

# “Dinâmica da pesquisa em ciências sociais” 40 anos depois e além...

*Research Dynamic in social sciences – 40 years later and beyond*

**Jacques J. Herman**

Université Catholique de Louvain

[jacques.herman@uclouvain.be](mailto:jacques.herman@uclouvain.be)

## RESUMO

1. O polo epistemológico: a busca da filosofia na ciência social.

Filosofia e sociologia da ciência. Ciência social factual e crítica.

2. O polo teórico: lógica, linguagens e paradigmas.

Conceitualização e representação, teoria e verificabilidade. O papel dos paradigmas.

3. O polo morfológico: complexidade e coerência.

Forma, conteúdo e finalidade/objectivo. Novos modelos formais: aplicação da teoria dos jogos, caologia e teoria difusa (ou teoria *fuzzy*).

4. O polo teórico: colecta de dados e verificabilidade.

“Computorismo” e empiricismo. Verificabilidade e a inevitabilidade da estatística.

5. O Projecto AdeQua. Os passos da Análise de Dados Qualitativos. Por quê o foco em dados “qualitativos”?

Nota sobre Correspondência Factorial.

## Abstract

1. *The epistemological pole: finding philosophy in social science.*

*Philosophy and sociology of science. Critical and factual social science.*

2. *The theoretical pole: logic, languages and paradigms.*

*Conceptualization and representation, theory and testability. The role of paradigms.*

3. *The morphological pole: complexity and coherence.*

*Form, content and scope. New formal models: applied game theory, chaology, fuzzy sets theory.*

4. *The technical pole: dataism and testability.*

*Computerism and empiricism. Testability and the fate of statistics.*

5. *The ADeQua Project. The steps of Qualitative Data Analysis. Why focus on « qualitative » data?*

*Note on Factorial Correspondence Analysis*

**Palavras-chave:** Metodologia em Ciências Sociais; **Keywords:** Social Science Methodology; Polos Epistemológico, Teórico, Morfológico e Técnico; *Epistemological, Theoretical, Morphological and Projecto AdeQua; Análise de “Dados Qualitativos”* Technical Pole; *AdeQua Project; “Qualitative” Data Analysis.*

## 1. The epistemological pole, finding philosophy in social science

### Philosophy and sociology of science

*Dinâmica* is an exercise in general methodology, part of the philosophy of science. It has a large descriptive content but above all a prescriptive and normative content. Epistemology is the normative “know why” ingredient in the methodological “know how” procedure. Science is also socially and culturally determined and historically changing. But this is a factual problem concerning, notably, the sociology of science. Therefore, it is possible in a UNESCO survey to compare researchers from different countries using different methods and paradigms, but this *presupposes* introducing concepts and definitions independently of the respondents 1. Don’t confuse the normative and the factual!

### Critical and factual social science

*Dinâmica* has been written in the cold war epoch, before the first energy crisis, between the Marxist heritage, the Anglo-Saxon dominance and the French cultural effervescence. Nevertheless, it survived! The principal reason is because we tried impartially to articulate the major ingredients of sound factual scientific research, regardless of ideological obedience's.

Methodology offers a pragmatic point of view that helps to avoid ideological dogmatism. Criticism must be first a cognitive activity aiming at evaluating the value of a *problématique*, addressed to the researcher himself. True science is the *unended quest (Karl Popper) of chasing reality (Mario Bunge)*, independently of ideological interests. Most ideologies bank

---

1 Jacques Herman "L'articulation des sciences et l'organisation de la recherche. Transdisciplinarité, paradigmes méthodologiques et sociogenèse des pratiques scientifiques". Doctoral thesis. Louvain-la-Neuve. 1978. 380 pp.

on factual science at a time, neglecting or even perturbing their later development. Of course, applied science is necessarily linked with some human interests, but it is because factual science is neutral that it can be soundly applied by different parties and interest.

## 2. The theoretical pole: logic, languages and paradigms

We are confronted to a double challenge: first, the *comprehension* of natural languages used by social actors, with their specific semantical and pragmatical aspects, second, the methodological *construction* of our own disciplinary scientific language. We need to articulate those two levels to escape from narrativism. We cannot confuse science with literature!

Social sciences can benefit from the use of contemporary logical and semantical research to clarify its theoretical work 2. Methodology is not only a process of data collecting and analyzing, it is overall a process of conceptual and theoretical construction. Moreover, those processes are closely linked in the research dynamics.

### 1 - *Elements of theoretical practice*

<i>Semiotical field</i>	<i>Methodological field</i>	<i>Semantical field</i>
Symbols	Constructs	Context
'a <u>term</u> '	<i>Connotation</i>	Sense { <ul style="list-style-type: none"> <li><u>import</u></li> <li>intension</li> <li>purport</li> </ul> <i>Representation</i>
	designates {a <b>concept</b> }	
	<i>Denotation</i>	Reference [Objects]
		<i>Syntactical field</i>
'a <u>sentence</u> '	designates {a <b>proposition</b> }	MEANING
	<i>Hypothesis</i>	+ Deduction
		Valuation (T/F)

2 Mario Bunge « Treatise on basic philosophy » vol. 1 & 2. Dordrecht. D. Reidel. 1974. Semantica 1 & 2. Barcelona. Gedisa. 2008.

When constructing a theory, we must be aware of its *scope*, its range of applicability. The Great theory understands everything but explains nothing, the Small theory explains anything but understands nothing.

## The role of paradigms

Every social science exhibits a pluralist diversity of approaches, schools or trends. This internal epistemic competition, although reflecting the vitality of the discipline, has many negative aspects. Notably, it renders problematic the comparison between theories issued from different paradigms.

The metascientific concept of paradigm aims to clarify this epistemic situation to facilitate communication and to clarify the debates. For sociology, six basic paradigms can be reconstructed<sup>3</sup>.

Paradigm	Ontological focus	Auxiliary sciences	Methods	Type of explanation	Sociocultural context
POSITIVISM	the social fact	physics, history logic, biology	observation, experimentation, measurement	nomological, causal, prediction	Comte Vienna circle
DIALECTICS	the socio- historical totality	anthropology, History, Logic	analogy, contradiction, praxis	essentialistic, finalist	Plato, Hegel Marx Frankfurt school
UNDERSTANDING APPROACHES	the human world	psychology, philology, logic	Verstehen, phenomenology, hermeneutics, ethnomethodology	understanding, idiography, interpretation	Methodenstreit, idealism, anti- scientism
STRUCTURO- FUNCTIONALISM	the social system	anthropology, mathematics, biology, psychology, cybernetics	function analysis, process analysis	systemism, teleonomical	culturalism general systems
STRUCTURALISM	the cultural code	linguistics, mathematics	semiotics	holism (structure)	anti-subjectivism neomarxism, psychoanalysis
PRAXIOLOGY	the social action	economics, psychology, modal logic	decision theory, game theory, rational choice	teleological, limited holism (field)	pragmatism, behaviorism, libertarianism, praxis

<sup>3</sup> Jacques Herman « Les langages de la sociologie ». Que sais-je ? Paris. PUF. 1984. 3 ed. Japanese translation.

Each paradigm has a particular ontological commitment, presupposes a definition of basic social reality. It finds its inspiration and legitimacy in some other scientific disciplines. It promotes some specific methodologies. It tries to reach some kinds of explanation. It roots in a specific sociocultural context, more or less historically extended. All those features mix together in a cohesive whole, a sort of scientific *Weltanschauung*.

### 3. The morphological pole: complexity and coherence

In social sciences, most of significant and seminal researches use or presuppose a *set* of different theories, often issued from various different fields. Ex: sociology + psychology + mediology + economics. An important function of the morphological pole is to articulate all those theoretical parts into a coherent whole. Thus, *morphology is a nest for interdisciplinarity*.

The morphological pole is also at stake when we cope with the apparently radical opposition between micro and macro analysis (*well known in economics*). This dichotomy hides deep controversies between individualism and holism, reductionism and systemism <sup>4</sup>.

Scientific methodology must struggle against reluctance towards formalism and *abstraction*. It must defeat the illusory quest for the "concrete". Form and content are not opposites, they must enrich each other.

#### New formal models

Forms are provided by the morphological pole to enrich theories and to structure data (remember the *dynamical* character of polar methodology). New global approaches emerged from mathematics: Game theory, Catastrophes theory, Fuzzy Sets theory, Chaos theory, Fractal theory... In social sciences, why not try to benefit from all those discoveries? Of course we must methodologically adapt and epistemologically evaluate any formal tool for our specific objects and purposes. The use of formal models improves the global coherence of our research.

---

<sup>4</sup> Jacques Herman "Praxiological analysis of international politics: between systemism and methodological individualism". in GIRARD Michel "**Individualism and World Politics**". Macmillan. Houndmills. 1998. 227 pp., pp. 69-88.

## Applied Game theory: the hermeneutical context of competitive political games

Game theory is the most advanced branch in strategic rational choice field. Praised for its axiomatic coherence, it suffers however from a lack of applicability. The applicability of game theory is always delicate: there is constant risk of formal reductionism, of a too simplistic schematisation of complex situations. To be applicable, its models must receive an "interpretation" in the sense of scientific semantics, they must be specified and contextualized, they must be "understood" by taking account of the signification the actors give to the issues at stake.

The canonical formal 2X2 praxiological model presupposes 2 actors A and B, each disposing of two possible alternative strategies 1 or 2. The strict order relation  $>$  is interpreted as a basic **preference** relation. Each four possible issue is characterized by a couple of utilities  $u$ , the payoffs of the game for the actors. Very naturally in political science, the strict order relation  $>$  can be interpreted as a **power** relation, domination or imposition.

In an institutional, i.e. parliamentary, context, we will frame the actors in terms of Majority versus Opposition, accepting the will of the other or imposing their own. In a democratic power game, we could construct a theory of "democratic respect" leading to four possible occurrences: "democratic consensus", "tyranny of majority", "tyranny of minority", "democratic dissensus".

If we shift the focus on a (non)cooperative game, we could construct a "theory of institutional roles" where the meaning of the game, the style of the strategies, the content of the payoffs, would be modified. We will frame the actors in terms of Majority versus Opposition, willing or not to cooperate; four issues will be possible: "democratic synergy", "minority blockage", "domination of majority", "democratic stress".

If we decide to describe a game of governance participation, we will understand the game as a more global sociopolitical process. The four issues for Majority and Opposition will be: "big coalition", "single party governance", "inversed democracy" and "regime crisis".

The methodological challenge for social science is to soundly *interpret* robust formal models and adapt them to *adequate* qualitative and quantitative data. We must match hermeneutics with formalism<sup>5</sup>.

### **Jeu de Pouvoir démocratique (théorie du respect démocratique)**

		<b>MINORITE</b>	
		<b>Accepte</b>	<b>Impose</b>
<b>MAJORITE</b>	<b>Accepte</b>	<b>"consensus démocratique"</b>	<b>"tyrannie de la minorité"</b>
	<b>Impose</b>	<b>"tyrannie de la majorité"</b>	<b>"dissensus démocratique"</b>

### **Jeu de Coopération démocratique (théorie des rôles institutionnels)**

		<b>OPPOSITION</b>	
		<b>Coopération</b>	<b>Non-coopération</b>
<b>MAJORITE</b>	<b>Coopération</b>	<b>"synergie démocratique"</b>	<b>"blocage minoritaire"</b>
	<b>Non-coopération</b>	<b>"domination majoritaire"</b>	<b>"tension démocratique"</b>

### **Jeu de la Participation gouvernementale (théorie de la gouvernance)**

		<b>OPPOSITION</b>	
		<b>Participation</b>	<b>Non-participation</b>
<b>MAJORITE</b>	<b>Participation</b>	<b>"grande alliance"</b>	<b>"gouvernance unipartite"</b>
	<b>Non-participation</b>	<b>"démocratie inversée"</b>	<b>"crise de régime"</b>

## **Chaology**

The (in)famous "chaos theory", initiated by H. Poincaré and I. Prigogine and popularized by many contemporaneous authors, is actually no theory proper. It consists of a bunch of

---

<sup>5</sup> Jacques Herman, "The hermeneutical turn of game theory in international relations". 19<sup>th</sup> IPSA WORLD CONGRESS. GP6-113. The rational actor paradigm in the analysis of international relations.

mathematical models analyzing systems far from equilibrium. We can consider this domain of transdisciplinary research as part of General System Theory.

Contrarily to Catastrophes theory, which is a topological theory without metrical component, most models in chaology can be coupled with measurement procedures, permitting not only computer simulations but also empirical application in economics, cardiology, ecology, etc. Consequently, it should be possible to apply some chaotic models in political science and international relations where we are constantly faced with crisis, wars, revolutions and democratic instability.<sup>6</sup>

We can consider chaology as a store of methodological procedures for describing chaotic processes in social systems far from their point of equilibrium. With time series data and a proper cardinal level of measurement, we could analyze some relevant historical processes to evaluate their random, deterministic (ex: linear, cyclic), or chaotic allure.

The classical Poincaré phase transformation method consists to compare of the original series  $X(t)$  with the same observations shifted by some interval  $X(t+i)$  and to construct a phase space. If we submit a truly random process to this procedure, we find no attractor (graphs 1 &2). If we apply the same procedure to the iteration of the specific non-linear quadratic function [  $x(t) = z \cdot x(t-1)^2 - 1$  ] we find a linear fractal attractor. The method applied to empirical data describing the historical troubles in Russia gathered by Sorokin ("Social and cultural dynamics", 1937), shows a random fluctuation localized in the phase space, with some symmetries. We should test other values of  $(t+ i)$ , improve our indicators, multiply the number of observations to be more conclusive.

Research dynamics, even in social science, is 1% of inspiration and 99% of perspiration. I guess it could even be chaotic!

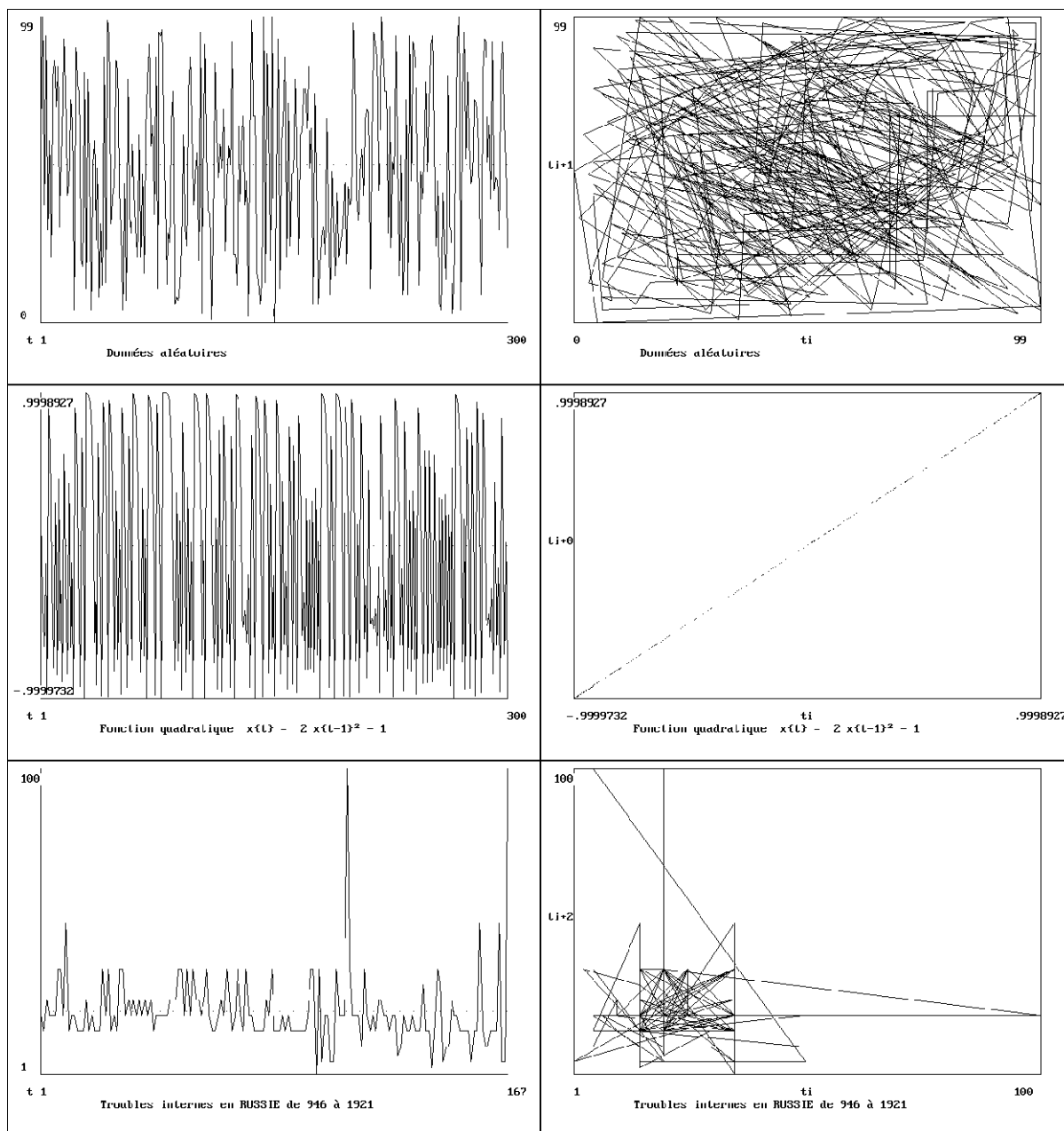
---

<sup>6</sup> Jacques Herman "Chaologie, politique et nationalisme", *Revue Internationale de Politique Comparée*. Vol. 1, n°3, 1994. pp. 385-415.



Raw data

Poincaré phase transformation



Troubles in Russia (946-1921). (P. A. Sorokin, 1937).

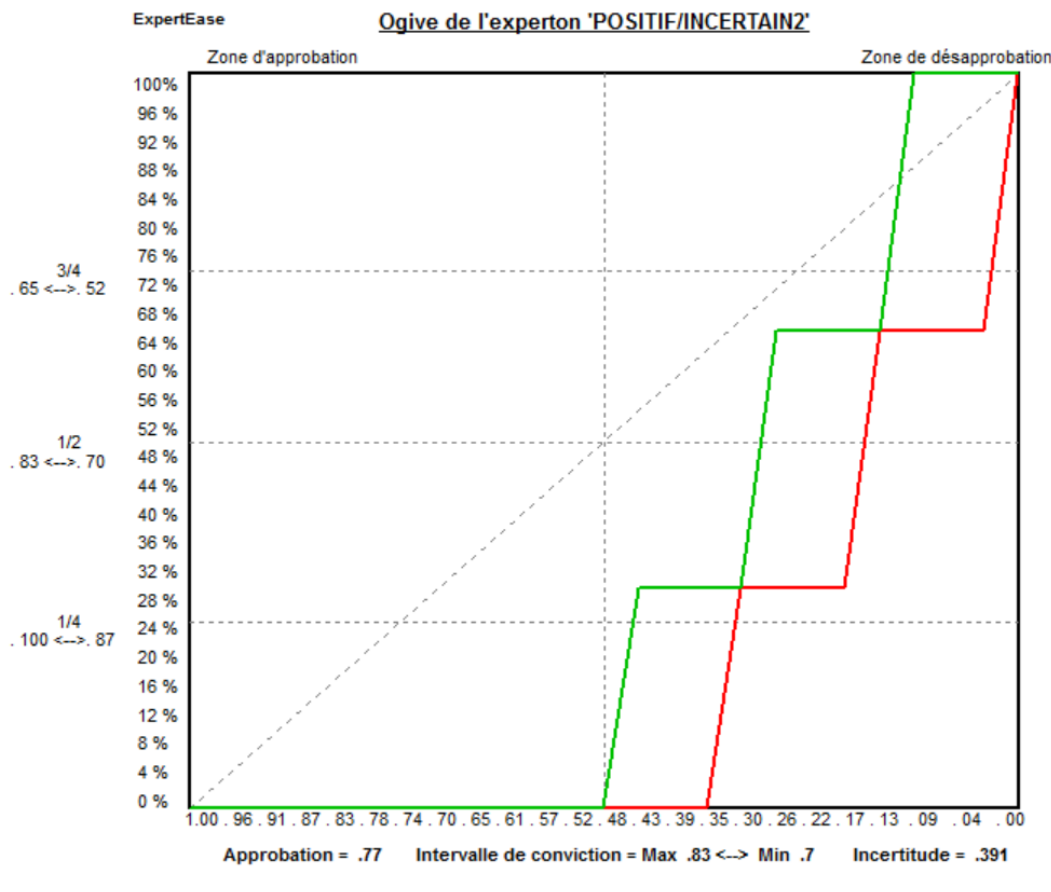
## Fuzzy sets theory

This mathematical field, initiated by B. Mandelbrot and A. Kaufmann, enlarges our vision of the basic structure of social data. Things and phenomena are not always clear-cut, especially in matters of opinion an attitude, beliefs and even knowledge. Fortunately, as statistics did not kill determinism, fuzzy sets do not ruin mathematics or logics. It is a strict and useful extension of sets theory.

Moreover, unlike dialectics, *fuzzy sets theory itself is not fuzzy at all!* It can be applied to empirical problem of questionnaire formatting, permitting the measurement of fuzzy knowledge. The technique consists in coupling Approval / (Dis)approval scaling with Conviction / Uncertainty scaling. 7

	OUI				Echelle de conviction								NON											
I	1				2								3											
II	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
III	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
IV	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

7 Jacques Herman « Experton ». Expertease software. Centre d'études praxéologiques. 2001-2014.



The method is particularly adapted to the gathering of expert knowledge. A human expert must be aware of the limits and variability of his information, notably but not only in social sciences 8.

## 4. The technical pole: dataism and testability

### Computerism and empiricism

Globalization and the information revolution provide a superabundance of data. The current *motto* is, more than ever, (clever) data selection and reduction. We risk submitting research to *dataism*; science is theory-driven, not data-driven. Computer is an indispensable servant, not a master, even intelligent and benevolent. Scientific research is *praxis*, not technology.

Some contemporary phenomena must focus our attention: the important place of opinion pools and surveys in modern democracies; the expansion of computerized data bases

8 Gabriela Palavicini-Corona « Le Mexique : l'inéluctable transition vers la démocratie ». Louvain-la-Neuve. Academia.2001. 416 pp.

(Caution: big data bases are often ill-defined and trivial.); the Internet revolution, that must be regulated for the sake of scientific progress. Beware of uncontrolled results, be cautious about sources, sampling ... and copyright. Moreover, second hand repetitive research can kill original data producing research. Bite less, chew more". (*James A. Davis*).

## Testability and the fate of statistics

The fundamental role of the technical pole is to integrate the empirical support in the conceptual apparatus of science. This procedure articulates many ingredients of research. It is a prerequisite of any strategy of data description and theory assessment, falsification or confirmation, to nourish our theories and models with clean and relevant empirical data.

In social science, we need desperately to rely on good statistical tools while the vain qualitative and quantitative *controversy* pollutes the methodological debate. Unexpectedly, the computer revolution seems to have darkened the fate of social statistics. For some (or many) social scientists, empirical and applied statistical research has become a *push-button black-box game, a garbage-in-garbage-out activity, a no-prestige (or lower class) mechanical routine*.

Of course we must epistemologically evaluate and methodologically adapt any formal tool for our specific objects and purposes. It is the purpose of the ADeQua Project to provide relevant statistical tools for the social sciences research 9.

## 5. The ADeQua Project

The strategy behind the ADeQua Project is to articulate qualitative evaluation with quantitative measurement in the *technical context* of survey. The epistemological and the mathematical aspects are interlinked and documented in an expert system. The aim is to offer to the researcher integrated and modular software that he could eventually modify and enlarge. The code is given in standard BASIC programming language and can be adapted to QuickBasic and Visual Basic, or to other programming languages. The modules of statistical analysis contain revisited classical and innovative elements and features.

---

9 Jacques Herman "Analyse de Données Qualitatives. T1. Traitement d'enquêtes: échantillon, répartitions, associations.". T2. « Traitement d'enquêtes : modèles multivariés. ». Paris. Masson. Coll. "Méthodes + Programmes". 1986. 183 pp. 1989. 215 pp.

Interpretation in *natural language* is provided. The emphasis is on robustness and usefulness for empirical research in various fields.

### **The steps of qualitative data analysis**

1. Sampling (simple random, correction for small sample).
2. Construction of qualitative and quantitative nomenclature(s) and data base.
3. Operationalization of knowledge bases, qualitative and quantitative.
4. Univariate analysis of quantitative and qualitative variables
5. Reduction of quantitative to qualitative variables
6. Bivariate qualitative analysis: contingency tables, associations' matrix
7. Plurivariate analysis: factorial correspondence analysis
8. Multivariate analysis: causal & systemic

### **Why focus on « qualitative » data?**

The myth of quality opposed to quantity leads to a dichotomy in the system of the sciences. Human science would be subjective and spiritualistic, natural science objective and materialistic. We recognize the old quarrel between *Geistwissenschaften* and *Naturwissenschaften*, between *Verstehen* (Understanding) and *Erklären* (Explanation). This classical philosophical (ideological) opposition between « humanism » and « positivism » can have important (harmful) consequences for the present methodology of social sciences 10. Some trivial misconceptions are frequent about qualitative methodology.

“Qualitative study is only an *exploratory* approach to furnish new ideas to the researcher”.

Critics: ignorance of modern research in social sciences, theoretical and methodological weakness, inductionism or amateurism.

---

10 Jacques Herman « De la ferme intention de comprendre en expliquant », in Zaccari-Reyners Nathalie éd. «Explication-compréhension. Regards sur les sources et l'actualité d'une controverse épistémologique». Bruxelles. Edition de l'Université de Bruxelles. 2003. 254 pp. pp.225-236.

“Qualitative study restricts itself on *case study*; at the very most to a few non-randomly selected cases (anyway the data gathering process is rapidly saturated)”.

Critics: a true case study presupposes other cases for comparison and a theoretical grid to record it; otherwise, except in a training context, it’s a waste of time rocked by wishful thinking,

“Qualitative study is conceptual research focusing on language and meanings”.

Critics: confusion between speculation and research, philosophy and science; constructivism, reluctance to face the facts.

The philosophy of the ADeQua project is to break this fundamental dichotomy leading to obscurantism and impotence in the social sciences. The specificity of social sciences methodology is *relative* and “quality” is an insufficient answer. To valorize a scientific discipline, apartheid is not a solution. We must *adapt* the methods to the objects of study and *not throw the baby with the water of the bath*.

ADeQua adopts a middle range target, it privileges *qualitative* or « low » measurement over *quantitative* or « acute » measurement, reducing the quantitative to qualitative (ex: age to categories of ages, income to levels of income).

*Is qualitative only poor quantitative?* Indeed, qualitative evaluation is less precise than quantitative evaluation but relevant scaling depends of the fineness of empirical reality itself, of our conceptual and technical apparatus of data taking.

Ex: Attitude toward democracy (Context: interview for a survey)

#### SCALE

Qualitative	« How do you consider democracy in UE today? » <u>essential</u> / important / secondary / unimportant / harmful		
Quantitative	100%I	« How much do you favor democracy in UE today? » v 32,7%	I0%

In this context, the use of natural language in ordinal scaling is more appropriate to catch the attitude in the mind (brain) of the respondent. Methodological adequacy is based on ontological relevance. *Beware of misplaced precision, be ADeQuate !*

Actually, quality and quantity are *not* opposed to each other. Quality and quantity are « categories » both entrenched in natural language, they manifest themselves by specific questions such as: «what?», « how many? », « how much? ».

A quality is a hypothetical property of some aspect of a thing, event or process, *conceptualized* by some attribute and modalities, *formalized* in a « nominal scale » (Ex: State: democratic / corporatist / totalitarian). When we want to evaluate empirically and compare those modalities, we use the (quantitative) question « How many? » in each modality.

In an “ordinal scale” (Ex: Power: very strong > strong > medium > weak > null), we evaluate a *more-or-less intensity* designated by quantity-type modalities; we use the (quantitative) questions « how more? » and « how many? »

A quantity is only a continuous variable intensity of some specific quality (Ex: Fortune: very rich > rich > poor > very poor) evaluated on a “cardinal scale” by a unit of measure (Ex: capital in \$).

We use the (quantitative) questions « how much more? » and « how many? » but we always presuppose the (qualitative) « of what? » question. No quantity without an underlying quality.

### **Note on Factorial Correspondence Analysis**

Scope: qualitative data (nominal scales), can be extended (with carefulness) to ordinal and cardinal scales. It can be applied to various types of data: contingency tables, raw databases, associations or distances matrices. NB: it was the favorite method of Pierre Bourdieu, empirically and theoretically (the “field concept”).

**Contingency table**

(frequencies)

	a	b	c	d	
A	35	457	178	216	886
B	19	83	49	42	193
C	16	101	50	114	281
D	13	114	72	132	331
	83	755	349	504	1691

**Database (cases / criteria)**

disjunctive coding

ordinal coding

	a	b	c	d	e		a	b	c	d	e
A	0	1	1	0	1	A	11	8	10	16	17
B	1	0	0	1	0	B	10	11	13	14	18
C	1	0	0	0	1	C	8	10	15	13	13
D	0	1	1	1	0	D	9	7	9	20	11
E	1	1	1	0	0	E	11	8	10	11	16
F	0	0	0	1	1	F	14	10	12	14	13
G	0	1	0	1	0	G	6	11	11	18	12
H	1	0	1	0	1	H	12	8	13	19	19
I	1	1	1	0	1	I	7	9	8	12	12
J	0	0	0	1	0	J	10	8	10	12	14
K	1	0	0	1	0						
L	0	1	1	0	1						

14 Variables-clés (CN)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 TYPE d'ACTIVITES	1	-.45	.24	-.07	-.16	-.01	-.08	-.05	-.19	-.26	.33	.21	.28	.08
2 GAMME d'ACTIVITES	-.45	1	-.44	-.24	-.04	.24	-.07	.32	.16	.11	-.01	-.14	.02	.06
3 ALLURE PRODUCTION	.24	-.44	1	.43	-.21	.12	.11	-.16	-.18	-.35	-.16	.21	.18	-.12
4 STANDARDISATION	-.07	-.24	.43	1	-.01	-.14	-.15	0	-.04	-.18	-.14	.44	-.07	-.27
5 MILIEU CONCURRENTI	-.16	-.04	-.21	-.01	1	.44	.21	.1	-.54	-.09	.25	-.26	-.12	-.1
6 MILIEU TECHNOLOGIQ	-.01	.24	.12	-.14	.44	1	.15	.48	-.03	-.05	-.23	-.21	.09	-.13
7 MILIEU SOCIAL	-.08	-.07	.11	-.15	.21	.15	1	-.14	-.24	-.13	.19	-.11	.17	-.13
8 MILIEU CULTUREL	-.05	.32	-.16	0	.1	.48	-.14	1	.22	0	-.06	-.16	-.14	-.07
9 ROLE ETAT	-.19	.16	-.18	-.04	-.54	-.03	-.24	.22	1	.25	-.16	-.14	-.08	.12
10 ESPRIT ENTREPRISE	-.26	.11	-.35	-.18	-.09	-.05	-.13	0	.25	1	-.31	.28	-.23	.23
11 ESPRIT OPPORTUNISM	.33	-.01	-.16	-.14	.25	-.23	.19	-.06	-.16	-.31	1	-.08	-.07	-.29
12 NATURE DIRECTION	.21	-.14	.21	.44	-.26	-.21	-.11	-.16	-.14	.28	-.08	1	.3	.36
13 STRUCTURE POUVOIR	.28	.02	.18	-.07	-.12	.09	.17	-.14	-.08	-.23	-.07	.3	1	.46
14 ORIENTATION AUTORI	.08	.06	-.12	-.27	-.1	-.13	-.13	-.07	.12	.23	-.29	.36	.46	1

**Associations' matrix****Functions:**

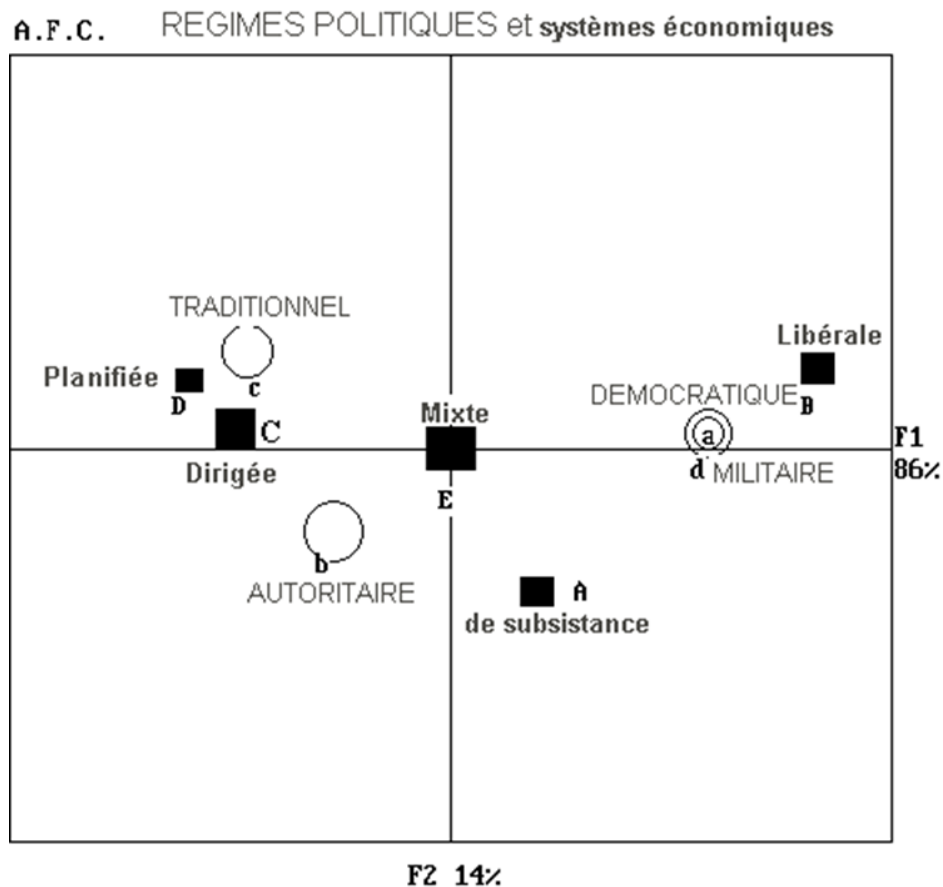
- A. Exploratory device that *visualizes* the « field » of relationships between variables and their modalities.
- B. Descriptive / topological (distance and proximities)
- C. Explanatory (axes of inertia (« factors ») and contributions)

NB: conceptual explanation should derive from the semantics of the variables and not be imposed a posteriori as a *deus ex-machina* !



ADeQuA focuses on small (ex: 8X5) and medium tables (ex: 27X15) to retain the gain of visual clarity. Ideal target: 2 axes of representation with more than 80% explained inertia.

Nevertheless, for exploratory experimentation, the program can detect 7 axes if the data are very complex. But, good luck for the conceptual interpretation!



Some social sciences, due to very nature of their objects, will use more or less sophisticated evaluation or measurement methods. Economics and demography use mostly cardinal (continuous) quantitative scales; psychology, depending of paradigmatic prevalence, is also largely quantitative; sociology, political and communication sciences, referring to groups of people, cannot avoid the quantitative procedures; even history often deals with quantitative phenomena, not restricting the research to the *narrative* approach.

Quality and quantity participate in the same scientific *process of evaluation*, of giving a value to things, events and processes. « Measurement » is a procedure of scientific evaluation, *not*

restricted to the natural sciences. Actually, measurement or evaluation theory belongs to the domain of formal sciences. Factual social sciences as well as natural sciences can benefit from the discoveries of formal science (logic and mathematics, set theory and statistics). Each scientific domain has to choose relevant morphologies and formalisms to reach their objectives of description, explanation and prevision.