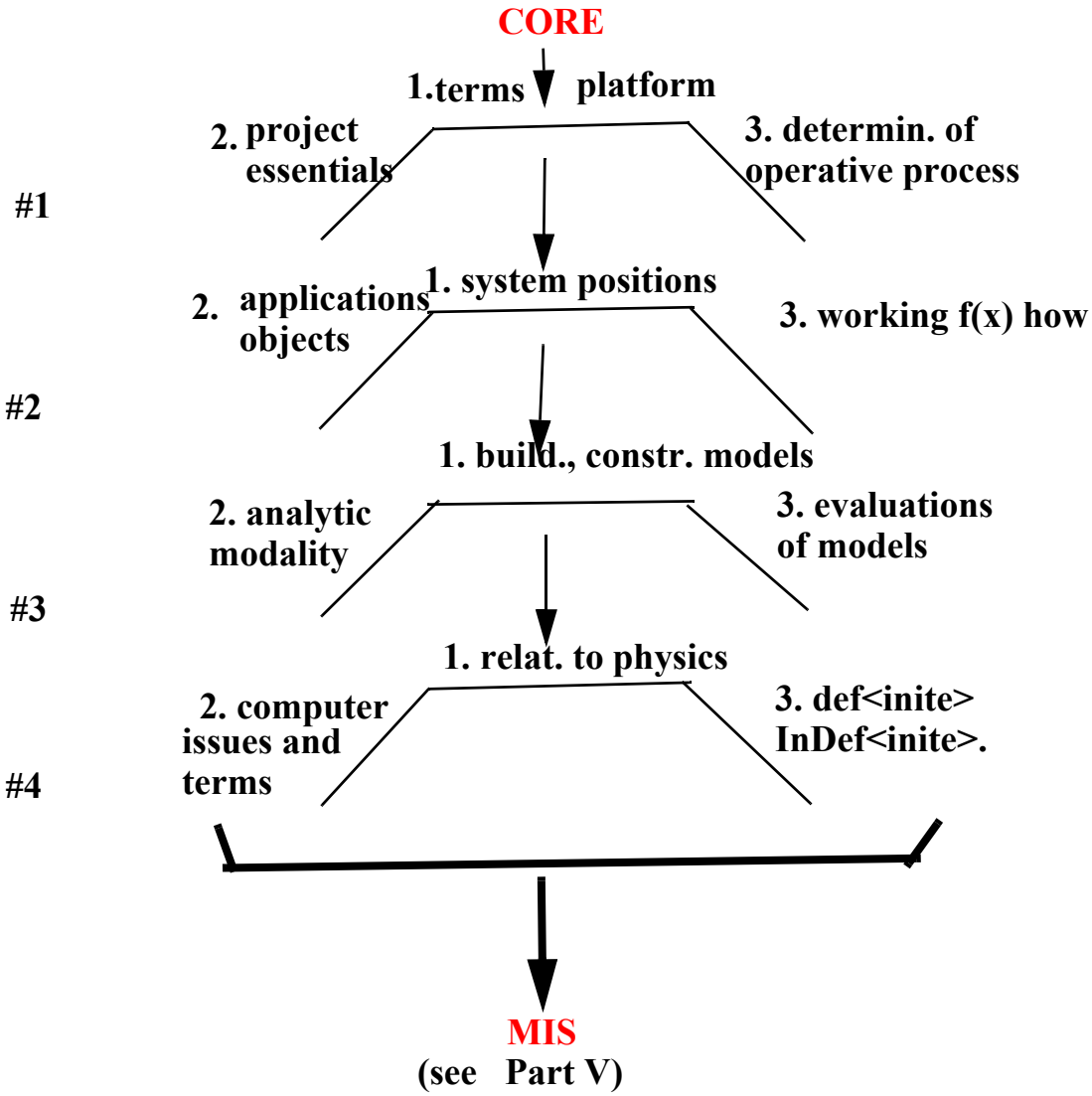

Fig.1.2.1, *MetaGraph - MIS = Management Information System(s).*

The terms System and Model will be central in this book. **Since in using them I deviate somewhat from current norms and functions, let me present them conformingly with my convention (risking repetitions).**

1. A *system* is a static structure into which are loaded various entities, such as models, which, depending on specifications and circumstances, can be static or dynamical.

2. *Graphical Models* of the non-operative, *configurative* category , are the basic operators in the book (*configurational*: relative disposition or arrangement of parts : interrelationships of constituent elements).

3. Any such graphical *model* is classified as a *system* whenever emerging statically, while it should be semantically graded down to being called a *model* whenever dynamics, figuratively or really, are being attributed to it.

4. Consequently, the term *system* will pragmatically be applied *whenever a model is complex* and is considered as a static environment for subordinated *models.*
5. Of course, this grading can be shifted up and down a list of model types, through some encompassing system.

These observations should take care of the strictly definitory aspect. I will not guarantee that it will be respected consistentely throughout the book. For in relation to more or less customary international practices, my usage could create confusion for the readers.

***It is in view of these observations that I shall speak of C-systems and C-models,* in order not to confound my models with others on the market. But, having stated this at this point, I shall go on speaking of *systems* and *models* without further qualifications.**

Bypassing the *cognitive* aspects of human data elaboration, attended to in earlier publications citing, among others, Sowa and Benjafield, in this work it is human use of *basic units, terms and words*, rather than full sentences and paragraphs, that are on the agenda. There are several motivations for this restricted perspective which will arise as we go on. The principal one to mention here, is that in a study focused on methodology, a test can become more effective by limiting the discourse to basic units, a point most efficiently made by Herbert A. Simon (coming back to this).'

The book, let me repeat, is built on a series of *models* and *charts.* At the *basic operative level,* to be imagined as the internal motor of all argunents, there is a simplified model of a *Von Neumann computer system,* shown in Fig. 1.2.2, *Rocinante:* repeatedly shown dependent on the context.

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 *m* subjects are related to *n* principles or parameters.

The computer references can be considerably amplified, developed and systemically integrated in the discourse. For this program, Douglas E. Comer's *The Internet Book* (4th. ed., 2007, 380 pages) provides the best tool we seem to have today.

My task requires that a distinction is being made between what I will call *Tech Driven* and *Human Driven* exploring and testing. To explain the latter aspect here would be superfluous, since the entire present book is centered on it.

The *Tech Driven* alternative requires more attention here, even when it turns up again in the book.

Most conveniently, there is a publication, besides the one by Comer just mentioned, that delivers what I need here in a highly articulate concentration.

Three authors, Marco Brambilla of the *Politecnico* in Milan, Jordi Cabot in oft the *École des Mines de Nantes*, and Manuel Wimmer of *Vienna University ot Technology* (the group I have coded BCW), have published *Model-Driven Software Engineering in Practice* (Williston, VT, 2012, 166 pages).

The idea is somehow to join *Soft* models to *Hard* ones, as in the present work, providing valid guidelines, emphasizing, among other things, the distinction between *model-driven* and *model-based* work. In my present book, of course the only realistic process is to *base* arguments onfigurative models, notions that can be *driven* only in digital environments.

These ideas bring up my central notion.

The *centerpiece* in my argument regarding the illustrative *functions* relevant for my discourse, is a configurative representation of a *Von Neumann computer* (Fig. 1.2.2); *configurative*: relative disposition or arrangement of parts : interrelationships of constituent elements), which is honored by the name of Don Quijote's horse, *Rocinante*, being artificial, reduced to the bare essentials, ineffective by reality standards, but figuratively moving along (to say nothing about the rider) and by the rider attributed with great powers.

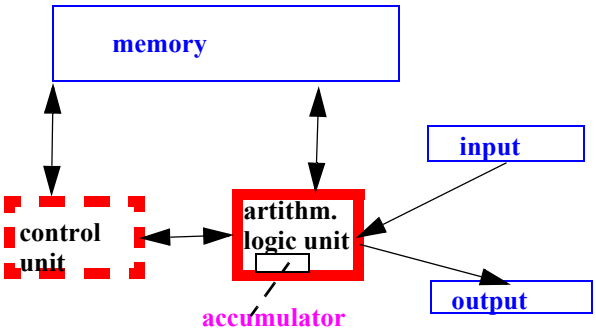

Fig. 1.2.2, *Rocinante: Operating System in a PC structure. The original Von Neumann Machine, with memory, input and output, after Tanenbaum and Austin., Fig. 1-5* (coloring mine).

This model, with variants, will be the *core configuration* in the book.

In the BCW book, on p. 17, *Model classification,* it is argued that *a very simple way of classifying the modeling language and the rwespective models is based on the* level of abstraction *at which the modeling is performed.* This formulation sets a distinction between digital and configurative models (*configurative*: relative disposition or arrangement of parts : interrelationships of constituent elements), since in the latter case abstrac-

tion cannot be quantified and hence not graded, and also since in the configurative cases, variability enters in the variable coverage and scope rather than in technical operations.

Consequently, the corresponding distinction arising in the *digital* cases, is not relevant in the *config* ones: p. 122, *Transformation of models*, and also because the *Purpose and use of models* (pp. 1ff.) will be be definitely different.

The program for *Transfof models* (BCW, p. 122) in the digital cases cannot be replicated in the config ones, since here "transformations" can only be practised by moderating a *design*, not directly a *function*.

1.3 *Inception Theory*

Observatons start out from some kind of inceptional theory, being subsequently developed into one or several workable ones.

In the present assignment, I am not comparing the *cases*, only t*he models extracted from or built around them.*

This book is built on a series of *models* and *charts.* At the *basic operative level,* to be imagined as the internal motor of all argunents, there is a simplified model of a *Von Neumann* computer system (Fig. 1.3.4, below).

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 graphical model is *not* a straight translation of the corresponding verbal formulation. The model does *not* substitute the words.

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

Some of my models might be considered superfluous. But I have included them in order to display experimentally the research process and stages in it. The process should be taken as more important than the product, calling for criticism and eventual development or improvement.

I am not using nor proposing any set of definite *rules,* rather developing theories and methodologies as outcome of *informed and goal-focused decision-making*.

If there is a red thread in this book, it is the notion that there are *no solutions, only propositions*. This is my motivation for subtitling the book *A Personal Experiment,* recalling Herbert Simon's message: *the race is on its way.*

My punch line is extending, deepening and controlling our efforts in Historical research regardless of academic classifications, relying on systemic *patterns* reflecting *Science* and guided by the interdisciplinary *Open_Source* modes (for which see further on in the present *Section*).

Speaking of *patterns* in this connection simply means that analysis of soft subjects - non-Math/Physics - will more or less roughly mean putting subjects, parameters and rules into some *pattern* which is pre-established, first by hunch, then stepwise developed with the help of systems handled according to some methodological rules, mostly derived from so-called *hard sciences, mainly Physics,* which determines the *pattern*. Full circle, as always in programs not riding upon quantitatively recordable entities.

Historical events and processes, and people involved in them, are not directly accessible even in theory or hypothesis. We can only know them through some web or pattern into which our mind has lodged, transformned and adjusted them.

The main perspective, then, is on how we can approach, not "conclude", the process of History as a theory concern: not through an explanatory model but a programming one, extracting from notional reality some significant patterns, to build relevant assumptions into models that are created according to the cited preestablished rules, and then focus the sights on Classical documents (mainly Cicero's).

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

Taking paradigmas from *Physics* as representing the *Def<inite>* alternative, no concept or term in History studies, standing for *InDef<inite>* case, can be directly connected with them. But they can be described and formalized as reflections or images of *Def* structures. Since we *recreate* whatever we experience, know or express, this move is not logistically invalid.

The next graph, Fig. 1.3.1, *InDef Programs,* shows a limited spectrum, sufficient for my argument here. Fig. 1.3.2, *Def ,* is exemplified with *Physics.* The categories are culled from A. Beiser, *Perspectives of Modern Physics,*. To simplify, I have left out most of Classical Physics: momentum, solids, gravity, energy, optics, etc., etc.

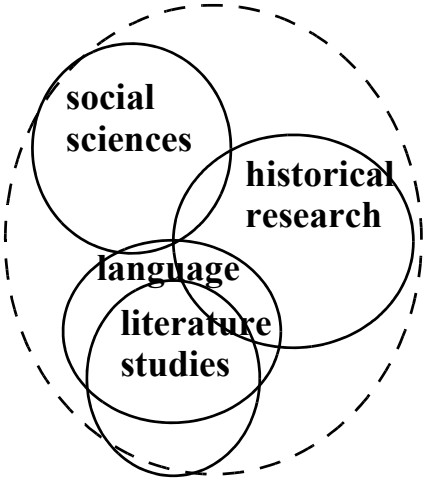

Fig.1.3.1, ***InDef - selected programs, broken line indicating vaguely defined outlines.***

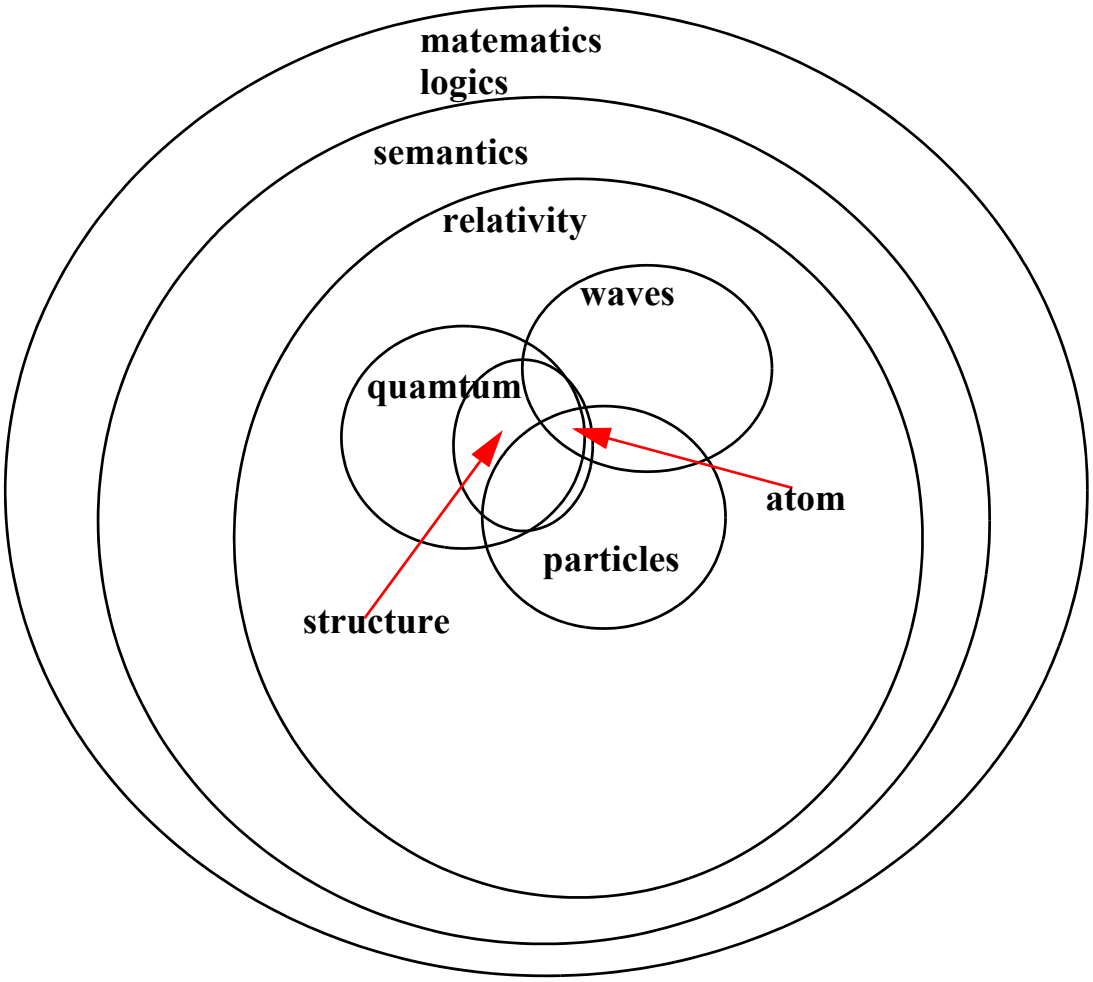

Fig. 1.3.2, ***Def - exemplified with programs from modern Physics.***

The *two types of models* that I have introduced, *Def<inite>* and *InDef<inite>*, and, basically my tentative combination of them within programs, represent the fulcrum of the entire project. Their scope is wide and complex and is to a large extent set down in terms of other models.

No "correct" or definitive nor definite account can be construed of any event, process or achievement in *History*.

Javier Cercas, in his *Anatomìa de un instante* (2009, second ed. 2010), spends 461 pages on an event in Madrid 23 February 2008 which lasted a couple of hours, the aborted coup in the Spanish Parliament by military troops led by Colonel Tejero. The project failed because with the coup concluded, King Juan Carlos refused to receive the representative of the leaders for the constitutional confirmation of the project.

From this history Cercas concludes regarding the coverage and reliance of historical accounts (his pp. 275 f., and also 26), a long comment that I shall quote *in extenso,* since I find his argumentation important and highly relevant in the present context, and I shall supply an epitome in English with a parenthesis added.

¿quàndo empezò todo? ¿Dónde empezó todo? ¿Quién lo empezó todo?¿Cómo empezó todo? No hay protagonista, testigo o investigador del golpe que no tenga respuestas a esas preguntas, pero apenas hay dos respuestas que sean idénticas. Pese a ser contradictorias, muchas de ellas son válidas; o pueden serlo: segmentar la historia es realizar un ejecicio arbitrario; en rigor, es imposible precisar el origen exacto de un acontecimiento histórico, igual que es imposible precisar su exacto final: todo acontecimiento tiene su origen en un acontecimiento anterior, y éste en otro anterior, y éste en otro anterior, y asì hasta el infinito, porque la historia es como la materia y en ella nada se crea ni se destruye; sólo se trasforma.

It remains uncertain when, how and by whose action the coup started (after all, Tejero was not alone, but had great miltary forces behind him): but how to define them and their ideological heritage? Infinite regress. There are almost no participant who could not explain this event, but hardly two answers would be similar. Furthermore, an historical event is continuous with the preceding and with series of following events, equally continuous. One cannot determine neither start or end to such a process, only note that the case is transformed. Like physical matter, it has no start or end term, it only changes.

To repeat: *segmentar la historia es realizar un ejecicio arbitrario,* for *la historia es como la materia y en ella nada se crea ni se destruye; sólo se trasforma.*

***Working with History*, we have to pick out what interests us and what we estimate we are needing and what can be productively useful, a *creative impresa*.**

Since I am trying to connect two academically incompatible fields, *History* and *Science,* the agenda basically concerns interrelating the two values that I have classified as *Def/InDef*.

Elaborating the *Def/InDef* relationship, I apply the criterion of *How* rather than *What.* We can describe with sufficient precision *How* something started, happened and ended, in an *instrumental* modality, while trying to decide *What* happened, leads us into an unsurveyable maze, even into infinite regress. For the *What* modality, we would have to rely on traditionally significant codes, hoping for the best.

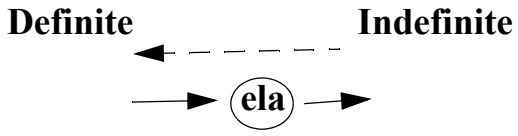

Fig. 1.3.3, *Intercations between two programs. Broken line: Indef referring back to Def for info; arrows with "ela", for elaboration: applying and elaborating selections.*

The relationship must be taken as *bi-directional* (as in the rather unimpressive Fig. 1.3.3), since the indefinite program seeks up factors from the definite one with the purpose of somehow using them.

The main arguments, I have argued, cannot be determined as absolute or tenable, and my central project is being implemented in a *virtual* modality, which is to make two formally incompatible models work in unison, the *Definite* from Math-based Physics and the *Indefinite* from Humanities such as History.

A drive towards a goal that turns out, by strictly loogical criteria, to be *beyond reach,* can produce ideas, awareness and also by-products. To note this is an explanation of the *unfinished character of the entire book*; which should rather be evaluated as an inchoative work. So it is for two motivations: no study of subjects as complex as those in view here can ever be concluded; and being more interested in methodology than products, I take the incipient status as adequate.

Summing up, my *project* is to *integrate in a system of models* two apparently incompatible entities, programs from *Science* such as Physics and

programs from *Humanities* such as History, using *these two types of program Def<inite> and InDef <inite>, avoiding the more obvious terms of Hard and Soft, since these terms are in use in other connections.*

My project, then, involves me in a search for elements and features in *Physics* that are "soft enough" to allow attaching *InDef<iniite>* programs, notions or terms to the *Def<inite>* ones.

One candidate here seems to be *Field Theory,* as described by Von Weizsäcker, *Aufbau der Physik* (1988, orig. 1985, 662 pages) as *Feldtheorien* (pp. 252f.). Also V. W.'s 13. Kapitel contains a number of paradigmas and observations that can support the bridging-over among the models.

In this context *war es nicht wichtig ob die Materie prinzipiell als Kontinuum aufgefaßt oder als atomär strukturiert angesehen wurde.* - not important whether matter was understood in terms of continuous fields or as being atomically structured.

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.

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 *functions and working of a computer*, and we can set up an experiment in that context. 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 develop a *model* (already shown) 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.*

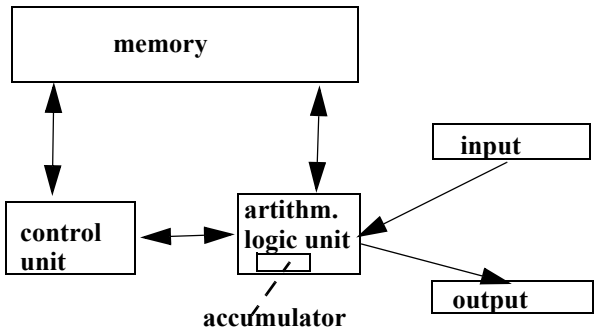

Fig. 1.3.4, *Operating System in a PC structure. The original Von Neumann Machine, with memory, input and output, after Tanenbaum and Austin., Fig. 1-5.*

As a consequence, observations on real systems are relevant and useful. **An early and simplified model of computer structure and working can serve as a model in the present context (Fig. 1.3.4, previously named *Rocinante*).**

The working is *digital* in true machines, but we have to *attribute a similar effect for our non-digital models, since our mental and graphical constructs should replicate true digital operations*.

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

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.***

László Méró has published an interesting book with the title, in the Italian version, *I limiti della razionalità,* generally telling us that the boundaries are narrow*, in full agreement with modern views.* But to define boundaries or limits, you have to argue rationally.

Rather than trying to fix these limits, we can start out from some selected centrum investigating the rationality and the applications in our progams to see how far we can get, where we are sliding into the *imponderabilia.* Anyway, Méró's book is a contribution to a general trend, an initial physical motivation of which was Werner Heisenberg's proclamation of the *Uncertainty Principle.*

My *approach*, now to consider it more carefully with the background just recorded, is to consider the stated moves as critical *images of machine programming, the most articulate, precise and reliable medium we have, despite the limitations in entails, for recording and reasoning with models as tools* (*see* Fig. 1.3.4, *Operating System in a PC structure*).

I apply the term *critical* to my models and charts, and hence on their contents. Let me start out from *critical mass*: *a size, number, or amount large enough to produce a desired or expected result* (Webster).

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? The case is lodged in my poor brain; it is not *out there*.

Features under this heading can include the following *positive* factors: *determination, effect, range, coverage, connectivity, being crucial, stable*; and some *negative* factors, such as *indeterminate, uncertain, experimental*, etc.; finally, some "*neutral*" and intermeduiate terms such as *tendency, vectorial, Heisenberg's dynamis, approach<ing> (f(x)* on the graph.

In many cases some of these factors overlap, so that the outcome can be such as illustrated on the graph (Fig. 1.3.5, *Model Connections*), in which the function symbol is meant to indicate the complexities arising at the conflation or tangential linking between the positive and negative factors.

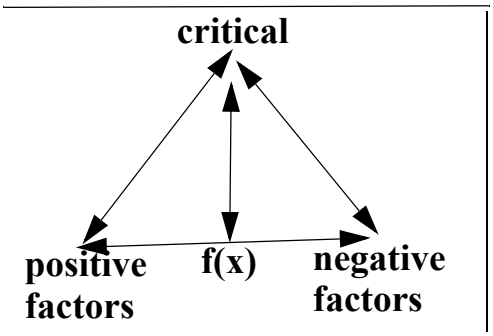

Fig. 1.3.5, *Model Connections.*

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? (there being no absolute standards).

I shall be using graphical *models experimentally:* there are *n* options for how to build and use a chosen model.

Every option is tentative, being a provisional tool for going on with a research progam.

I shall use the *Open_Source* paradigma regardless of the fact the wording, with a different hyphen, is used in the computer industry. This program is different from the vaguer one labelled *Interdisciplinarity,* for it does not refer to academic disciplines but to any paradigm whatsoever, addressing topics and programs rather than university classifications (Fig. 1.3.6, *Open_Source Collection*).

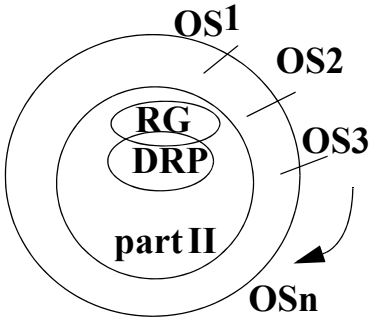

Fig. 1.3.6 *Open_Source Collection.*

Here is a picture of research -focused projects that can make up an *example* of an *Open_Source* collection. The numerical order is immaterial (*see* Fig. 1.3.6).

The group of Diagrams in Fig. 1.3.6 show: DRP = Cicero's *De re publica* with comments; RG =Augustus' *Res gestae* with comments, partly overlapping and integrated, the whole integrated in some alternative programs OS1 to OS8 (for OSn = Open_Source).

My project, as I have noted, is to relate *InDef<inite>* models functionally to *Def<inite>* ones, and I believe that in the universe 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.

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 dynamic program 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 ouline with some precision due to math and model logistics.

A chosen structure can reflect 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, so that the perspectives vary.

Whatever we do is never definitive or totally stable. We need translations and a transfer of the factor of *Uncertainty* from post 1900 Physics, supported by the *Quantum* "revolution".

We have to presuppose two classes of Uncertainty.

The type just cited arises at a basic atomic level, and has been named also *Unschärferelation* (Werner Heisenberg) an "Uncertainty" which denotes a principle from basic Physics and *experimentally and virtually* transferable to more pragmatic levels.

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* the upcoming references to De Finetti and Luigi Pirandello). Bruno De Finetti published a book entitled *L'invenzione della verità - The Invention of Truth* - to be discussed further on.

The traditional view of Science is no longer realistic: *So kann man nicht sagen, wenn man will wissenschaftlich sein.* We no longer *are* scientific.

As a young person at home in Oslo I was constantly told that this or that was *scientifically proved* (*vitenskaplig bevist*). "Culture" was loosely understood as a field of mixed spiritual and mental activities, while *Science* was *absoloute 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 Werner Heisenberg, *Der Teil und das Ganze* (p. 116):
***Vielleicht macht Ihr den Fehler, die Naturgesetze für absolut zu er-klären...* (*perhaps you are committing the error of taking the laws of nature as absolute*).**

To embark upon History studies in contact with the Sciences does *not* mean to debunk the traditional and often productive practice of keeping the paradigmas apart from each other, only to suggest that we need a *firmer basis*, which is available in terms and ideas in the Sciences, in which, mathematically formulated criteria, regardless of twenty-century-relativizing re-defintions, offer some degree of *operative stability*.

When Herbert Simon criticized some products for resulting from mere *hunch, no Science,* we can understand what he meant, while knowing that most innovating Science ideas and observations have their origin in vaguely, impenetrably complex, half-baked notions and piecemeal awareness.

So far I have sketched out my personal schedule with ideas from a wide range of sources. Designing a chart or a model is an approximate and personal affair, unless we borrow them from some publication, while our

employment of it and the context into which we load it, makes personal creations even of copied examples. Still, we are never "original", always mirroring some previously launched idea, model or, let us face it, some 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). We approach and handle the items and issues *indirectly,* through a web of pre-onceived notions and ingrained attitudes.

Having indicated the main lines of my program, let me present a chart interrelating the *model-focused operations*.

Fig. 1.3.7, *Operational Survey*, can be considered as summing up the observational and argumntative process and the interconnections between the critical terms, *Open_Source, Def<inite, InDef<inite,>* developed in the present *Section* and further on.

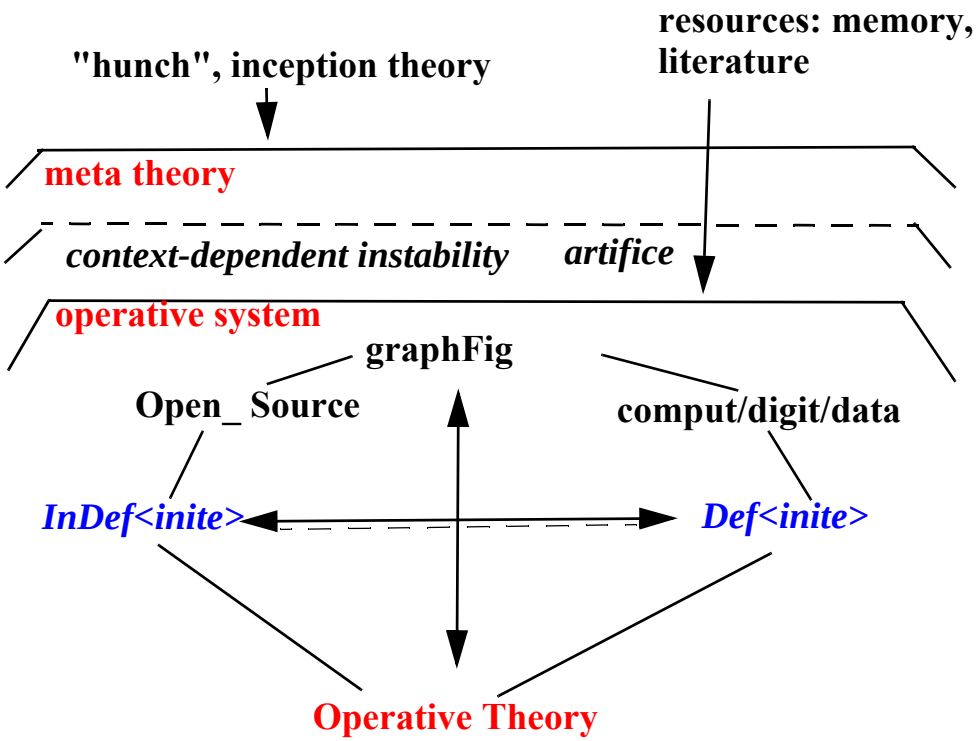

Fig. 1.3.7, *Operational Survey GraphFig refers to Fig. 1.4.2, General Chart Operating System*.

Some details should be noted. The double line of the *horizontal arrow* indicates the two levels of complete or alternatively reduced interconnection, the focus issue in the present context. The variabiliy and creative factors indicated by the dotted line arise in all contexts except in some purely numerical ones as a *chart*, not as a running model or image of one.

It is to such images we now turn.

1.4, *The Core Models*

Computer configurations provide the basic model in this book **and for depicting its stored body of informations and argumentation. The computer is an imperfect image of our recording and operating capacities, but it providing us with definitely operable features and workings. Let me repeat that it can take care of determined units, while being blind for the irrational, emotional and optimizing views in our setup, the *imponderabilia*. This means a limitation, but when could we work seriously with "totalities" in human intellectual or emotional functions? The sharp and consistently rational observations in novels by Balzac (with his French penchant for finances) can be exactly configured, not so the *brumes* coating them (*Illusions perdues,* 1844).**

So the computer is the *operative core model*.

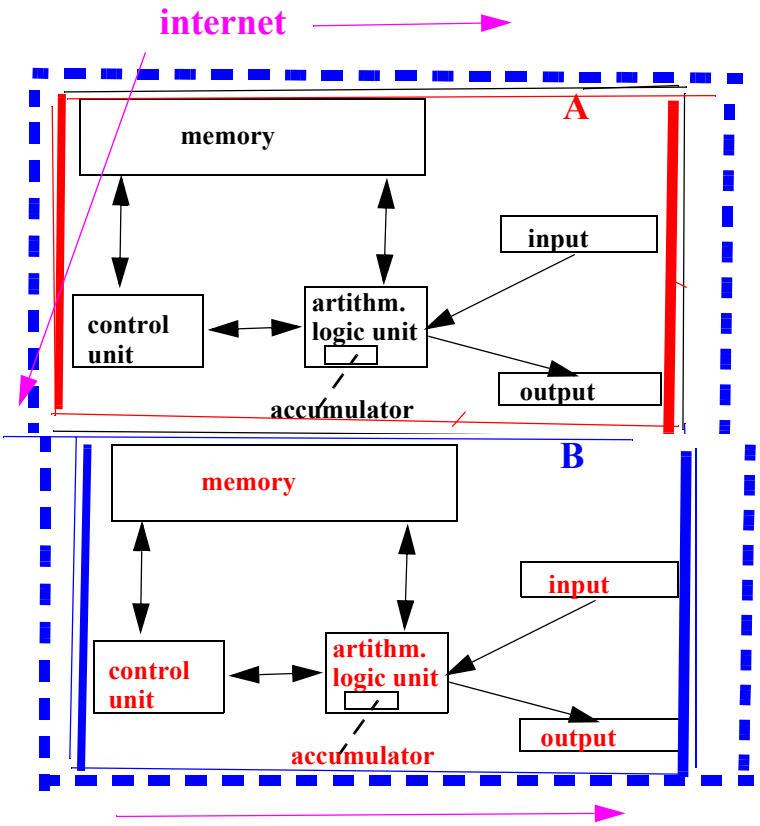

Fig. 1.4.1, A, *System-Model Coordination, twice using a Von Neuman Computer, copied from Tanenbaum and Austin.*

The color codes in Fig. 1.4.1, A, are:
Blue = system Red = model Blue broken line: Larger system with the two graphs integrated, the upper one a model, the lower a system with models

integrated. Internet, indicated with a few arrows, but graphically the whole configuration should have been embedded in it.

The codes indicate the following distinctions:

A. Computer model taken as a *basic* systemic unit, while

B. refers to a computer *system extended framework* with the internal operational units in focus. Reinterpreted now as integrated models, the Larger field arises. Of course this again could be a *model* in a larger *system*, *a level or two up,* such as the present book.

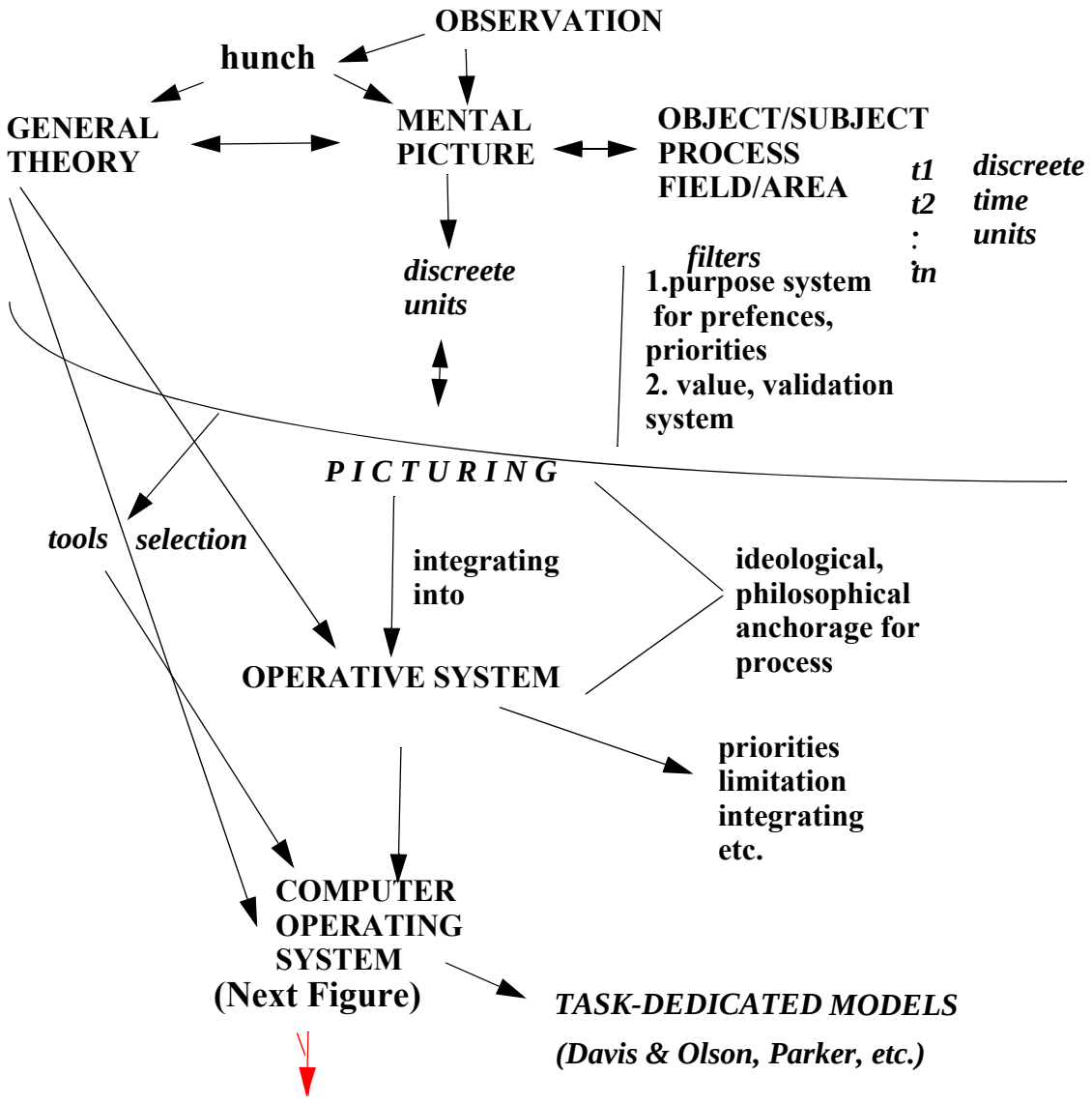

Fig. 1.4.2, *General Chart with the Operating System in a PC structure. (Fig. 1.4.3) integrated*.

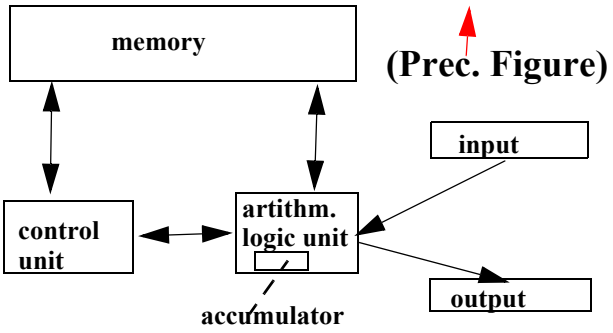

Fig. 1.4.3, ***Operating System in a PC structure. The original Von Neumann Machine, with memory, input and output, after Tanenbaum and Austin., Fig. 1-5.***

The cited process of mapping over from digital realities to some dumb configuration (*que ne se bouge pas!*) can be further (than in the present work) developed 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 directly relevant titles are listed, all with the same publisher, *McGraw-Hill*).

There is nothing mysterious about this choice. As a word (or number or symbol) handling structure, it offers the best choice for single terms modeling. I do insist on the single term, because, as I have noted already, I doubt if sentences can be adquately elaborated with the present methods. This use limited to single terms can be related to so-called *packet switching*. I cannot transfer continuous messages, only discrete ones.

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 *historical documents.* This centerpiece facilitates to some extent setting boundaries around and limitations to my treatment. Still, the approach will be tentative.

A model such as the one for Cicero can be *productive* in an indirect sense by opening up perspectives as well as revealing blank spots that await being filled up with substance.

Figures 1.4.2, *General Chart with Models Integrated,* and 1.4.3, *Operating System in a PC structure* are displayed here in combination.

In the combination of the two figures, the computer model is integrated into a suvrey chart of the principal ar- guments in the book.

Inventing and building a *model* can be the fulcrum in an *Inception Theory*, and developing and elaborating it, the central factor in our *Appli-*

***cation theory*. With this procedure, models can be the most important productive and informative agents in our work.**

The British economist Mary S. Morgan, in her *The World in the Model. How Economists Work and Think,* 421 pages, 2012, generalizes about *models with several functional alternatives* in the following terms (obviously with economics as the specific case).

Turning a metaphor, which begins as a figure of speech and idle likeness, into an analogical model involves both cognitive and imaginative work. And, as with so many aspects of making models, cognition and imagination are intimately linked, both in creatively developing the metaphor into a model, and in making the economic terms fit the analogical world,* and *the analogical terms fit back onto the economic world.

The cognitive issue is one we have already met. Economists don't know well how the economic world works. One option,... is to imagine how some aspects might be and make an image of them, ... Another is to start with the bits that are known, and bring them to fit together... Yet another is to simplify and abstract an account from the complications of the real world.... The fourth alternative here begins with metaphor and develops them into analogies with which to explore how the world might be and how it might work if it were like those analogical worlds. In choosing another object/system on the basis of some aspects of similarity between that sytem and beliefs about how the economy works, economists place significicant constraints on the form and content of the model. They develop the analogical model using these constraints as a way to explore the implications of that analogy and whether the model can be used to interpret the economy in those terms.

The *scientific view*, supported by Morgan's argumentation, that I have drawn from considering the my models in a wider frame, seems to go as follows.

While working with *terms, codes* and *numbers* we can use the *quasi-digital model*s that will occupy us from now.

But when it comes to *text flows,* such as substantial written sections or paragraph, those models do not work well any longer. We have to use *matrix-imitations,* as exemplified in Fig. 3.5.1, *Pseudomatrix,* with no *directed and dynamica*l (figuratively speaking) models and graphs, displaying and elaborating no dynamics, no direction or focus, no internal interactions, being a static field of mutually related arrays tied up in a grid.

A leading notion in contemporary work is the distinction between *discrete* and *continuous* proceedings.

Howard Eves, in his *Foundations and Fundamental Concepts of Mathematics*, elaborates the distinctions regarding *continuity* and *continuum,* the latter being 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.

All the same, the distinction, if reflectedly conceived, is useful for Historical contexts. Paul Feyerabend's book, *Wider den Methodenzwang,* 1999 (originally 1975, in English), delivers a major attack on the "continuity" paradigma, according to which one sticks to one and the same basic principle all through, rather than respecting the fact that paradigmas vary according to situation and purpose.

The matter is not settled so easily.

Models can have a more definite reality-relevance than the "facts" they are construed to show and handle.

Niels Bohr, as Werner Heisenberg notes several times in his writings, *did not believe in the atoms he was studying, but did so regarding his models of them.*

This is a realist attitude, since we have access to the "originals" only through our theories about them. In the *Social Science*s, models are used all the time, and the practioners, even if some of them do not admit it, are fully aware of the fact that you cannot directly record and understand something so complex and unstable as a chunk of human society. Here again, we only have *pictures* of it (4. 2, *Social Sciences*).

The usefulness of such pictures depends on functional context and our creative efforts for introducing an *operational field* in terms of models within the chosen context.

A *model* can usefully represent *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. There is a back-and-forth here, for we develop models from our theory, whike we elaborate or, at least, refine our theory from our models

Even more crucial in the tech perspective is the existence of *boundary conditions,* since our non-dig models have their critical point exactly here. There is nothing to stop them and nothing to interrupt our developing them *ad infinitum.* But the need to integrate them in theory can have a controlling effect.

Let me consider an extended version the machine-related problems and resources (Fig. 1.4.4*, A, Simplified Chart of Computer and Computation;* Fig. 1.4.4, B to follow).

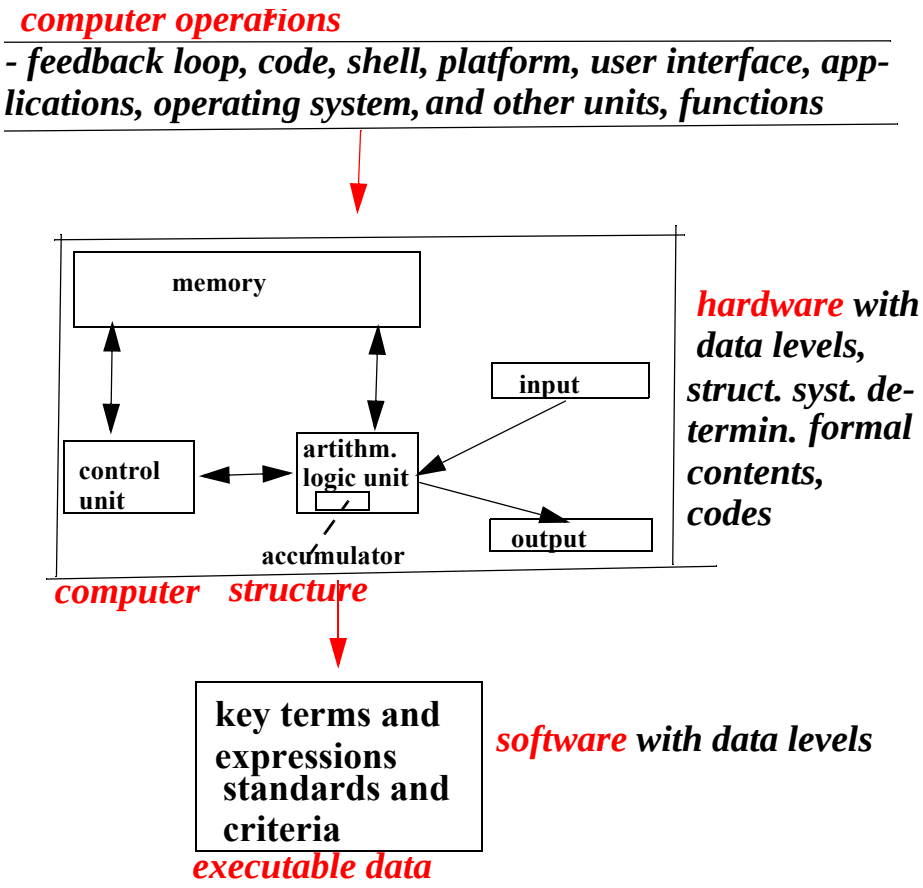

Fig. 1.4.4 A, ***Simplified Chart of Computer and Software . The larger box represents the computer core.***

The chart in Fig. 1.4.4, A, includes an *Operating System in a PC structure*, from the original *Von Neumann Machine*, named *computer* on the Figure, with memory, input and output, after Tanenbaum and Austin, Fig. 1-5 (Design and CAD are not indicated on the chart; should have been displayed in several places). The list is not necessarily the correct one and not complete by any account; it only indicates the type of mechanism.

The cited figure shows a much simplified model that does *not* illustrate the important fact, that there are precisely articulated and graded levels of data in a computer, including machine code, languages, etc. (for such matters, *see* Martin, *Introduction, passim,* but specially his chapters 2, 4, 6). An example of a model for *executable data* is shown in Karsten Jakobsen's work, in Fig. 3.9.3.

Configuratively speaking, the chart in Fig. 1.4.4, A is a realistic one in the sense that any numerical or verbal operation can be run on the tech prototype, granted that all sentences are reduceable to strings of 0s and 1s, the digital way.

We can appeal to Math in order to apply a further distinction aimed at settling more precisely the operative situation of my models.

I shall repeat (from SL, *Patterns*) about models concerning the distinction *shape* and *form* as developed by Lord and Wilson, in their *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* geoterical *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.**

Applying this math distinction to the present work with the *not-running* and *not-digital* graphical models and charts, it is clear that it essentially operates at the level of *shape.* Lord and Wilson's cited work can perhaps serve as a further support for my interconnecting the *NonDig<ital>* models with the *Dig*<ital> ones.

Comparisons can be useful anyway, driving home a point or rejecting one.

When working at interdisciplinary or; *Open_Source* levels, noting what *cannot be used* is important. Much verbal-driven research suffers from inattention to this point regardng *limits* and *boundaries*. I understand the publishers who do not want their goods to display limitations or omissions. Writing for the net, we bypass that.

My assignment now is to integrate the *operative paradigma in the present work* in the simplified computer structure (Fig. 1.4.4, B).

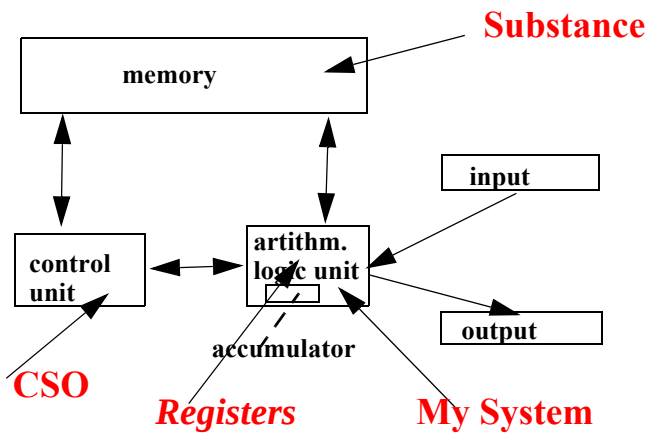

Fig. 1.4.4, B, *Simplifed Chart of Computer and Computation, with Operators from the Present Work in red.*

In Fig. 1.4.4, B, the following operators are loaded into three nodes, in the following manner.

The Substance is represented by the most important among the entries in the *Table of Contents* for the book.

***My System* is the collection of the most important systemic configurations in the book.**

For the *Registers*, which work at several levels and for different scopes, such as related to holding down data for specific purposes, in this figure are considered as represening our *memory*.

The *Computer Systems Organization* (CSO) is represented by such items as the following, to be taken as a *pars-pro-toto* (page and figure numbers refer to Tanenbaum and Austin):

1. *Processors* (pp. 55ff., Figs. 2-1, 2-2 data path);

2. *Instruction Execution* (pp. 58ff.), with seven instructions to the CPU, a *sequnce of steps .. often referred to as the fetch-code-execute cycle. It is central to the operation of all computers.*

3. *Cache Memory* (p. 82, Fig. 2-16).

4. *Memory Hierarchies* (p. 86, Fig. 2-18).

5. *Packet Switching* (Comer, esp. p. 163).

6. *Networks Integration*. Not elaborating this subject, I will refer to Douglas E. Comer's *The Internet Book* (4. ed., NJ 2007, 380 pages), generally and particularly to his chapters on the Internet: Ch. 19, *NAT: Sharing An Internet Connection;* and Ch. 20, *Why the Internet Works Well*.

Having used a graph for the *operative paradigma in the present work*, let me show a *meta-graph for the theory embodiment in the present book* (Fig. 1.4.5), going up a level.

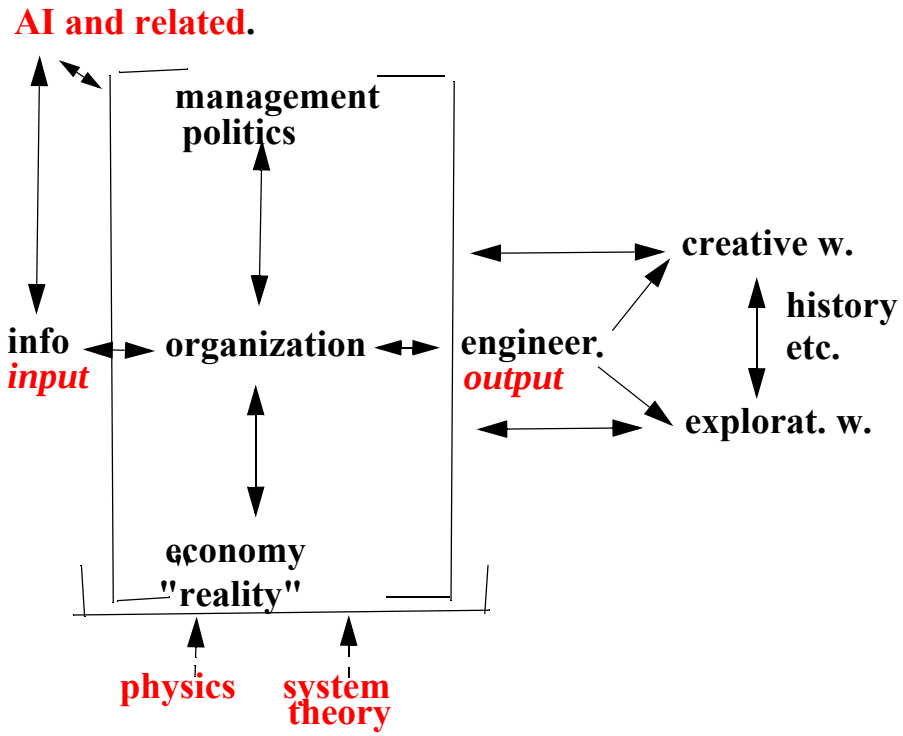

Fig. 1.4.5, *Meta-Graph of Present-Work Productive Structure. Doubleheaded arrows = possible feedbacks considered. W = works. Info includes Informatics. AI = Artif. Intelligence.* engineer<ing>.

In the graph Fig. 1.4.5, each unit can be expressed/represented by operative models. *Management*: Davis and Olson; and Parker, both books centering on *Management Information Systems* (MIS); Social systems are also considered as belonging under *Management*. The reflected programs are such that contribute partially to the model complex.

Let us have an approximate *catalog of the items in the Meta-Graph* in Fig. 1.4.5, 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 (full references in the *Bibliography*).

- *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, numeorus 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.
- *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* in *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-Graph* just displayed (Fig. 1.4.5).

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 is an active factor here: SL, *Patterns* (4.4, *Emergence and Object*).

4. *Maximation.* Adopting the *maximation principle* (SL, *Burden, Patterns*), we ahcieve 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 stuctured for maximation is that blanks in what we have could have considered so to speak will stare accusingly at us.

5. *Explanation is a by-product of systemization* (Radnitzky, *Contemporary Schools of Metascience,* II, p. 102). I prefer to say that systemization *is* explanation, since causal explanation in the traditional version does not work.

6. There is one further most important aspect to consider: *limits, boundaries and scope* for our choices of thematics, their range and coverage, and relational positions (not to be confused with Herbert Simon's *Bounded Rationality*, which means that we act rationally within conditional boundaries).

These terms have their backing in mathematics (see Eves, *Foundations*...). Thes parameters, however, must be approached in direct contact with specific cases and categories, and have to be left out here.

Linking one item to another requires a third as the *tertium compoarationis.*

This means that I have to run *my Cicero* through a modern-style systemization that was entirely alien to Cicero and his Roman contemporaries.

1.5, *The C-System a Tool*

My system is based on structures figuratively reflecting the basic functions in a simple *digital Computer*, hence *C-System* with *C-Models,* entities interchangeable dependent on interrelations between them.

The notion, concept and term of *System* is widely applied with an unsurveyable range of specific norms. In Sweden, the State monpoly for alcoholic products is named *Systembolaget.*

Let me opt for a definition that I can *use.*

I need the following criteria (four points):

1. A group of subjects or themes of notions /concepts under exploration for being applied and integrated in some manageable pattern of description and use in argumentation;

2. under the integrated headings or order, reach, interconnection, purpose-driven entities, items or prcesses that can, partly or in combination, be used *digitally as dynamical fields, configuratively as static fields;*

3. in a clearly describable pattern, the complex being

4. amenable to being handled in terms of graphical and verbal models representing selected units from 1 - 3. on a computer.

All these points also apply to the central *graphical model* in use in tis book (e. g., in Fig. 1.4.3).

To establish constructively usable norms, I could rely on Douglas E. Comer's The Internet Book (4th ed., 380 pages, 2007). This crucial publication can offer a valid guide because of the logistical integration of computer operations within the WWW, considering the latter as a shell for the former.

In the cited publication, some thematics under the respective headings can be located which *together* can constitute a general model for the Human-applied categories of knowledge acquisition, observation, argumentation modalities, and manipulation of terms in experience.

Some of these categories will now be *listed*, but with no claim to systematics, since there is no logistically confirmable standard neither for the selection of items nor for their number.

In Comer's book: the WWW, and particular subjects come as follows (a limited selection):

pp. 100 - 111 network issues
p. 240 storage
p. 206 multimedia
pp. 218f. browser
p. 224 instructions
203, 228 links.

The listed items could be bracketed together in a configurational *graphical scheme,* but I shall not implement the present idea further.

In terms of the criteria noted above, the computer model already shown can be specified as follows (Fig. 1.5.1), referring to the Historical "subject", Cicero (*Part* II), with the basic elements in red.

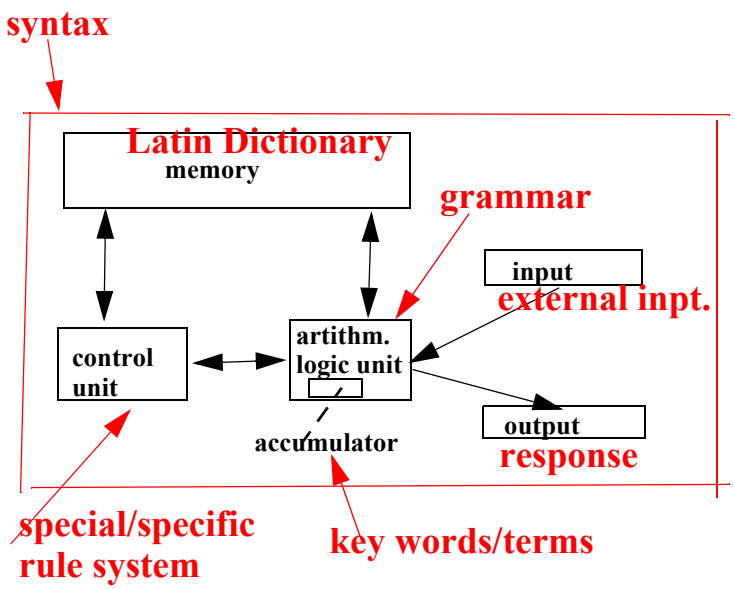

Fig. 1.5.1, *Cicero at the Machine Level, using. the original Von Neumann Machine, with memory, input and output, after Tanenbaum and Austin, Fig. 1-5. Transpositions to Ciceronic use in red.*

This model showing abstractions of Cicero's writings in the operative context of a computer system can be employed as a field of interconnections or integration betwen the *digital* and the *non-digital* parameters or functions.

My *comparisons* between the *Dig* and *NonDig* functions are supported by the presentation of some of the systems ideas in a book by Blanchard and Fabrycky, on pp. 17f. (1.1.1, *The Elements of a System*) and 23f. (1.3.1, *General Systems Theory).* These considerations lead us over to the issue of *description.*

Let me supply some general observations on the *systems idea* from the cited publication (pp. 24f.):

General systems theory is concerned with developing a systematic framework for describing general relationships in the natural and the human-made world. The need for a general theory of systems arises out of the problem of communication among various disciplines. Although the scientific method brings similarity between the methods of approach, the results are often difficult to communicate across disciplinary boundaries. Concepts and hypotheses formulated in one area seldom carry over to another, where theycould lead to significant forward progress. One approach to an orderly framework is the structuring of hierarchy of levels of complexity for individual systems studies in the varous fields of inquiry.

And a list follows, referring to works by Kenneth Boulding. Invoking the list, Blanchard and Fabrycky note:

The first* [lower] *level in Boulding's hierarchy is the most opervasive. Static systems are everywhere, and this category provides a basis for analysis and synthesis of systems at higher levels. Dynamic systems with predetermined outcomes are predominant in the natural sciences.

At higher levels, cybernetic models are available, mostly in closed-loop form. Open systems are currently receiving scientific attention, but modeling difficulties arise regarding their self-regulating properties.

Beyond this level, there is little systematic knowledge available. However, general systems theory provides science with a useful framework within which each specialized discipline may contribute. It allows scientists to compare concepts and similar findings, with its greatest benefit being that of communitation across disciplines.

These paragraphs give an exceptionally clear, cogent and, relative to the space, complete descriptive summary of systems such as they are considered and used today

The cited authors continue:

***Descriptions that brings out platforms for further work* (and not mere characterizations) are *processua*l, such that the features of an object and the structure they form, are rendered configuratively dynamical and workable by digital, verbal, visual or numerical means, with the purpose of achieving tractable pictures of the object (Fig. 1.5.2, *Procedures*).**

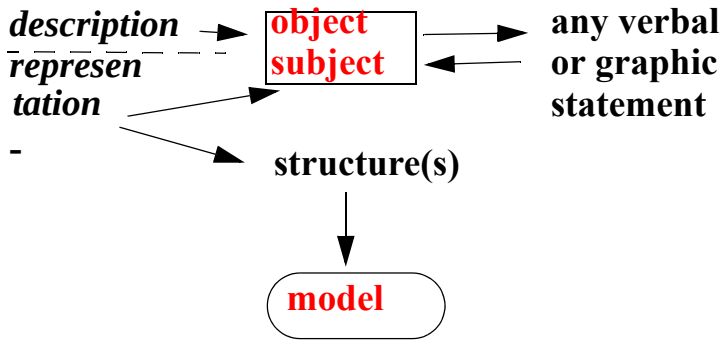

Fig. 1.5.2, *Procedures*

On the other hand, *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 and communicating its buildup clearer.

This is in agreement with the idea that *abstraction,* the operation activizing representation, 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. 1.5.2, *Procedures*).

1.6, *Platform Issues for Research*

Further consiferations of the platform for my graphical models are needed.

In logistical terms, the models are, besides the written materal, the central manifestation, and the operative and argumentative tools. They will be and remain a central issue in theory and pragmatical planning. There are no absolute solutions regarding this maze, which means that there is no "objectivity", just choices by arguments blended with hunch and notions of purpose and reader access - *and* possible competition. All we can do here is *artificial,* several steps removed from what we are used to consider *objectively handling realities.*

Most of the non-digital models applied here are figuratively representing *dynamical* properties and roles. In order for them to play that role, we start out with *a priori* construing them as *static configurations, fixing their type, outline and contents category.*

This is a well-established notion, developed in space studies by the paradigma labelled *Personal Construct Theory* (for which see the references to Gollege, Downs, and Stea, cited in SL, *Burden*). Imagery, real or mental, plays a great role here, for which se also David Canter, *The Psychology of Place,* 1977 (SL, *Burden*).

Our logical and consistent tendency is to look at graphical models as indications referring to their contents and nothing more. But it can be useful to take the boundaries more seriously and include the surrounding empty fields as something more than just emptiness, more actively regardig them as a reminder of surroundings that are there but are not displayed. In other words, let the models play an activizing role rather than meaningless codes for meaningful concepts.

One great advantage brought about by *application of graphical models* is exactly this, that, since models figuratively close a picture in boundaries of variable extension, the globe or circle of unconsidered darknes surronding them also is variable, figuratively speaking.

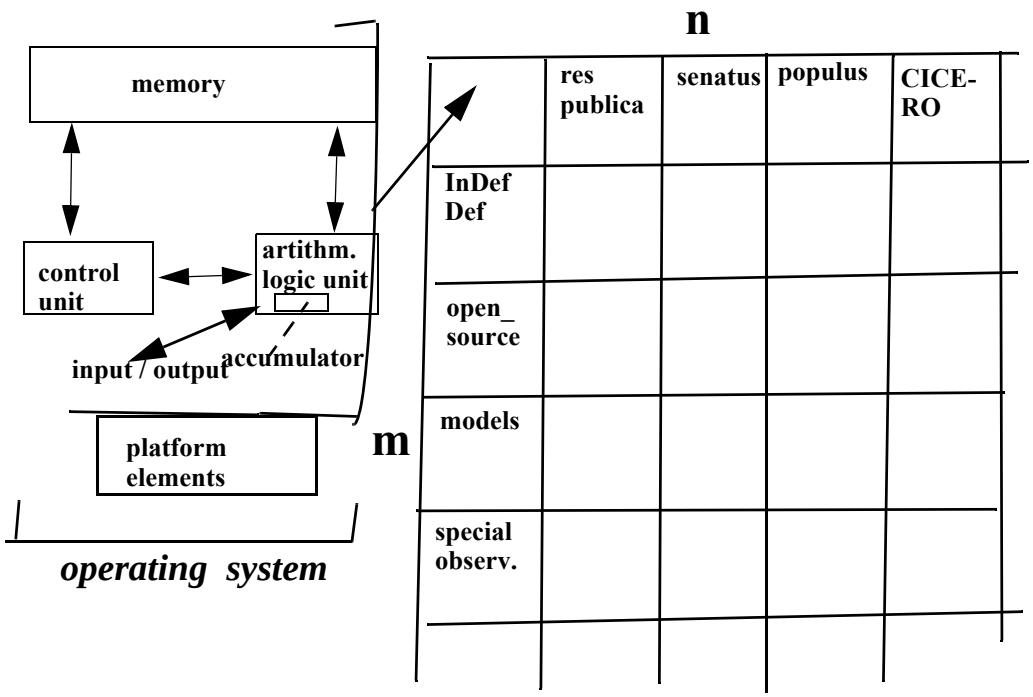

Fig. 1.6.1, *Pseudo-Matrix incorporating* Fig. 1.4.3, *Von Neumann Chart of Computer and Computation.*

Building a *verbal model,* we mentally form sentences and plot them down word after 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 for each step, 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 interrelatons can only be imagined or written out as a comment to the verbal model.

The modus in the present work is thinking and arguing in terms of *integrated visualized patterns of Key Terms* (*n*) and *Operative Terms* (*m*) just 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* (Fig. 1.6.1, *Pseudo-Matrix*), the same terms will have to appear any number of times, in order to be completely and adequately related, in different company. The *repetitive* 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:**

1. denoting, charting* and *moving patterns of data;
2. producing products or results;
3. 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 proceesses involving them (2.)
and/or being generated by them.

Having established a framework program, 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).

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 wider boundaries to my process-focused efforts.

The very notion of *non-dig model*s, but not the name, such as are tradtionally in use in Organization, Management and Social Theories, defies the idea of sufficience 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 differentl 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. 1.6.1, *Pseudo-Matrix*) can represent the present book entirely, the model forming a *grid* or *skeleton* of my arguments.

Now, with the intention to extend our notions of true digital systems, which after all remain the standard support of my *non-dig* models, let us consult Sacha Krakowiak's highly informative 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 activized by the model.

On p. 196, Fig. 6.3, Krakowiak 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 folllowing distinctions:
1. *Objects internal to the procedure,* 2, *Local objects,* 3. *Remanent and global objects,* 4. *External objects,* and 5. *Parameters.*

The last item requires 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, activized]. *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...**

Krakowiak supplies a chart showing these interrelations, which I have redesigned and renamed here (Fig. 1.6.2, *Transfomation Chart*).

Some further notes on computation models are available.

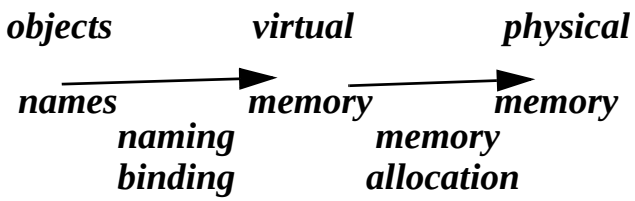

Fig. 1.6.2, *Transformation Chart. Krakowiak*.

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 computter'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, tellling 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 Pannetta 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 (David Bank, *Breaking Widows*).**

Two important Parts in Tanenbaum and Austin convey detailed informations about the *CPU* element (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.*

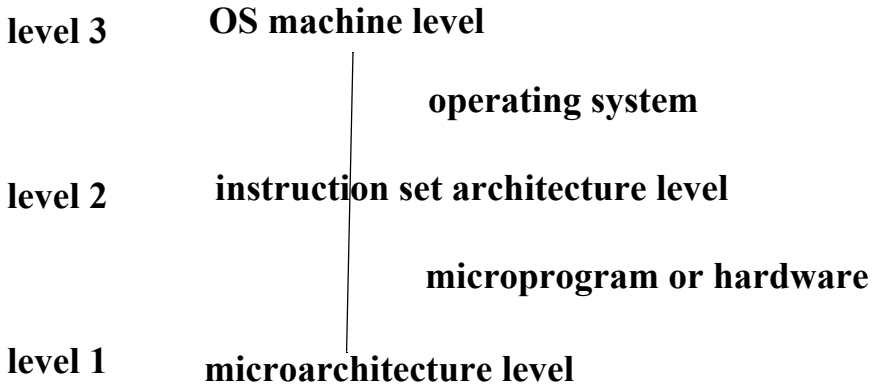

Fig. 1.6.3, *Systems Levels, after Tanenbaum and Austin.*

Introducing *The Operating System* [*OS*]- *Machine Level* (pp. 437ff.), in a figure redesigned here (Fig. 1.6.3), 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. 1.6.3.

Having spent so much space on real digital computers 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 developed 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.

In my youth, in the 1950s/60s, we learnt to *work scientifically,* a program based on a series of absolute values and procedures. Some among us suffered from a crisis of identity, because the only place for consistent rationality we could find, was specific sections in Mathematics. It would have been helpful to have known Herbert A. Simon's notion of *bounded ratuionality* developed in his *Administrative Behavior* of 1947 (*see* also his *Reason in Human Affairs,* Stanford (CA), 1983).

Simon could profit - and teach - from steadliy working, as collaborator or as leader, with collegues and students. In the field to which I academically belonged, directly or tangentially, one did one's job in isolation, guarding one's individual achievements against competition. This laming tradition, still alive in some of the Humanities, must have been a major obstacle to a development of theory, methodology and systems notions in some of the Humanities.

Let us have Simon himself describe the paradigma (quotation from *Adm. Beh.* in his *Models of My Life,* cited ed., p. 88).

Rationality, then, does not determine behavior. Within the area of rati onality behavior is perfectly flexible and adaptable to abilities, goals, and knowledge. Instead, behavior is determined by the irrational and nonrational elements that bound the area of rationality.... Hence, administrative theory must be concerned with the limits of rationality ...

In this connection, Simon offers a brief note on the *two ruling principles* in his work (p.88):

His *Administration* book, he notes, *was built around two interrelated ideas that have been at the core of my whole intellectual activity:*

(1) *human beings are able to achieve only a very bounded rationality, and*

(2) *as one consequence of their cognitive limitations, they are prone to identify with subgoals.*

I would not object to having my whole scientific output described as largely a gloss - a rather elaborate gloss, to be sure - on the pages of Admninistrative Behavior where these ideas are first set forth (especially pages 39 - 41, 204 - 212, and 240 - 44).

In his *Reason in Human Affairs* (1983, pp. 5f.), Simon notes that

Reasoning processses take symbolic inputs and deliver symbolic outputs. The initial inputs are axioms, themselves not derived by logic but simply induced from empirical observations, or even more simply posited. Moreover,

the processes that produce the transformations of inputs to outputs (rules of inference) are also introduced by fiat and are not the products of reason. Axioms and inference rules together constitute the fulcrum on which the lever of reasoning rests, but the particular structure of that fulcrum cannot be justfied by the methods of reasoning.

There have been oppositons to trends in Simon's work, among others, from Margaret Boden, but his main ideas remain. To my mind it is not so much the *results* and *conclusions* that count; it is the tightly intercoonnected properties of *methodology, procedure and scope*.

My present work, strongly influenced by Smon's ideas, is built up on and elaborates some arguments that can be epitomized here (a few repetitions are unavoidable).

1."Objectivity" in the normal understanding is not practicable except where it is not needed, on numbers and simple geomtrical 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 stuctured 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, alternatives or misguided entries (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?*****). Let us see.**

Quoting the essential description: *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 (accummulation 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 is comprising both routines and data that are 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).

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 *approximnation* - but so we have in all fundamentals in modern Physics (*see* for example Ricxhard Feynman, *The Character of Physical Law,* pp. 33f., end of Chapter 1). An especially rewarding introduction to this aspect in *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, are 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.

A 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,* reminding indirectly of paradigmas in Physics, in particular, Heisenberg's *Unschärferelation.*

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 advising us to be aware of and accept *complexity*.

1.7*, Organizational Issues*

Yes, *issues*, not *theory*, since I do not intend, nor is competent, to come up with any kind of imitation of such works as David Silverman's *The theory of organizations. A sociological framework*, 1970. Herbert Simon's publications, to which I frequently refer, also can be classified as one with a wide perspective on organizational structures and functioning.

My professional life has required me to direct several organizational investigations at the Norwegian Institute of Technology, and thus to some extent equipped me for the structural and argumentative programs.

Making decisions in my necessarily complex present work involves a range of issues from priorities over general programs and ideas to specific selection or building and use of models, both verbal and graphical. This process must start out from a theory or theoretical considerations and determination. The preceeding *Sections* have brought forth somee elements for this process. Now we elaborate some of the ideas in a short summary.

***Einstein's Rule* goes 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 comparable terms (speaking specifically of organizations):

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 term *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* dunamis *or "potentia" in the philosophy of Aristotle. This lead to a strange kind of physcal 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 "dunamis" oder "Potentia" in der Philosophie des Aristoteles. Sie führte eine merkwür-*

***dige Art von physikalischer Realität ein, die etwa in der Mitte zwischen Möglichkeit und Wirklichkeit steht*) (Heisenberg, 2006, 17ff.).**

The subject here is a *pattern ordering our programs,* conceptions of patterns and handling of involved *complexities.;* this term taken to refer not generally to complications, but to *intricacies forming a definite factor in a picture we are selecting with a view to handling the program.*

This option will delimit and limit my program further than already implied in the unavoidable strictures imposed by any program.

***John C. Martin's 436 pages Introduction, is an extraordinary compendium* richly endowed with graphical models and charts, and, in particular, his Chapter 11, *Introduction to Computational Complexity* (pp. 358ff.).**

Martin notes (p. 358):

A decision problem is decidable if there is an algorithm that can answer it in principle. .... we try to identify the problems for which there are* practical *algorithms that can answer resonable-size instances in a reasonable amount of time. These aren't necessarily the same thing. The* satisfiability problem *is decidable, but the known algorithms aren't much of an improvement on the brute-force approach, in which exponentially many cases are considered one at a time.

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 models consequently arise as *determinants* for the further procedure, experimentally settling the categories on which my analysis has to rely.

These subjects will be further developed in *Part* III, after having payed a visit to the oppostion and after *Part* II, dedicated to *Cicero*.

1.8*, No One is Perfect*

This statement famously concluded a movie and concludes my *Part* I.

There are no conclusions, only stages or steps.

We need articulate and informed disagreement with whatever we produce, and there are at least three motivations for this

1. To alert us to the soft underside in our argumentational hedgehog.

2. To remind us that in our fields, not plainly numerical and hence variable and uncertain, two opposite views can both be right, since the criterion of *being right* depends on so many factors and standards that no definite boundaries can be drawn.

3. Reflecting on an approach or methodology as we formulate it, we search for contrary ideas for verification and control, and we should welcome any initiative doing the job for us.

Gerald Vision's *Modern Realism and Manufactured Truth* (1988) is out to debunk the program his title announces and which could have been the programmatic caption for the present work. He very carefully shows weak points in the modern relativizing attitudes and research paradigmas, the ones that for me and the present book represent the central and fundamental *credo.*

Yes! perhaps merely a *credo.* Presumably *agreement* is not an issue, while *preference* is.

How are we identifying, selecting and deciding on preferences and theoretical advantages? Certainly not only by plain hunch. But probably, beyond plainly testable facts and numerical values, by allocating whatever comes up into some pattern that lends structure to our ideas, convictions and preferences. Creating our realities.

The Roman Church in her much-proclaimed wisdom saw this point and profited by it. The doctrine of the Trinity was useful since it distinguished the Church from other confessions. Sittting back with just a *Father* and a *Son* would work badly. The Greek gods already were blessed with sons and daughters.

The doctrine promoting the idea of a *Trinity* became instrumental, regardless of the fact that *the first and only time* the Trinity is mentioned in the Bible is with the so-called *Comma Johanneum,* a tiny paragraph that was added to the Bible in the *fourth century,* in one of the three *Letters of St. John*.

In the official Vatican-sponsored C*ordantiarum SS. Scipturae,* the entry *Trinitas* has wisely been *left out*. The cited book, continuously republished, in my copy containing 751 pages with two columns, each with 69 lines, approximately 103.638 entries.

Listing the *trinitas* here would glaringly illuminate the embarrassing lonelines of the reference.

The Church, with her educational method, stayed silent on the point, hoping for the best, not citing the term and not making it public that the *Trinity* is a lone bird in the complex. Of course her teaching was proclaimed fundamental and divinely inspired and instructed, so the issue of documentation could be bypassed, making people forgetting it under cover of the dogma that the *teaching* of the Church was just as essential as the Biblical texts.

Erasmus of Roterdam left the *Comma Johanneum* out of his Bible edition of 1516; with five more reprints in a few years. Many people wanted what they considered the original Bible.

A crucial question regarding a work in research of any subject must be *choice of authorities,* literary or personal.

In a work depending on terminology debate and applying unorthodox graphical models will have to explain the ground on which to stand, the *platform,* so to speak.

My platform, as I have indicaed, to be further specified in *Part* III,, is defined in terms of *data-simulation* and consists of two levels: the basic level is a modern *computer system*, the next is *digital programming or work,* supporting the *non-digital* programs - provided such a structure can be made to work *experimentally in terms of* non-technical, *configurational* procedures. In this game, the structure and functioning of a *computer* is the core of documentation, argumentation and display. The version selected is a simplified image of a *Von Neumann machine*, on display on several occasions through the book.

Cicero, we know, had no computer, but we can lend one to him.

PART II ***POSITIONING CICERO***

2.1, *Meeting My Cicero*

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

***My*? Yes, for there are many of them. As I see and present him, he has grown out of my hunch and theory.**

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.

The *data relating to Cicero* and loaded into my models are merely indicative, pointing out directions, and they need further elaboration. But to keep the book within reasonable limits, I have decided to keep my "reduced" version.

Having scanned my table of contents, the Reader might want to know why the space for the *models* and their weightage by far outbalance the rather meager notes on the main protagonist, *Marcus Tullius Cicero*. Yes, for developing method and analysis can involve us in complexities that our rather meagre facts about Cicero will not.

Studying historical subjects we are also 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 thet 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.

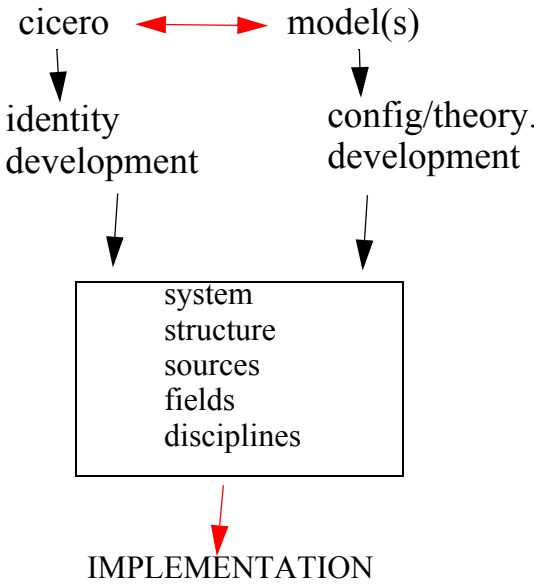

Fig. 2.1.1 *Historical-Subject Pattern*

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

The *models* do not form a background or a basis for the principal subject. They form a cohesive program with the Ciceronic matters: a tentatively total picture configuring the worthy man in a picture of *Cicero-cum-Models,* a couplet that is divisible historically but not analytically.

This picture can be set down in a simple abstracting graph (Fig. 2.1.1, *Historical-Subject Pattern*).

Loading "Cicero" into a model is no plain job, seeing that his lengthy ramblings over an enormous quantity of pages would make transferring to any 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 be tried out by limiting the view to *text examples,* rather than to my concocted notions about them, and within the chosen examples, work on the level of *single terms, rather than sentences.*

In *Cicero's De Re Publica* (*Part* V), *chapters xix to xxxv* have been analyzed and key words highlighted. The next step then is to load them, or some of them, into models (*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 hue.

Discussing events on the time-line from Cicero's ideas of the Republic over to Augustus' doctored imperial program can only mean to juxtappose 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 graphical model, about *policy-making generally speaking*, 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 oi the strategy - Actor-specific behavioral model* - directed upon the resultant model: *Policymakers' judgment.*

Roman political writings do not present such 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 tendencious details.

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

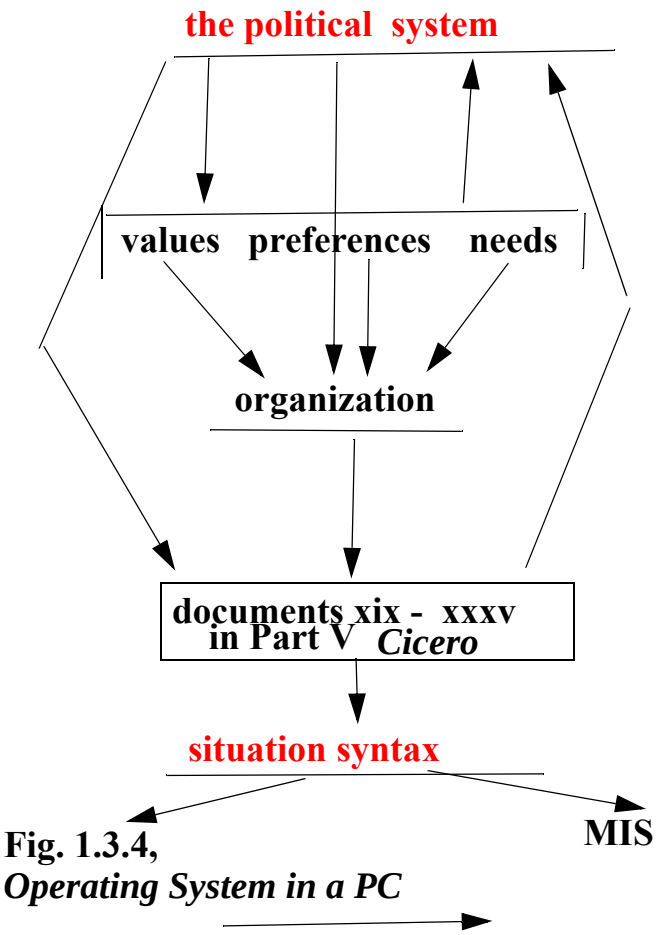

Fig. 1.3.4,
Operating System in a PC

Fig. 2.2.1, ***Political System - the Operating System is that of a computer. MIS = Management Information System(s).***

Roman political ideas, notions and references are not easy for us to describe, partly because no common system, no system at all, contributed to structuring the manifestations of them..

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.).

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 *Badalí* (*Cicerone*, *Paradossi degli stoici,* 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, accepting 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 piú 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 Jos. Frey (1909), *optimates* mean *die Besten, Edelsten in polit<ischer> Beziehung, die Optimaten, Aristokraten (im Vergleichnis zur Volkspartei*). Hans Lamer (1933, 3rd ed.): 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.*

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 sc attered 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 Cicero's activity, 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:

1. *the optinmates:*

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

2. the populares or populus:

a more loosely definable category of "establishment" members, to be distniguished from the generally unprivileged and often poor multitude, the mass of men not considered relevant in an acceptable political picture that was relevant to well-positioned 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' *Satyricon* 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 with a simplified model recosntruct 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 of the cited group of journalists (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.

Facing, as we are, a historical process over a relatively long timespan, 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* (Fig. 3.1.1 *A System of Arguments*). Fig. 2.2.2. *Program Chart,* presents a (*one*) maximized view of some of the logistic points in such an elaboration.

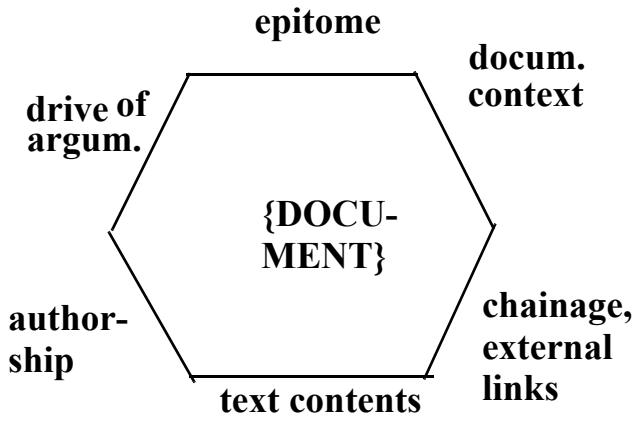

Fig. 2.2.2. *Program Chart. A loosely contrived reminder of some crucial parameters.*

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

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

The figure represents a selection of parameters activized 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.

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.

HOW	***WHAT***
Normative	**Descriptive**
Setting rules	**Using rules**
ut, uti, sicut, quemadmodum tanquam	***res, qui, quae, quod***

The Reader will have noted that 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 upcoming *Key Terms,* I have based them mainly on *Cicero's De re publica* and his *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 (as the well-trained lawyer he was)- 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

Cicero is consistent in grouping the notions of *Senatus* and *Populus* together. So it seems defensible, at least in an experiental vemture, to empha-

size 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 unpresicely determinable class of noblemen.

This is different from *vulgus,* which we might translate as *populace:* Webster on the latter: *the h*ope, it is hard to find equivalents, partly, I believe, on account of the deep-rooted class ideologies supported by the religion (SL, *The Sixtine Ceiling:* the story Noah's three sons finding him drunk).

Perhaps we find the best correspondence in the Russian nineteenth-century *naród* (= the people - before the *Soviets)*: *naród bezmolvstvuet - 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 in Cicero's treatise, but so it is in Horace: *odi profanum volgus* [or *vulgus*] *et arceo* (*Carminum lib. ter., 1*): *I abhor the unhallowed 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.

2.3, Cicero's Program

Some subjects already introduced emerge in political programs.

The subject is political events and notions highlighted by the *De re publica* and *Paradoxa stoicorum,* both by Cicero, which seem to cover most aspects.

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 but filtered through Cicero's* somewhat corrupt mind. I could have chosen the *Annales* of Tacitus, which are historically more manifestly positioned, reliable and precise (and in even purer Classical Latin)- *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.

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'ideololgia stoica ad avere un grosso impatto sulla mentalità tradizionalista romana: le modalità esspresive e stilistiche, infatti, adoperatie dagli Stoici influenzarono e plasmarono profondamente il linguaggio nei diversi ambiti: filosofico, letterario, giuridco. 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 espresive 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 pragmatical (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: *Itaque 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 experiental vemture, 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 unpresicely determinable class of noblemen.

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 meaningfull part of these sources, would make my experiment burst at the seams, perhaps, as I imgine, without contributing much to the present limited scope.

Most of the cited book by Cicero is totally irrealistic, 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 intoduction 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 the situation in writing for posterity*.

Dalle sue parole emerge una posizione di estremo conservatismo, mentre scandalosa appare appare ai nostri occhi la cecità che dimostra - e con lui numerosi esponenti del partiti 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 like to 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 reveal unawareness. The case to me seems emblematic: writing for the present *and the future* cannot *sic et sempliciter* 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 - 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 practical research value, without being absolutely distinct in relation to one another.

Now let me consider the texts.

Fron 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 suffciently 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 perspec-

tive surfaces especially in my restructuring his document in a *systems* view certainly totally alien to the views and approaches in Rome of his day.

To set up an abstract of Cicero's ideas in the *Republica* is no simple task.

***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.).**

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 drammatically and disrupting Classical Latin (much as we do with English today). The progressive role of the military, including newcomers from the Provinces, contributed to pushing aside the classical forces of the *Senate* and the *Optimates*.

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,* 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*, with ideological links 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 alledged 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, addtionally, 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. Barrile, 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 incitamur, 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 determied 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, magnaeque res temporibus illis a fortissimis viris summo imperio praedictis, dictatoribus atque consulibus, belli gerebantur.***

Cicero tells us about himself as involved in the events and how clever he was and does so with a view to what he wants us to accept.

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

2.4, *Augustus' Program*

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 regarding 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.

The program edited in Augustus name represents a conclusion to the republican ideals in Cicero and a transition to a new State reality, consolidating new conditions, while keeping up republican appearances (as modern Europeans we are used to dictatorships being proclaimed *democracies*).

To compare with critical methods two different document like those of Cicero (in his *De re publica*) and the one underwritten by Augustus, the *Res gestae*, is no simple assignment. Nor is it strictly consistent, since so many parameters are different. But the operation is experiemental for method rather than matter.

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 deci-

sions 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 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*.

No informations regarding experts working out the *Res gestae* seems to be available. Augustus, apparently, 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 poitical action program in full course, telling us what he had already accomplished, and he has a long tradtion 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 ceiling program for the Cappella Palatina at Palermo (SL, *Plura ordinantur ad unum*).

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 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 dispaying a program that could make modern politicians envious.

He must have employed an expert committe - 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 take a closer look at the material.

The text can be evaluated in terms of a political program, offering introductory material for a basic-level *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 libbertatem 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 omnbus supersedi*) - for my militari exploits, the Senate decreed thanks offering to the immortal gods, 55 times - and prayers in the Senate: 890 times (yes: *DCCCLXXXX !*) - *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 modem maiorum delatum)* - everything that the Senate desired me to achieve, I realized *per tribuniciam potetstatem.

***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 evey 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 confluente 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 enterted the forum, they were entitled to particpate 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 recommandation 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 pople.**

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 invvested 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 magiustratu conlegae 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-promotiom, 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. Political philosophy was not a typically Roman affare, but the cited interconnection can mean that State and Emperor were tacitly being conflated. This he further emphasized by his interventon 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 sleave to show whenever opportune. Roger II of Sicily could have been his pupil (SL, *Plura ordinantur ad unum*). A higl-level politician avoids being clear (we note that consistently in Norway); in Rome they could never be sure what would come next in their way, a triumph or a dagger or a dose of poison.

Some scholars, noting terms cited above, will say: they have noting 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.

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 and *nüchtern* 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 rursum 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 monuemtal *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 el-

ders. Today, you have new tools for information. While we try to understand the position of our female friends.

2.5, *Cicero at Machine Level*

Conventionallly, Cicero would not be placed at such a level, but we have no way but to see historical subjects through our own optics, and one of them, at lest in the present book, is the *computer as a model for focused observation*.

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* V.

The upcoming figure represents the main features of Cicero's image of the Roman State, with the *Senate* as the principal ruling organ. I shall articulate the picture later on.

The discourse before us 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.

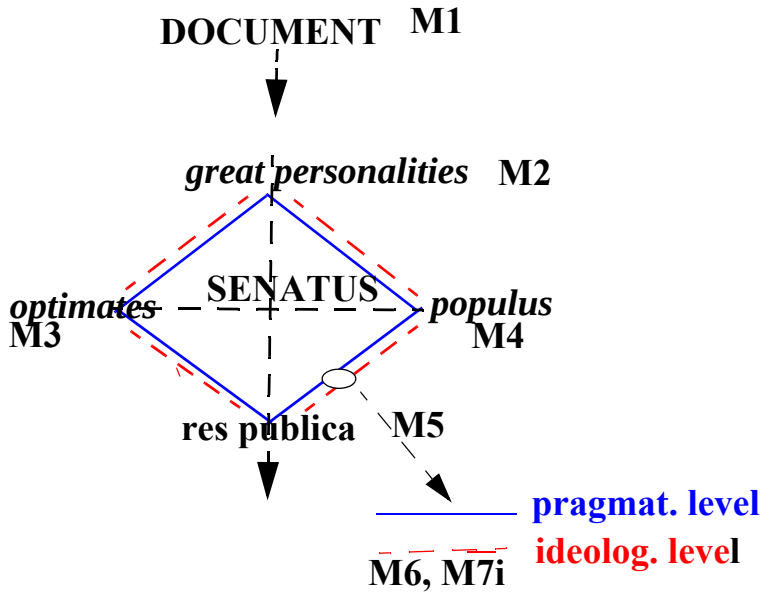

Fig. 2.5.1 *Rhombic Model, Ciceronic View, with*

categories from M1 to M7 as listed below.

The connecting rhombic configuration in Fig. 2.5.1, *Rhombic Model, 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.

A note on the *levels.*

Cicero, a practicing lawyer, was perforce a pragmatist, as a writer a declared ideologist, emphasizing the models of former Great Men, which should turn him out as perfectly normal. In History writing the last decades, there has been a definite drive from accentuating the latter to that of the former (see the Italian writers I am quoting).

This example of using the *two levels* in one model highlights the situation that with models much of the details get lost, while in a corresponding verbal accout, the frameworks tend to get lost. *No one is perfect!*

The Rhombic model (Fig.2.5.1) in combination (see below) with the "Cicero Machine" (Fig. 2.5.2, can be considered as the basic model in this book. It 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 M*n* 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 on the practical possibilities of loading whatever we want in there as a refletion 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 correspnded 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, notionally understood, and their analysis.

Thus, aas I have noted earlier, a *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 (*Cicerone*, *Dello stato*, ed. Anna Resta Barrile, 1992), while a more complete selection is given in the *De re publica* selections in the present *Part* V, *Cicero's De Re Publica*, and its range of view is strictly limited ton the institutional aspects of the *De re publica*. Thus the presentation brings nothing more than a shortcut version, probably sufficient to convey the idea.

We have already seen a model depicting the idea of *Cicero at Machine level*; here is a copy (Fig. 2.5.2).

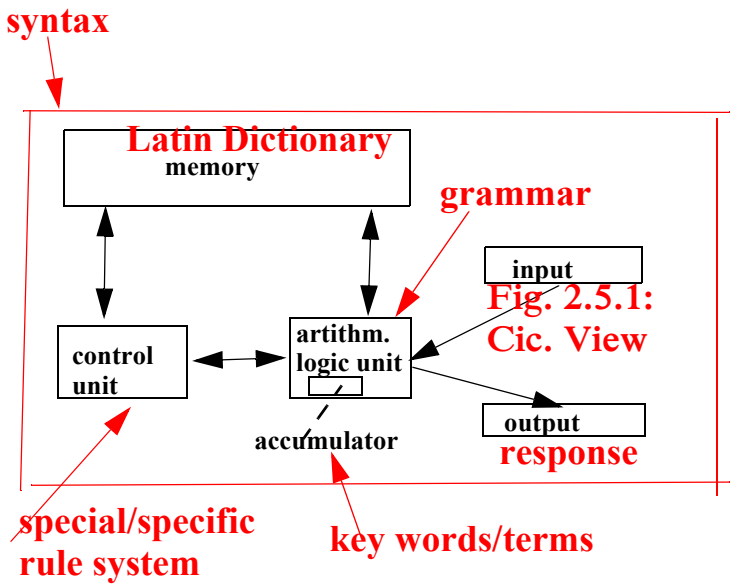

Fig. 2.5.2, *Cicero at Machine Level, using. the original Von Neumann Machine, after Tanenbaum and Austin, Fig. 1-5. Transpositions to Ciceronic relevance in red.*

Now let me integrate texts from the selections from Cicero's writings with the rhombic model, the captions referring to the model in Fig. 2.5.1, *Rhombic Model,* Ciceronic View, *with categories from M1 to M7 as listed below.*

As illustrated in Fig. 2.5.2, the central notions from Cicero's writings, displayed in Fig. 2.5.1, are integrated in terms of *input* into the Machine

level construct: an ideological system, regarded as mainly static, integrated into the dynamics of intellectual, mental and emotive "machinery".
Here is the list.
***M2 input, data filter.* - Great Romans (and Greeks) are fundamental in Cicero's world view.**
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 republc must be studies 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 publiae conservari statum.*

The traditional equality among political forces we have seen the last two hundred years and which made ome 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 formulatiuon 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 adofficium 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 hominnum coetus quoquoe 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 arbitratu suo, praeclaram ille quidem fortasse, sed a vita hominum abhorrentem et a moribus.***

Not constituing the State out of imagunation 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*.**

This model comes out of a series akready discussed, but which requires further testing and evaluation.

PART III THE INNER CIRCLE

3.1, *Framework Issues*

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

I have had to respect the following requirements:
to set up

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 *purpose-defined* root: *structure, range, application* (Fig. 3.1.1).

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

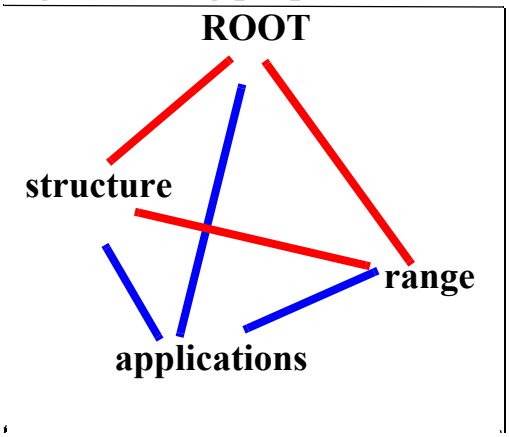

Fig. 3.1.1 A System of Arguments

The model repesents 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* and *Range,* and the interrelations between them and the *Root, and by the interrelations with the Applications*.

This figure conveys an ideal image, while real application can start out not from the root but from ideas about purpose and hence applications.

A problem attached to this model arises from the *interfaces* between the noted programs and units on one hand, and our appreciation and use of them, on the other. The problem suggested here, defies clear formula-

tions and have to be taken *cum grano salis,* but are supplied just in order to note possible extensions to my program.

Functionally on the abstract configuration level, the model in Fig. 3.1.1 involves *several interfaces.* So does, in a *running digital* program, the relation between comparable features and the user. In my "reflected" cases this issue is less tangible, being merely figurative, 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 (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 suppply tech comments in numerous places in their book. Of direct and aplicable value are especiallly 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. supply 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 opoerate with and within *systems* with *heuristics* entering the game.

Regarding my experiental perspective, there is some support to be found in Physics (Herbert Simon, *ibidem, Index)*,also 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.*

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" works or not, in the conception that terminology, system, process and goal formulation *seem to work well together.* This is the subject of the entire book.**

There cannot be any universal rules for my 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. available information and capacity;
4. subject background and context;
5. language and interdisciplinary idioms
6. reception variations; audience setup and capacities.

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. 3.1.2).

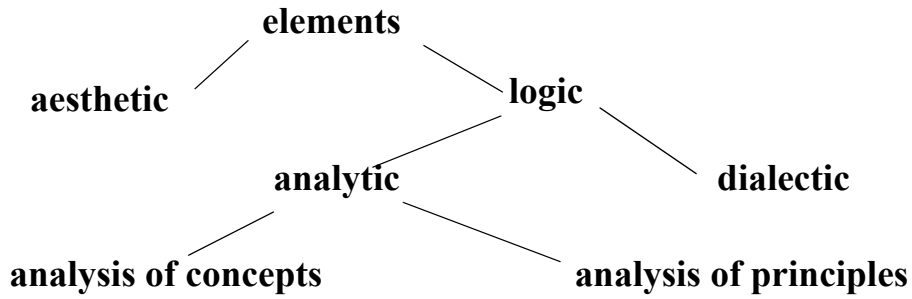

Fig. 3.1.2 ***Bennett's diagram.***

From my general perspective I would claim that the seven nodes in Bennetts' 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.

This is the place to be specific about the *more elusive aspets* 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 isue of *measuring value, depth and range of statements* under certain conditions.

Next, we have the crucial property of *approximation,* a notion that is central in most sciences. In Russell's formulation: *All exact science is dom-*

inated by the idea of approximation. **Heisenberg's notion of *dynamis* is closely related to the idea as expressed by Russell. This applies even to one of the most "exact" paradigm we have: *the Calculus.***

Explanation is a by-product of systemization (Radnitzky,*Contemporary schools of metascience,* II, p. 102). I will take the idea a bit further and say that *explanation is systemization,* since cause-effect arguments are rarely understandable. We have to let the notion of chain explanations (from *a* to *b* to *c*) 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 *network,* such as a *matrix.*

Networks **for real use normally appear as abstract patterns. If we want a readable intuitive picture of a network with the details at display, the book about *Microsoft* by David Bank (2001) provides an excellent source. Just a tidbit 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,* by transfer relevant for my models and systems, 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* (1959), but the impressively interconnecting character of the book defies a shorthand treatment such as could be included here. And I am less concerned with general sociology than organizational patterns.

A constructive choice of writings on compplexity is to be found in the collection by Daniel Lerner, *Qualità e quantità e altre categorie della scienza,* Turin 1971, 270 pages, a collection of texts published in English by the *Americal Academy of Science*, 1961, and MIT, 1959 and 1963.

Now let me approach the main issue, that of my dedicated *working conditions and parameters*. It is here that the systems issue and related notions enter the game, since we need systems by which to determine and evaluate conditions and perform our work. I have been using a simple model of the original Von Neumann machine for ths task (Fig. 3.10.3).

The working is *digital* in true machines, but we have to *heuristically attribute a similar effect for our non-digital models, since our mental and graphical constructs can be understood and logistically handled as replicated true digital operations*.

As a consequence, observations on real systems are relevant and useful. **An early and *simplified model of computer structure and working* can serve as a model in the present context (Fig. 3.1.3). The model has been used in several contexts in the present book.**

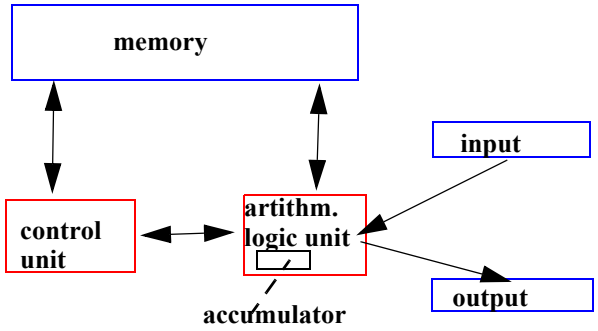

Fig. 3.1.3, *Operating System in a PC structure. The original Von Neumann Machine, with memory, input and output, after Tanenbaum and Austin., Fig. 1-5.*

In the upcoming Fig. 3.1.4, *General Chart with Models Integrated,* there is a general survey of nodes with related operations. This is a staic *chart,* not a *model* with potential dynamics, and it can be useful for introductorily surveying some of the most prominent topics and operations in the present work (it is repeated from *Part* I, Fig. 1.3.2. with small modifications).

I shall adopt Herbert Simon's formulation regarding models, only subsituting 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. 3.1.3, *Operating System in a PC structure*).

I shall adopt Herbert Simon's formulation regarding models, only subsituting 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. 3.1.3, *Operating System in a PC structure*).

Let me repeat that I distinguish *context* from *framework.* Of course, these dimensions cannot be precise, but they can serve pragmatically, the former meaning the *closest environment for one or several models,* within an encompassing framework (these values of course are relative, variable and, on certain levels, interchangeable). In other words, we are narrowing down the view, taking a closer look.

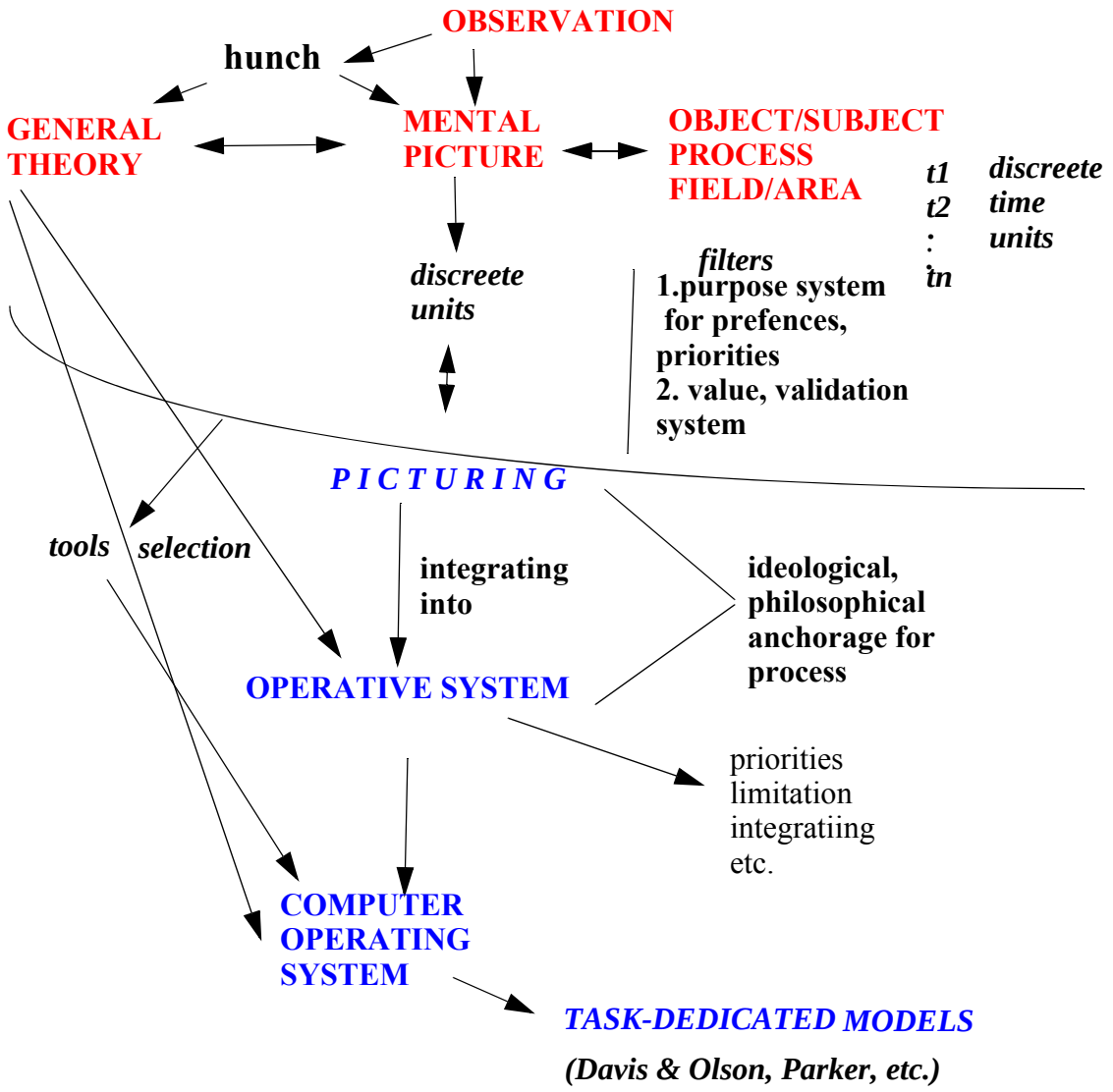

Fig. 3.1.4, *General Chart with Models Integrated.*

Let me now set my models and the systems idea in a *narrow context* (as distinct from a larger *environment*, for which,. 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 in terms of models for these entities;

2. *dynamically* (attributed, not real): as tool for *denoting* directions, processes, and procedures.

The general perspective in Brambilla, Cabot and (BCW), *Model-Driven Software Engineering in Practice* (*MDSE*, 2012, 165 pages), is definitely digitally-modern, but there are plenty of proposals and part-pro-

grams in it than can be useful also in a wider perspective and on a *non*-digitally established level. This work present a good illustration of the complexites in modern paradigms.

The authors supply a 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 (BCW) go beyond basic models over 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*).

Such a classification by coverage and reach capacities cannot be directly applied to my non-dig models and systems, but denoting *limitations* can be useful.

We are not informed unless we have, at least provisionally, an idea of the *limitations* to the info process, primarily the digital one, which can be mirrored in non-dig contexts.

There are the *boundary conditions* to be considered. The term is Herbert 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 asumptions 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 specific 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, avoding entrenched academic positions and, of course, paying for it by renouncing on definite conclusions.

The cited MSDE book, by Brambilla, Cabot and Wimmer, in my opinion, is *pragmatically* useful by defining borders and boundaries (besides many other merits).

As a consequence of the perspectives just stated, a certain amount of *instability* must be accepted for the promoted observations, claims, configurations and conclusions. *My non-digital models can help me to approach, hardly to get there.*

With the remarkable *perceptrons,* as used in Mitchell's book (see below) and by Marvin L. Minsky and Seymour A. Papert, and the introduction of so many layewrs of complex models, instability must enter the game (Minsky and Papert, in an *Expanded Edition* with handwitten comments and corrections of their book, *Perceptrons. An Introduction to Computational Geometry;*(third printing, Cambridge, MA, 1988; expanded edition, with handwritten supplements and corrections, expanded edition 1988, orig. 1969).

The term *Computational Geometry,* in M. and P.s book, is taken in a wide sense of a great variety of both formalized and free-hand graphs and mathematical underpinnings. Two examples of *Section* headings can convey the flavor: *Higher-Order Translation Spectra*, pp. 105f., and *Heuristic Geometry of Linear Separation Methods*, pp. 123f.

Minsky and Papert (p. vii) indicate the field:
This book is about perceptrons - the simplest learning machines. However, our deeper purpose is to gain more general insight 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 wr focus on theories of perceptrons.

There is a "moral" to this explanation that will be obvious for most of us but which merits a comment. This will to some extent underpin my references to "alien" field in my present book. Entering them at the periphery, without penetrating the crucial text body, I can come across features that are and remain by-products or "extras" or comments, but which can be relevant and useful for my specific tasks. Such devices can result useful also to support interdisciplinary, or Open_Source, approaches.

The authors offer a survey of the development of computer science and application; obviously simplified, but sufficient to bring home the richness, complexity and hence also unruly nature of digital programs.

***The 1940s: Neural Networks; the 1950s: Learning in Neural Networks; the 1960s: Connectionists and Symbolists; the 1970s. Representation of Knowledge; the 1980s: the Revival of Learning Machines.* For the rest, up till today, can one say: *Perceptrons, Human-Machine Interface, Broader View of General Science Relevance; Interdisciplinarity*?**

At least it seems, to me, evident, that the focus has been *increasingly directed on the periphery or outskirts of classically central issues*.

Let me repeat my claim that the general comments in the MP book, often at the periphery of the subjects, are useful for those among us, myself included, that are not equipped to penetrate the math issues in the book. In their section 0.2, *Mathematical Strategy,* they note:

We are not convinced that the time is ripe to attempt a very general theory broad enough to encompass the concepts we have mentioned and others like them. Good theories rarely develop outside the context of a background of well-understood real problems and special cases. Without such a foundation, one gets either the vacuous generality of a theory with more definitions than theorems - or a mathematically elegant theory with no application to reality.

From their substantive discussions I note especially what they say regarding the interrelations between models and conceptions on pp. 224f., 12.7.8, *Why is Best Match so Different from Exact Match.*

***... though the phrases "best match" and "exact match" sound similar to the ear, they really are very different. For in the case of exact match,* no *error is allowed, and this has the remarkable effecct of* changing an n-dimensional problem into a one-dimensional probl em. .. And they supply the math for this.**

3.2, *Theory Basis*

We know that an *outcome predicted by theories that are not purely numerical cannot be downloaded in a precise modality* because of the fluctuating and vaguely bounded nature of almost any such theory, but we can *move towards* a stage or situation previsioned by the theory. A theory in non-exact fields (to the extent that Math and Logic *are* exact), then, can at best, and approximately, represent a *roadmap,* a path with a vectorial direction but no observable or predictable terminus.

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 (*see also* 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 others, in his *Der Teil und das Ganze*).

This of course is circular, or better, helical, by going up a level, for we cannot even sketch out a theory without a relatively clear idea - or hunch - about the substance that the theory is going to handle. Following up on this kind of conundrums supports the view that all complex argumentations based on *verbal resources* are circular.

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 or the road we are entering. This is the wisdom in the so-called *Personal Construct Theory* [*PCT*] (discussed at some length in SL, *Patterns,* 4.3.7).

The modern digital universe is a medium for a crossover, in my terminology, between *InDef*<inite> and *Def*<*inite*> models that can be made to cooperate, or, at least, be comparable on certain levels.

If two entities can be *compared*, then they are subordinated to one and the same working procedure - or, indeed, vice versa. An intermediate entity is needed, a *tertium comparationis.* In the present work, various alternatives have been tested. This is the critical notion, delimiting but, let us see, workable.

This project is related to *recent system theory* and B. S. Blanchard and W. J. Fabrycky, *Systems Engineering and Analysis,* fifth ed., Boston 2011, will serve as my program foundation. The B. and F. book has eminently proved its usefullnes, published now in its *fifth version* (the first in 1981), with 800 pages and a great number of graphical models and charts, a rich bibliography and a list of 36 relevant websites; on p. 13, a list of six entries of *What is New in This Edition* (such as *Incorprates strategic systemss thinking* and *Harmonizes synthesis and analysis* - qui*te* an idea for our schools!).

The authors introduce their Chapter 2, *Bringing Systems Into Being,* with notes among which the following one is directly relevant to my project:

This chapter introduces a technologically based interdisciplinary process encompassing an extension of engineering through all phases of the system life cycle; that is, design and development, production or construction, utilization and support, and phase-out disposal. The process is derived from the systems concepts and general systems thinking ...

As the basic model level I am using a modern *computer system*, and John C. Martin, *Introduction to Langauges and the Theory of Computation* (fifth ed., New York, 2011, international edition, differing from the US one) will be my text book. But there are some *informations* that must come first.

In my present program, with a view to handling the issues of methodology, terminology and procedure, I have been using the following works: T. M. Mitchell's *Machine Learning* (1997; 414 pages), M. L. Minsky and S. A. Papert's, *Perceptrons*, already cited and used; Paul Feyerabend's two books, *Against Method* (1975) and *Wider den Methoden-zwang* (1986), taking into consideration also J. Buchler, *The Concept of Method,* New York 1985, origin. 1961. I will 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).

To cite adequately even only the crucial points in the cited books would make my present project burst, but the notes that follow are very

much due to my having consulted them. When scanning interdisciplinarily oriented books, noting what *cannot* be used is inportant.

Let me present a preliminary or raw version, a graph of the interconnections to be studied at closer quarters and more systemically (Fig. 3.2.1, *Methodological System*). Method will, at least in the present context, be systemic, and here is a simple graph indicating the typical structure.

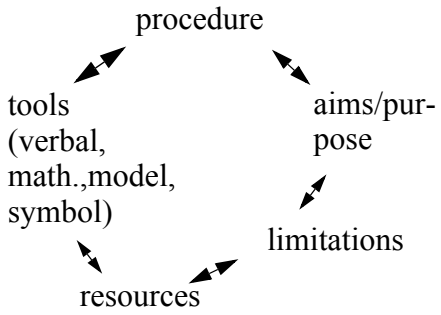

Fig. 3.2.1, *Preview of Methodological System*.

The graph in Fig. 3.2.1 is not 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 approached with theoretical evaluations or models.

| There is no automated procdure for setting up a chart or model of this kind: it has to be *invented for a specific purpose,* with a view to general values and applications. This is so for *digital models*, too, but the main difference is that they are tested by being activized eletronically and can produce response data.

3.3. *Models: Brass Tacks*

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.

One *basic computer mode*l is repeatedly used in this book, in slightly different versions (e. g. Fig. 3.1.3), according to context and reference frame, that of a simple *computer operative structure* borrowed from Tanenbaum and Austin.

The upcoming summing-up chart (Fig. 3.3.1, *Conjunction Schema*), which displays the *cognitive 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*.

Let me set the present arguments into a comprehensive chart of the main systemic perspectives of the book, submitting what will be conveyed in detail later on, namely that the terms *model* and *system* are interchangeable.

The present summing-up chart (Fig. 3.3.1, *Conjunction Schema*), which displays the *cognitive 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*.

The chart is not pretended to indicate more than a survey of the program resouces available for going on.

The first configuration, *Observational*, gives a program map of subjects and their interrelations in an upcoming elaboration, set in relationship to an organization model (ORG, indicated, not illustrated).This group represents a maximized picture of the central 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 partly interacting and intersecting-*Venn diagrams*.

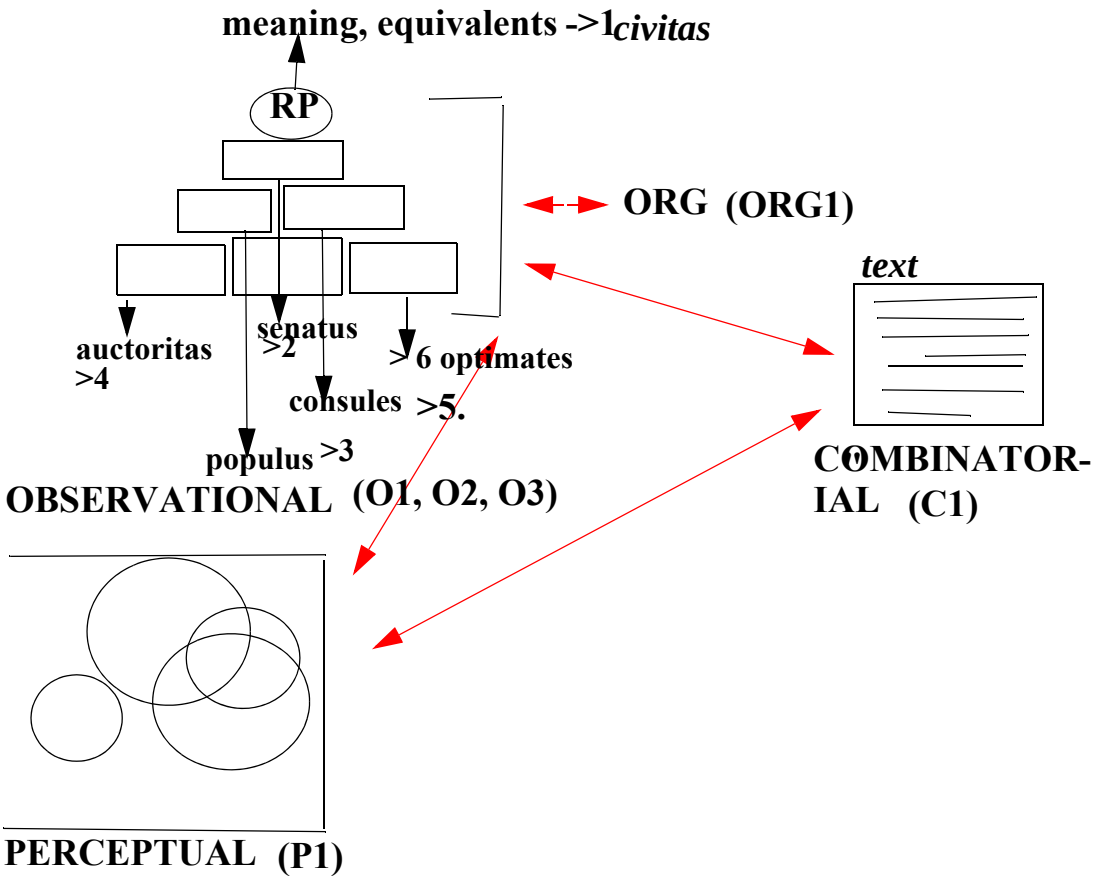

Fig. 3.3.1, *Conjunction Schema. RP = the Roman state: res publica. 1, civitas indicates the larger socio-politcal framework. ORG indicates elaboration of organizational issues in the observed system.*

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

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

To distinguish this system from the unsurveyable totality, I shall refer to it as the *C-System*, the *C* standing for *computer*, since the machine will serve as the basic model handling the central issues in the chart just presented.

Being can mean that the models serve in an experiment- *being functionally or effectively but not formally of its kind* (Webster).

The chart is not pretended to indicate more than a survey of the program resouces available for going on.

The first configuration, *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 represents a maximized picture of the central issues of this book.

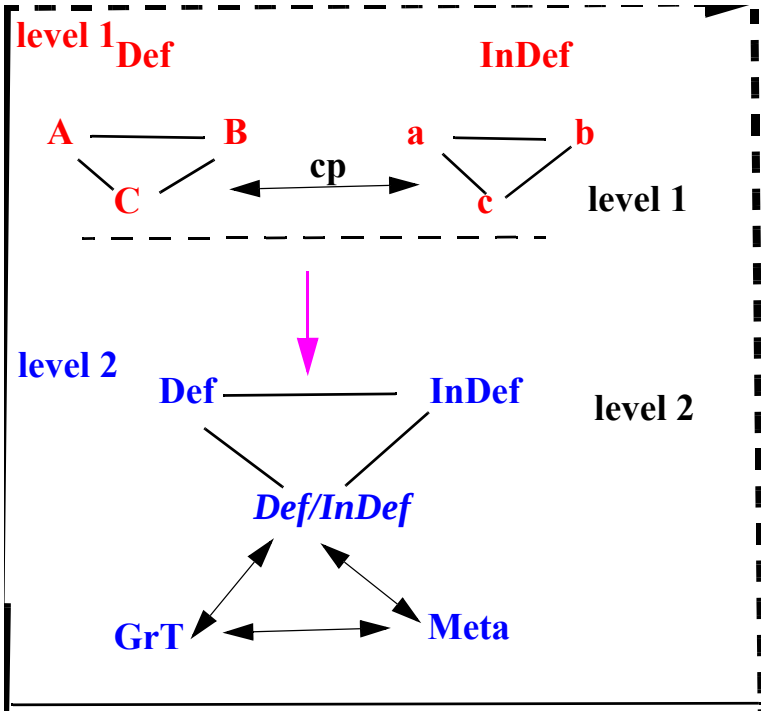

Fig. 3.3.2. ***Crossplatform Chart - Def/InDef*** **,**
A, B, C; a, b, c, = models handled, resp,,
by Def* and *InDef* procedures; *cp* = *Cross-platform.
GrT = Ground(level)Terms. Meta, see 3.2.1.

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 graph in Fig. 3.3.2, the *Crossplatform Chart*, with the following codes:
- *level 1*, *general models,* for subdivision in terms of *Def<inite> and In-Def<inite>;* elaborated models: a model of some cases handled by *Def* programs coded A, B, C; and another one for *InDef* with elaborated models a, b, c. This level 1 represents not definite but abstractly indicating "open", contentless categories of models, to be concretized at level 2.
- *level 2, dedicated models,* 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[GrT] and meta).

The tech words, such as *Def<inite>,* indicate actions on some machinery or process, as the units in Turing's numbered strips. The definite

words, A, B,C, denote position in some system without dynamics being necessarily involved.

Let me repeat here that "reality" at the level of *non-digital graphical models* consist in *virtuality,* while as *tools* they are, at least in the present context, *experimental*: testing the construction and use of them *as if* they were technically operative: an heuristic device. They can be considered operative in the sense that they can be used as dumb intermediaries between the observer and whatever piece of reality is being handled.

We now need to conflate the previews on *models* and *systems*. Elaboating my models and testing them is not a *stage* in my work but is rather *the work.*

My non-digital "systems" are *approximate*, and to serve in simulating operational fields for models, they have to be as far as possible structured and conceived as mirror-images of real systems.

The observations now to follow present approximate definitions that are to be taken as idealizations of the relationship between *systems* and *models*.

It could seem logical to start out with the encompassing *system*, but in the present excercise the *models* provide the initial items since they are focused on doing things, with the *How* rather than the *What* (*see* 1.3*, Inception Theory*), while their applications are meaningless without integraing them into a system.

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

The simplest way to describe this *heuristic distinction* seems to be to say that while *systems*, such as they are used in my work, reperesent *static fields*, with *models* representing *dynamical fields within them*, while lower order static configurations will be considered as *graphs.* Models and graphs need to be designed in order to be applied, while systems can often be taken for granted without being called up, being implied by the general discourse.

Thus the difference between models and systems are context-dependent.

Summing-up, we can say that systems are operationally regarded as constant, and when systems become variable, denoting potential dynamics (potential in the present non-digital context), they are considered as models.

This means that there should be no definiute hierarchy among the systens and the models, but that they are variously related depending on *levels in a pattern* (avoiding the term *system* here).

The *tools,* let me epithomize, in use in this book are flexible, potenially dynamical zones for figuratively (not digitally) handling of items such as objects, categories, events, actions, and we/I call these tools *models.* These models are *operative units, e*mbedded in normally static (or considered as static) *systems.* In other words, the reciprocal space relations between two or more configurations determine their being considered *models* or *systems,* always a heuristic and pragmatic choice.

This concept regarding the relationship *model-system* can be loaded into a comprehensive chart (Fig. 3.3.3, *System-Model Coordination*), coming up after a few supplementary notes.

Calling forth again the *approximation* principle, reflecting the role of approximation and tendencies in the Sciences (a major issue in *Part* I), I will put the paradigma on a passable track by arguing as follows:

When there is no formulation available for *defining* a case or process, we can use a vectorial tendency towards our idea about the underlying reality, as *tending* towards the "real" notion. This would reflect a normal process in our converging approach to the afffairs of the world.

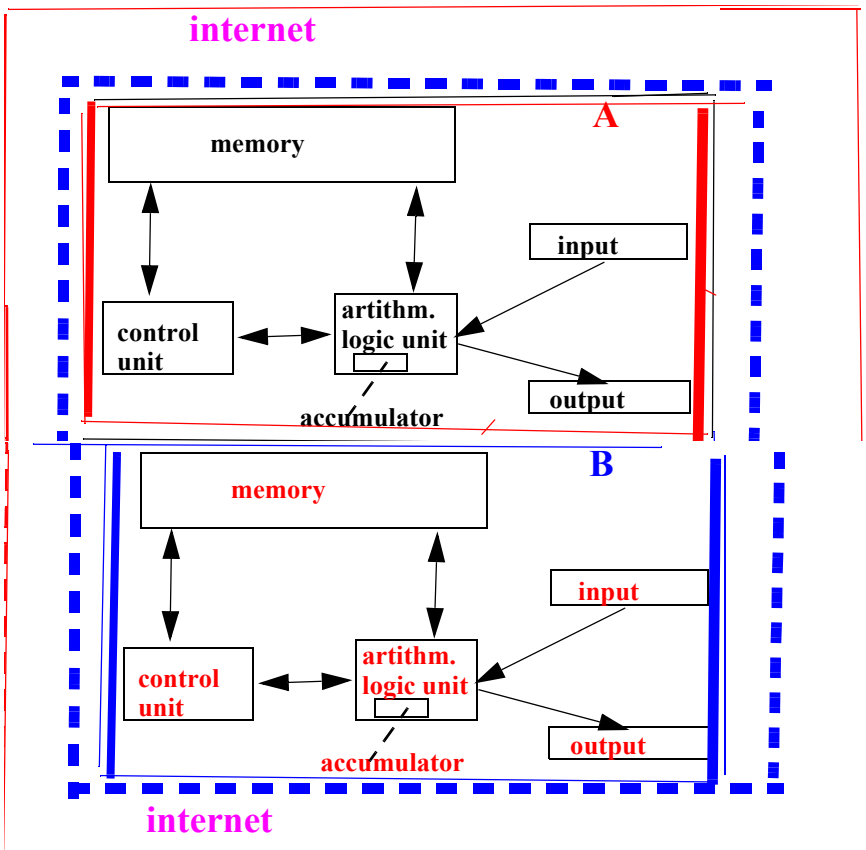

Fig. 3.3.3, *System-Model Coordination, twice using a Von Neuman Computer, copied from Tanenbaum and Austin.*

The color codes in Fig. 3.3.3 are:

Blue = system Red = model Blue broken line: larger system with the two graphs integrated, the upper one a model, the lower a system with models integrated. The Internet enclosing the entire group.

The codes indicate the following distinctions:

A. Computer model taken as a *basic* systemic unit, while

B. refers to a computer *system extended framework* with the internal operational units in focus. Reinterpreting them as integrated models, the Larger field arises. Of course this again could be a *model* in a still larger *system*, *a level or two up,* such as the present book.

For a competent and inciting introduction to the *Internet*, see Douglas E. Comer, *The Internet Book* (4 ed., 2007, 380 pages).

These crude models should be sufficiently illustrative to obviate further explanatory comments.

Their simplicity represents reality, which should be sufficient, since in the present non-dig context, model application can only stay at an elementary level, *indicating* the operation.

Using a model that fits in important details but with some fields left out, can alert us to features and characteristcs in Human behavior that call for new methods for describing them.

The "reality" I am so candidly announcing, consists in the original *Von Neumann computer*, a simplifed picture of which I am repeatedly using in this book. This model to a sufficient extent replicates essential workings in our notional "mind". We cannot do anything without *models,* despite our school having told us to work "objectively" - wihout ever being able to explain what objectivity meant (and who knows?) .

So a picture of a computer is basic to my work here. Richard Gregory wrote a big book on the subject, a work to be cited further on, that strongly contributed to my switching tracks in the 1980s (*Mind in Science. A History of Explanations in Psychology and Physics*, 1984; originally 1981, reprint 1988).

Let me supply a few further notes on the *models* in use in this book. They are *non-digital,* being geommetrical shapes figuratively indicating whatever they specifically mean or illustratively perform.

Graphically, they are reconstructions of an idea, observation, argument or project/plan, such that their essential significances in such games are distinctly represented and interrelated, while offering the potentiality for configuratively attributing dynamics to them as static configurations, without pretending that they perform dynamical work as do the digital models.

My models tend to complexity encompassing the really ungraspable patterns before us, and it must be noted that, the more complex they become, the wider grows the surrounding area that lies beyond our control. We have to work in an area of fathomable but only indirectly describable uncertainty.

Speaking of models in general terms, I refer to them as *Config*<urations>, including the *Def*<inite> and *InDef*<inite> types as well as charts and numbered lists (*see* 1.3, *Inception Theory*).

The elaboration of this theme will proceed by directions or tendencies rather than delivering definitions (configuratively reflecting Heisenberg's dynamis ; *configurational:* relative disposition or arrangement of parts : interrelationships of constituent elements). The ideas involved here are often not original, but given the context, I have to work as if so they were.

Creating a *graphical model of the non-digital type* used in the present work, we have to start with categories and settle or propose their mutual relationships. *This process amounts to drawing up a theory*, however sketchy and fragmentary, while making, as far as possible, the degree of completenes and defectiveness, and the *coverage capacity*, visually evident. What such a model does, to appply a term developed by Richard Skemp, is *showing structure* (SL. *Burden,* pp. 158f. for Boltzmann and Skemp (*The Psychology of Learning Mathematics*, 1971, Penguin Books 1979, pp. 30f.) for visualization versus verbal accounts, as distinct from a model structure).

For a model to be useful, it must show *space extesion* and *time,* the latter usually in terms of a *flow* indication. Remaining neutral over these dimension, a model lets go of considerable potentials - and perhaps even *analytical* usefulness for text elaboration. The necessary condition of being able to interconnect models and sections in them depends on inherent or explicit flows.

A *text structure* will often (normally?) be operated on at two levels.

1. There is the text *as it stands* (a dubious affair, and I shall desist from playing a game that doesn't lead us much further); then

2. the text *as read interpreted and used*.

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, lasting a few ours only) with an Introduction, *Prólogo. Epílogo de una novela* (pp. 13 - 31).

***How to build and access a model* that is maximally definite, accessible and clearly structured? I need to follow up on this query for a while, at the**

risk of repetitions - unavoidable when one subject is being viewed in complex environments.

A graphical model 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 momnent). This excercise 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.

We can stipulate six points regarding models of the type in use here.

1. one of 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 theorically construed and purpose-dedicated guidelines; 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 notion, concept or program.

4. We have to decide by combining an *illustration* or *display* and a *determinative description* of the theme or subject, by which we can, at least in terms of analogies, manipulate items included in the model.

5. It seems all to be an issue of *operation* and *organization,* whose course may be clear while the objects operated on are not definitely distinguishable.

3.4, *Our Models in the C-System*

Let m repeat: one *basic computer mode*l is repeatedly used in this book, in slightly different versions (e. g. Fig. 3.1.3), depending on context and reference frame, that of a simple *computer operative structure* borrowed from Tanenbaum and Austin.

The focus all through the present work has been intended to evaluate graphical models as tools, and to see how they can be figuratively functioning as a system-*n* in a system-*m*. My task, therefore, is to collect some of the models in a composite view for this purpose.

To distinguish this system from the overall catalog, I shall refer to this system as the C-System, the C standing for computer, since the machine serves as the basic model.

Since we shall have to connect *Historical categories* with a relatively articulate *operative* model (figuratively speaking), among those that have been used in the book, the *rhombic* ones with Ciceronic themes (Figs. 3.4.1,

A,B,C) and the *computer* model (Fig. 3.4.2) will probably be best suited for my experiment.

This group of configurations, here repeated, have been central to the entire discourse of arguments in the book, particularly in 2.5, *Cicero at Machine Level*.

The computer structure provides the model that, accepting the simplification and unrecorded details, most resembles human intellectual activities. It is entirely describable and works by translating input to output. The computer image can be used as a shell for the flow of arguments in the book.

To develop this idea, I have relied mostly on Tanenbaum and Austin (*Structured Computer Organization*, 6th ed., 2013, 776 pages).

Using a model on Historical documents, and focusing on *Cicero* (bypassing Augustus), it should be a dynamical one, being process-configured and indeterminately concluded, and, as I hope, consistent with the drive of the book.

The rhombic central configuration, 3.4.1, in three versions shows the main thematics in the system, with the three most important players in the game: the *Res publica*, the *Senatus* and the *Populus,* as evaluated by the present author (A), by Cicero (B) (hypothetically)! and in an extended analytical view (D.

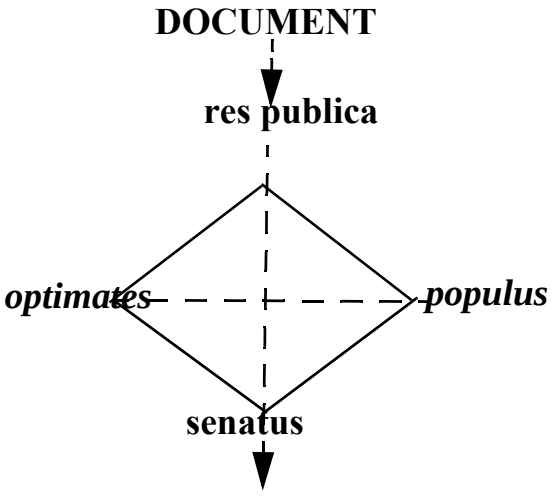

Fig. 3.4.1, A *The Roman-State Model.*

My description here is problematic and open to discussion, but sufficient in connection with the model soon coming up (Fig. 3.4.2*, Simplified Chart of Computer and Computation*), the very core of my argumentation. The chart represents my ideas of coverage and functionality of the *omputer-*

computation pattern **as relevant** ***to the present argument,*** **and accordingly simplified.**

In Fig. 3.4.1, A, the coded notion of the ***res publica,*** **acting as a** ***triggering factor*** **on the model level , forms the transfomative link between the document and operations on it. "The document" refers to the selections from Cicero's writings in** ***Parts*** **II and V.**

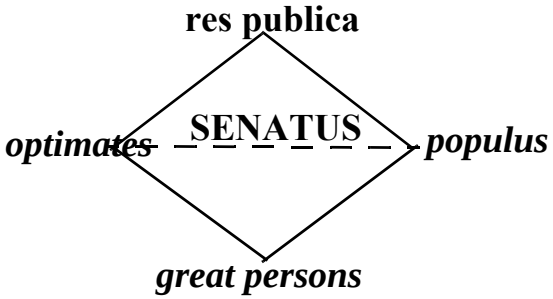

Fig. 3.4.1, B, ***The State acc. to Cicero***

Regading the image of the Roman State as just presented by a modern writer (myself), it must be noted that this does ***not*** **agree with the image Cicero himself would have produced, were he to have resort to figures. Fig. 3.4.1, B,** ***The State acc. to Cicero,*** **reflects the crucial fact that he placed the** ***Senate*** **in the center of his idealized image of Rome, and that he put much store in the traditions he atttributed to the** ***great men*** **from earlier times.**

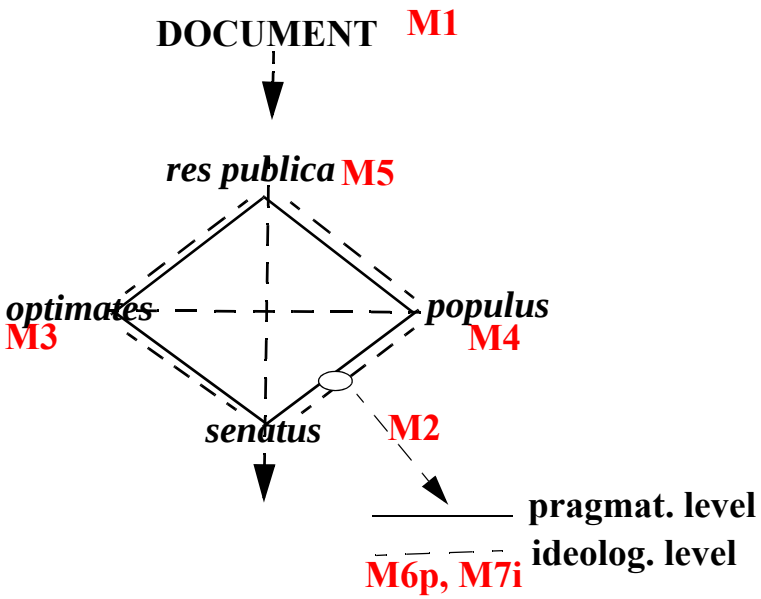

Fig. 3.4.1, C, ***Rhombic Model, Roman State.***
The M numbers in Fig. 3.4.1,C, refer to the list in Part II.

There exists no correct picture of Cicero's view on the matter, for his writings about the subject are strongly colored by all sorts of interests, worries and hopes, factors deriving from his dramatic, superactive but uncertain life in the polittical and social chaos that dominated Rome (and today?). Even the elemenary notion of an abstract idea about *The State*, quite familiar to the Greeks, if not unknown also in Rome, was hidden in the dominant preoccupation and considerations here about one's name, familty, clique and *Anhängern* (modern studies insist on these factors) and worry about his own life.

Having epithomized the core issues of the book, my assignment is to integrate the *systems modalities of the present work* with the simplified computer structure, which will be shown again (Fig. 3.4.2), without the trappings in the foregoing copy of it, but rendered functional in the present connection, as a *model structuring an image of the present work*.

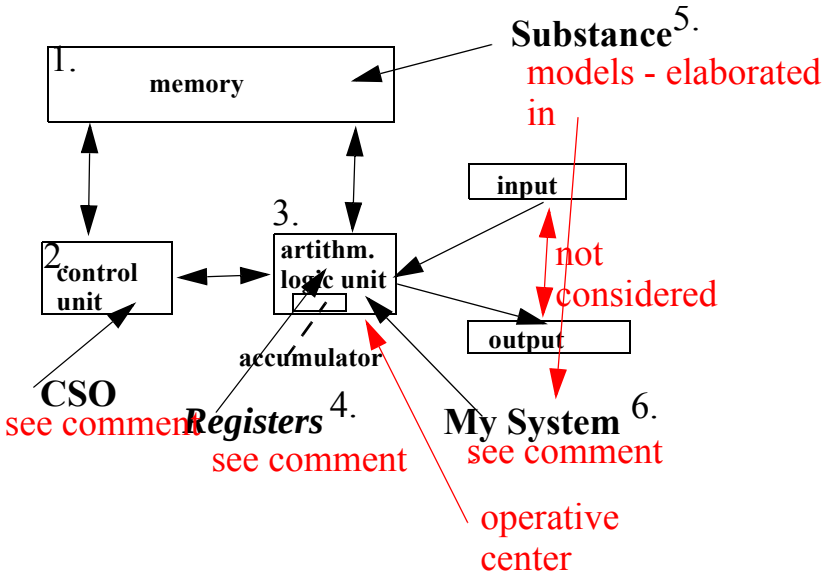

Fig. 3.4.2, *Simplified Chart of Computer and Computation (Tanenbaum and Austin), with Operators from the Present Work printed in red. CSO: Computer Structured Organization. The numbers are for references in the text.*

In Fig. 3.4.2, the operators are "loaded into" three nodes, in the following manner. The field on the figure marked "memory" (1) is here the position alternatively for one of the three models just having been illustrated in the present *Section:* Fig.s 3.4.1, A,B,C.

To explain the chart, we can start with the present author's interconnected contributions: launching a *My System* (6) accompanied by a *Sub-*

stance **(5) consisting of the models the au. has developed. These units are respectively loaded into the *arithm.logic unit* (3) and the *memory* (1), thereby being involved in a circuit consisting in 1. *memory - 2. control unit, the "brain" of the system*** **(here indicated as *Computer Structured Organizaton*) - 3. *arithmetic-logic unit*** **(the *operative center*) - *4.*** **the *registers.*** .

The "models elaborated" (under Substance) are one of the three illustrated in the present *Section*: Fig.s 3.4.1, A, B, C.

The *Registers* are operative on several levels and with various tasks, but the main one , and of relevance here, is described by Tanenberg and Austin (pp. 349f.) as being *there to control execution of the program, hold temporary results, and serve other purposes.*In other words, the registers affect not the central operations but the secondary ones, those, precisely involved in data execution.

My System **(6), finally, is my program in and through which the resources are retrieved, made operable and being exploited and delivered through the output.**

So far, we have been handling texts accompanied by graphical models specifying and developing the ideas connected with them.

The models, let me repeat, have been understood as more than just illustrations to the text, really as autonomous entities, bringing the text material on to another conceptual level.

The very notion of *non-dig model*s, but not the name, such as are tradtionally in use in Organization, Management and Social Theories, defies the idea of sufficience 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 differentl 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. 3.7.1, *Pseudo-Matrix*) can represent the present book entirely, the model forming a *grid* or *skeleton* of my 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 Sacha Krakowiak's highly informative and well-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 activized 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 folllowing distinctions:
1. *Objects internal to the procedure,* 2, *Local objects,* 3. *Remanent and global objects,* 4. *External objects,* and 5. *Parameters.*

The last item requires 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, activized]. *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...**

Krakowiak supplies a chart (here repeated) showing these interrelations, which I have redesigned and renamed here (Fig. 3.4.3, *Transfomation Chart*).

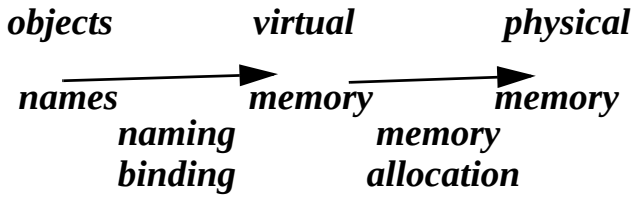

Fig. 3.4.3 ***Transformation Chart. Krakowiak.***

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 computter'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, tellling 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 Pannetta 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 (David Bank,** ***Breaking Widows*****).**

Two important Parts in Tanenbaum and Austin convey detailed informations about the ***CPU*** **element (Chapter 2, pp. 55ff.) and the** ***Operating System*** **Chapter 6, pp. 437ff.) (*****OS*****).**

About ***Processors*** **(2.1):** ***The organization of a simple bus-oriuented 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..***

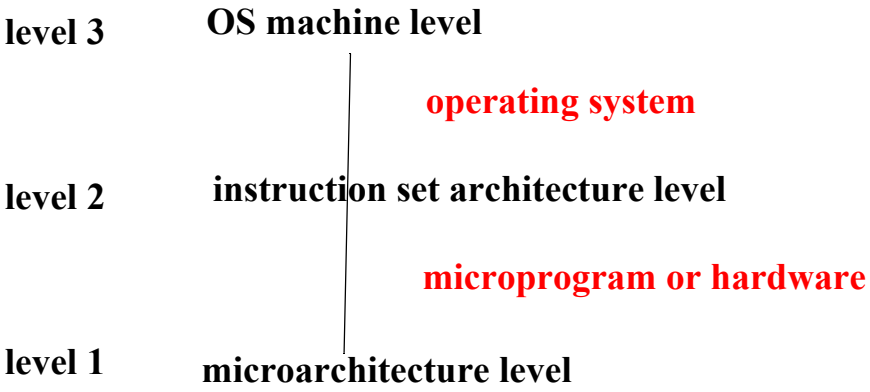

Fig. 3.4.4, *Systems Levels, after Tanenbaum and Austin (repeated*).

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. 3.4.4.

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 developed 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 relations *man-machine*.

A complex of system-cum-model can hardly be well grasped and subjected to use when rendered just verbally. A method(ology) will normally be directly linked up with some system, so that considering the former without the latter means a fragmentation and reduced effect and range of relevance.

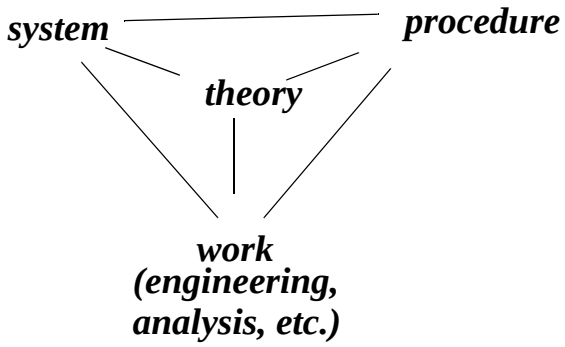

Fig.* 3.4.5, *Structural Graph, procedure standing for method.

The relationship can be understood in terms of the graph connecting the main operative categories in a work like the present one (*Structural Graph,* Fig. 3.4.5), in which *theory* establishes the links between *system, procedure (method),* and *work.* Of course the theory in the central position here, is just *one* category among many theories, but notionally the central one and directly work-connected.

Such graphs can be submitted to the criticism that they mix up different levels. But in practical work, this distinction often is irrelevant or inactive.

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, creating artifical time-lines and operation spaces, and we have to consider limits and situations bordering on imponderabilia.

How far should we go towards the periphery, and what "periphery"?

Here, I shall borrow some cues from Abler, Adams and Gould's *Spatial Organization,* a publcation 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.* Probably so, and the term and notion of a *Geography* also is a theoretical construct. But some people are still telling us to keep theory, reality and images apart.

In the *intuitive probability framework of analysis* proposed in the present work, this idea must be applied not only to Physics, but also to Histor-

ical studies. There is no alternative. Both embody processses with no definite terminus.

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, p. 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 dissappears and we wit back with a purely mathematical scheme**

At the same time, we cannot directly 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 on numerical models. The Turing machine is a mathematical model *not of computers, but of computation*.

An ordinary machine is also an *abstraction* (Richard Gregory, *Mind in Science. A History of Explanations in Psychology and Physics,* 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. 3.4.6, *Operating System in a PC structure*).

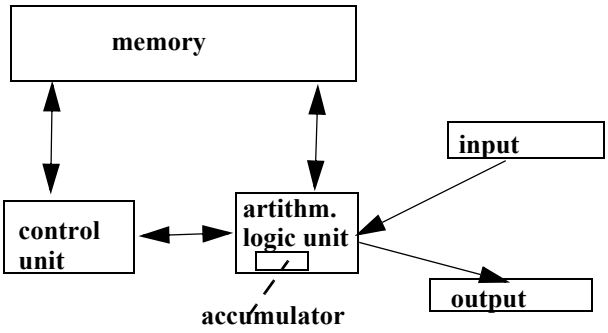

Fig. 3.4.6 ***Operating System in a PC structure; source: Tanenbaum and Austin.***

The specific choice of machine is not 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.

J. H. Fetzer (*Philosophy and Cognitive Sciences)* 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 configuratively 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.

3.5, *A Syntax for Models*

One syntax? There are alternatives. I am just proposing one of them.

My project is clealy multi-disciplinary, in my terminology, with slightly different references, *Open_Source*.

The term *Open_Source* indicates, provided our focus is settled, that we *adopt and adapt whatever we can use from any discipline.* The term is preferable to *interdisciplinarity*, because I borrow theory and model wherever I find them relevant, without regard for academic schools and traditions. Theory and model are (usually) *tools*, disciplines are not. So it seems more straightforward to focus on whatever tools they may contain.

The *Open_Source paradigma* indicates a program envsioned for conflating research paradigmas of different characters, aims, capacities, and programs, *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.

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. Werner Heisenberg's notion of *dynamis* is, or so I believe, indirectly related to the idea formulated by Bertrand Russell, with his sense of paradox, that *all exact science is based upon the idea of approximation.*

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

We recall Herbert Simon's program to simplify an issue, removing some of its *cluttering details.* Models are excellent tools for simplifying an issue or a program.

***Digitally* operative models, like those in *Management Information Systems* (general survey, Parker, and Davis,Olson), do three things of particular relevance in the present connection:**

1.denoting, charting* and *moving patterns of data;
2. producing products or results;
3. 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 proceesses involving them (2.)
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) developed by distilling material from the rich literature on *Management Information Systems* (MIS, on the back cover of Parker's big book, 828 pages, of 1989, seven other directly relevant titles are listed, all with the same publisher, *McGraw-Hill*).

Model application depends on *verbal thinking* while remaining graphical.

Richard Skemp, in his *The Psychology of Learning Mathetics* (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-cicruiting of the process of hearing oneself tell them to someone else. This view is supported by the common observation that actually 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 ....

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

With the graphical models we can build *systems* of parallel trails, or distributed over a space, which can be studied separately *and* in conjunction with one another. Verbal modelling is tied up in separate linear configurations.

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. Pure verbal modelling is tied up in linear configurations, forcing us to take one after the other.

Establishing somehow workable links between our models and some basic programs in *Physics,* can help us to develop a more *dynamical grasp* of our models, accompanied by a recordable, at least visually demonstrable, kind of *variability*.

The conceptions and practices regarding *Physics* are affected by relativizing attitudes.

***This modern physics will require, at each instant, a revision and a re-evaluation of previous ideas and 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 *InDe*f programs could be manifest or permanent.

Paul Feyerabend (*Wider den Methodenzwang,* 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, howver, need repeated revision).**

Immon Bach includes in his book an instructive section modestly labelled *Something about Method* (pp. 15 - 18). His notes on the *display values of models* are relevant in this connection. With *display* we include *images.*

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.

Backed up by the foregoing observations regarding *systems* and *models,* I shall now bring the subject more sharply (as I hope) into focus.

The mutually integrated terms *System* and *Model* are central in this book. As noted already, pragmatically depending on coverage and complexity, the two terms are interchangeable, depending on complexity and relative levels. Consonant with the relational "rule" just indicated, a complex system can contain any number of subordinated models.; and any one of them can serve as system for sub subordinated models.

For a simple model coordinating *models and system(s),* in Fig. 3.5.1, I have redesigned, with some modifications, one presented by Brambilla, Cabot and Wimmer (BCW, p. 55, Figure 5.2, *Model-based testing*).

The diagram represents an abstract machine consisting of a *closed* system of interacing elements. Its relevance is that it connects the parameterss of *word* and *graphics, system* and *model* in an integrated circuit, illustrating the interdependence of these notions and programs.

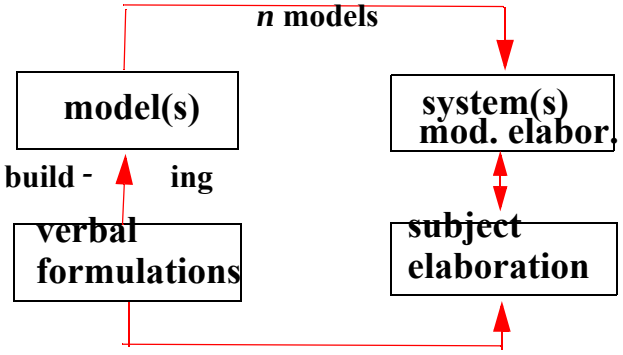

Fig. 3.5.1, *Mod-Sys Combination. Mod. = model.*
Redesigned after BCW.

Since the *Operating System* is the origin of the flow through the model, and is fundamental for the entire discourse in this book, I will elaborate the configuration.

This means to come up with a short but tentatively and fundamentally correct and adequeate description of a typical *Operating System*, especially in *Windows* (here, with the role of an example of a general program): Fig. 3.5.2 *Operating System in a PC structure.*

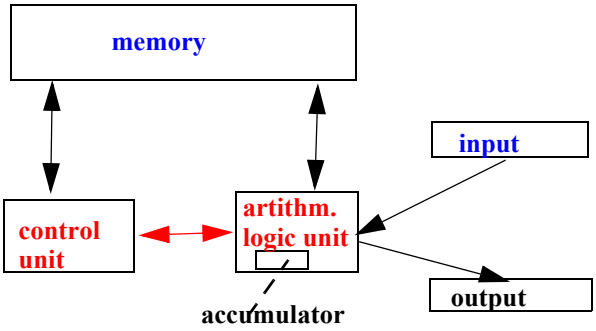

Fig. 3.5.2 *Operating System in a PC structure. The group is redesigned after Tanenbaum and Austin. Machine level and program levels.*

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. The figure displayed (Fig. 3.5.2, *Operating System in a PC structure*), is redesigned after Figure 1-5 in Tanenbaum and Austin.

Some further *critical distinctions* will be constantly in use or referred to, among them *math* notions.

An exceptionally clear and comprehensive account of relevant mathematical thought is available in Stephan Körner, *The Philosophy of Mathematics. An Introductory Essay,* New York 1968 (198 pages, numerous reprints); references to other books on the subject by Edna Kramer and Morris Kline in my *Bibliography*.

Having introduced the specific operations of non-dig models at work in this book, *we need a closer function-focused scrutiny of them.*

We have to adopt the idea of a distinction between *form* and *shape* for the functions of a model.

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* (1984, reprint 1986, 260 pages, p. 8):

Most problems of form have physical and dynamical aspects, as well as geometrical aspects.The material poperties of building components belong to the 'form' of a building ina broad sense, and have to be taken inti 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 manaeable proportions, we have chosen to concern ourselves in the work (except in a few instances) with the pure* geoterical *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.

The abstract connectivity between the models depends on the *framework* we create for them. It is on this level that we can determine how one model leads on to the next and evaluate the involved dynamics.

***Herbert Simon,* in his *Models of Thought. Introduction,* emphasizes the *dynamics* in model functions.**

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.

Herbert Simon was one of those who most importantly contributed to breaking up the traditional boundaries between *hard* and *soft* approaches.

Let me supply a few more notes on the closely related notions of "relativity" and *uncertainty*, citing them as they arise in Bruno and Giorello\s *Introduzione* to Bruno De Finetti's work (p. 20).

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 dranatically 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 pe me, ci fosse una signora probabilità mia e una probailità 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 probailità

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 graduali concessioni alle comuni previsioni e congetture della vita pratica. Non vi è più, nella previsione scientifica, una certezza assoluta, vi è soltanto una certa probabiltà 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-Phyisics* is evident (3.10, *Frameworks for Physics*).**

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 to attempt a summary, so let me just give an indication citing a series of chapter titles: pp. 30ff. : *c. Wahrscheinlichkeit, d. Irreverisibiliät 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 weiβ ich, wenn ich weiβ* – knowing, what do I really know?); finally, Chapter 13, discussing the situation, in English; *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.

I have listed these features in Von Weizsäcker's book to have an authority tell us how complex programs in Science can be.

For theory building, like the present one, that is focused on construed

material, a healthy corrective and guidance can be found in case-developed or based theory development.

In their highly acclaimed book, *Case Studies and Theory Development in the Social Sciences* (MIT, 2005, 331 pages), A. L. George and A. Bennett depict the categorization of sosial theories, relevant also for other theory ventures, in the terms presently to be noted. One of the reviewers wrote: *The beauty of their approach is their careful integration of theory and method and their conviction that the pursuit of empirical knowledge is profoundly theory dependent* (Charles Ragin, University of Arizona).

In their Chapter 6 (Phase Three: *Drawing the Implications of Case Findings for Theory* (pp. 109ff.), the authors note as follows:

Case study findings can have implications both for theory development and theory testing. On the inductive side of theory development, plausibility probes and studies of deviant cases can uncover new or omitted variables, hypotheses, causal paths, causal mechanisms, types, or interaction effects. Theory testing aims to strengthen or reduce support for a theory, narrow or extend the scope conditions of a theory, or determine which of two or more theories best explains a case, type, or general phenomenon. While many works on research methods and the philosophy of science emphasize theory testing more than theory development, we see both enterprises as essential to constructing good theories.

3.6, *Experts on Models*

The models I am using here are pretended to be anchored in Science or, at least, be linked up with parameters there.

We have an usnsurpassable account of *Making Modern Science* in the book of that name by Peter J. Bowler and Iwan Rhys Morus, Chicago 2005 (529 pages); modestly subtitiled *A Historical Suvey*. The book is an achievement in acumen and productive analysis, but only indirectly relevant for the present assignment.

A crucial question regarding a work in research of any subject must be *basic perspectives* and *choice of authorities.* The former having been the subject for foregoing *Sections,* let me consider the latter.

In his *Model of My Life* (p. 62), Herbert Simon emphasizes the role of his first teacher Charles E. Merriam, at Chicago, who worked his way with relative independence of *schools of thought and practice*, not being a *follower* of anyone in particular.

To attract disciples, one must provide certainty, and a catechism from which there can be no deviations and which can be recited to solve nearly all problems. Neoclassical economics provided that kind of certainty. So do Skinnerian psychology, Chomskian linguistics, Piagetian development psycholo-

gy. There is no Merriamic political science. Political science of the Chicago School provided a goal - to understand political behavior and political processes - and some directions from which to approach the data and theories in psychology, economics and the other social sciences and modern techniques of experimentation, statistical analysis, and mathematical modeling...

To analyze the literature available today after these criteria would require too much space (and exceede my competence), so, comparing the listed thematics, I have to reduce the scope to a survey, noting the different accounts of the subject, leaving the rest to the reader.

Focusing on the question of how a "field", *basic for models,* is being represented in the literature, I have chosen a definitely focused set of writings, *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* starts 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., Galaxes 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:

1. that the order of *presentation*, that is, customizing for the benefit of the reader/user, is radically different from one book to the next; and

2. that the *general notion of Physics* is not entirely definite or consistent.

Of course my quotations indicate paedagogically focused categorizations. But to show *how* Physics should be presented and *how* initial studies

should be programmed, substantial differences hower in the close background. *Physics* on the Webster level is easily explained, on the *operative* level the name indicates a vast, multicolored cloud with imprecise boundaries and shifty internal relations, this even before the *Quantum* revolution.

This idea could be further underpinned by references to how *Mathematics,* basic to Physics, is being developed, presented and studied.

There is Morris Kline's book with the "telling" title: *Mathematics: The Loss of Certainty* (1980) and Edna E. Kramer's massive *The Nature and Growth of Modern Mathematics,* 1981 (orig. 1970).

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

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?

In a work depending on terminology debate and applying unorthodox *graphical models,* I will have to explain the ground on which to stand, the *platform,* so to speak.

My platform is defined in terms of *data-simulation* and consists of two levels: the basic level is a modern *computer system*, the next is *digital programming or work,* supporting the *non-digital* programs - provided such a structure can be made to work *experimentally in terms of* non-technical, *configurational* procedures. In this game, the structure and functioning of a *computer* is the core of documentation, argumentation and display. The version selected is a simplified image of a *Von Neumann machine*, on display on several occasions through the book (e. g., Fig. 3.5.3, *Operating System in a PC structure.*)

Tom M. Mitchell's *Machine Learning*, New York 1997 (414 pages; TM is a Carnegie Mellon professor), is an articulated and basically com plete (by today's criteria) treatise, modestly presented as an *introduction,* on *making our computer programs learn from our operations on them.*

As he notes (p. xv), *The field of machine learning is concerned with the question of how to construct computer programs that automatically imnprove with experience.*

His elaboration of sets of high numbers of hypotheses also can give an example, warning us against betting on just one of the numerous that

could **be relevant in our work;** ***learning from the machine*** **not to believe in conclusions, just possibilities.**

Scanning Mitchell's ***Machine Learning,*** **I find it preferable to start out from a central consideration of the nature and use of** ***hypotheses*** **(M., pp. 214ff.), from which to fan out to related notions.**

His chapter 7.4 with 7.4.1 is strictly tech, requires familiarity with a corrsponding vocabulary and definitory paradigmas, and is hardly applicable in the present work.

My selected considerations on Mitchell's publication can be regarded as critical for the entire program of my work in this book.

What concerns me, is mainly the couplet ***performance program*** **and** ***search space.***

Of direct applicability to my ***InDef*** **program are only a few of the ideas and types of connections in Mitchell's exposée. But the comparison is useful since it helps me to keep in mind** ***and*** **consider dfferences between** ***two formally incompatible program formats*****. Developing consciousness about these differences can help me to awareness of the limits and limitations of my soft programs.**

An option, therefore, is to borrow norms and ***digital terms*** **from a field of more stringent qualifications, such as we meet in Mitchell's book, and adopt and adapt them, but now in reflected versions; in other words, building a passage from** ***Digital to Nondigital*** **language.**

Mitchell's model in his Fig. 7.3, p. 215. is accompanied by the followings comment on hypothese values:

A set of three instances s h a t t e r e d by eight hypotheses **[for** ***shattering, see below*****]. *For every possible dichotomy of the instances, there exists a corresponding hypothesis.***

Shattering **is the keyword here (Mitchell, p. 214), but this kind of model dynamics is irrelevant even as a model for our context., because no digital operations nor relations will obtain with my models.**

The ***definition*** **reads as follows (p. 214),** ***shatter*** **being synonymous with** ***scatter*****:**

A set of instances S is **shattered** ***by hypothesis space H if and only if for every dichotomy*** **[which I take as sets of two alternatives]** ***of S there exists some hypothesis in H consistent with this dichotomy.***

The utility of this exploring of ***digital multi-hypothesis work in quantifiable fields*** **is not in a direct application in** ***InDef and non-quantifiable*** **fomats and concerns. The critical awareness in this relationship, to the extent that we can establish one, appears to come out in the following manner.**

A verbal denotation of a program will usually (always?) result randomly at the margins of the main one and in relation to possible neighbor-

ing programs or extensions from the main one. Usually this condition is left unconsidered and unstated on account of the vagueness of *literary statements,* and because of our need to simplify an issue in order to make it manageable. So the comparison I have proposed can be useful in two modalities.

1. Inviting us to consider fanning-out notions; and

2. dressing the *verbal arguments* in digital garb as for more efficient handling.

Needless to say, the comments just offered can only be taken as an incitement to further study of the problem and the consequences for the interrelations between the two universes.

An idea to be gathered from the case just considered is to avoid *conclusions* and argue exclusively with *groups of hypotheses*, and, if listing the alternatives works badly in a writing, use *frameworks* or *argument spaces.* I cannot make my programs *work,* but they can simulate work by being tested against definite problems and cases.

The general framework in which Mitchell elaborates the idea just reported can be indicated by citing his initial chapter captions: 1.1, *Well-Posed Learning Problems,* - 1.2 *Designing a Learning System,* - 1.2.1, *Choosing the Training Experience,* - 1.2.2, *Choosing the Target Function,* 1.2.3, *Choosing a Representation for the Target Function,* - 1.2.4, *Choosing a Function Approximation Algorithm,* - 1.2.5, *The Final Design.*

Here is, as an invitation to go further with the issue, 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, to which I have referred several times, stand out by sounding both depth and width, 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 competences and the available space do not allow me to convey more than indicative 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 (NTH,* now *NTNU)* book-shop 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, 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).

***Simon's 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 programming, 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 (Engl.) heading *Problems in the Behavioural Sciences.* At that time, computer modeling was a widely discussed and publicized theme, and her book gave the field a new start, providing an intensely and richly documented and critical disscourse, 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 was 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 psyhology 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.

Margaret Boden also offers a penetrating criticism of "popular" programs such as *Connectionism,* including a theory of vision; and she develoops the *Classroom* model for some of the connectionist functions (pp. 78 ff.).

The recent book - *The World in the Model* - by the British economy and methodology specialist Mary S. Morgan (Cambridge, Eng., 2012, 421 pages in A4 format), delivers ideas regarding models derived from her work as an economist, bringing the complex and rather forbidding subject

articulatedly 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 or torn down.

Here is the list of the chapters headings:

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-Philppe 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 Econmics* - 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 intimation of Morgan's 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 econmists 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 Morgan 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. Since I have been referring to this publication in numerous occasions, I go on with the literature.

The *fourth work* to be noted (but not discussed here, for the same reason), with *model-dedicated* programs, can be considered an offspring of Simon's *Model* book just discussed, while working more abstractly,. 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 MDSEs.

In all the cited works, the core of research and studies have a soft underside, like the proverbial hedgehog, and *Physic*s also has one.

3.7, *Dissecting Configurations*

Having proposed and displayed various graphical models, a critical review can be adequate.

The central protagonists in this *Part* are *models* and the *systems - C-Systems*, into which they are embedded, this group labeled *Configurations*. Following up on the introductory observations in *Part* I, a more intensive and articulated approach is needed. Unavoidably, there will occur some repetitions, but they can come in usefully in such a complex environment.

Digital functions of course are based on *mathematics,* and my imitation models could have reflected this. But I am not out to study *computers*, only *computing* using their *frameworks* for modeling digitally reflecting discourse.

Defining *models,* Webster states: *a description, a collection of statistical data, or an analogy used to help visualize often in a simplified way something that cannot be directly observed (as an atom) b : a theoretical projection in detail of a possible system of human relationships (as in economics, politics, or psychology) : BLUEPRINT *his model of an election procedure based on permanent personal registration reveals some of the problems to be solved* *constructed the first of the world models of the present century—*

Since WWarII, *models* have been used in most Sciences and data programs. Desisting from offering a survey of the vast catalog, I will go straight on to my work, providing a customized platform for introducing the *Systems* paradigma and a guidance for my roadmaps *across models* in the systems.

Attentive readers will note that here as elsewhere I am working at the perimeters of two publications: Marwin L. Minsky and Seymour A. Papert, *Perceptrons* (special edition with handwrittten comments, MIT, 1988)*;* and Marco Brambilla, Jordi Cabot and Manuel Wimmer, *Model-Driven Software in Practice* (Williston, VT, 2012).

My *graphical models* which, even when this cannot be seen directly, involve us in great complexities, calli for a closer scrutiny.

In logistic terms, the models are, besides the written materal, the central manifestation, operative, and argumentative units, under certain conditions emerging as complex *systems*.

They will be and remain a central issue in theory and pragmatical planning, considering also the access modality for the Reader. There are no absolute solutions regarding this maze, which means that there is no "objectivity", just choices by arguments blended with hunch and notions of purpose and reader access - *and* possible competiton. All we can do here is *artificial,* several steps removed from what we are used to consider *objectively handling realities.*

Most of the non-digital models applied here are figuratively representing *dynamical* properties and roles. In order for them to reflect such variable universes, we have to start out with construing them as *static configurations, fixing their type, outline and contents category.*

This is a well-established notion, developed in space studies by the paradigma labelled *Personal Construct Theory* (for which see the references to Gollege, Downs, and Stea, cited in SL, *Burden*). Imagery, real or mental, plays a great role here, for which se also David Canter, *The Psychology of Place,* 1977 (SL, *Burden*).

Our logical and consistent tendency tends to be to look at graphical models as indications referring to their contents and nothing more. But it can be useful to take the boundaries more analytically and include the surrounding empty fields as something more than just emptiness, more actively regardig them as a reminder of surroundings that are there but are not displayed. In other words, let the models play an activizing and expanding role rather than meaningless codes for meaningful concepts.

One great advance brought about by *application of graphical models* is exactly this, that, since models figuratively close a picture in boundaries of variable extension, the globe or circle of unconsidered darknes surronding them also is variable, figuratively speaking.

Building a *verbal model,* we mentally form sentences and plot them down word after 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 for each step, 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 while their spatial and priority interrelatons can only be imagined or written out as a comment to the verbal model.

The modus in the present work is thinking and arguing in terms of *integrated visualized patterns of Key Terms* and *Operative Terms,* just as tiles fitting into a field. Let me take a critical view at the subject.

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* (Fig. 3.7.1, *Pseudo-Matrix*), the same terms will have to appear any number of times, in order to be completely and adequately *related*, in different company. The *addiditve* principle leading to integration. Not merely "pseudo", the graph in Fig. 3.5.1 is drastically minimalized, merely indicating a *pars-pro-toto* picture. The *m* rows *indicate* analytical categories; the *n* columns examples of the historical protagonists. They are being subjected to computer-modeling operations compa-

rable to the various computer models in this book, with the difference that in Fig. 3.7.1 a *much wider scope is being indicated by the matrix-like structure,* m,n, added to the operating system, with the structuring parameters loaded into the platform elements.

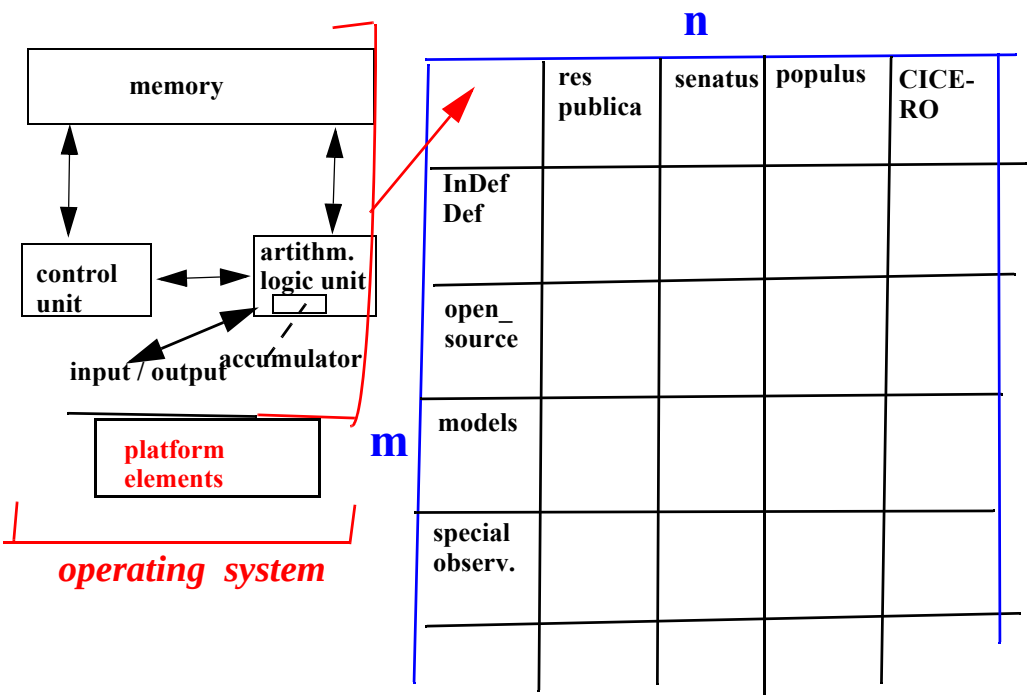

Fig. 3.7.1, *Pseudo-Matrix incorporating* the *Operating System of a computer. Pseudo: no significant diagonal.*

3.8, *Studying History*

Now some notes specifically on the discipline of History, a program generally suffering from the insistence on definiteness and conclusions.

We have an excellent example of the *involved uncertainties and complicatedness* (rather than complexities) in Javier Cercas' *Anatomia de un instante* (Barcelona 2009 for the Castellan version, 461 pages), the "moment" being the three-hours lasting aborted attempt at political takeover in the Spanish parliament, led by Colonel Tejero, in the afternoon of 23 February, 1981, with shootings sending everybody, excepting the Prime Minister Adolfo Suárez, under the seats (he remained seated).

The coup failed because King Juan Carlos refused to receive the general sent by the leaders to have the new situation officially recognized and accepted.

Cercas's book of course tells us about the dramatic event, but the unusual length of his book derives from the fact that he presents numerous ways of looking at the event, a tight series of Hows, we could say, reminding me of Theodore Dreiser's *The Financier*.

On page 184, Cercas notes that
La istoria fabrica extrañas figuras, se resigna con frequencia al sentimentalismo y no desdeña las simetrías de la ficción, igual que si quisiera dotarse de un sentido que por sí misma no posee **(translation should be superfluous). Focusing on the human element, he raises a series of queries, regarding *Quién?* - who did so and so or understood or intended so and so in this moment?**

Now to the subject of *Science and History.*

Science is messy. Historians write seamless accounts to make it comprehensible, and in doing so, sometimes paper over the knots and holes in scientifiic life. Philosophers provide sparely argued analyses of scientific method, and in doing so may avoid the many awkward rubs of detail.
(Mary S. Morgan, *The World in the Model,* p. xv).

Nevertheless, it is a part of the basics for the present work that *central paradigms* of modern Physics be taken as a guide for observation and argumentation. The hedgehog of Phyiscs has its soft underside, thus being accessible at least in part to an Open_Source approach.

I am not going get myself lost in the wilderness of university schools and directions surrounding us since the earliest times and effiiciently denounced by *Erasmus of Roterdam*.

Poking fun at them, 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 scholasticorum 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.

History nilly-willy reflecting philsophical attitudes or hunches generally speaking can be messy.

The principles vary across periods, schools and opportunities and there is no definite or definitive approach or platform. In my long years in university contexts, I have seen the *vogue* change with the length of the skirts of our female friends, but differently from my case with them, I have not been tempted. I shall select a platform that has been based on parad - digmas that imply sufficient complexity, solidity, articulation and - at least regarding certain crucial features - are accessible to the Open_Source approach.

The paradigma in Physics called *Uncertainty* (or *Unschätferelation*)

is mirrored in what Herbert Simon called *human affairs*. So there are common denominators between *Science* and the Humanities like *History*. I shall be trying to profit by this common ground on which I shall experiment with asking *How* things can be elaborated, bypassing the question about *What* they may be, focusing on processses rather than objects. We can describe a process and follow it up, while trying to settle for a definition of objects, we will end up at some arbitrary end term. Here we have no control and risk getting involved in infinite regress.

This consideration leads us over to look more closely at some specific features in the models.

3.9, *The Central Paradigmas*

The observations in the preceding *Sections* can need a more consistent structural support, in argumentation and model display. Together with *Section* II,5, *Cicero at Machine Level,* the upcoming observations constitute the central material of the book.

As noted earlier, the book for a critical model uses a *digital computer* of the most basic design (Fig. 3.9.1, *Operating system*, with the main sections differently colored) will, with variants, be the *core model* in the book), with the central units: the arith.logic unit, and the control unit.

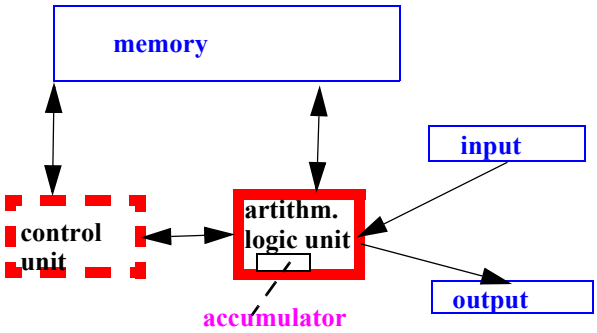

Fig. 3.9.1, *Operating system in a Von Neumann computer (Tanenbaum and Austin; the coloring is not theirs).*

Some distinctions are needed.

A premise for what follows is that of considering utterances, events, objects, processes that are not available for being loaded into or indirectly operated by the core units (CU and ALU) of an operating system like the one on Fig. 3.9.1, as covered or indicated *by the term Imponderabilia* (a non-lexical term meaning *what is incapable of being weighed, measured, or evaluated with exactness* (Webster on *imponderable*).

The second premise distinguishes between *Operating* (OP+) and *being Operated on* (-OP), and it goes as follows, warning that the distinctions will rarely be exact. Most of the graphical models in use here can be *operated on,* and can include or involve internal processes of interaction, while no externally focused activity is being attributed to them, figuratively or really.

The computer model just shown represents an *operative* group (OP+) of interactive elements with active relations to the exterior environment, and susceptible of being handled by someone outside it.

For a further distinction of the OP+ category (just discussed) , a comment by Richard Gregory can be quoted, with the reservation in the present discussion, that he very definitely includes psychological and mental features.

In his *Mind in Science. A History of Explanations in Psychology and Physics* (1981, later reprints, 1988, p. 26), Richard Gregory notes:

A brain or a computer goes through sequences of physical states that* represent [emphasized by Gregory] *the inference rules required for prediction and understanding, by obeying 'artificial' or designed restraints, such that more or less logical procedures or processes are carried out. This is not a mirroring of some kind of deep logical structure of the world, for the inference steps carried out may follow more or less arbitrary and conventional rules, which are not laws of physics. The rules of grammar of a language, the rules of logic, arithmetic and mathmatics, are not laws of phsyics - though vital for describing the physical world. Thus digital computers, though machines, function according to programs which are outside physics. What we see here are procedures of inference carried out by machines within physical laws, but not to be described by physical law - because they are not sufficient or even at all relevant for inference. Concepts quite outside phsyics ar necessary for understanding computers, and indeed clocks. Thus logarithms are not part of the physical world, though they can be carried out by physical processes of a suitably designed machine. ...

In this context, *terminological norms* are fundamental.

In the book now before you, definitions and terminologies are being developed in the relevant contexts and for the specific purposes. A warning against getting tied up in definite conceptions, 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: not to stop searching

… even when we seem to be wholly satisfied with the defnition. 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).**

The computer simulation can be transposed to another level of modeling, bringning out the passage from computer to computation and data elaboration (Fig. 3.9.1, *Stages of Interrelations*, *Kernel and Shell.*).

The *shell* program now on the agenda is developed on top of the simpler one, the *kernel* ("shell" here not identical with the term in the couplet *Form-Shell).* The relationship can be illustrated with a simple figure (Fig. 3.9.1, *Stages of Interrelations*, *kernel and shell*), in which *kernel* (thus named regarding the upcoming figure; generally called the *core*) represents the computer model repeatedly displayed.

Note that a computer system is *and* simulates *interactive dynamics*. The notes now coming up are intended to contribute to building bridges between computer working and "soft" programs.

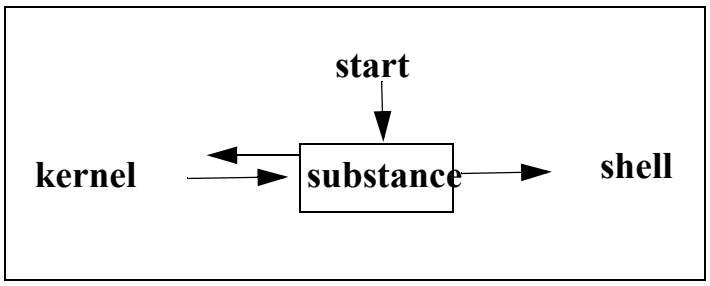

Fig. 3.9.1, *Stages of Interrelations: kernel and shell.*

Observation begins at *start* and is focused on whatever is on the agenda.

The idea is that the operating *kernel* - a computer system - picks up a substance consisting in configurable data and transforms it into *shells* or packets that contain whatever applies in terms of extended data and related environment(s).

To specify (most sketchily).

Kernel* and *Shell* do not represent *states* but *programs,* acted out on the *analysis.* This is a *process,* not a *situation.

The *kernel* should represent the initiating procedure, the *shell* then being developed from this analysis.

The *substance* - the documentation, argumentation and display *Sections* in this book - is understood as being integrated between the two stages. They are considered *stages* because of the stepwise passage from *kernel* to *shell*, and internally in the *shell*, from the computer kernel to the environment on which it operates.

For the assignment of loading the *kernel* and *shell zones* in Fig. 3.9.1 with substance, I would be using two recent publications: Tanenbaum and Austin's *Structured Computer Organization* (6th ed., 2013, 776 pages) and D. E. Comer's *The Internet Book* (4th ed., 2006, 380 pages; also an excellent vocabulary of modern data-tech terms, e. g., *open system* and SSL, pp- 345 - 372).

This model would be relevant in the two boxes of the computer model in Fig. 3.9.2, *Operating system,* in the following polarity:
control unit* <-----> *arithm.logic.unit.

The model in the noted figure, depending on our concepts and projects, can be thought to be operative in various directions and in different contexts, such as in the example figure (Fig. 3.9.2) simply labeled perspectives . These units can arise in a number of contexts, such as different brands of the CU, attachments to them or specifications of its functions and coverage, for which *see* Tanenbaum and Austin, *Structured Computer Organization,* pp. 16ff., and *passim*; and Blanchard and Fabrycky, *Systems E ngineering and Analysis,* Index: *Control* (19 references).

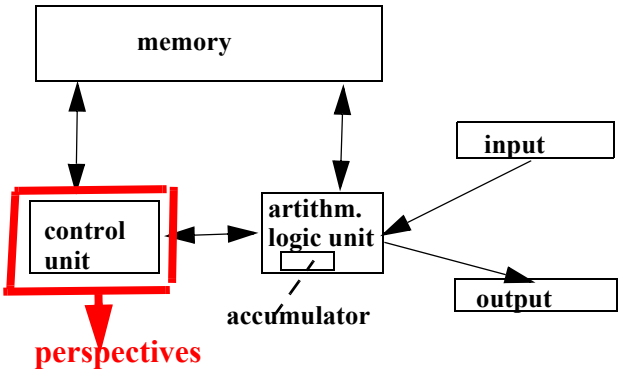

Fig. 3.9.2, *Operating System in a PC structure, with additions in red. The original Von Neumann Machine, with memory, input and output, after Tanenbaum and Austin, Fig. 1-5.*

To help me develop a more substantial grasp on my idea of *model structures*, I shall present and discuss a set of interconnected configurations, in Fig.s 3.6.4 ff., derived from Karsten Jakobsen, *Modern Design Principles in view of Information Technology* (formerly Rector at our Institute of Technology, NTH; his model is here correctly redesigned for the present job).

At the conceptual root of these models, we can consider the one in Fig. 3.9.3, A, and due to Karsten Jakobsen.

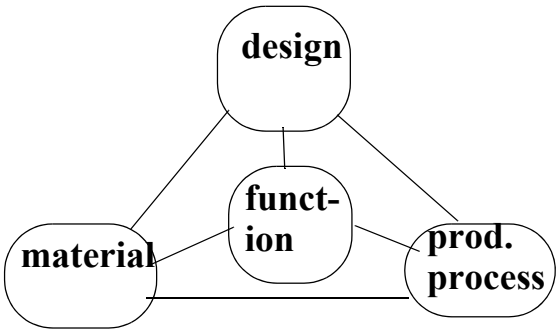

Fig. 3.9.3, A, *fig. 4 in Karsten Jakobsen, redesigned, with the original captions. Prod. = production.*

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.

Jakobsen's model, which can be understood as a group of *static* or *dynamical units*, can serve as an approximate specification of a general model of research programs for *Def<inite> values,* based on the above computer system, if we make the following substitutions: *plan* for *design*; *data and handling capacities* (e. g. computer modeling) for *material*; *analysis and elaboration* for *process*; the *solution(s),* the functions and tasks in the relevant context, for *function*.

If a configuration can be developed, modified or substituted by a closely similar one, this would be a sign of functional potential and usefulness of the model.

One development from this model (Fig. 3.9.3, A) with a view to emplying the model ideas to Cicero &Co, can be constructed as follows here (Fig. 3.9.3, B).

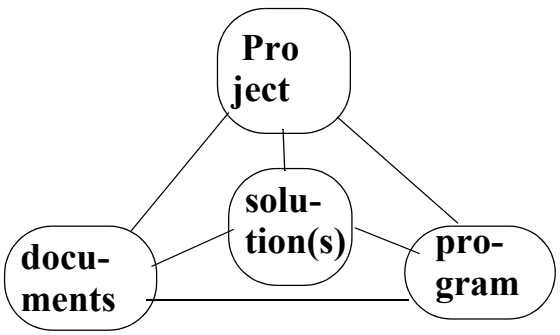

Fig. 3.9.3, B, *Model derived from the Jakobsen Model (above)*.

The captions in the upcoming *Cicero model* (Fig. 3.9.3, C) are taken from the Cicero quotations in *Cicero's De Re Publica,* a group of terms further elaborated and extended in another model (Fig. 3.9.3, D, *Group Model,*).

The captions to this model would be explicitly rendered as: *One State and one people - Cicero's political writings - State ideally after the ancient model - the forth (composite) form of the ideal government.*

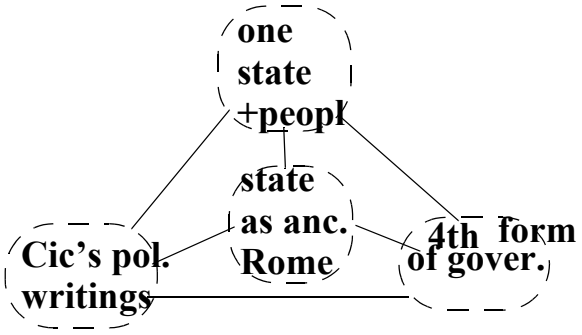

Fig. 3.9.3, C, *the KJ model with contents from Cicero.*

The two adapted models in the present Section, Fig.s 3.9.3, B and C, do not offer much that is new, but can serve to bring home the idea of *model grammars,* a spatial distribution of closely interedited and transposed to a new position, being *embedded* in a larger system, as in Fig. 3.9.3, D, *Group Model,* the larger system functioning as a framework for an original model., with the nodes as shown. It can figuratively include static and dynamical sections or nodes.

The series highlights the problem of distinguishing between the design outlines and the contents loaded inside them.

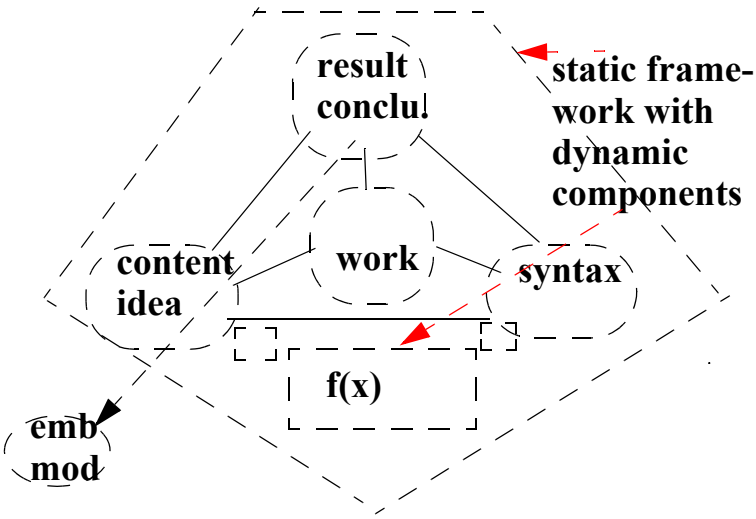

Fig. 3.9.3, D, *Group Model, the larger model system with an embedded model indicated. f(x) - the operative factor.*

Such a series of interconnected models as the one just passed in review will normally be experimental and inviting and facilitating scrutiny and criticism and possible improvements or substitutions. This is the "message" when I say that the proposals are *experimental* and involve or imply dynamics. Apart from the substantive aspekt of this show, there is the principle, that graphs and graphical models allow us to develop pictures, each *visually* developed from the foregoing one, a process not relevant in verbal discourse. If an idea is even minimally complex, construing a graphical model for it, can involve us in a series of attempts, a process more complex - and instructive - than reworking a verbal formulation.

3.10, *Structuring Thematics*

After having discussed issues regarding systems and models and their interrelations, now we need to elaborate some *methodological and procedural structures* to be applied to the subjects and their entourage.
This picture can be displayed by the graph now coming up (Fig.3.10.1).

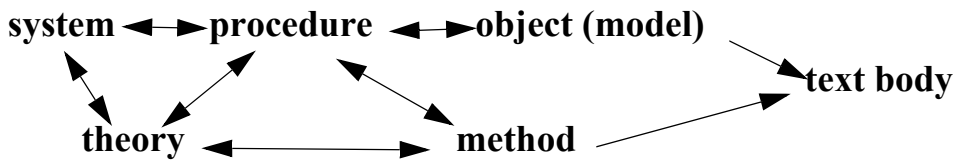

Fig.3.10.1, *Argument Structure, categorization active in system, method, model, and theory.*

Since a text runs in lines, the sequences too must do so. The configuration just displayed must be transformed into one that is linear, as in the following example.

System - Theory - Method and Processes --> Models

Depending upon *linear* writing, a decision must be made about *What comes first, second,* etc.

This consideration leads us over to look more closely at some specific features in the models, primarily systems-based theory.

***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. The 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 Hofstadter, if I have understood him correctly, any theory ready for handling is an elaborated replication of a basic theory "out there". I do not claim for them an absolute and distinct ranking, rather an indicative or pragmatic application, conveying *direction* or *tendency*.

For further observations, we could consult three relatively recent publications: Minsky and Papert, *Perceptrons,* 1988*;* and Brambilla, Cabot, and Wimmer (BCW), *Model-Driven Engineering in Practice,* 2012; and, finally, Cammarata, *Reti neuronali* 1990).

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.

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.

Some general notes on *terminology* can be highlighted further. BCW offer a program for this. 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., Frameworks from Physics

A deeplevel conundrum in Physics was the *emergence of alternatively waves and particles in one and the same operation on one and the same medium,* depending of 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*, the most disturbing discovery for Heisenberg's early teachers who had advised him not to study Physics, since nothing new would come out of that.

E. B. Bolles (*Einstein Defiant. Genius versus Genius in the Quantum Revolution*, 2001) 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 perfact precision, that if we increase the accuracy of one of these measurements, it automtically 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 charactistics, one of which, accoording 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 indeterminancy of vcelocity. This issue does* not *arise in classical mechanics ....

The burden of the present Section is to evaluate notions regarding our *recording of "facts" and their relative values and prcedures for utilizing them for some stated purpose.* The subject is cited in a great number of connections, concerning the notion oft indefinite "truths"(in Physics: Von Weizsäcker - VW, *Faktizität, ad vocem*).

A few quotations will introduce the idea of *probability.*

VW's reflections *ersparen uns aber nicht der Opfer vertrauter Vorstellungen das nicht weniger radikal ist als im vorangegangenen Abschnitt, das Opfer des grundsätzlichen Begriffts 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 is offered by *Quantum Theory* which, however, describes formally *possible* states.

These condensed reflections bring us to what is considered essential factors in *Physics*.

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 Franco Selleri's *Die Debatte um die Quantentheorie* (3. ed., 1990; *see below*), encourage us to *accept probablilites 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 understand Science exclusively in terms of definite formulas.

This is the place to refer more carefully to Murray Gell-Mann's (GM) *The Quark and the Jaguar* (New York, 1994, 392 pages), which brings novel ideas and new observations almost in every one of the 23 Sections *(Nobel Prize* in Physics for his identification and theory regarding a subatomic particle that he named a *quark*).

Having to restrict my references, I shall just list some of his Chapters and Subsections supplying short comments, sufficient, I hope, to give a crude idea of the drive of the massive enterprise.

In Chapter 3, *Information and Crude Complexity,* GM starts with noting that *in studying any complex adaptive system, we follow what happens to the information. We examine how it reaches the system in the form of a*

stream of data. (For example, if a subject in a psychological experment is shown a sequence of images, they constitute the data stream). We notice how the complex adaptive system perceives regularities in the data stream, sorting them out from features treated as incidental or arbitrary and condensing them into a schema, which is subject to variation.

As we might have expected, the burden of the work is *Quantum Theory.* In Chapter 10, *Simplicity and Randomness in the Quantum Universe,* GM starts asking the fundamental question:

How do the fundamental laws of nature and the universe stand today? How much is well established and how much is conjecture? And how do those laws look with respect to simplicity and complexity or regularuity or randomness?* (for non-scientists, the notion of *simplicity* can come as a surprise, but we can recall that *simplicity* is a traditional criterium of good mathematics). *The fundamental laws are subject to the principles of quantum mechanics, and at every stage of our thinking we will have to refer to the quantum approach.

After a presentation and discussion of *The Standard Model* (p. 125), GM takes us through the following subsections regading Quantum Mechnics (QM): *So-called Grand Unified Theories; Einstein's Dream; Superstring Theory - The Drea*m *Perhaps Realized,* and some further Subsections, thereupon over to Chapter 11, *A Contemporary View of Quantum Mechanics* (subtitled *Quantum Mechanics and the Classical Approsximation*).

The drive of GM's argument can perhaps be briefly indicated by citing the subtitle on p. 142: *Alternative Histories in Quantum Mechanics.* The QM is not a uniquely interpreted nor a static notion.

At this point I want to see the cited perspectives in a wider, let me call it, *science-political,* context.

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 a*nd 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,* as well as a story about the *human and organizational* characteristics, with evaluation of the chief protagonists, among them Bill Gates (the Boss), James E. Allchin and Brad Silverberg, reporting the story as one about multi-lavel organizational issues with staff ingredients - and conflicts as well as cooperation.

A book like Bank's is useful also in the present context, since most of the issues in my work are linked up, at least indirectly, with organiozational patterns on abstract levels.

There are of course some points of diference between a corporation like *Microsoft* and *universities,* even in the US, where unversities 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 thinking of 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).**

Concluding this *Section* I shall quote from Murray Gell-Mann's *The Jaguar and the Quark,* from his *Preface,* pp. ixf.:

my aim in this volume is to set forth my views on an emerging synthesis at the cutting edge of inquiry into the character of the world around us - the study of the simple and the complex. That study has started to bring together in a new way material from a great number of different fields in the physical, biological, and behavioral sciences and even in the arts and humantities. It carries with it a point of view that facilitates the making of connections, sometimes between fact or ideas that seem at first glance very remote from each other. Moreover, it begins to answer some gnawing questions that many of us, whether working in the sciences or not, continue to ask ourselves about what simplicity and complexity really mean.

3.11, Notes on General Theory

As we have seen, *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:... Erst die Theorie entscheidet darüber, was man beobachten kann - Theory first.*

Definitely so?

There will be a motivation for approaching a notion or project, and this motivation will usually contain a dose of theory or, at least, a *hunch* with elements of prevision, planning and purpose awareness, which amounts to more or less the same. Einstein bypasses the issue by anticipat-

ing a determinant but secondary stage in such a processes. Even hard-looking proceedings suffer from such imprecisions at the initial stage.

Our *roadmapping* cannot bypass such first-step activities in our mental and brain setup.

My notes here are not original ones, as they will arise more or less directly in the cited works by Herbert Simon, Gell-Mann, and Minsky & Papert.

The idea of being mentally prepared is developed in the context of physical environments, particularly urban and architectural settings and disucussed at length under the heading of *Personal Construct Theory* (Gollege, Stea and others; *see* SL, *Patterns*).

***We can now carry the ideas over into general theory*.**

Murray 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 unfamilar 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 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 in the present work. I am out to explore *How,* not why, certain writers expressed themselves, and what eventuallly 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, can 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 *ma-*

***trix* (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* (statistical) proposal (*hat eine Formulierung der Quantentheorie angegeben, in der explicit wird, daß sie nur eine neue Wahrscheinligkeitstheorie ist.*).**

Physics, as we formulate it is not a reality but an artifice and a subject of action rather than a set of definitions (excellently explained in Richard Feynman's *The Character*); a dynamical web of parameters rather than a manifest field; modalities of actions rather than types.

A *structured representation* of digital networks and the functions, capacities and operative handles of an essential *Von Neumann computer* can serve as an adquate model for Human intellectual and response patterns. The idea is not new, 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.

3.12. *Uncertainty*

We have to accept an amount of *uncertainty* in our trajectory. 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 uncertainty or *Indefiniteness* in our arguing and model application can turn out as an asset, because it helps us to bypass our traditional teachings always to demand final results and conclusions.

While Erwin Schrödinger took the math attitude, launcing *equations* for the *Uncertainty* problem, Werner Heisenberg proposed a matrix solution for this, accompanying his argumentations and discoveries with highly articulate philosophical considerations and proposals. For me to give a summary of the ideas impled here, would expand the present book even more than actually, so I shall just set up a list of some chapter headings in Heisenberg's two most important books, in the versions I have myself:

1.*Der Teil und das Ganze, Gespräche im Umkreis der Atomphysik*, Munich 1969 (my copy: 2005).

The book contains twenty articles from various periods, 1919 - 1985. Selecting, I will highlight the following articles to show, in addition to the ob-

viously fundamental writings directly on Physics, contributions of a wider perspective, such as
- *Der Begriff "Verstehen" in der Physik.*
- *Erste Gespräche über das Verhältnis von Naturwissenschft und Religion;*
- *Quantnenmechanik und Kantsche Philosophie.*
The next book:
2. *Quantentheorie und Philosophie, Stuttgart 2006,* with, among others, the following headings.
- *Die Quantenmechanik und ein Gespräch mit Einstein:*
- *Die Kopenhagener Deutung der Quantentheorie* (Niels Bohr lived and worked in Copenhagen):
- *Über die Verantwortung des Forshers.*
- *Die Bedeutung des Schönen in der eksakten Naturwissenschaft.*
Will we read H. differently today respectively of the way he intended and undestood his writings in the 1920s? A criterion of an important contribution is that, linguistic variables taken into consideration, it seems to remain basically the same with different readings.

In her masterly *Skurrile Quantenwelt* (2006), Silvia Arroyo Camejo has a section on the subject (pp. 118ff.), where she offers an epitome of the divergence, concluding that Heisenberg, with his *matrices* represented a fundamentally *positivische Standpunkt,* while Schrödinger with his *equations* took a typically *realistische Sichtweise.*

This to my mind is to simplify Heisenberg's position unduly. He wrote a great number of books and articles with definite, highly informed and penetrating *philsophical* insights, ideas *and original propositions.*
Matrices are different from equations not only in terms of procedure (*see* Howard Eves, *Foundations...,* pp. 122 ff. on this), but also on account of their semi-geometric and pluri-processual nature, lending them an image-like character.

Mathematics, too, involves uncertainty. Howard Eves (Foundations, 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 wehther 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".

We have seen that the notion of "facts", German *Faktizität,* is not a constant variable even in Physics.

***Complexity* will often come as a associate to *uncertainty*.**

This brings us to a notable case of *bipolar qualities in Physics.*

It is the falready cited divergence between Werner Heisenberg and Erwin Schrödinger I have in mind, concretized in their development respectively of *matrix* or *equation* for recording and handling the basic duality in deep-level Physics.

When Heisenberg resented the preference among contemporary scholars for Schrödinger's equations, especially after the latter showed the compatibility between the two modalities, the reason must have been the feeling of loss on a philosophical level rather than a personal resentment.

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 (when accepting the statis nature of the matrix). There are at least two levels here: the graphically figurative one, and - most importantly - the functional one, in terms of which most differences vanish.

For the description and handling of one and the same *Uncertainty* principle in Physics, let me repeat and elaborate the fact that Werner Heisenberg and Erwin Schrödinger developed *two different models*, which can seem to bring out two different modalities of approach, *image scanning versus text scanning*. Schrödinger formulated the notion in *equations*, that is, pure "text", Heisenberg with a *matrix*. A matrix is a rectangular array with certain internal properties and handles for operations. This comparison, however, is a little less definite than I have noted, for equations can appear as a group or system and be integrated with one another.

We are involved in *complexities* with no *Yes* or *No* answers.

James Gleick has a mass of fascinating but not very precise information on complexity in his book *Chaos*, and Murray 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 observation 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 latter a name for a wide range of emotion-

al experiences and conundrums: *An appeal to the emotions is little likely to be effectual before luncheo*n (Somerset Maugham).

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, (*Against Method,* pp. 257f.), describes the conflict, not as traditionally claimed, as one between a "modernist" and a "reactionary", but rather *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, to my mind convincing.

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. 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. His world was diferent from Damasio's. Was Aristoteles' *Physics* erroneous - or was it an expression of the age's knowledge and ideas? Is our idea of Physics more correct?

Descartes operated on a d ifferent issues 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.

But "realities" are rooted not only in fundamentals in Science (Heisenberg) or roles in Society (Bellarmino), the convictions also emerge 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 editors, Giordane Bruno and Giulio Giorello.**

The work is rich in logistic perspectives for theory-building and application, with references to other "relativists", among them 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 *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, should 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 bibilography 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 (from now DF) 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*, *Probabilty, 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).

Bruno and Giorello note how, for DF as for 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 probabilitá è questione di* feeling [sic] (pp. 22ff.). Further on *probability,* pp. 27, 36f. On pp. 17f., *mathematics* is singled out to show how *truth (Veritá*) is *incompensibile,* unintelligible.

It is because *post-1900 Physics presents relativational* (thus, to avoid saying relativistic) *features at the very base level*, that l 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 medium to relate these units to comunicable "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 roadmap for strategical operations*, we have to simplify the picture, selecting the central 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,* the general perspective of model construction and use.

We 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 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.* 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 (VW) 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 Werner 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 (publishing in the 1580s !). On p. 585, VW discusses the status of theories, and the fact that nothing is permanent but subjected to change. *Alles fließt.*

Franco Selleri (*Die Debatte um die Quantentheorie,* pp. 34f.) gives a detailed account of the remarkably *contrasting* argumentative modalities to be found among the most important protagonists in the Physics of the 1920s. The shift in outlook and accent over a fundamental notion in such a reputedly "exact" Science as Physics, lays bare the soft underside of the hedgehog.

I shall quote the passages in the original German, and supply a summary in English.

Die Diskussion der wissenschaftlichen Persönlichkeiten der Hauptautoren der Quantentheorie hat uns auf eine scharfe Trennung der Ansichten dieser Autoren bezüglich dreier Fragen geführt:
1. Existieren die grundlegenden Größen der Atomphysik, wie Elektronen, Photonen, usw., unabhängig von den Messungen, die von Physikern ausgeführt werden?
2. Falls die obige Frage positiv beantwortet wird, ist es dann möglich, die Struktur und Evolution atomarer Objekte und Vorgänge zu verstehen, in dem

Sinn, daß es möglich ist, Raum, Zeit, Bilder in Übereinstimmung mit der Realität zu entwerfen?
3. Sollen die Gesetze der Physik so formuliert werden, daß ein oder mehrere Gründe für jeden beobachteten Effekt angeführt werden?

Debates among the chief protagonists in Physics reveal fundamental differences in the outlook regarding the anti-classical notion that physical states at atomic levels depend on our observation of them. The three-point questionary asks if there is agreement or not about this. As one would expect, the *supporters* of the *Quantum* theories (among them Sommerfeld, Born, Bohr, Heisenberg, Dirac) reply with a *No*, the antagonists (among them Planck, Einstein, Schrödinger), defending what they took as *rationality,* and the undecided, reply with a *Yes*. Traditionally, physical data are not taken to depend upon the observer and her/his understanding, technology and frames.

The crux of the matter in the present connection, is that there was a deep split among top physicists about fundamental issues in their common field.

But there were nuances. Franco Selleri (p. 35) notes that among *those who defended Quantum Mechanics*, only Werner Heisenberg opted *klar gegen das Konzept der Realität.* The others stuck to Tradition on this essential position, defending "Reality". Selleri (p. 34) notes that Paul A. M. Dirac did not accept the traditional notion of *causality: wir müssen unsere Ideen über Kausalität revidieren. Kausalität ist nur auf Systeme anwendbar, die ungestört bleiben* (we have to revise our ideas of causality. Causality can be attributed only to systems that remain intact).

The fluctuant charater of theories and knowledge acquired through physical theory , as we have seen, also affects our relation to rationality and what we mean by this term.

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

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

The parameters, programs and terms so far reviewed will all of them arise, at least indirectly, in the literature on *Management Information Systems* (MIS).

Recent treatises on the subject of *MIS* offer nunerous choices, and as Davis and Olson 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, 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.

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 borrow a graph (Fig. 3.12.1, *Five Paradigmas*) , representing a *maximation* framework and situated within some not definitely or clearly bounded framework of other models, patterns, environments, etc.

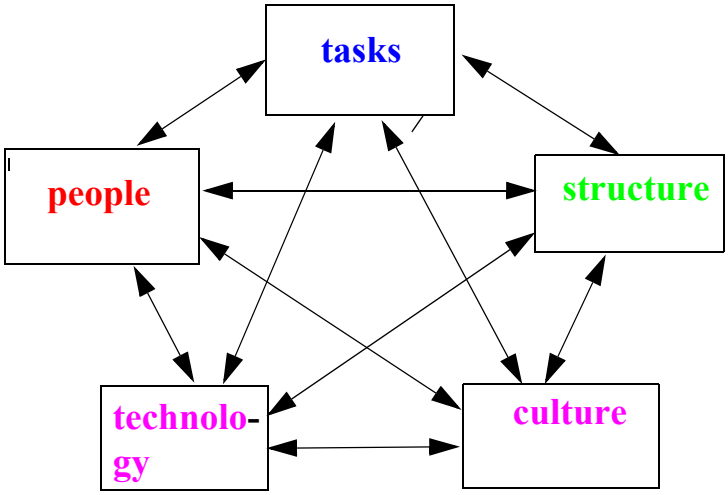

Fig. 3.12.1, *Five Paradigmas, cross-level chart with 20 directives (from Davis & Olson).*

Provided that we can consider the five entities on Fig. 3.12.1 as if being located on *one and the same level* (my coloring suggests differently), the chart can be taken as a workable picture of a *maximation framework*, with twenty specific interactions denoted by the twin-headed arrows.

Certainly, the codes cited on the chart are not commensurable nor unilevel. The chart forces the issue by knocking into one parameter widely different notions on several levels, making them look tightly coupled. Disturbing? 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 our models and charts can be subjected to a *maximation process*.

***Maximation* has been discussed in my earlier publications. 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).

Having got as far as this point, the Reader may well ask: So What?
The only answer to that query seems to be considering the theoretical and

system-focusing environment as it will now be presented, evaluating it for loading capacities. This demands my construing an Encompassing Problem Picture, the principal subject of the present *Part.*

Looking back, the question arises about the problem issue: how does it come out in general terms?

A fundamental question regards the nature of a "problem". Let me say that the term focuses on an issue or relationship that needs to be described in other terms, models or comparisons or on another level than those in which we meet the subject, no substitution in terms of some "solution", like solving an equation in terms of symbols or numbers; there are no engines producing something, no causation mechanism. merely going down or up a step or two, changing the view and the context.

This, let me repeat, means that we cannot hope to come up with conclusions or definite statements, results or models. A further consequence of course is that "my work" cannot invalidate "your work", it can only seem preferable. I am speaking now of works, mostly in heuristic terms,in certain theoretically founded programs.

So *problem solving* can mean simply to transfer an issue to another level in a system.

Let Herbert A. Simon state his view on problem solving (*Models of My Life*, pp. 228 ff).

Problems in the real world are sometimes presented in the form of natural languague statements (problems in textbooks), sometimes in the form of visible situations (the road in front of our car), sometimes in a combination of natural language texts and pictures and diagrams (a scientific article). The steps that translate a problem from the form in which it is presented to an internal form on which the available problem-solving processes can operate are a crucial initial component of every problem-solving activity.

An explanation of problem solving is grossly incomplete if it does not account for what goes on in "understanding" the problem, or, what amounts to the same thing, in forming an "internal representation" of it....

Creating the internal problem representation requires a semantics, that is, information on what the representation "denotes" in the outside world. A semantics is needed both when problem solving begins, and, subsequently, when changes in the external situation need to be known by the solver. his requirement is bypassed in problem-solving systems that operate wholly internally...

So far Simon.

Have we "solved" the problem?

A crucial and informative aspect arises from the *Def/NonDef* relation, however artificial this may be considered. The question is not whether the

relation holds water or not, but whether it can serve to get a more systemicallly and logically articulate and communicable grasp on the soft underside of the animal.
No model is better than the other, in any sense that guarantees results, never uniquely valid, only vectorial.
Concluding decision for my program or a section of it can only be to *stop the process*, calling it a conclusion, being aware that there is no such thing as a definite or definitive conclusion. For *decision theory*, see John C.Martin, *Introduction to Langauges and the Theory of Computation* (fourth ed., 2011, 436 pages). I cite this to make clear in terms of contrast that no such theory can be applied to my project.

3.13, *Conflating the Programs*

We now need to conflate the observations on models, systems and their functional context. The matters so far presented could not make up a highly consistent program, but here are some scattered notes.

My non-digital programs are *approximate*, and intended to serve in simulating operational fields for models, they have to be structured and conceived as mirror-images of real systems.

Working out our models and testing them is not a *stage* in my work but is rather *the work.* The models represent ths closest we can approach any subject or theme or problem.

The models have to be loaded into some *model-group or 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.

An additional note on *systems use* is relevant 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 ito 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 FitzGeralds (*see* the references just cited in SL, *Burden, Patterns,* and the present *Bibliography*) discuss real or *Def<inite> systems,* dynamical structures that can be identified in the running machinery of social, industrial, biological and other organisms. *Programming,* means to work on a selection from some pre-established tentative theory-represented by some graph or, indeed, verbal formulations.

Having used a computer model to replicate human initiative in contexts, subject selection and focus, and object/theme handling, in short, definitions, in the next phase this picture could be implemented on the wide range of human categorization, applications and rule-systems for storing, using and manipulating knowledge, controlling and determining observation and reasoning.; epitomizing: argumentation.

Mutatis mutandis*, approximately but closely in terms of reasonably determinable and graspable, the human interplays just indicated come figuratively to life in the range, depth and extention of a *computer-based environment.

The *source* for my models has been an image of a classical *Von Neumann computer, within* and *at the base of* the technical-operative range of human intellectual activities. It is to these activities I now turn.

My hunch is that I need some *systems model* to guide me. Which means to bring in the famous rule of Albert Einstein: *theory first!*

Yes, because I shall need some *norm* by which to procede. And any norm is *theory-based*, or *expressing theory*, even when this is not made explicit.

I shall be using the classical, simple Von Neumann computer model (Fig. 3.13.1), supplying codes - A -. F - on it for references to the elaboration to follow.

The reference system applied here is *one* alternative, that of *imagining* our capacities and mechanisms as being loaded directly into the computer model. I shall limit the related show to the base essentials, just sufficient, I hope, for general evaluation of the procedure rather than the outcome.

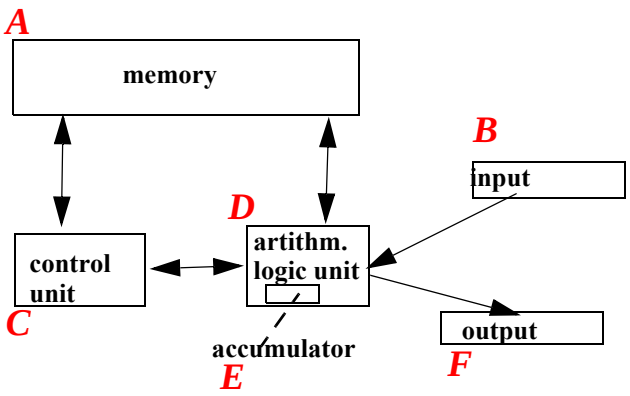

Fig. 3.13, 1, ***Operating System in a PC structure. The original Von Neumann Machine,*** **codes following: A - F C-D the kernel.**

Here is the list of the figure nodes in categorization terms (a typical case of experimentation inviting criticism).

A, B

Consulted literature, personal writings, sources

C

Structuring, categorization

1.focused on objects;

2. ***focused on method(ology).***

Make model(s) for structuring these parameters.

D

Implementation

Arguments, sources, models, method:

characteristics of these

E

Special theory/system/model choices in the works.

F

Summary, conclusion.

So far a ***thought-experiment.***

PART IV THE OUTER CIRCLE

Part IV is dedicated to supplying informations and comments on fields that are tangential to the central issues discussed so far.

4.1, *Science Systems*

My justification for returning to the complex subject of *Science*, tangentially considered in several places in this work, is that whatever we do in conceptual and argumentative terms, somehow must take paradigmas of Science as a guide and model. This at least for me is axiomatic.

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 Richard Gregory said, he will "see" the entire machine working, but he does not need to understand these opera-

tions from a standpoint of physical mechanics. (in his *Mind in Science. A History of Explanations in Psychology and Physics).*

3. A *concptual syste*m, 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 ilustrate 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. 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 written 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 localizzable clusters of parameters we categorize as scientifical; 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.

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 comunity-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 (as some writers did with Ibsen's *Doll's House)*, with *le grand Cardinal,* Richelieu, initally amused but soon worried, and finally blocking further dicussions.

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 (*Einstein. His Life and Universe*, 2007. 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.

4.2, *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 communitaction, since notooriously *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 proclaimed: *we shall win the battle with arguments!* (they didn't) But in politics, arguments are no more determinating 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 methdologically adequate way. Political approaches are mostly literary and demonstrative.

It doesn't seem possible, at least not advisable, when discussing Social Science, to bypass some of the issues in modern Sociololgy. 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 further 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 usful hints, both substantially and methodologically.**

***Secondly*, all parameters on the agenda in the present work are *social at some levels.* So I have to take Mills' book seriouly.**

There is no "objectivity" for handling such matters, only *points-devue* that depend on our backrgound, upbringing, education, inclinations, opportunities, purposes and planning. Works like the cited one can help us controlling this process (please excuse my repeating what is obvious).

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, building, or more or less consciously claimning, 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 since we would then be involved in an unsurveyable maze.

Connecting some comparable human attitudes and ideas that defy definition and formalization, we would 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 (SL, *Burden,* IV, 6 pp.

184ff; available on the present site.). Some of these ideas are in the background of my thoughts about what I call *Inception Theory* - for a universe of theoretical models of configural and verbal nature (*Part* I, 3).

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;* purely verbal systemization will temain impenetrable and opaque.

I shall supply some further notes on the field just referred to.

Wright Mills (*The Sociological Imagination*, 1959) delivers an exceptionally "complete" and critital 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 commonly used to the data universe. At an international "inter-university" conference in Florence in 1995 (I think it was), I asked a British matematician 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 adquately 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, *Hand-*

***book 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 linkage 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).**

Adam Podgórecki and Maria Loz (Woz: excuse my imperfect 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 per-spectives. 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 whom 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 hasmuch 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 Jaritz. study and by studying the *Organizational Subystems Model* in Davis & Olson (their fIg. 11- 8; here Fig. 4.2.1, repeating the design without the earlier colored classifications) as commented by the cited authors.

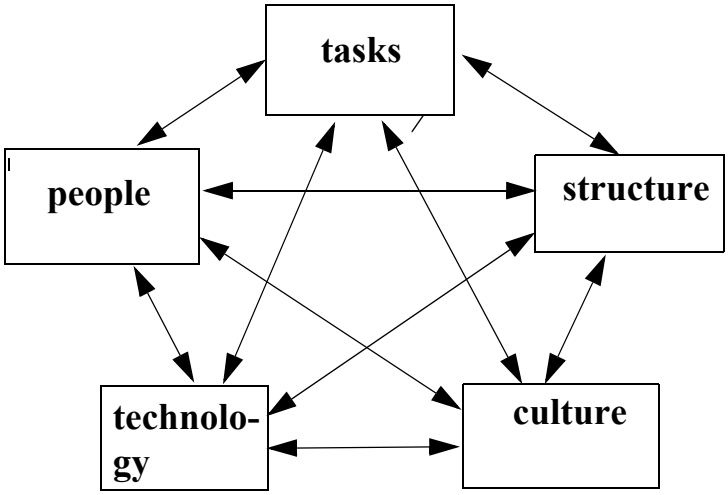

Fig. 4.2.1,*"Culture" in Context (from Davis & Olson).*

They note (p. 354) that *many management theorists add organizational culture as a fifth element* [with task, technology, structure, people]. The signiificance of the model displayed here, they note, *is that, because of the strong interdependence, a change in one component ineviably has effects, planned or unplanned, on the others. The impliicit approach of many technology 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.

For several of my models I 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.

Now let me present some relevant publications:

From Minsky/Papert (*Perceptrons,* 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.

***S.* Cammarata's *Reti neuronali* (1990) is claimed, probably rightly, to-have contributed to new research on *Artificial Intelligence*.**

My point of referring to these publications in a context of social theory is that the arrival upon the stage of new, efficient and *analytically fundamental* paradigms should force sociological programs to rethink its bases.

Two relatively recent work, one on economy and models, the other on modern science generally, merit some further attention, siuce 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 amswer questions about the economic world. These manipuable objects are the principal starting point in ecnomic 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 consert "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.*

4.3, *Space Organization*

A great complex of studies in area topography and use, urban structures and corresponding administrative and political issues can be subssumed 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, *Spatial Organization. The Geographer's View of the World,* 1972.

They introduce their work with some general considerations, among which I will highlight the following entries, indicaint an argumentation in terms of structural behavioural models:

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 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 and focus on "human" intake. Citing *human rights* regarding a site under Chinese control of course makes the work amount to something more than just Architectural History.

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.

4.4, *Industrial Design*

The discipline of *industrial design* in Europe and the US start out, if not always in parctice, 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 one.

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.*

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 Deisgn Proces*; pp. 41 - 52*s*.).

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 develop-

ment 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.

A witness, I believe, to the relatively "modern" method of focusing on relativized and non-terminable processes.

These activities and those already cited in this *Part* owe much to *organizational* ideas.

4.5, *Organizational and Administrative Issues*

This *Section* will touch on organizational theory, but with a limited and mostly indirect scope, the purpose being to propose directions for more close and carefully conducted exploration.

Almost any question of *modern organizations* and their conduct and administration, is today handled with heavy doses of the so-called human factor. Herbert Simon's autobiography, *Models of My Life* (415 densely printed pages in my version of 1991), provides an unsurpassable guide (with numerous references, also to his own "professional" works).

By *looking at management in decision-making terms* (p. 73), Simon took the step over from (neo)classical economic theory to a much more complex view of economics in organizational terms in which the human factor played a pivotal role.

Organizations, it appeared, could be understood by applying to them what you knew of human behasvior generally. Where specific experience was lacking, metaphors and analogies might fill the gaps...

Following the lead of Simon's discoruse, I shall supply some notes more or less tangential to the central issues of *Organizational and Administrative* theory. My motivation is, simply, that activities at the fringes are no less important than the goings-on in the center.

Bruno de Finetti , *L'invenzione della verità* (1934), refers to the field of traditional philosophy as *una sterile arena di acrobazie verbali e di ludi dialetici* (p. 69, translation hardly required) and specifies the criticism (*see* also Bruno and Giorello, summary, p. 10) in the same publication. 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).

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, competitional situations, and internal exchange of plans, ideas and "cultures" of the largest ever data company, and how the US legislation, not too well up on the matter, could block innovation in a field under constant development.

An imnportant 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*, widely developing depth and scope as found in many existing studies and models.

This subject or field has been referred to several times in the present book, while of course the field and social science dovetail on many points.

David Silverman's *The Theory of Organiuzations* (1970) brought 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 'marco' problem of the pattern of relations that is established by their interaction.

In Simon's as well as De Finetti's, Bank's and Silverman's compass, the *sociolgical issues,* centering around the human factor, play a great and decisive role.

A by now classical analysis of 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 *Consentus theory* and *Conflict theory,* surely paadigmas 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), to which I return for a moment. Of course, *connectivity* was a central issue here:

Connectvity. 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 predomimant 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 contrasts with other firms and organizations - and the distant (from Seattle, but also in terms of understanding) Government in Washington DC.

Do you want a text book on organization theory?
David 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 drammatically determinant, incisive *and* noise-creating Human Factor (*noise* of course in the system significance).

PART V SUPPLEMENTS, FIGURE LIST, AND BIBLIOGRAPHY

5.1, *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 Engliush 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 contemnar 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 sediotissimis 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 relicttum, procuratio atque administratio rei publicae, non me inertiorem 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 querimus.
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 cognagtione 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 semone 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 imstitutio. Hi coetus igitur hac, de qua exposui,

causa instituti sedem primum certo loco domiciliorum causa constituerunt; quam cum locis manuque 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 optimatium 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 vinclum, quod primum homines inter se rei publicae societate devinxit, nom 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 cupiditatitbus posse videtur aliquo esse non incerto statu.

DRP xxvii
1. Sed et in regnis nimis expertes sunt ceteri communis iuris et consilii, et in optimatium 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 vitiis, quae ante dixi, deinde habent perniciosa alia vitia; nullum est enim genus illarum rerum publicarum, quod non habeat iter as finitimum quoddam malum praeceps ac lubricum.
2. Nam illi regi, ut eum potissimum nominem, tolerabili aut, si voltis, etiam amabili, Cyro, subest ad immutandi animi licentiam cruddissimum 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 optimatium vel factiosa tyrannica illa vel regia vel etiam persaepe popularis, itemque ex ea genus aliquod ecflorescere ex illis, quae ante dixi, solet, mirique sunt orbes et quasi circumitus in rebus publicis commutationum et vicissitudinum;
2. quos cum cognosse sapienis est, tum vero prospicere inpendentis 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 familarum 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 optimatium.
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 immuatbilis, nihil firmius;
5. facillimam autem in ea re publica esse posse concordiam, in qua idem conducat omnibus; ex utilitatis varietatibus, cum aliis aliud expediat, nasci discordias;
6. itaque, cum patres rerum potirentur, numquam constitisse 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 honinem 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 comi domino an aspero serviant; quin serviant quidem, fieri non potest.
4. Quo autem modo adsequi poterat Lacedaemo illa tum, 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 populu 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 acesserit.
2. Quodsi liber populus deliget, quibus se committat, deligetque, si modo salvus esse vult, optimum quemque, certe in optimorum consiliis posita est civitatium salus, praesertim cum hoc natura tulerit, non solum ut summi virtute et animo praessent imbecilioribus, sed ut hi etiam parere summis velint.
3. Verum hunc optimum statum pravis hominum opinionibus eversum esse dicunt, qui ignoratione 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 optimatium 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 opulentisimi 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 permisso 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, ocurrit 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 conparandi difficile ad eligendum sit, quid maxime velis.
Terms in Cicero

Here is a list of key terms intended to help readers in looking critcally 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 - inperia consulatusque - libertatem - doctissimorum hominorum 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 domicilorum causa consistuerunt... - 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 optimatium - 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 optimatium 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.

5.2, *Bibliographies*

1.Classical Editions (below: 2. Modern Publications).

- CICERO.

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