

# HUMAN SCIENCE RESEARCH



Methods, Theory, and Thinking

by

Arne Collen, Ph.D.

August 1995

Limited Edition

# HUMAN SCIENCE RESEARCH

Methods, Theory, and Thinking

## SEMINAR SUPPLEMENT

by

Arne Collen, Ph.D.

Prepared for the HSR International Seminar

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Castel Ivano, Strigno, Italy

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## SEMINAR DESCRIPTION

Over the five days of discussion and group sessions, the seminar will take up content, process, and research issues about methods for conducting human science research with human beings. This year the seminar gives special emphasis to the interconnectivity among methods, theory, and thinking in the pursuit of disciplined inquiry.

The seminar makes special use of forms of disciplined inquiry which involve participants working together in small groups, focusing on the dynamics of inquiry within and among groups, and an orientation toward social, collaborative, and cooperative processes of scientific discovery, deepened understanding, and constructive change. We will examine key assumptions, concepts, and principles in the context of inquiry, in order to clarify the common as well as the distinguishing features among a select set of component processes leading researchers from simplistic applications of a traditional research method toward construction of the more human oriented systems methodologies. This process entails the composition and integration of methodological components from among various techniques, procedures, and methods, such as idea building, participant observation, focus groups, experiment, interviewing, modeling, surveys, project designing, project planning, and many other such investigative activities. Drawing on a systemic perspective, the seminar emphasizes the construction of a coherent human science research method, methodology, or met methodology for solo and small group oriented inquiry that can be directed to investigate the human diversity, complexity, and problematique characteristic of contemporary life.

Participants arrive during the late afternoon before the first full day of sessions. The introductory session is held in the evening and materials distributed. Each full day, two of the three hour sessions (morning, afternoon, and evening), will involve group meetings. The third session is for individual activities. The final and closing session is held the morning after the last full day of the seminar.

## SEMINAR SCHEDULE

<i>Day</i>	<i>Session</i>	<i>Activity</i>
SUNDAY	1	H Arrival ORIENTATION AND INTRODUCTIONS
MONDAY	2	C SEMINAR FOCUS AND OVERVIEW
	3	C Free Time
	4	C ARENAS OF INQUIRY AND METHODS
TUESDAY	5	C CONSTRUCTING METHODOLOGY
	6	C Free Time
	7	C DESIGNING, PLANNING, AND CRITIQUE
WEDNESDAY	8	C METHOD, THEORY, THINKING INTERFACE
	9	C Group Excursion
	10	C CONNECTING THINKING AND METHODS
THURSDAY	11	C CONNECTING THEORY AND METHODS
	12	C Free Time
	13	C INTEGRATING INQUIRY CONSTRUCTS
FRIDAY	14	H CLOSING AND FARWELLS Departure

Location:    H = Hotel Ca' Bianca            C = Castel Ivano

DAILY ROUTINE:	H	8:00	-Breakfast
	C	9:30	-Seminar session (Coffee break 11:00)
	C	12:30	-Lunch
			-Free Time
	C	14:30	-Seminar session (Coffee break 16:00)
	C	19:30	-Dinner

## SEMINAR OBJECTIVES

My objectives for the seminar are:

1.

2.

3.

Questions, topics and concepts which I am especially interested in having addressed during the seminar are:

1.

2.

3.



## SEMINAR FOCUS 1

### WHAT IS HUMAN SCIENCE RESEARCH?

#### *The Proximal View*

The more circumscribed, conservative, delimiting, and historically based definition is that Human Science Research is disciplined inquiry through individual and collective action directed toward deepening our understanding of what it means to be human.

#### *The Distal View*

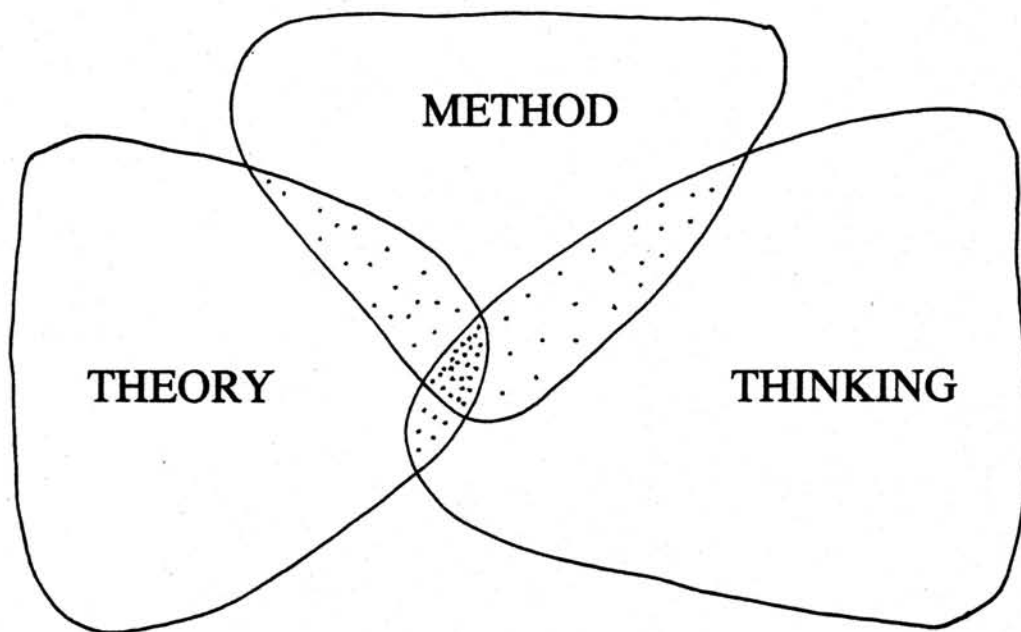
The more controversial, comprehensive, integrative, and liberal definition is that Human Science Research is disciplined inquiry through individual and collective action directed toward combinations of 1) providing an account and explanation of what it is to be human; 2) deepening our understanding of what it means to be human; 3) ameliorating the human condition; 4) bringing one closer to union with one's god, nature, and humanity; and 5) comprehending the complexity of human phenomena.

NOTE: Human Science Research (HSR) centers on not only the phenomenon of interest to the inquirer, but also the nature of the inquirer. It is the added relation connecting the phenomenon under study to the inquirer, and vice versa, that distinguishes HSR from any form of science which ignores or intentionally excludes this relation. As evidence emerges of influence and impact of the inquirer on the phenomenon of study, and vice versa, HSR moves necessarily from the proximal toward the distal view.

#### KEY CONCEPTS:

human science research	account	human condition
disciplined inquiry	explanation	individual action
science	understanding	collective action
phenomenon	complexity	union
inquiry/research	humanness	god
knowledge	ameliorate	nature
evidence	comprehend	humanity

## SEMINAR FOCUS 2



## SOME CENTRAL QUESTIONS FOR INQUIRY IN HUMAN SCIENCE RESEARCH

Can a human being be described?

What does it mean to be human?

What characterizes humanness?

What are we about?

Can a human being be understood?

What is the meaning of what we say and do?

How do human beings interact?

How do we dwell on planet Earth?

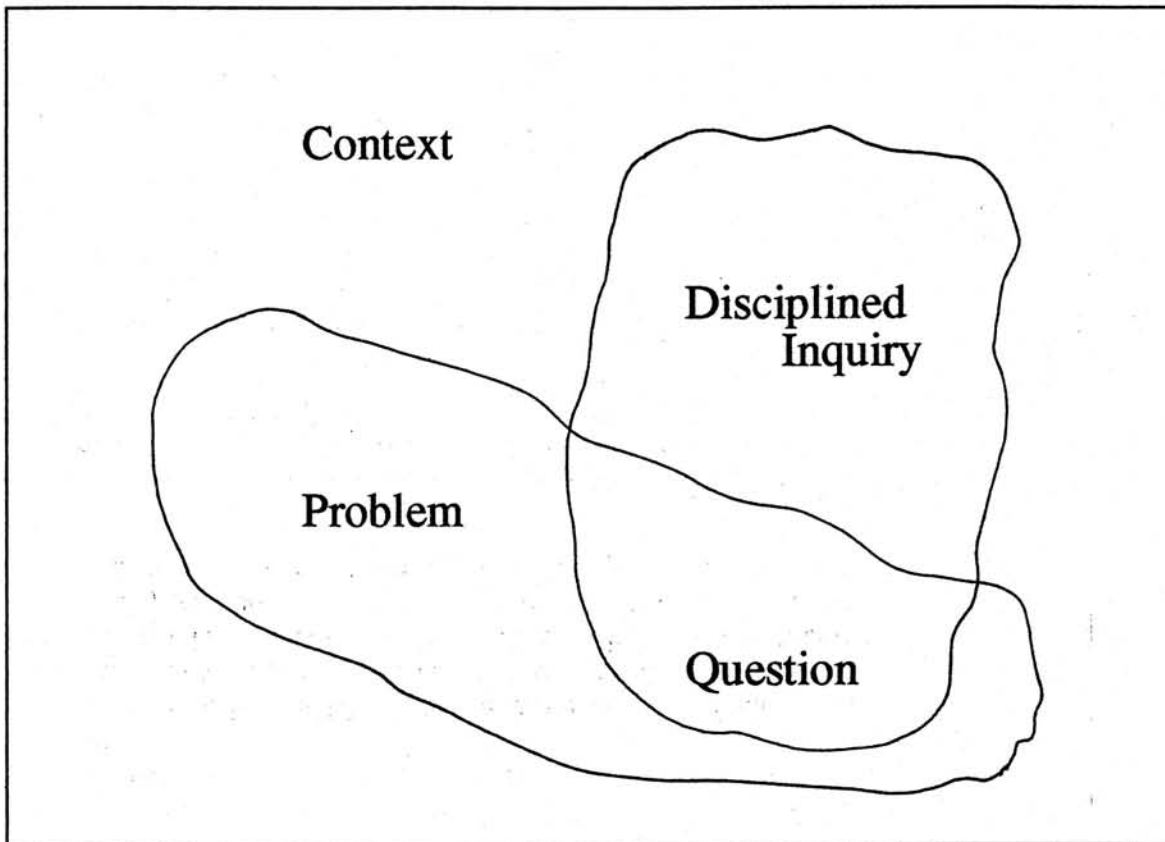
Can a human being be studied separate from other human beings,  
from other living beings?

What diminishes or enhances our humanness?

What accounts for the way we do what we do?

What can we do to improve ourselves, others, and our world?

## QUESTION, CONTEXT, AND DISCIPLINED INQUIRY



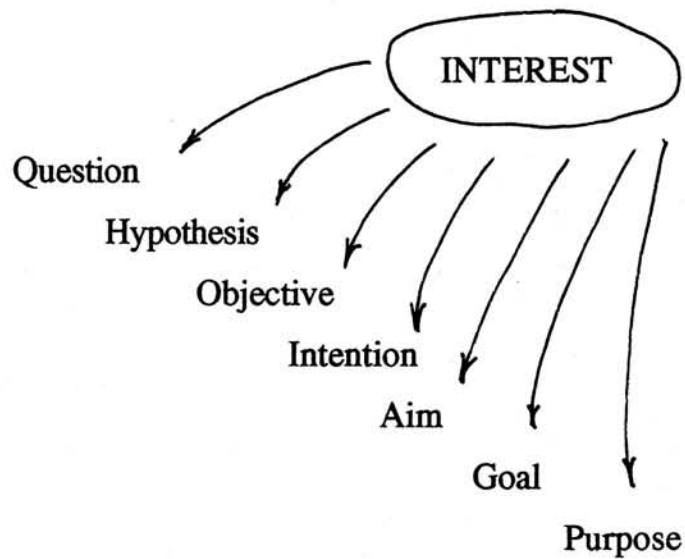
**Disciplined Inquiry is a formalized means to pursue a question, that is, a focus for research in the problem context.**

## ORIGINS OF AND INTERESTS IN RESEARCH QUESTIONS

Depth	Interest
1	<b>GENERAL</b> Of interest to the public
2	<b>PROFESSIONAL</b> Of interest to the field
3	<b>SOCIAL</b> Of interest to colleagues and close associates
4	<b>PERSONAL</b> Of interest to oneself

The research question of inquiry may come from many levels and may involve many stakeholders. Self-examination of one's purpose may make more transparent the relevant arenas of inquiry as well as whose interests are served by the inquiry. Iterations of the research cycle may make more apparent to the researcher origins of questions and interests served.

## EXPRESSIONS OF INTEREST



**INTEREST:** a concern, involvement or curiosity, aroused by a phenomenon, thing, or person, that excites, engages, holds the attention, preoccupies, and influences.

**CONSTITUTED INTEREST:** an attitude and predisposition constructed from the researcher's excitement, involvement, preoccupation, and activity of participation and engagement in inquiry.

## ARENAS OF INQUIRY

*Ways of Knowing*

(Types of Interests)

### A R E N A I

#### NATURAL INQUIRY

*Analytical/Explanatory*

(To serve TECHNICAL interests)

### A R E N A II

#### HUMAN INQUIRY [Proximal View]

*Historical/Hermeneutic*

(To serve PRACTICAL interests)

### A R E N A III

#### CRITICAL, SOCIAL ACTION INQUIRY

*Evaluative/Ameliorative*

(To serve EMANCIPATORY interests)

### A R E N A IV

#### SPIRITUAL INQUIRY

*Contemplative/Unifying*

(To serve TRANSCENDANT interests)

### A R E N A V

#### COMPLEXITY INQUIRY

*Integrative/Wholistic*

(To serve COMPREHENSION interests)

HUMAN INQUIRY [Distal View]

## THE THREE EYES OF ST. BONAVENTURE

<u>Eye</u>	<u>Description</u>	<u>Disciplines</u>
👁️ EYE OF THE FLESH-	by which we perceive the external world of space,time, and objects [Perception of the <i>vestigium</i> of God]	<b>SCIENCE</b>
👁️ THE EYE OF REASON-	by which we attain knowledge of things and mind itself through activities of the soul (memory, will, and reason) [The <i>imago</i> of God in ourselves]	<b>PHILOSOPHY PSYCHOLOGY</b>
👁️ THE EYE OF CONTEMPLATION-	by which we rise to knowledge of transcendant realities [The <i>lumen superious</i> or the whole transcendant realm beyond sense and reason]	<b>RELIGION SPIRITUAL ORDER</b>

## HUGH OF ST. VICTOR'S THREE WAYS OF KNOWING

### **E C O G I T A T I O -**

seeking facts of the material world by means of the senses.

### **E M E D I T A T I O -**

seeking truths within the soul by means of reason.

### **E C O N T E M P L A T I O -**

seeking union with God by means of transcendant insight.



## PURPOSES OF NATURAL SCIENCE RESEARCH

Scientific research is disciplined inquiry with a purpose.  
It is not conducted in haphazard fashion.  
It has one or more purposes.

The purpose of a specific research project can be to:

1. describe, explain, evaluate, or verify phenomena;
2. make the implicit, explicit;
3. test assumptions, common sense, or theories about human behavior;
4. view phenomena through alternative perspectives;
5. solve problems and generate solutions;
6. evaluate and improve methods;
7. apply a theory to understand a specific problem;
8. build theory, develop and refine theory;
9. integrate a large amount of data into a single explanatory system;
10. clarify underlying processes of human behavior;
11. repeat earlier research to see if findings hold up;
12. test whether a relationship found in one area extends to another area;
13. attempt to account for unexpected findings or unconfirmed predictions;
14. apply techniques for one problem to a different problem;
15. challenge prior research.

Although there can be considerable overlap in the purpose of exploratory, pilot and descriptive research, some distinct purposes of each can be delineated.

Exploratory research can be to:

1. generate hypotheses;
2. clarify hypothetical constructs;
3. establish priorities for subsequent research;
4. become more familiar with what is being studied;
5. provide a small scale or preliminary test of an hypothesis.

Pilot study can be to:

1. provide a scaled down execution of the main study;
2. refine instruments, procedures and apparatus;
3. provide a small scale or preliminary test of an hypothesis;
4. select variables, instruments, procedures and apparatus.

Descriptive research can be to:

1. obtain complete and accurate information without explanation;
2. detail the boundaries, limits, trends, or characteristics.

\*Adapted from L. Kidder (1981) Selltiz, Wrightsman & Cook's Research methods in social relations. Fourth Edition. New York: Holt, Rinehart and Winston.

## PURPOSES OF CRITICAL, SOCIAL ACTION RESEARCH\*

- To increase people's involvement in an issue or problem
- To develop a constituency for change
- To reduce distance between researchers and the public
- To ensure that research does not become the province of a few to benefit only the wealthy and the powerful
- To base changes on fact rather than guesses
- To test theories of human behavior in the outside world
- To provide feedback to researchers on the utility of their work
- To teach researchers how to conduct studies in the field where conditions are fluid and all the key variables cannot be specified in advance

\*Source: Based on the section "Why do action research?", in R. Sommer and T. Amick (1984) *Action research: Linking research to organizational change*. Davis, CA: Center for Consumer Research, University of California, 3.

## ETHNOGRAPHY IN THREE ARENAS OF INQUIRY\*

Arena I  
NATURAL  
INQUIRY

research on

Acquisition

Explanation

one way  
exchange  
from  
participants  
to researcher

Arena II  
HUMAN  
INQUIRY

research with

Collaboration

Understanding

two way  
exchange  
between  
researcher  
and participants

Arena III  
CRITICAL, SOCIAL  
ACTION INQUIRY

research on

Advocacy

Amelioration

three-way  
exchange  
among  
researcher,  
participants,  
and other members  
of the community

\*Based on V. St.Denis and R. Katz (1988, June) *Research and indigenous people – Where is the exchange?* Paper presented at the meeting of the Human Science Research Association, Seattle, Washington.

NOTE: These researchers favor an approach they term “community-based participatory method” which combines collaboration and advocacy.

## POSSIBLE RESEARCH METHODS FOR THE HUMAN SCIENCES

Archeological  
Archival  
Autobiography  
Biography  
Case Study  
Causal Comparative  
Constant Comparative  
Contemplation  
Correlational  
Ethnography  
Ethnomethodology  
Experiential  
Experimental  
Dialectic  
Dialogic  
Focus Group  
Hermeneutics  
Heuristic  
Historical  
Interview  
Life-history  
Life-story  
Meditation  
Mythic  
Naturalistic Observation  
Participant Observation  
Participatory Action  
Phenomenography  
Phenomenology  
Psychobiography  
Psychohistory  
Single Subject (N = 1)  
Social Action  
Survey  
Systemic

## CASE STUDY METHODS

“The case study is the descriptive, analytic, interpretive, and evaluative treatment of the more comprehensive descriptive data that is in the case record.”

M. Patton (1983) *Qualitative valuation methods*, Beverly Hills, CA: Sage, p. 304.

“A case study is a type of research investigation whose conclusions may be used in a policy or practice setting.”

R. Yin, The Case Study Institute.

### CHARACTERISTICS:

- Intensive study of one phenomenon or entity
- Purposive sampling of one entity from a population
- Variations to fit various disciplines, interests and contexts
- Multiple observations and measures, both qualitative and quantitative
- Data collection within the real-life context
- Primacy to chief and unique features as well as common features with other cases or representatives of the population

### VARIATIONS and FOCUS:

CLINICAL (Psychological, Psychiatric or Medical)- One patient

EXPERIMENTAL (N = 1)- Single subject

EVALUATIVE- One program in an institutional setting

HISTORICAL- One historical, political, economic, social force

Political- One political issue, movement or policy

Anthropological- One culture, subculture, or society

BIOGRAPHICAL- One person

AUTOBIOGRAPHICAL- Oneself

ORGANIZATIONAL (Management)- One corporation, business or institution

SIMULATIVE- One model (person-machine interface; computer software scenario)

PEDAGOGICAL- One problem situation

LEGAL- One law suit

## **SOME SYSTEMS RESEARCH METHODS AND METHODOLOGIES FOR HUMAN ACTIVITY SYSTEMS**

**Nominal Group Technique**

**Delphi Method**

**Systems Analysis**

**Interactive Planning**

**Soft Systems Methodology**

**Living Systems Process Analysis**

**Interactive Management**

**Systems Models Approach**

**Viable Systems Methodology**

**Systems Design Journey**

## TYPES OF INTERVIEWING

RESEARCH  
(Social Science)

POST EXPERIMENT

PHENOMENOLOGICAL

EVALUATIVE

EXIT

EXPOSÉ

FOCUS GROUP

CLINICAL  
(Psychiartric, Diagnostic)

INFORMATIONAL

JOB PLACEMENT

STRESS

PERFORMANCE REVIEW

LEGAL  
(Depositional)

TESTIMONIAL  
(Journalism and Jurisprudence)

INTAKE  
(Psychiatry and Psychology)

## COMMON METHODOLOGICAL PROCEDURES AND TECHNIQUES OF SYSTEMS RESEARCH

**M o d e l i n g**  
(the parts of the system)

**M a p p i n g**  
(the configurations of the system)

**C h a r t i n g**  
(the flows within a system and among systems)

**S i m u l a t i n g**  
(the dynamics of the system)



## SOME COMMON CHARACTERISTICS OF NATURAL SCIENCE RESEARCH METHODS\*

The research methods used historically in the natural sciences have an underlying set of assumptions which may be described through statements of their common characteristics. Researchers who adhere still to them, often termed as a collective the natural science perspective, tend to make wide spread use of the following characteristics in the conduct of inquiry:

- Pursuit of evidence, proof, and truth
- Objectification of phenomena
- Generalizability of findings
- Standardized procedures applied systematically
- Operationalization of hypothetical constructs
- Establishment of single variable linkages
- Building axiomatic networks from linkages
- Model building
- Control and prediction of phenomena
- Causal inference
- Reductionistic explanations
- Theory building through empirically based hypothesis testing
- Guided inquiry through hypothesis formulation and testing
- Elimination of rival hypotheses
- Deductive and inductive reasoning
- Analysis and synthesis
- Discovery of laws of Nature
- Some form of isomorphism and realism
- Observation and data collection
- Classification and description of phenomena

These characteristics provide a general foundation and reference point for understanding the activities of main stream scientists today, even though the characteristics have been challenged and thoroughly critiqued, and some have undergone modification.

## SOME COMMON CHARACTERISTICS OF HUMAN SCIENCE RESEARCH METHODS\*

- The researcher grounds the research in the real world context, in the life-world.
- The inquiry serves to clarify and deepen the meanings that are lived from the perspective of one's own experiencing, for both the researcher and the participants (co-investigators).
- The purpose of the research is to obtain a more thorough understanding of human experience, human interaction, and what it means to be human.
- The role of the researcher's presuppositions, perceptions, and formulations is to be distinguished from those of the participant, and may be considered alongside and/or in contrast to those of the participant.
- The questions for inquiry are formulated in such a way as to address human experience, concerns, and conditions as lived.
- Data collection may include descriptions of situations lived by the researcher in addition to other participants, and all descriptions are considered potentially valid sources of information from which to reach a deeper understanding of human experience.
- The inquiry is open and unfinished.
- The inquiry is a dynamic social interactive process in which the researcher maintains a sensitivity to the integrity and presence of the other human beings (co-researchers) involved in the process.
- Data analysis is an aspect of method whereby the meaning implicit in the human experience is brought into clearer focus.

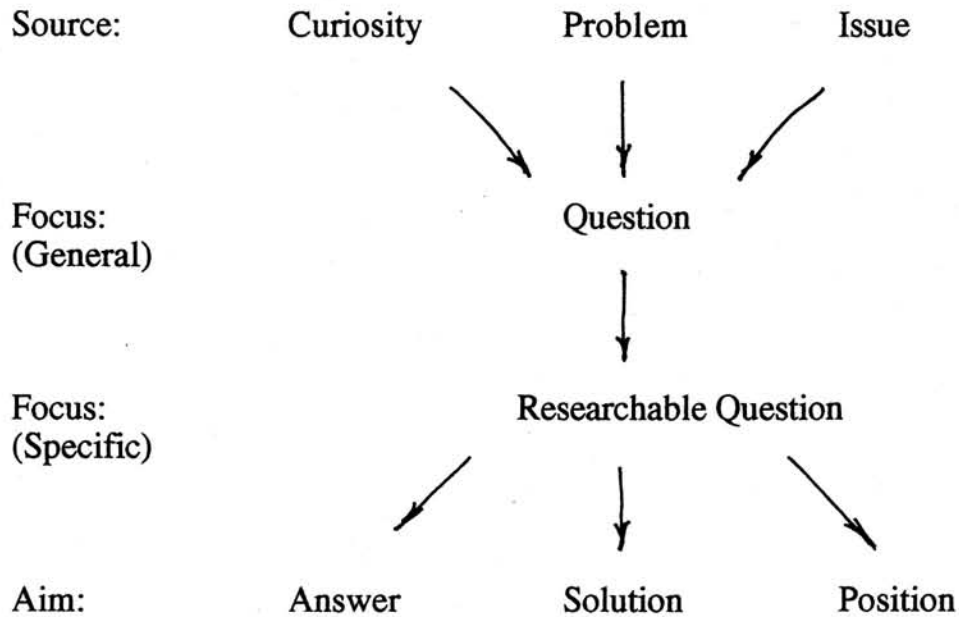
\*Adapted From J. Barrell, C. Aanstoos, A. Richards, and M. Arons (1987) *Human science research methods*. Journal of humanistic psychology, 27, 424-457.

## SOME COMMON CHARACTERISTICS OF COMMUNITY-BASED PARTICIPATORY ACTION RESEARCH\*

- Collaborative
- Advocacy by researchers
- Power and control sits with the community
- Informative exchange
- Community problem oriented
- Action oriented
- Tangible products usable in the community

\*Based on V. St. Denis and R. Katz (1988, June) Research and indigenous people--Where is the exchange? Paper presented at the meeting of the Human Science Research Association, Seattle, Washington.

## LINKING QUESTIONS, SOURCES, AND AIMS

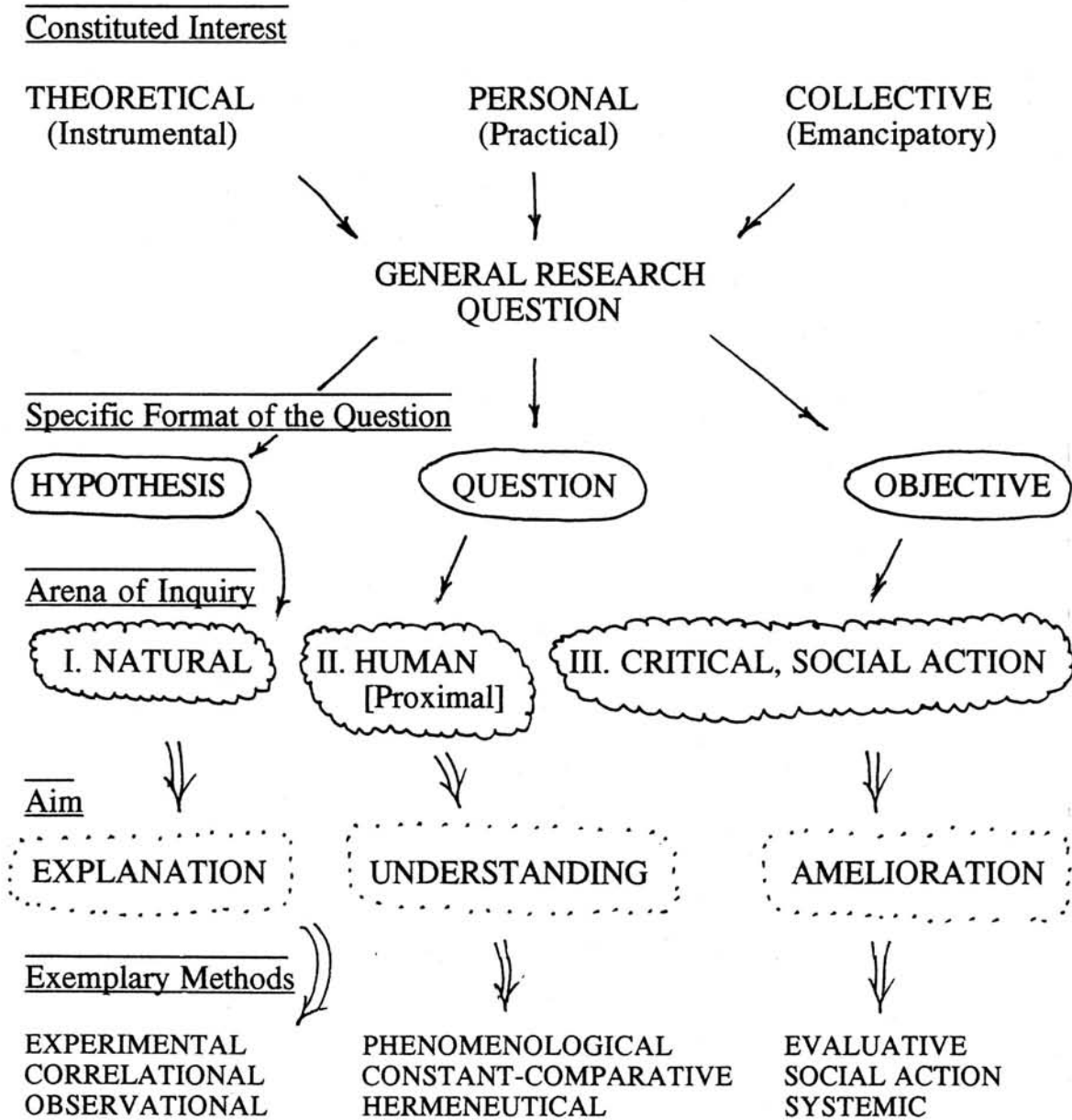


### NOTES:

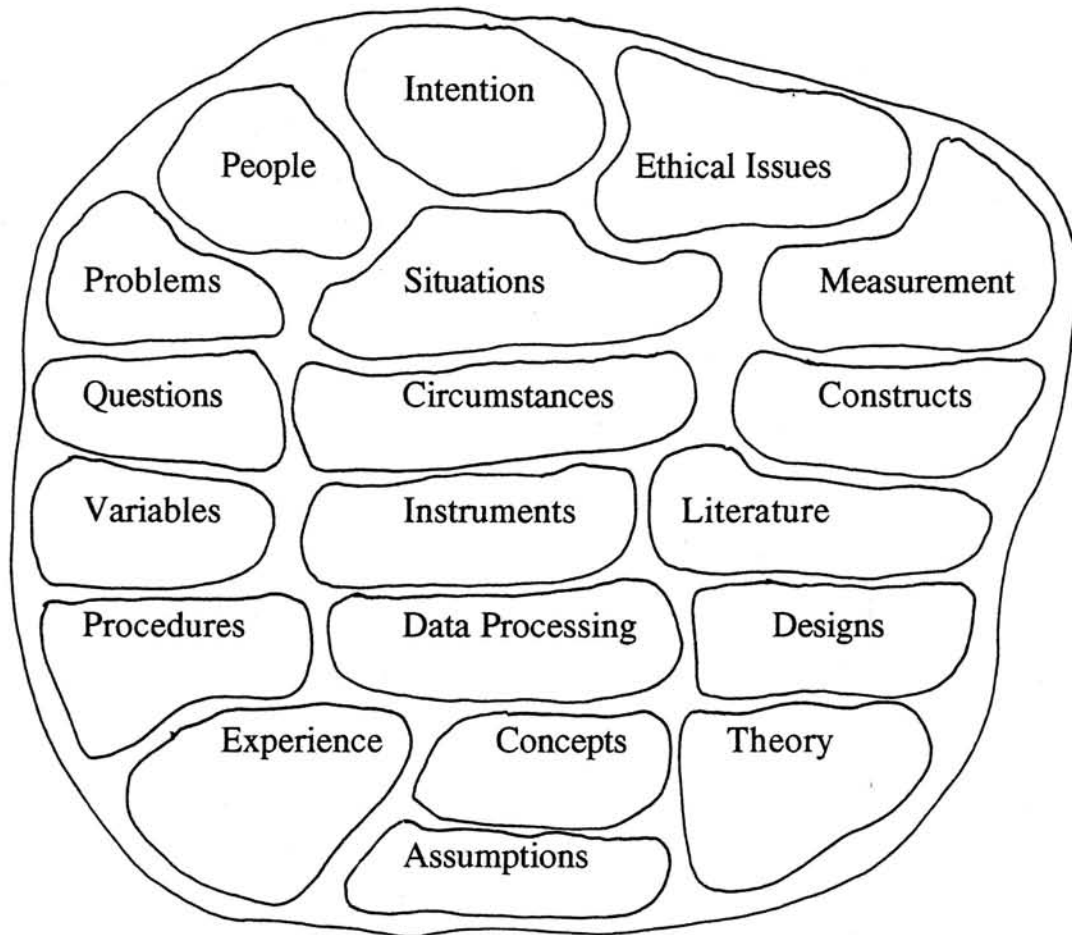
1. Associations:
 

Question (Curiosity)	—>	Answer
Problem	—>	Solution
Issue	—>	Position
  
2. The researcher's activity of question asking is a methodological tool. It is a key aspect of the means by which a scientific investigation is focused, chartered, and guided.
  
3. A specific question (hypothesis, objective) serves to focus a specific inquiry. General questions seem to guide inquiry of a general research program involving a set of interrelated questions and their investigations.

## EXPRESSING INTERESTS IN TERMS OF RESEARCH QUESTIONS THAT ARE LINKED TO METHODS



## THE METHOD SPHERE



- What are the principal components of a research method?
- How is a method defined in terms of its boundaries?
- What makes a method disciplined inquiry?
- What are the chief considerations in selecting a research method for a specific human oriented inquiry?

## LINKING PURPOSE AND METHOD

### *Purpose*

To describe the elementary features, characteristics, and boundaries of the phenomenon as defined by the subject or researcher, but described by the researcher.

Ex: EXPLORATORY, DESCRIPTIVE

To describe the course of events as witnessed and described by the researcher.

Ex: OBSERVATIONAL

To describe a systematic relationship between any two variables which represent the phenomenon in terms of covariation (without the determination of cause) as defined and described by the researcher.

Ex: CORRELATIONAL

To describe the systematic relationship between an independent and dependent variable which represents the phenomenon in terms of assessing a hypothesized difference between treatment and control groups, in order to support the inference that the independent variable has a causal impact on the dependent variable as defined and described by the researcher.

Ex: EXPERIMENTAL

To describe the essence of the phenomenon in terms of its essential structure, themes, and meanings, as experienced by the subject but described by the researcher.

Ex: PHENOMENOLOGICAL

## LINKING RESEARCH QUESTION AND METHOD

### *Question*

What are the basic strategies children use in creative writing?

Ex: EXPLORATORY, DESCRIPTIVE

What basic strategies do children use while doing creative writing?

Ex: OBSERVATIONAL

If a child is given instruction in the use of basic strategies of creative writing, then those who receive such instruction will write more creatively than those who do not receive such instruction.

Ex: EXPERIMENTAL

If there is a relationship between instruction in creative writing and creative writing, then the more children receive instruction in the use of basic strategies of creative writing, the more creative their writing will be.

Ex: CORRELATIONAL

What are the essential meanings of the basic strategies children use in their creative writing?

Ex: PHENOMENOLOGICAL



## LINKING ASSUMPTION AND METHOD

### *Assumptions*

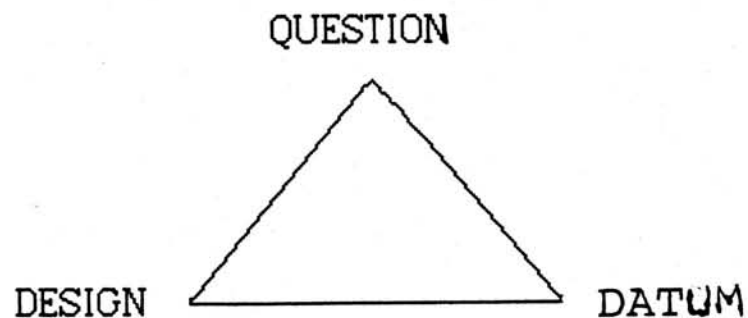
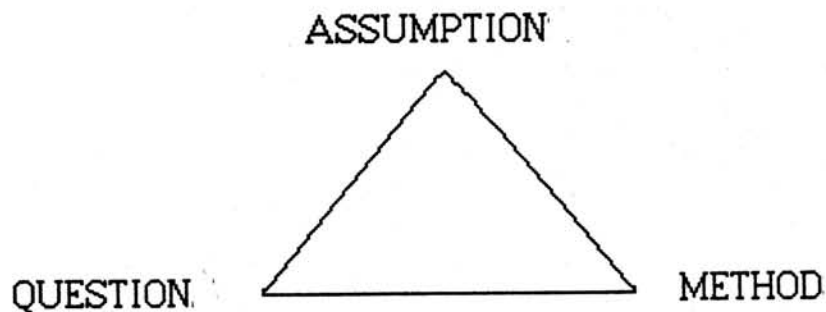
- The phenomenon exists as witnessed and/or recorded by others or the researcher.
- The elementary features of the phenomenon can be delineated.
- The phenomenon can be described in words understood by others.  
Ex: EXPLORATORY, DESCRIPTIVE
  
- Conditions will occur in which the phenomenon will reoccur.
- Participants can be observed without altering the essential features and behavior of the phenomenon
- Participants eventually accept and neglect the presence of the observer.  
Ex: OBSERVATIONAL
  
- The treatment will impact on the participants.
- The experimenter can remain objective throughout the research study.
- A causal connection can be made between the treatment and human performance.  
Ex: EXPERIMENTAL
  
- The two variables are quantifiable and can be measured
- Covariation between the two variables is continuous and linear.
- The full range of variation of the phenomenon can be sampled.  
Ex: CORRELATIONAL
  
- The participant can describe experience accurately and fully.
- The essential structure of the phenomenon as reported by the subject is invariant.
- The researcher can describe accurately the essence of the phenomenon as experienced by the subject.
- The experience is manifest in the consciousness of the participant.  
Ex: PHENOMENOLOGICAL

## INTERNAL CONSISTENCY (Methodological Coherency)

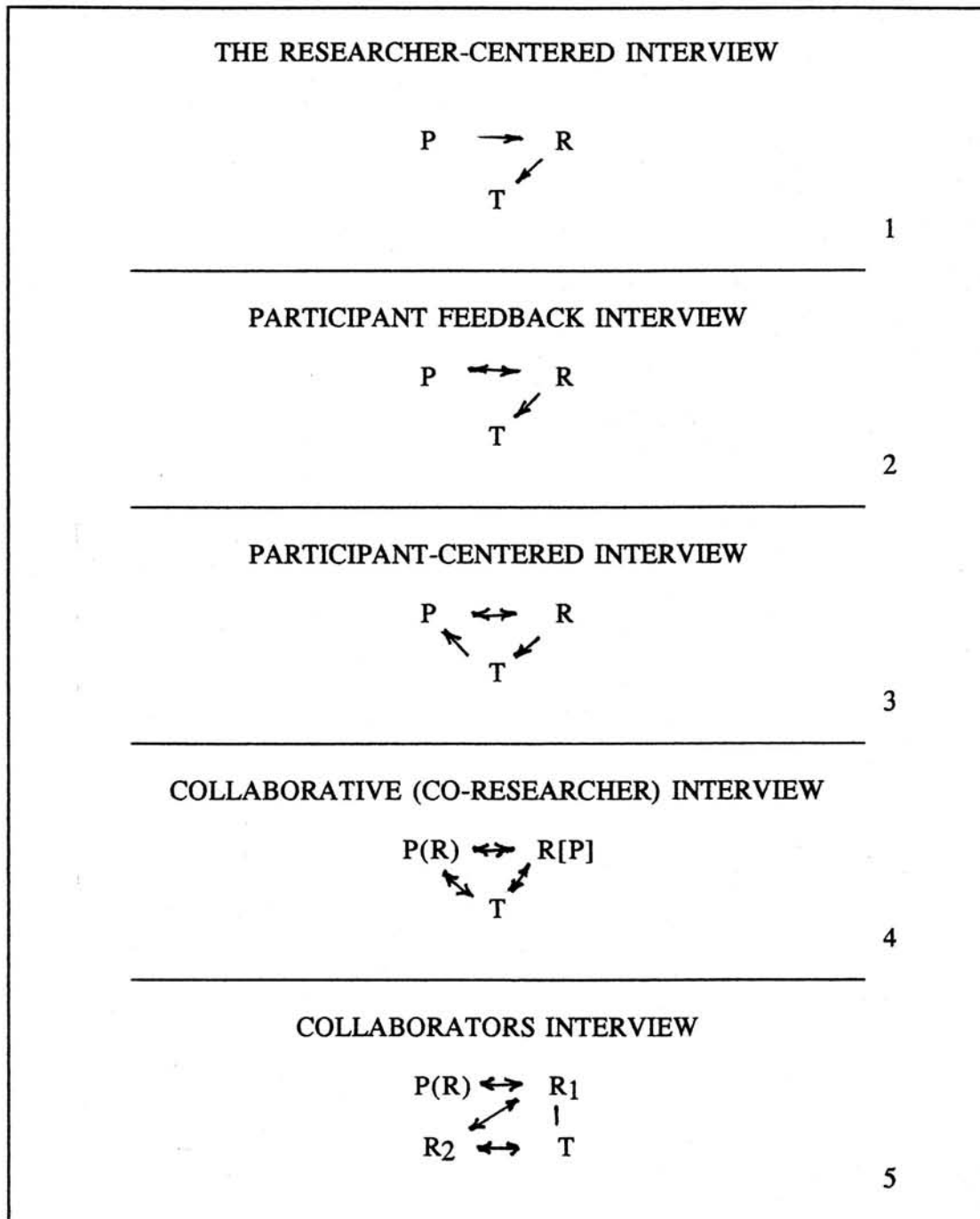
Internal consistency is an aspect of the internal validity of a research project.

Internal consistency refers to the logical relations among specific aspects of the research project.

Two chief concerns regarding internal consistency are:

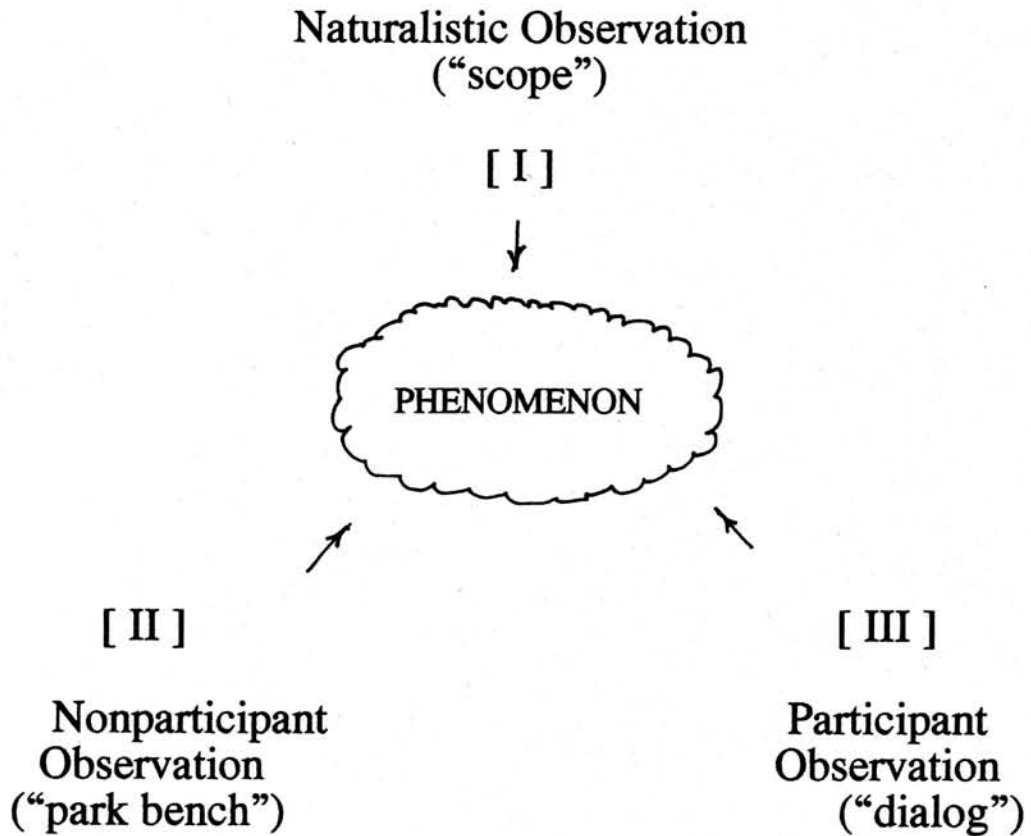


## THE INTERPERSONAL RELATIONSHIP OF THE INTERVIEW IN HUMAN INQUIRY



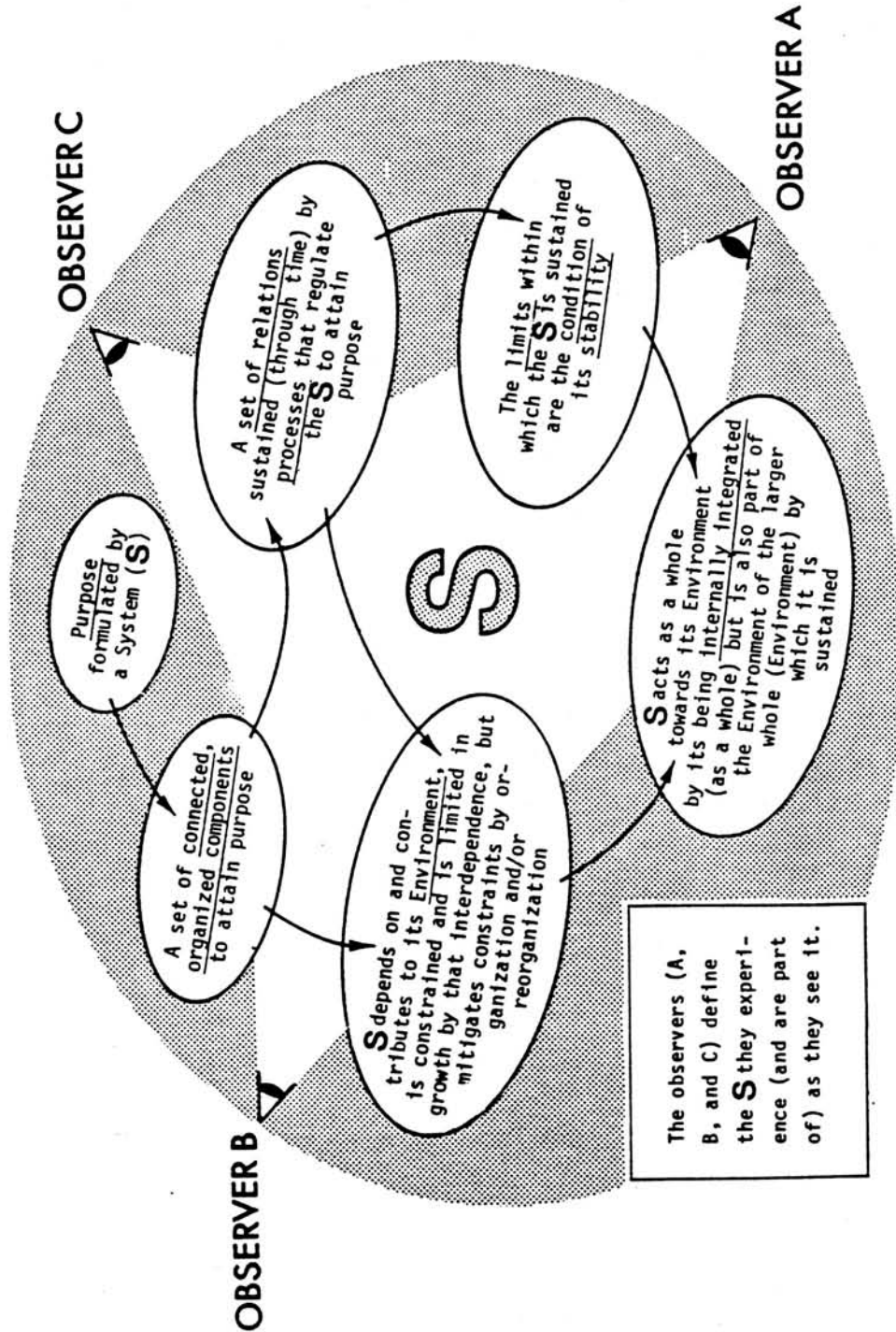
Key:    R = Researcher    P = Participant    T = Transcribed Interview

## TRIANGULATION IN OBSERVATIONAL METHODOLOGY



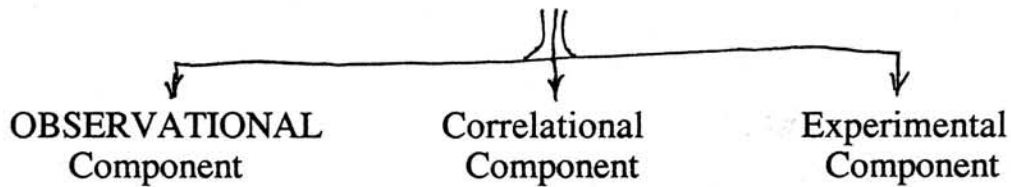
# A SYSTEMS VIEW OF SYSTEMS DEFINITION

(Courtesy of Bela H. Banathy)

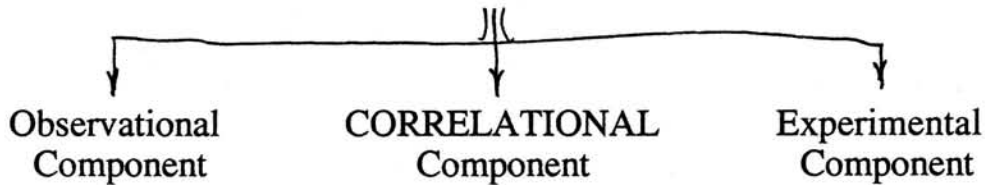


## CONSTRUCTION OF A METHODOLOGY FROM COMPATIBLE METHODS

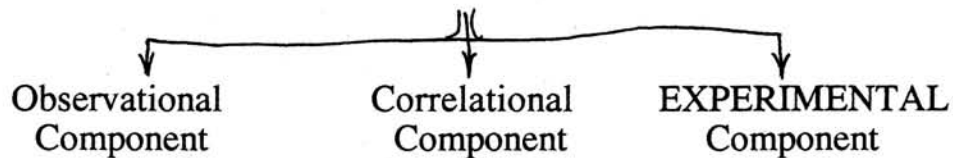
### OBSERVATIONAL METHODOLOGY



### CORRELATIONAL METHODOLOGY



### EXPERIMENTAL METHODOLOGY



## COMBINING QUESTIONS, METHODS, AND DATA PROCESSING FOR INTERNALLY VALID INQUIRY

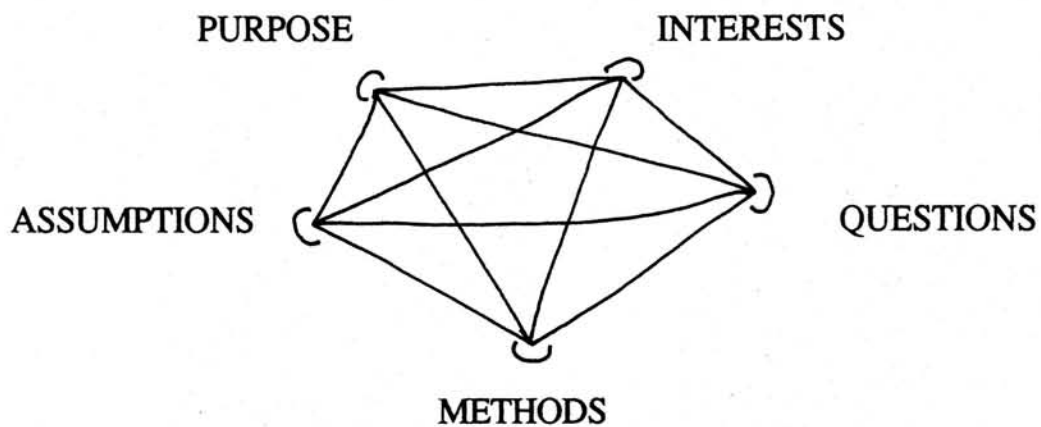
Perhaps the most visible conceptual triangle establishing the internal consistency of an inquiry involves the logical links among the research questions posed, the methods to yield the data, and the data processing procedures to position the researcher to answer the original questions directing the inquiry.

QUESTIONS	METHODS	DATA PROCESSING
H:1	A	X
H:2	B	X, Y
H:3	C	Z

For example, a specific inquiry may consist of three main and interrelated hypotheses (H:1, H:2, and H:3), a methodology by integration of components of three methods (A, B, and C), and multivariate data (X, Y, and Z) requiring both qualitative and quantitative data collection and data processing procedures. The questions stem from the purpose of the investigation and may be formulated as hypotheses. The methodology makes efficient and effective use of spacetime and resources to yield processible data. The data processing procedures enable the investigators to test the hypotheses. These logical links contribute to establishing the internal validity of the inquiry.

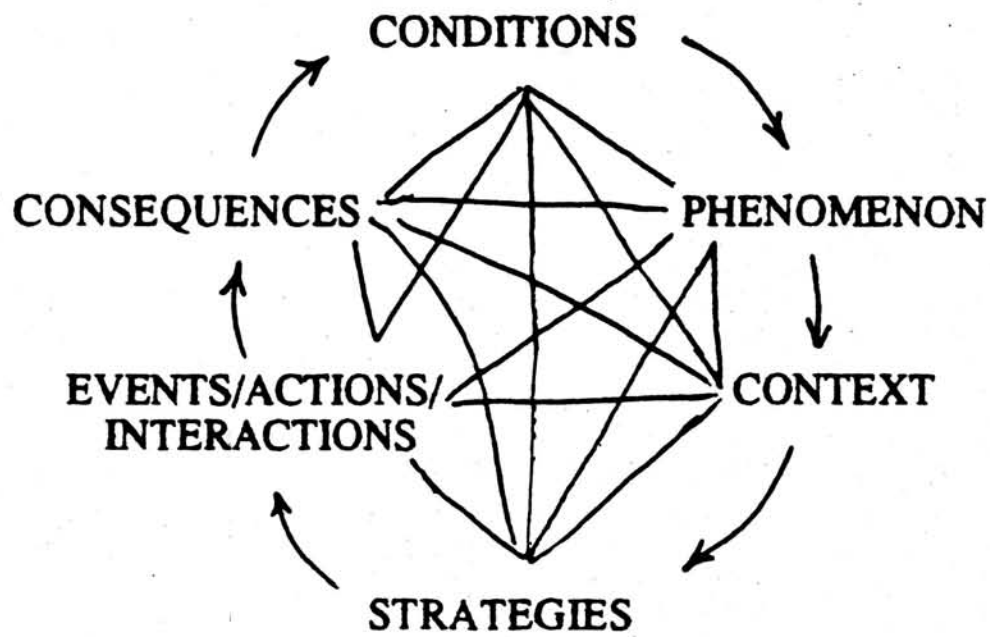
These logical links are articulated as much as possible in the formulation stage of the research cycle, and as a specific investigation proceeds, the discovery of an absence of a logical link may serve as a self-correcting signpost to steer the inquiry toward the eventual fulfillment of its purpose.

## CONCEPTUAL NET OF METHODOLOGICAL COHERENCY





## THE EXPERIENTIAL NET OF CONSTANT COMPARATIVE METHOD



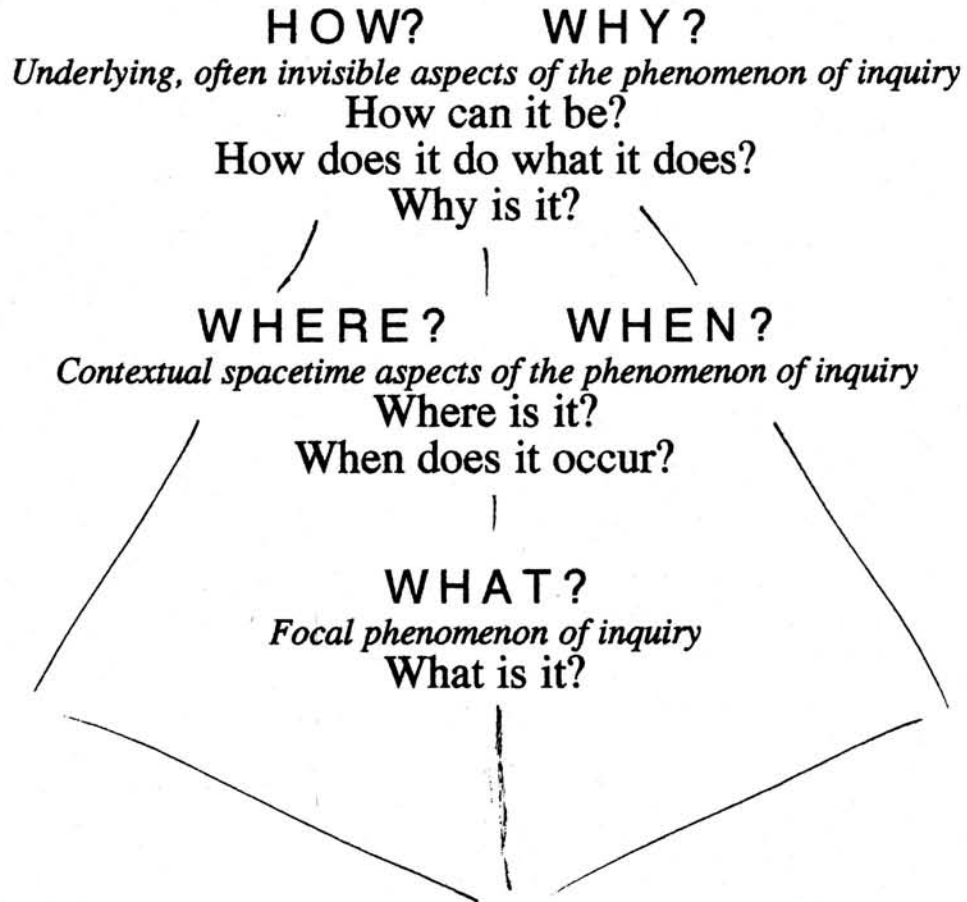
## HIERARCHY OF METHODOLOGICAL COMPLEXITY

<i>Level</i>	<i>Conceptualization</i>
5	<b>METAMETHODOLOGY</b> A combination of methodologies
4	<b>METHODOLOGY</b> A combination of methods and components of methods
3	<b>METHOD</b> A combination of techniques and procedures involving a research design and research plan
2	<b>TECHNIQUE/PROCEDURE</b> An application of two or more instruments and instructions of inquiry
1	<b>INSTRUMENT/INSTRUCTION</b> A single research device or communicative act of inquiry used to make observations and gather data

### Notes:

1. Higher levels are composed from parts to wholes of lower levels.
2. Higher levels are more complex as a form of inquiry than lower levels.
3. Level 1 often appears as Level 2, and Level 2 as Level 3, and so on. For example, techniques and procedures are often developed to such an extent that many researchers may refer to the data collection and processing procedure (technique) as a method, e.g. survey, interview, Delphi, constant comparative method.

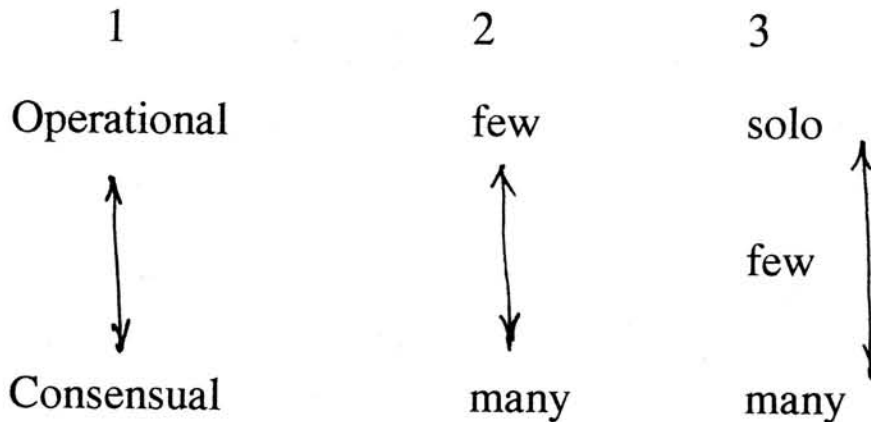
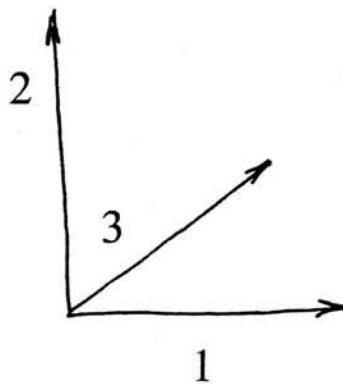
## HIERARCHY OF RESEARCH QUESTION TYPES



## COMPLEXITY OF INQUIRY

When designing inquiry for research of complex organizations, such as human activity systems, three primary dimensions of the complexity of disciplined inquiry can be utilized for the design decisions of the inquiry.

1. **SPECIFICATION** - Definition and operationalization of terms, concepts, variables, and the indices (instrumentation) which represent them.
2. **METHODOLOGICAL COMPONENTS** - Determination of those aspects and parts of methods to be integrated and sequenced in the inquiry.
3. **RESEARCH TEAM** - Determination of the number and identity of the researchers who comprise an investigative group to design, plan, and execute the inquiry.



## QUESTIONS OF METHODOLOGY

- What research methods help us to study human problems, interests, and issues?
- Can this application of method, or methodology, serve to provide an account and explanation of the phenomenon?
- Can this application of method, or methodology, serve to deepen our understanding of what it means to be human?
- Can this application of method, or methodology, serve to ameliorate the human condition?
- Under what circumstances does this particular method become applicable?
- What can be done to determine the strengths and limitations of this method?
- What aspects of other methods work compatibly with this method, in order to transform this method into a human science research methodology?
- Can these two seemingly different human-oriented research methods be combined to provide an effective and efficient methodology for human inquiry?
- What makes this particular method or methodology work?

## OPERATIONALIZING IN SCIENCE

Levels of Abstraction:

Level	E x a m p l e s	
HYPOTHETICAL CONSTRUCT	<b>Intelligence</b>	<b>Anxiety</b>
INSTRUMENT	Stanford-Binet Intelligence Test	Spielberg State Trait Anxiety Test
VARIABLE	General Intelligence	State Anxiety
SCALE	I.Q.scale standardized interval type	S-A scale Likert type
SCORE	I.Q score	S-A score

Converging Operations:

HYPOTHETICAL CONSTRUCT  
**Anxiety**

CLASSIFICATION  
Behavioral, Psychological, and Physiological manifestations

MANIFESTATION	OPERATIONALIZED VIA
Behavioral	Checklist of actions to be observed by trained experts
Psychological	Self-report questionnaire
Physiological	Nervous system activity recorded by peripherally placed electrodes

## CONSENSUS BUILDING IN SCIENCE

Although consensus building is often contrasted with operationalizing, as two means to make hypothetical constructs palpable for the purpose of scientific research, they both are widely used by scientists. Where operationalizing often makes the conduct of inquiry a formally directed activity through the instrumental and technological advances available, consensus building activity provides a widely used form of discussing, debating, and synthesizing the fruits of inquiry.

Note the following clipping from page 3 of the *Mexico City Daily Bulletin* (Wednesday, April 8, 1987):

### EVOLUTIONARY TREE REVISED

NEW YORK (UPI) — Leading anthropologists said last Friday they have re-drawn the evolutionary tree, announcing that a human-like species that coexisted with early Man is not as closely related to homo sapiens as previously thought.

The announcement at the annual meeting of physical anthropologists followed a five-day brainstorming session at which 30 anthropologists examined new fossil evidence, mulled over plaster casts of skulls, and read 28 recently published academic papers.

“We locked ourselves into a room for five days with rows of skulls and came to some consensus that was not unanimous, but we didn’t tear each other’s throats either,” said Fred Grine, a professor of anthropology at the State University of New York at Stony Brook, who called the special session.

The anthropologists focussed on the role of evolution of Robust Australopithecines, a stocky species that was not ape and not Man, but a separate entity that walked on two legs, forged for food and may have used crude tools.

For several hundred thousand years, some 2 million years ago, Robust Australopithecines and homo sapiens lived side by side, anthropologists say. The Robust species disappeared 1.4 million years ago.

## RESEARCH DESIGN AND RESEARCH PLAN

At the heart of a method is the *research design* and the *research plan*. It is the combined representation of both the design and the plan that gives a method pragmatic appeal.

RESEARCH DESIGN is a conceptual pattern, a *spatial* configuration of the elements of the method; the design serves to organize the inquiry.

RESEARCH PLAN is a conceptual pattern also, but a *temporal* configuration of the elements of the method; the plan serves to direct the orderly collection and processing of data, observations, and information sources.

Every method involves the conceptual organization of space and time. To be taken seriously and deemed a form of scientific method, this is necessarily so generally, in order to describe an approach to inquiry. In the specific case, it is necessary to discern clearly the feasibility of any research investigation.

### RESEARCH DESIGN

<i>Persons</i>	<i>Occasions</i>		
	<u>Day 1</u>	<u>Day 4</u>	<u>Day 8</u>
1-10	Test A	Test B	
11-20		Test A	Test B

### RESEARCH PLAN

- Step 1. on Day 1 administrate Persons 1-10 Test A
- Step 2. on Day 4 adminstrate Persons 1-10 Test B,  
and Persons 11-20 Test A
- Step 3. on Day 8 administrate Persons 11-20 Test B

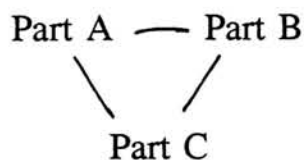


## DESIGN, PLAN, AND SPACETIME

Components or parts of two or more methods may be compatibly combined in some fashion to construct both the research design and research plan of the methodology.

Collectively, the research design and research plan comprise the spacetime manifestation of an inquiry and the central pragmatic core of a methodology.

### DESIGN



### PLAN

A; then, B; then C

A, B, and C; then B and C; then C

A and B; then B and C

A, B, and C; then A

### NOTES:

1. Parts A, B, and C may originate with various human science research methods. For example, A, B, and C may be taken from Observational, Correlational, and Experimental Methods, respectively.
2. Two parts may originate from one method and a third part incorporated into the design and plan, which stems from a second method. For example, a component of Participant Observation may be incorporated into a complex experiment to construct an Experimental Methodology.
3. An outstanding example from the field of Anthropology is the ethnography. Ethnographic Method is really a methodology, because typically, it may combine Participant Observation with Interviewing, Archival Documentation, Cultural Artifacts, Photography, Questionnaires, and even Psychological Testing.

## CROSS-LAGGED CORRELATIONAL DESIGN AND ANALYSIS

### An Example\*

The variables:    Life Stress (LES NCS)  
                       Job Tension (JT)  
                       Task Performance (PI)

The Cross-Lagged Panels:

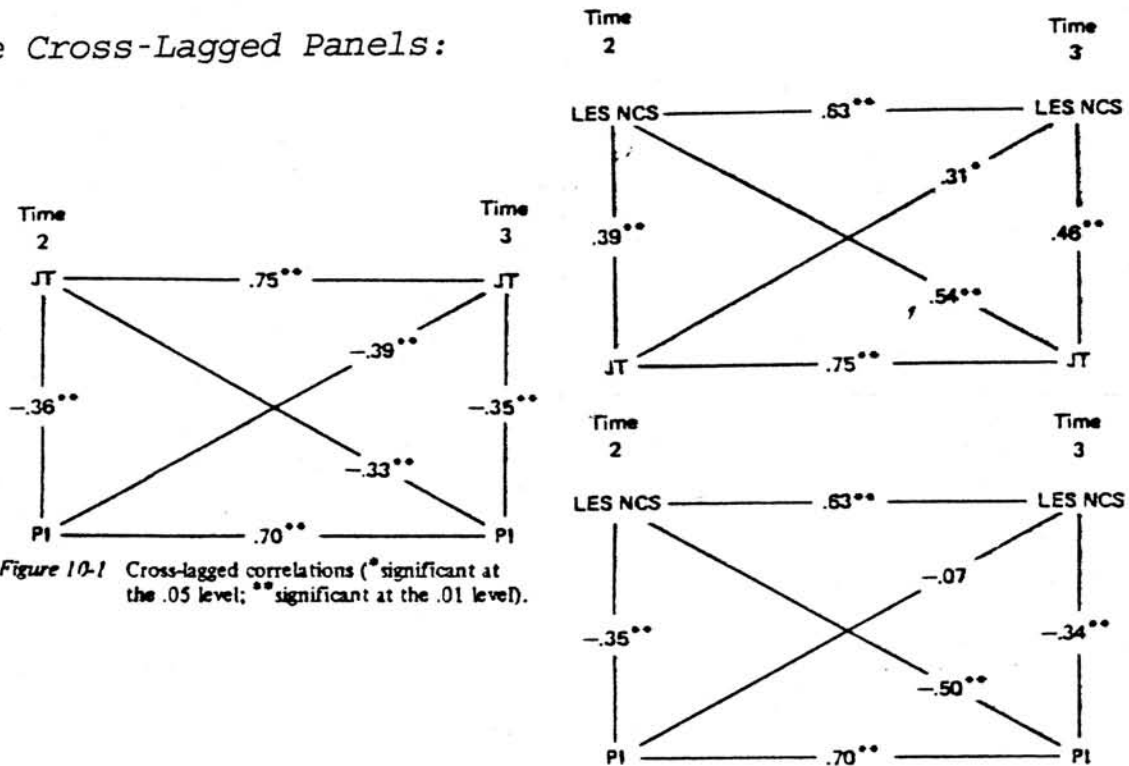
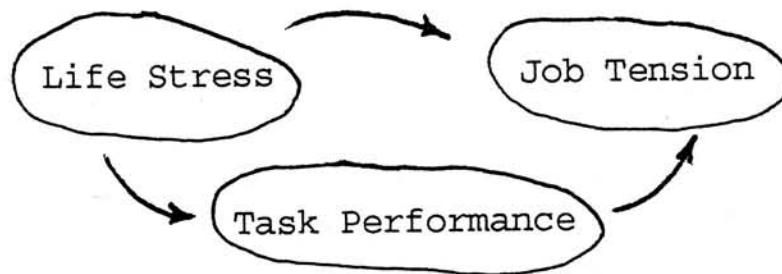


Figure 10-1 Cross-lagged correlations (\*significant at the .05 level; \*\*significant at the .01 level).

The inferred directions of influence:



\*From G. Vossel and W. Froehlich (1979) "Life stress, job tension, and subjective reports of task performance effectiveness," in I. Sarason and C. Spielberger, *Stress and anxiety*, New York: John Wiley & Sons, 6:199-211.

## DIAGRAMMATIC REPRESENTATIONS OF EXPERIMENTAL RESEARCH DESIGNS

### Independent variables (I.V.)

A, B, C, etc.  
letters from the beginning of the alphabet

### Conditions

AO    Experimental

### Dependent variables (D.V.)

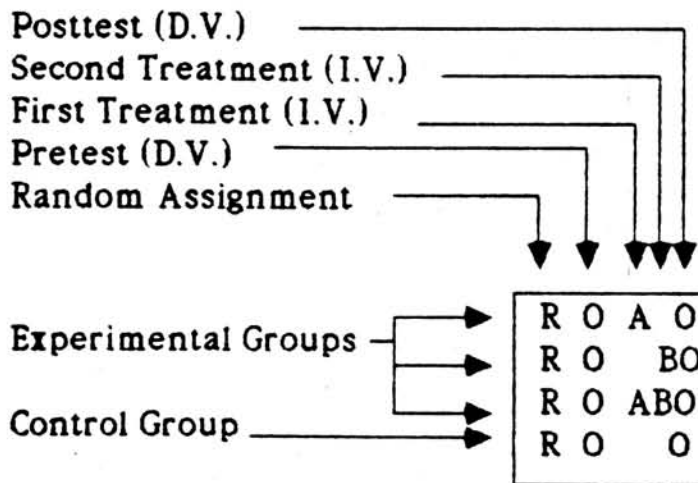
X, Y, Z, etc.  
letters from the end of the alphabet

O    Control

### Groups

O AO    Experimental

O O    Control



### Between Ss Design

R AO  
R O

### Between Ss Comparison

AO  
O

### Within Ss Design

O AO

### Within Ss Comparison

O AO

### Mixed Ss Design

R O AO  
R O O

## THE CONFIGURATION OF MYTH AS RESEARCH DESIGN IN DISCIPLINED INQUIRY

Symbols and Metaphors During the Warrior-hero's Journey

Film	Symbols			Metaphors				
The Green Berets	Green Beret	Vietnamese Children	Helicopters	* "We're going on (another) tour."	* "Who are you?" "Airborn."	* "How far?" "All the way."	* "Provo's Privy. It sings."	* "Can I have a choice just for the hell of it?" * "I'm taking the point." * "You're what this is all about."
<u>Pre-journey</u>								
	*							
<u>Departure</u>								
Call to Adventure	*			*	*			
Refusal of the Call	*							
Supernatural Aid	*							
Crossing of First Threshold	*	*	*	*				
Belly of the Whale	*	*	*					
<u>Initiation</u>								
The Road of Trials	*	*	*					
Meeting with the Goddess	*	*	*					
Woman as Temptress	*	*	*				*	
Atonement with the Father	*	*	*					
Apotheosis	*		*					*
The Ultimate Boon	*		*					*
<u>Return</u>								
Refusal of the Return	*		*					
The Magic Flight								
Rescue from Without								
Crossing of the Return Threshold	*	*	*					*
Master of Two Worlds	*							
Freedom to Live								

\*From A. Di Francesco and A. Collen (1985, April) The use of mythic content in film for psychohistorical research. Paper presented at the meeting of the Western Psychological Association, San Jose, California.

## RESEARCH PLAN FOR A RESEARCH METHOD USING MYTHIC CONTENT

<u>Phase</u>	<u>Step</u>	<u>Description</u>
I		THEORETICAL ASSUMPTIONS
II		THE DATA BASE
	1	Selecting the medium
	2	Narrowing the data base
	3	Applying general exclusion criteria
	4	Applying inclusion criteria
	5	Identifying prominent characters
III		DATA COLLECTION
	1	Selecting and defining the theoretical framework
	2	Previewing preparation
	3	Viewing
	4	Interjudge reliability
	5	Interjudge consensus
IV		DATA ANALYSIS AND SYNTHESIS
	1	Cinematic analysis
	2	Identifying the mythic structure
	3	Synthesis and describing the myth
	4	Comparison of myth in historical context

\*From A. Di Francesco and A. Colten (1985, April) The use of mythic content in film for psychohistorical research. Paper presented at the meeting of the Western Psychological Association, San Jose, California.

## RESEARCH PLAN FOR EXPERIENTIAL METHOD

### Purpose and goal

To illuminate the essential structure of the experience so that one can discover how one ordinarily creates the experience without awareness of the process.

### Four steps to the method

1. Noticing an immediate experience or reliving a past one.
2. Writing it down in the first person, present tense.
3. Doing a number of these reports or "snapshots" of experience for a given type of experience, such as anxiety.
4. Asking oneself what is common about these descriptions.

\*From J. Barrell, D. Medeiros, J. Barrell, and D. Price (1985) The causes and treatment of performance anxiety: An experiential approach. Journal of humanistic psychology, 25, 106-122.

## RESEARCH PLANS FOR DATA PROCESSING IN PHENOMENOLOGICAL METHODS

### Steps preparatory to data reduction

1. Identifying the phenomenon
2. Collecting data usually through taped interviews
3. Transcribing protocols for reduction

### Giorgi: Phenomenological Psychological Method\*

1. Readings through the text for a sense of the whole
2. Dividing narrative into constituent meaning units
3. Transforming meaning units from language of the participant to that of the researcher.
4. Synthesizing transformed meaning units into essential themes (situated structures)
5. Describing concisely the essential (general) structure of the phenomenon which incorporates all of its essential constituents.

### Spiegelberg: Phenomenological Method\*\*

1. Investigating the particular phenomenon (intuiting, analyzing, and describing)
2. Investigating general essences (Eidetic Intuiting)
3. Apprehending essential relationships
4. Watching modes of appearing
5. Exploring the constitution of the phenomena
6. Suspending belief in existence
7. Interpreting concealed meanings

### Heidegger: Ontological Phenomenology\*\*\*

1. reduction
2. construction
3. destruction

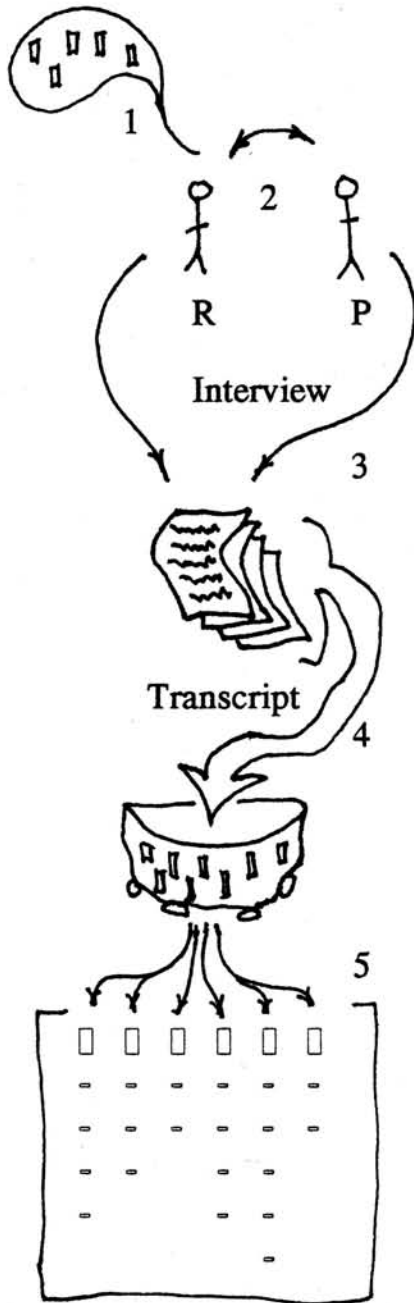
\*Based on A. Giorgi (1975) An application of phenomenological method in psychology. In A. Giorgi, C. Fischer, and E. Murray (Eds.) *Duquesne studies in Phenomenological Psychology*. Pittsburgh, PA: Duquesne University Press, 2, 82-103, and J. Bullington and G. Karlsson (1984) Introduction to phenomenological psychological research. *Scandinavian Journal of Psychology*, 25, 51-63.

\*\*Based on H. Spiegelberg (1976) *The Phenomenological Movement: A historical introduction*. Second edition. Amsterdam: Martinus Nijhoff, 2, 655-698.

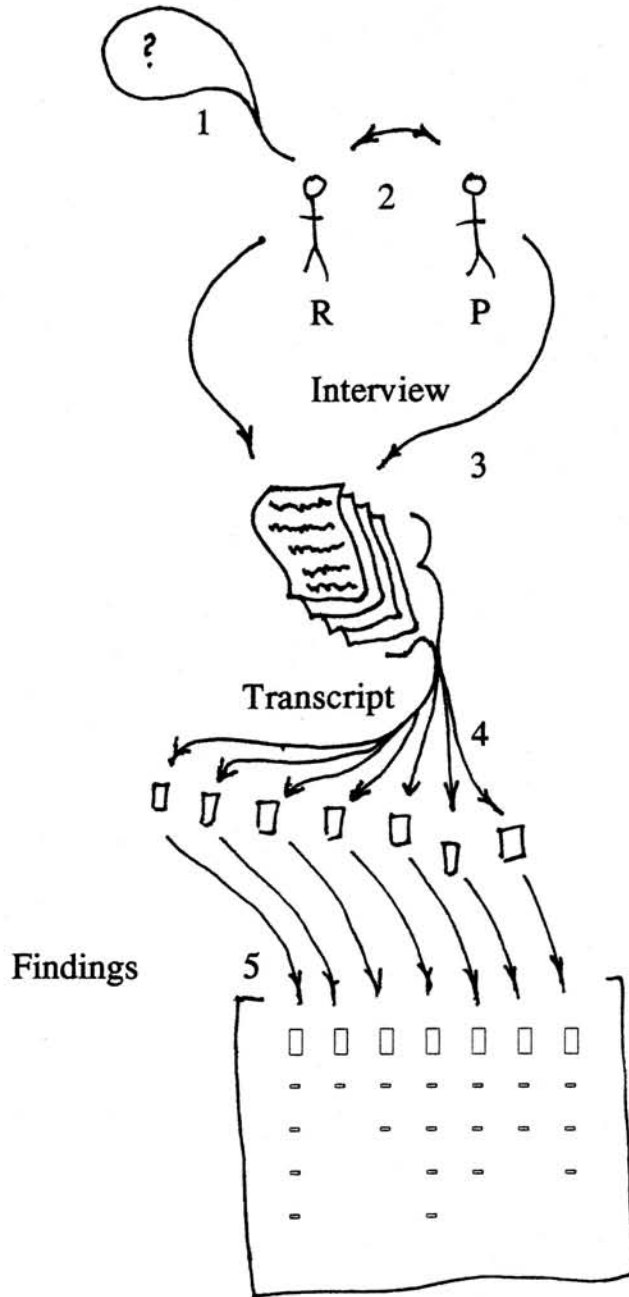
\*\*\*Based on M. Heidegger (1982) *The basic problems of phenomenology*. Trans. by A. Hofstadter. Bloomington, IN: Indiana University Press, 19-23 and 324-328.

## TWO GENERAL APPROACHES TO CONTENT ANALYSIS

### A PRIORI



### A POSTERIORI





## CONTRASTING VIEWS OF HUMANNESS

A human being can be described meaningfully in terms of:

- 1- his behavior
- 2- his conscious

A human being is:

- 1- predictable
- 2- unpredictable

A human being is an information:

- 1- transmitter
- 2- generator

A human being lives in:

- 1- an objective world
- 2- a subjective world

A human being is:

- 1- a rational being
- 2- an arational being

Each human being is:

- 1- like other human beings
- 2- is unique

A human being can be described meaninfully in:

- 1- absolute terms
- 2- relative terms

Human characteristics can be investigated:

- 1- independently of one another
- 2- as a whole

A human being is:

- 1- a reality
- 2- a potentiality

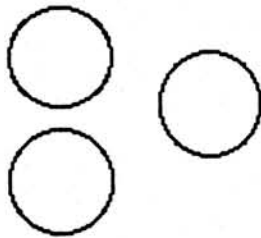
A human being is:

- 1- knowable in scientific terms
- 2- more than we can ever know

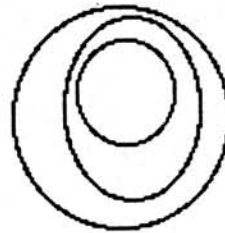
\*Based on W. Hitt (1968, August) Two models of man. Paper presented at the meeting of the American Psychological Association, San Francisco, CA.

## SOME DIALECTICS IN INQUIRY

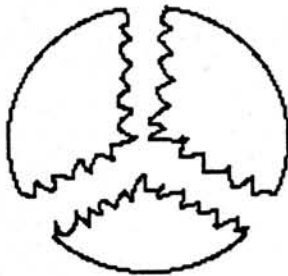
Exclusivity



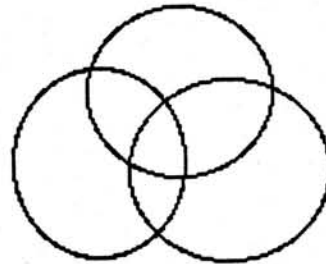
Inclusivity



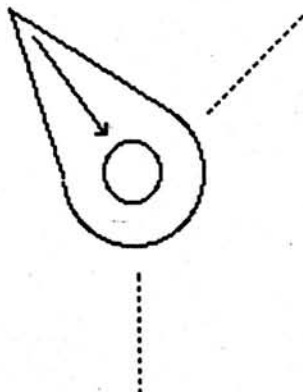
Antimony



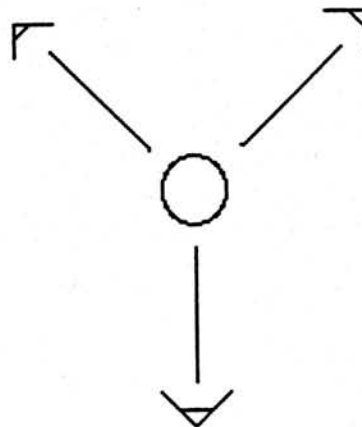
Complementarity



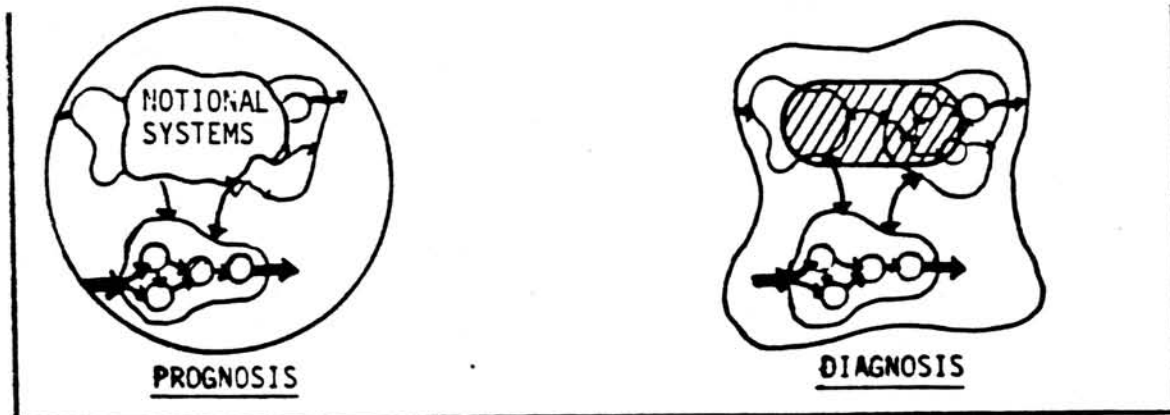
Position



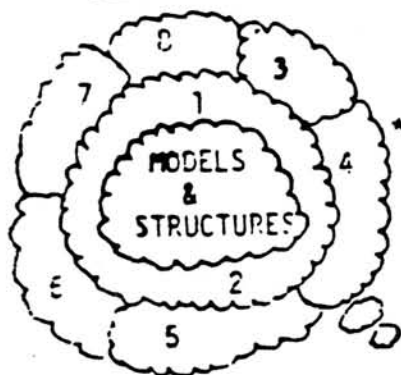
Perspective  
(Point of View)



## METAPHOR OF PHYSICIAN IN SYSTEMS ANALYSIS



### DYNAMIC MENTAL CONSTRUCT

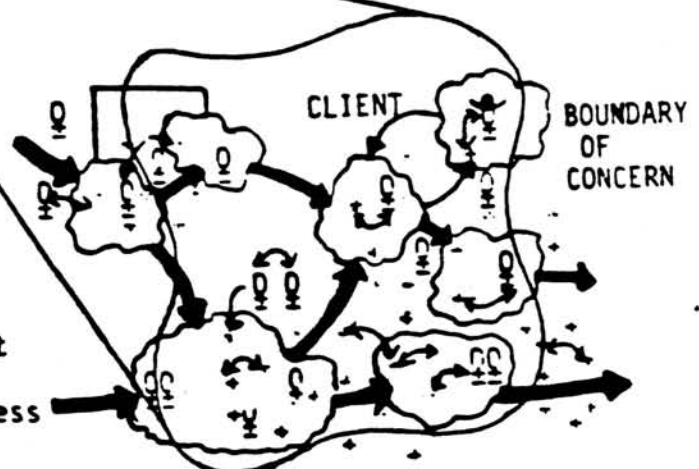


THE ANALYST

### DYNAMIC SITUATION

- (1) Perceptual Process
- (2) Structuring Process
- (3) Motives & Prejudices
- (4) Values
- (5) Intellectual Ability
- (6) Knowledge Sets
- (7) Client Relationship
- (8) Past Experience

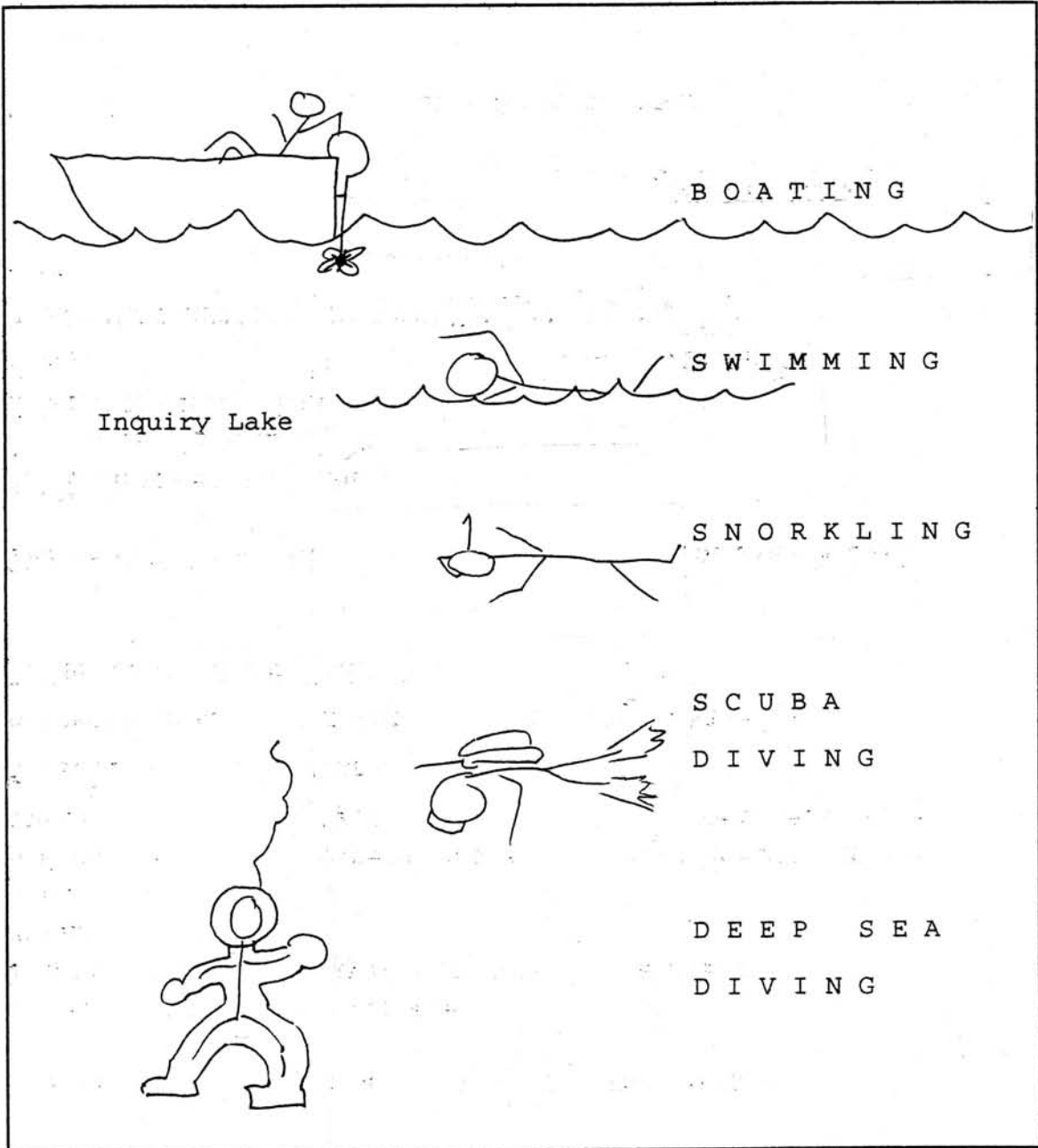
\* Note that the boundaries depicted which partition the mental construct in the diagram are purely to assist the reader's conceptualisation process



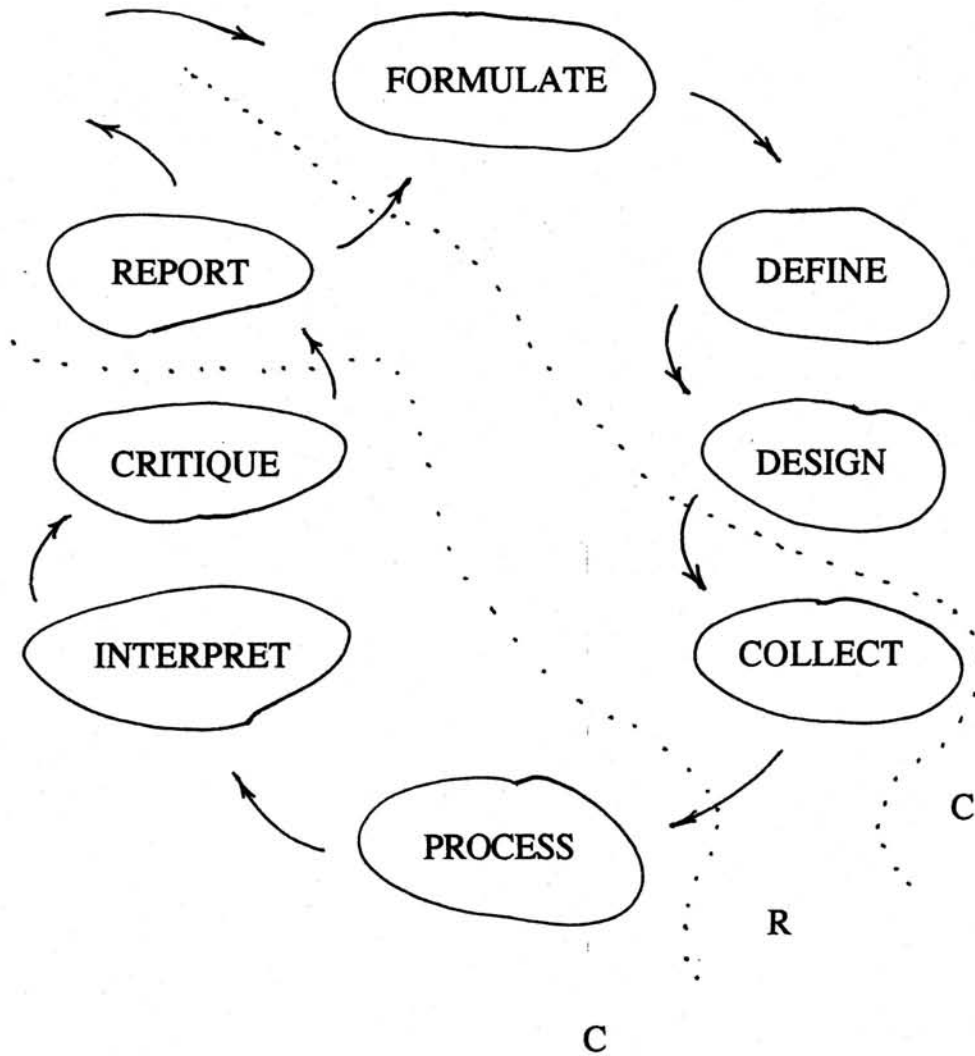
From N. Jayaratna (1985) NIMSAS: Toward a conceptual framework for understanding and evaluating systems analysis and design methodologies. Paper presented at Society for General Systems Research.

## TRAVERSING INQUIRY LAKE

Research means traversing the territory again and again. When this is done, it can be conceptualized as a journey in knowing that brings the inquirer into an increasingly deeper process of knowing the phenomenon studied.

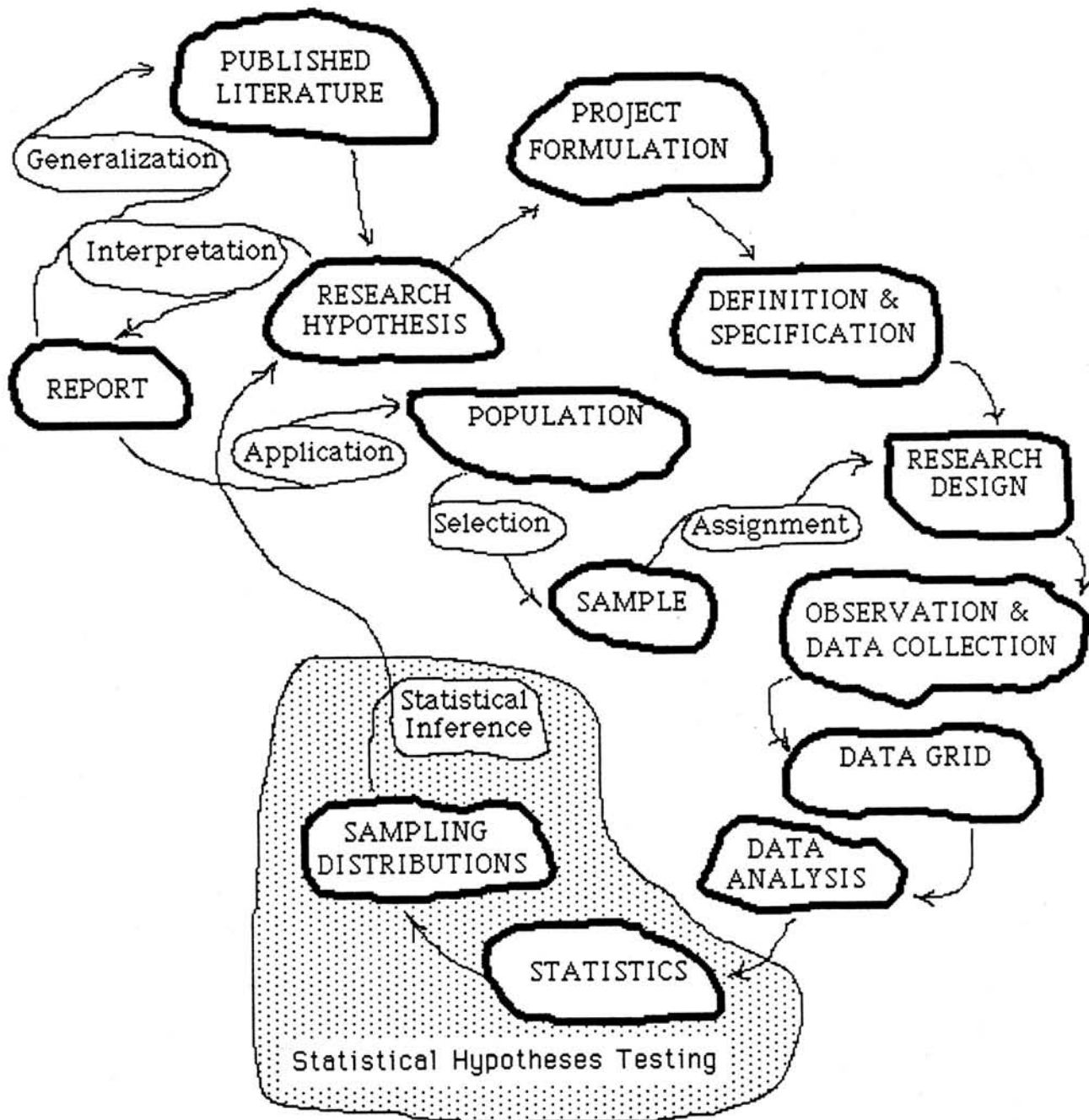


## GENERAL RESEARCH CYCLE

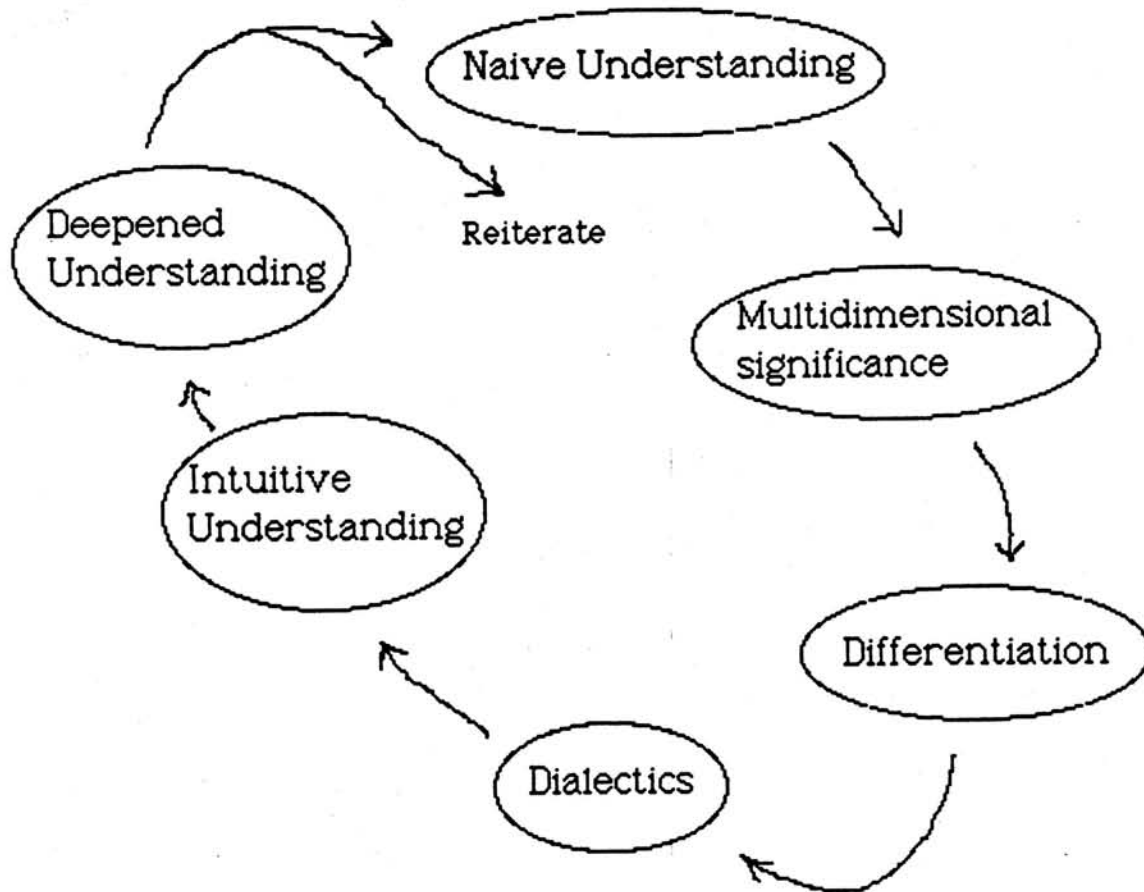


R = Real worlds of the participants, public, and scientific communities  
C = Conceptual worlds of the researcher and collaborators

## RESEARCH CYCLE IN NATURAL SCIENCE INQUIRY



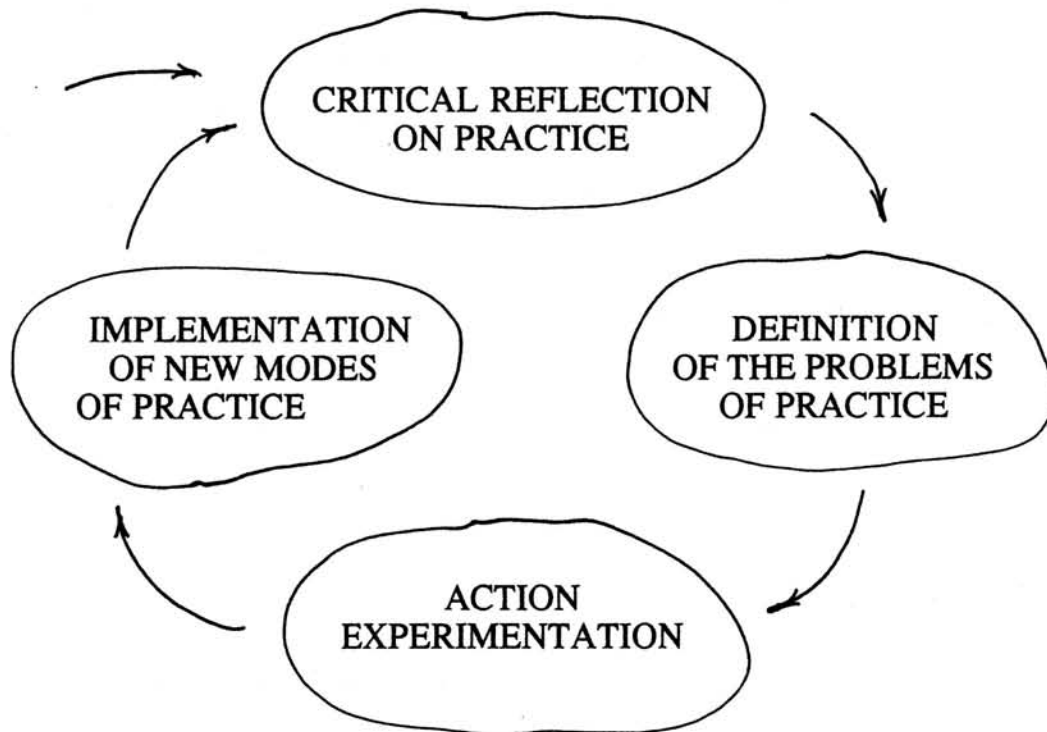
## HERMENEUTICAL METHOD AND THE HERMENEUTIC CIRCLE



\*Based on J. Barrell, C. Aanstoos, A. Richards, and M. Arons (1987)  
Human science research methods. Journal of humanistic Psychology,  
27, 424-457.

## RESEARCH CYCLE IN ACTION RESEARCH\*

### The Action Learning Cycle



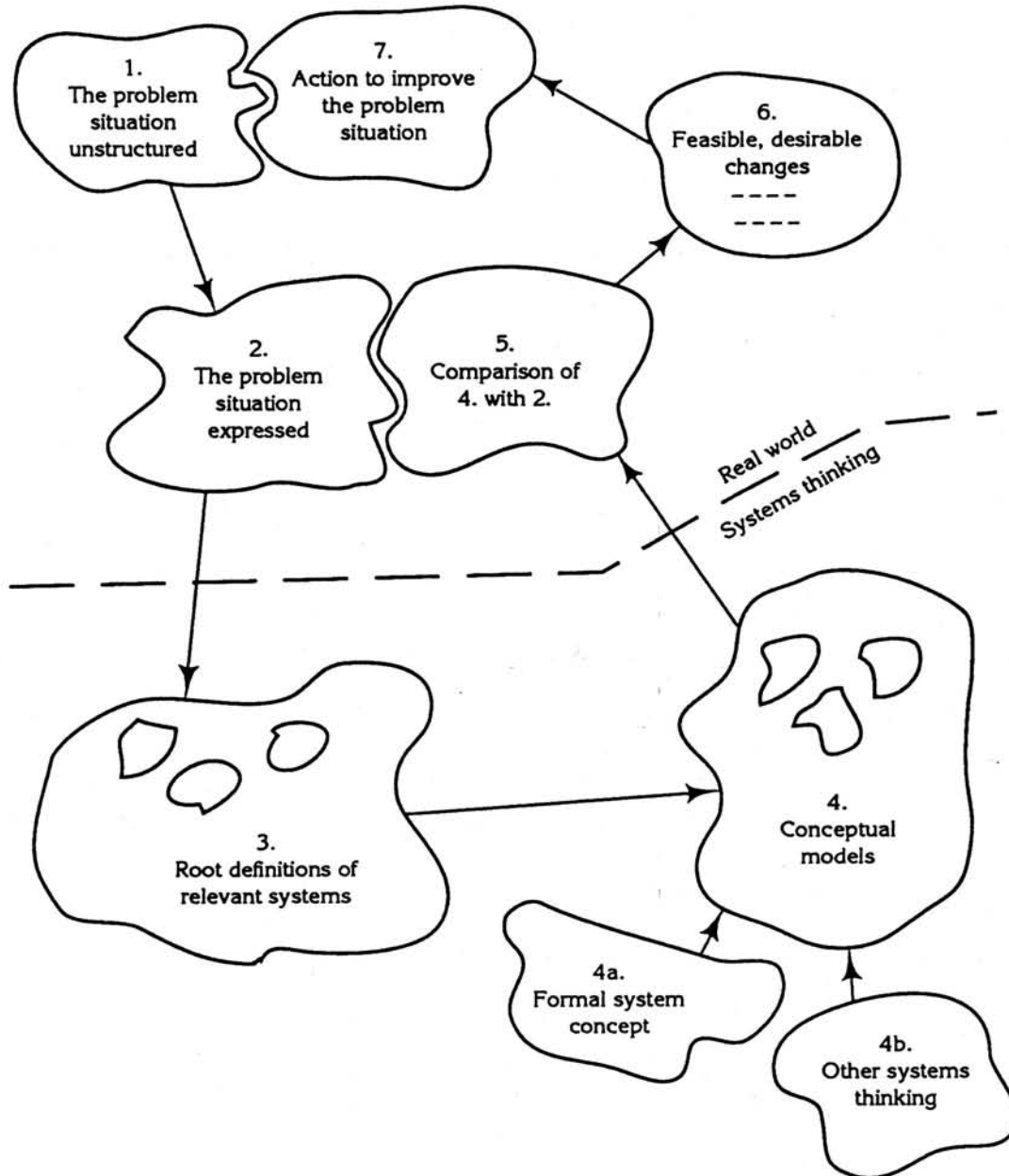
#### Emphasizes

- Advocacy with inquiry
- Experimentation within practice
- Theory-in-use (practice) over theory-in-thought
- Tacit knowledge over established knowledge
- First and second order (loop) learning

\*Source: Based on C. Argyris, R. Putnam, and D. Smith (1985) *Action science*. San Francisco: Jossey-Bass.



## RESEARCH CYCLE IN SOFT SYSTEMS METHODOLOGY\*



\*From P. Checkland (1981) *Systems thinking, systems practice*. New York: Wiley.

## PROBLEMS IN HUMAN ACTIVITY SYSTEMS

### Question:

What do we do with a system-wide problem?

IN RESPONSE TO THE PROBLEM, WE TEND TO:

	CLOSED ↔ <i>o p e n n e s s</i> ↔ OPEN	
SIMPLE		
↓	FIX WHAT DOES NOT WORK	ADJUST TO KEEP IT STABLE
↑	PROBLEM-SOLVING	REGULATING
<i>c o m p l e x i t y</i>		
↓	EXECUTE THE BEST OPTION AVAILABLE	CREATE NEW FORMS AND VARIATIONS
↑	SUBOPTIMIZING	REDESIGNING
COMPLEX		

NOTE: Four commonly employed strategies become apparent when we consider the dichotomized cross combinations of complexity and openness of human activity systems.

## TYPES OF VALIDITY

Validity is a general concept in research. It conveys that specific decisions and activities of the researcher have contributed to the intentions of the inquiry. The forms of validity sought in disciplined inquiry are:

**INTERNAL** — Establishing coherence and integrity to the research process itself, through each stage of the research cycle.

**METHOD** — Establishing that the research method was conducted in a manner which enabled the researcher to fulfill the aims of the inquiry.

**DESIGN** — Establishing that the configuration of persons and resources in spacetime enabled the researcher to address the question(s) posed for inquiry.

**PLAN** — Establishing that the sequence of execution of the inquiry in spacetime enabled the researcher to address the question(s) posed for inquiry.

**CONSTRUCT** — Establishing that the procedure(s) of operationalizing or consensus building did represent the construct it was intended to represent.

**INSTRUMENT** — Establishing that the form of operationalizing a construct worked in the inquiry to generate data that can be processed to address the question(s) posed for inquiry.

**FACE** — Establishing that the semantic web of surface meanings in an instrument or procedure represents the construct it is supposed to represent.

**CONTENT** — Establishing that the substance of an instrument or procedure represents the construct it is supposed to represent.

**STATISTICAL DECISION** — Establishing that the choice of statistic(s) and procedures of data processing were completed correctly, such that the researcher can make sound inferences from the result(s).

**CONVERGENT** — Establishing that two constructs share common characteristics and properties.

**DISCRIMINANT** — Establishing that two constructs have distinct characteristics and properties.

**EXTERNAL** — Establishing the boundary of reference that must delimit generalizability of the findings of inquiry to such persons, places, and conditions.

**POPULATION** — Establishing the boundary of reference that must delimit generalizability of the findings of inquiry from those persons studied to those from the same or similar human populations.

**ECOLOGICAL** — Establishing the boundary of reference that must delimit generalizability of the findings of inquiry from those places, conditions, and settings of the inquiry to other like or similar places, conditions, and settings.

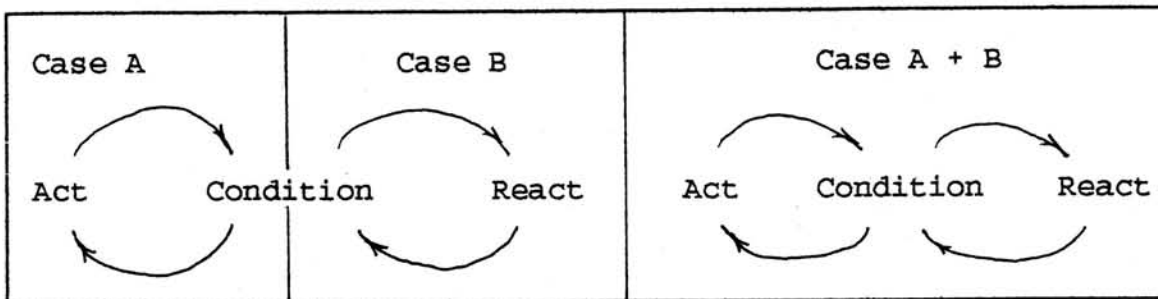
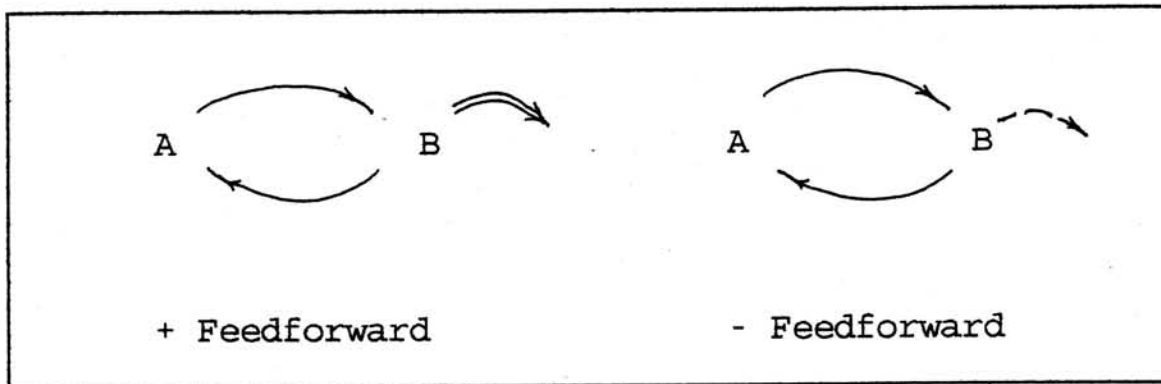
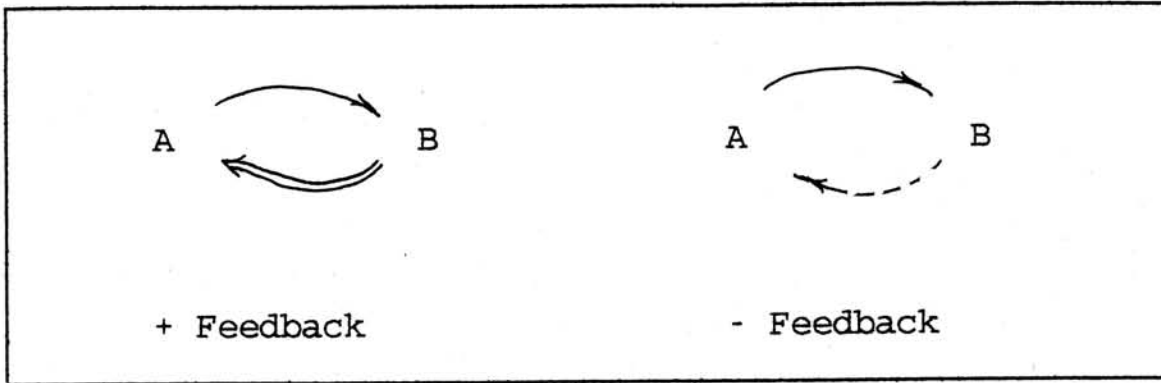
## RESEARCH ETHICS AND PARTICIPANT RIGHTS

The rights of every person, who is asked to be a participant in a research study, shall be:

- 1- To be told what the study is trying to find out.
- 2- To be told what will happen to me and whether any of the procedures, drugs, or devices is different from what would be used in standard practice.
- 3- To be told about the frequent and/or important risks, side effects or discomforts of the things that will happen to me for research purposes.
- 4- To be told if I can expect any benefit from participating, and, if so, what the benefit might be.
- 5- To be told the other choices I have and how they may be better or worse than being in the study.
- 6- To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study.
- 7- To be told what sort of psychological or medical treatment is available if any complications arise.
- 8- To refuse to participate at all or to change my mind about participation after the study is started. This decision will not affect my right to receive the care I would receive if I were not in the study.
- 9- To receive a copy of the signed and dated consent form.
- 10- To be free of pressure when considering whether I wish to agree to be in the study.

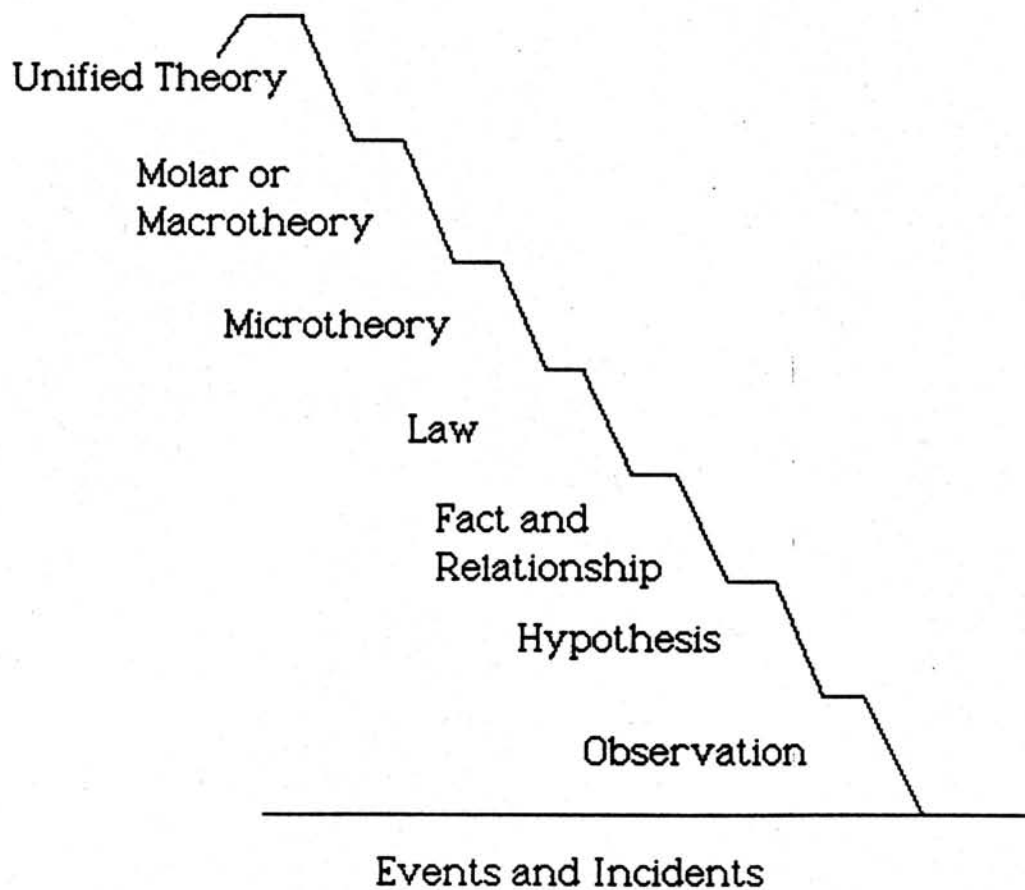
These rights have been adopted by many research centers and special committees, known as Institutional Review Boards (IRB), which have the responsibility to review and approve a research proposal for its impact on human participants.

## CYBERNETICS IN CRITICAL, SOCIAL ACTION RESEARCH

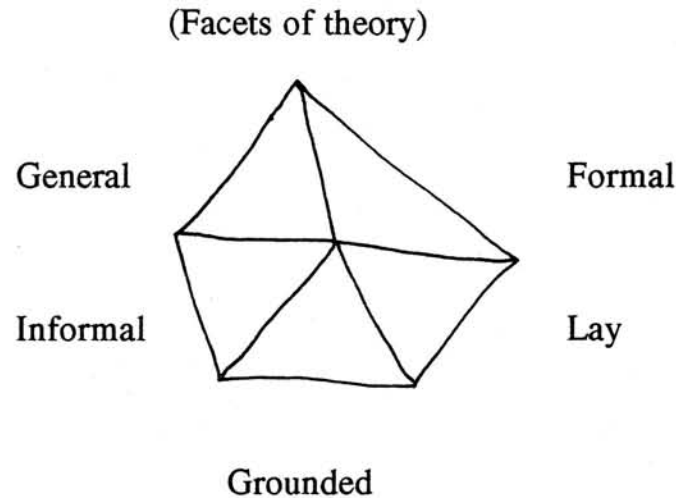


What are the feedback (speed and slow) and feedforward (grow and retard) aspects of the social action research cycle?

## THE THEORY BUILDING PYRAMID OF NATURAL SCIENCE



## TYPES OF THEORY BEARING ON INQUIRY



### GENERAL THEORY

A general conceptual framework that organizes a large body of concepts and principles and that pertains to a wide variety of phenomena.

### INFORMAL THEORY

A network of concepts and principles, which supposedly account for a circumscribed subject area, integrated by a set of hypotheses and/or assertions based on an established body of disciplined inquiry.

### LAY THEORY

Speculation and opinion on a subject based on incidental associations among daily events.

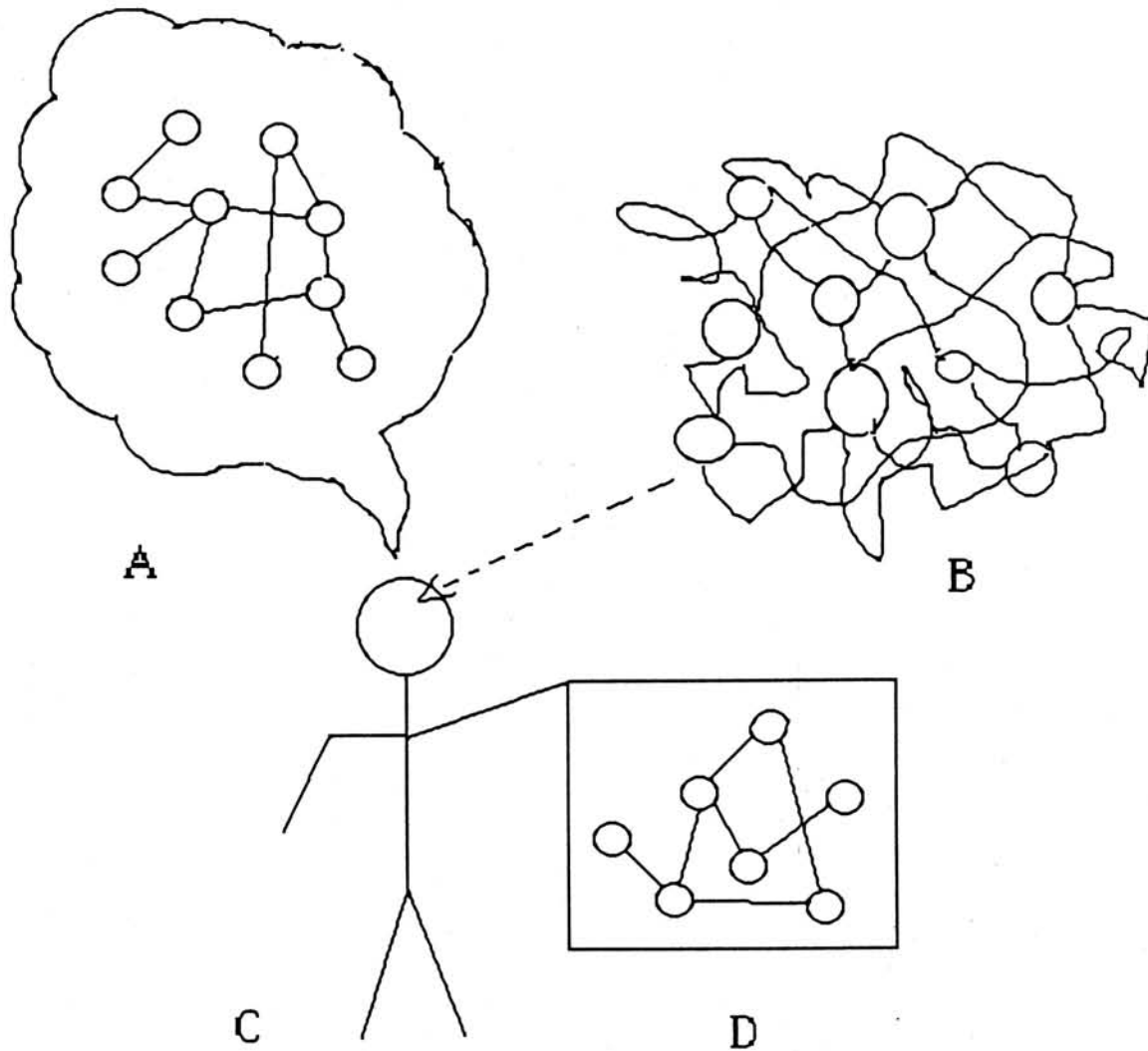
### FORMAL THEORY

A cogent set of logically interrelated propositions, axioms, and laws, each aspect of which has been derived by deductive and/or inductive logic, and tested through hypothesis formulation and empirically based disciplined inquiry.

### GROUNDING THEORY

A category scheme generated by the constant comparative research method, or such equivalent, pertaining to a specific human experience based phenomenon and revealing a network of hierarchical relations among the categories.

## WHERE IS THE SYSTEM?



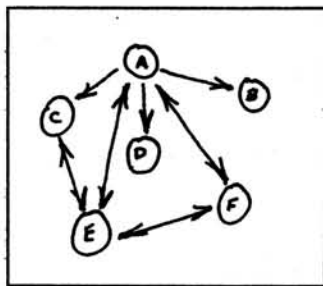
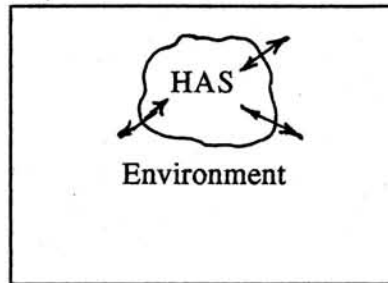
- A Idea of the System
- B Part of the Real World
- C Participant Observer, Person
- D Model of the System

D is a model of A  
which is relevant to B  
if it helps C  
to understand or change B

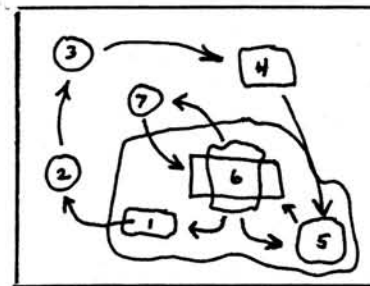


## THREE SYSTEMS MODELS APPROACH\*

### SYSTEMS-ENVIRONMENT MODEL



### STRUCTURE-FUNCTION MODEL



### PROCESS MODEL

\*Source: B. H. Banathy (1991) *Systems view of education*. New Jersey: Educational Technologies.

## CONCEPTS ACROSS RESEARCH METHODS

**INTEREST**  
**PURPOSE**  
**ARENA OF INQUIRY**  
**CONTEXT**  
**QUESTION**  
**ASSUMPTION**  
**CONSTRUCT**  
**THEORY**  
**PHILOSOPHY**  
**DESIGN**  
**PLAN**  
**DATA PROCESSING**  
**CONCEPTUAL NET**  
**RESEARCHER**  
**VALIDITY**  
**RELIABILITY**  
**ETHICALITY**  
**COMPLEXITY**  
**SIGNIFICANCE**

## CHARACTERISTICS OF AN ORGANIZATION-BASED ETHNOGRAPHIC METHODOLOGY (OBEM)

- **Participant researchers** Managers and workers (employees) are the co-researchers, informants, and participants.
- **Researcher participants** The principal researcher is a manager (member) of the organization. And so are his/her co-researchers and assistants.
- **Perspectivistic** Multiple views (viewpoints, vantage points, levels, and perspectives) are sought and included throughout the inquiry.
- **Polyparadigmatic** The assumptions of multiple paradigms may become affiliated and clustered as appropriate to the inquiry.
- **Multi-methodological** Two or more methods, or aspects of several methods may be combined and blended as appropriate to the inquiry.
- **Action-pragmatic** Emphasis on action type research that is interactive, makes use of feedback, participative, and cooperative collaboration. Central interests in what works and the consequences of action in relation to increasingly long range and globalized vision as well as constructive, critical, and ameliorative directions in inquiry.
- **Ethnolinguistic** Methodological concepts are translated into the language of the organization and become part of the organizational culture. The communications comprising the inquiry remain as much as possible in the language of the participants (organization), and they anchor and delimit the inquiry to its organizational context.
- **Data vigilant** The collection of information useful for the inquiry is ongoing made possible through various information based technologies. Data flows are rich but selective.
- **Thematic** The processing of the data of inquiry tends to be inductive and empirical, and may take the form of analysis, synthesis, explication, imaging, and combinations thereof. Processing moves toward trends and thema, and eventually finds its genre and story line that reflect a balance between integration of commonality and representation of diversity. Furthermore, the result is a mixture of the *a priori* (before; foresights), *in vivo* (during; here and now), and *a posteriori* (after, post hoc; hindsight).
- **Multi-vocal** The researcher is only one voice included among many who communicate in the ethnography.
- **Multi-phasic** The ethnography reveals representations, transitions, and selections of the realities of the organization. Critical stance is favored with no one reality necessarily taken as "the" reality of the organization.
- **Polymorphic** The ethnography has flexibility and fluidity, in that it may take several legitimate forms, that is, not only the customary published research report, but also a CD-ROM database, participative simulation, public briefing, and structural redesign within the organization.

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## SEMINAR LEADER

Professor Arne Collen is best known for his teaching and consulting activities, which make use of several research methodologies. He has taught human oriented research methods courses and seminars for designing inquiry and data processing (both quantitative and qualitative) in graduate institutions and internationally for the past two decades. The HSR Seminar, now in its seventh continuous year, represents an illustration and one central activity of his current work in human science research methodology.

From his earlier study of experimental method and other forms of traditional and empirical research, his study of approaches to inquiry continues. In the last dozen years he has examined some research traditions emphasizing the use of narrative and pictorial material, contributions of technologies to advancing methodology, methods for amelioration, and systemic methodology. He is also noted for his applications of cybersystemics to human science research methodology. Of special interest is his constructivist approach to the design of methodologies from among various human science research methods.

As an educator and research consultant, he has helped hundreds of students, directors, managers, executives, and fellow researchers to acquire, improve, and apply their research skills as disciplined inquiry in their academic, professional, and corporate settings.

## HSR SEMINAR GLOSSARY

The purpose of this glossary is to help the seminar participants to acquire an understanding of the terminology and concepts used in the seminar. The glossary is a group collaborative activity over the course of the seminar. The seminar includes receiving the updated version of the glossary that includes participants' contributions. Entries are shown in English and Italian; text appears in English only. The descriptive definitions, which follow, apply to the context of the seminar; they are not intended to suggest necessarily wide acceptance and usage across the sciences.

### HUMAN [L. *humano* - man]

1. having the qualities or attributes of human being.
2. a human being (*ie. homo sapiens*).

### METHOD [L.- *methodus* - pursuit of knowledge, mode of investigation]\*

1. a special form of procedure adopted in any branch of mental activity whether for purpose of teaching and exposition, or for that of investigation and inquiry.
2. a way of doing anything, according to a defined and regular plan, a mode of procedure.
3. a branch of logic and rhetoric which teaches how to arrange thoughts and topics for investigation, exposition, and literary composition.
4. orderly arrangement of topics and ideas in thinking and writing, in framing a particular discourse or literary composition.
5. orderliness and regularity in doing anything.
6. a disposition of things according to a regular plan or design. *Obs.*

### METHODOLOGY [L.-*methodos* + *logos*]

1. a study of methods.
2. the discipline and field of study of the methods from related disciplines or fields of study.
3. a composition, arrangement, or construction of methods or components therein, for the purpose of teaching and exposition, or for that of investigation and inquiry.

\*Source: *The Compact Edition of the Oxford English Dictionary*. Oxford University Press, 1971.

RESEARCH [It.- *cerchier* - to seek; Sp.,Pg.- *cercar* - to surround; late L.- *circare* - to go around; f.- *circus* - circle]

1. a search or investigation directed to the discovery of some fact by careful consideration or study of a subject; a course of critical or scientific investigation; investigation, inquiry into things.
2. to look carefully, to explore, examine thoroughly, scrutinize for the purpose of finding, studying, discovery.
3. to search again or repeatedly.

SCIENCE [L.- *scientia* - knowledge; f. *scire* - to know]

1. the state or fact of knowing; knowlege or cognizance of something specified or implied; (in Philos.) as opposed to opinion or belief.
2. knowledge acquired by study.
3. a particular branch of knowledge or study.
4. (more restricted sense) a branch of study which is concerned either with a connected body of demonstrated truths or with observed facts systematically classified and more or less colligated by being brought under general laws and which includes trustworthy methods for the discovery of new truth within its own domain (17th and 18th century use of Philos.; contemorary use of science).

## S Y S T E M

[Gk.- *systema* - organized whole, body, or union into a whole; f. Gk.root meaning: to set up, stand; L.- *systema* - musical interval, the universe, body of the articles of faith]

1. an organized or connected group of objects, associated, or interdependent, so as to form a complex unity; a whole composed of parts in orderly arrangement according to some scheme or plan, rarely applied to simple or small assemblage of things.
2. (sci. and tech.) a group, set, or aggregate of things, natural or artificial, forming a connected or complex whole.