## PRINCIPLES OF EMPIRICAL SCIENCE: A REMINDER

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# **Speaker's bias**

- Initial training in *mathematics* 

- Also training in *sociology* 

(empirical studies orientation)

- No training in humanities L

- Observation of research practice as an interpreter in scientific conferences
- Teaching research methods in mixed environments (*students of Japanese, T&I and terminology students*)
- Analysis of research in humanities through contact with translation research

# Main points of presentation

- Reminder about the Scientific Approach, its rationale and norms  $\rightarrow$  ESP
- *The Scientific Approach/ESP* is not necessarily the best way to explore the world
- Sophisticated methods are not necessarily the best in all circumstances
- Compliance with 'scientific' norms is not correlated with the degree of sophistication of the methods used
- When doing a PhD, need to choose paradigm and comply with the relevant norms

# Science: a reminder (1)

Our knowledge about the World/representation of the World comes from:

#### - Experiential knowledge

(direct experience through sensory experience and its analysis)

- **Inherited knowledge** (*what we learn from others*)

- What our brain does with the information

# Science: a reminder (2)

Data acquisition and its processing by the brain are constrained by:

- Sensory limitations
- Cognitive limitations
- Emotional interference

(which tends inter alia to make us see what we want to/expect to see and disregard what we would not like to see/do not expect)

# Science: a reminder (3)

Recognizing these limitations, *philosophers* and <u>scientists</u> have been developing for centuries the 'Scientific Approach' (SA), in order to push them back.

# Science: a reminder (4)

SA was first used in natural sciences, *it was also imported into social sciences* Henceforth '**ESP**' – Empirical Science Paradigm

Some of its norms (in particular writing norms) are found in the humanities as well

On the whole, it is found in empirical disciplines more than in theoretical disciplines

# Norms and methods

SA/ESP can be represented through:

- Conceptual Norms
- *Social norms and institutions* to enforce their implementation (academic hierarchy, peer reviewing...)

Social norms and institutions are very similar in ESP and in non-ESP academic disciplines

- Technical research methods
- Writing norms

# **Conceptual norms (1)**

#### 'Science' (ESP) is supposed to be

## 'Rigorous'

- Systematic
  - Cautious
- Objective

## Logical

## **'Collective'**

- Communicative - Critical
  - Explicit

# **Conceptual norms (2)**

#### In concrete terms, ESP scholars:

- Systematically conduct *empirical testing* of their ideas and theories
- Systematically *provide evidence* to back up claims
- Are *explicit* about their materials, methods and factual and/or logical grounds for their claims
- Make a *clear distinction* between documented facts and speculative thoughts

## **THE ESP CYCLE (Popperian model)**



## **THE ESP CYCLE (More realistic)**



[Inter alia: Kuhn's theories of scientific (r)evolution ]

## **THEORIES AND TESTING**

#### NEW THEORIES ARE CONSIDERED *PROVISIONAL* MODELS/EXPLANATIONS OF REALITY

#### THEY ARE *TESTED SYSTEMATICALLY*, WITH THE EXPECTATION (*IN PRINCIPLE!*) THAT

# ... TESTS WILL INDUCE CHANGES IN THE THEORY AND IMPROVE IT

#### THE LIBERAL ARTS PARADIGM (LAP)

#### Very common approach in TS due to scholars' background

- Mostly conceptual analysis Essays
- Can be empirical in a very wide sense
   (with examples, not representative samples in the statistical sense of the word, i.e. samples designed to represent the same features as the population)
- **Personal interpretation** of phenomena, statements, actions without necessarily considering alternatives

## THE LAP CYCLE

#### **OBSERVATION or IDEAS/THEORIES**

DISCUSSION

NEW/IMPROVED THEORIES

#### NO EMPIRICAL TESTING

#### BUT EMPIRICAL FINDINGS FROM OTHER SCHOLARS' STUDIES CAN BE TAKEN ON BOARD IN THE DISCUSSION

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# LAP vs. ESP

- LAP Less cautious (No strong requirement that samples be representative No testing requirement before claims)

- Less stringent objectivity requirements
- Less stringent explicitness requirement

Authors can make claims without explicating their tentative nature, without testing them, without providing evidence systematically.

#### So not fully compliant with SA norms

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# "LAP INFERIOR TO ESP"?

# Perhaps loss in reliability

#### but

- Faster
- Some theories cannot be tested or tested well (difficult to find valid measurable indicators, variability...)
- LAP does provide a way of exploring phenomena collectively and critically.

Cannot say it is "inferior" in absolute terms

# ESP vs. the liberal arts and other types of exploration of reality

- No claim that SA is *better* than LAP

- No claim that SA is *better* than direct experience, intuition and other ways of exploring the world
- Non-scientific exploration often leads to faster and more extensive knowledge acquisition

- No special value to "Science"

- But ESP corresponds to a specific approach and behavior, partly different from the liberal arts

# **Typical objectives of ESP vs. LAP studies**

#### ESP

- Explore/Find out about something
- Test a theory

. . .

. . .

- Develop a method to explore stng/test stng, a theory

#### LAP

- Think about a phenomenon (its meaning, relation w/ other
  - phenomena,...)
- Analyze a theory
- Compare theories

## WHY DIFFERENTIATE ESP FROM LAP? (1)

## **Criticized in ESP, acceptable in LAP:**

- "Unsubstantiated claims"
- "Hasty personal, subjective conclusions"
- "Interpretation of phenomena without considering alternative explanations"
- "Theories without intent to test them"
- "Pointless classifications"
- "Prescriptive & judgmental attitudes"
- "Not quite accurate representation of facts"
- "Randomly (or) biased selection of examples"

#### WHY DIFFERENTIATE ESP FROM LAP? (2)

## **Criticize in LAP, acceptable in ESP:**

- "Concepts defined operationally are *not defined well enough conceptually*"
- "Focus too narrow (failure to address more relevant aspects for practical or methodoloogical reasons), so *exploration incomplete*"
- "Focus too narrow, *focuses on one theory only* whereas there are many..."
- "Pointless accumulation of data"
- "Research with no social relevance"

#### WHY DIFFERENTIATE ESP FROM LAP? (3)

## Many texts in TS are extra-paradigmatic

- Didactic texts,
- Prescriptive texts with little theory,
- Analyses with little theory,
- Descriptions with no research context...

But *doctoral work* is generally required to contribute to "research" and will be judged paradigmatically

So need to know which set of norms to follow

# PEOPLE

SCIENCE (ESP and LAP) IS PERFORMED BY **PEOPLE** 

#### IN TERMS OF RESEARCH, SCIENTISTS ARE ESSENTIALLY SUPPOSED TO:

#### **1. COMPLY WITH SCIENTIFIC NORMS**

#### 2. INNOVATE SO THAT SCIENCE CAN ADVANCE

#### 3. **PERFORM EXTRA-PARADIGMATIC FUNCTIONS** (SOCIAL, ECONOMIC, TEACHING, ORGANIZATIONAL AND OTHER)

# **Requirements from PhD Work**

#### **1. COMPLY WITH 'SCIENTIFIC' (ESP or LAP) NORMS**

#### 2. INNOVATE

#### With

#### - FACTS

(NOT YET KNOWN, WHICH REQUIRE RESEARCH

TO BE UNCOVERED)  $\rightarrow ESP$ 

and/or

- IDEAS  $\rightarrow LAP, ESP$ 

(*HYPOTHESES, MODELS, NEW ANALYSES, NEW CONCEPTS*) and/or

- RESEARCH METHODS  $\rightarrow$  ESP if development & testing included

#### LOCAL CONDITIONS

#### NORMS VARY

(LAP versus SA, length of thesis, theoretical exploration, empirical versus theoretical, citations, writing style,...)

#### FOR PhD STUDENTS: THE 'RIGHT' NORMS ARE THE SUPERVISOR'S NORMS

#### THE AMOUNT OF REQUIRED INNOVATION VARIES: ENOUGH IS WHEN THE SUPERVISOR SAYS IT IS

## WARNING/REASSURANCE

- MOST CONTRIBUTIONS OF SCIENTISTS ARE **SMALL** 

# - MOST MAJOR CONTRIBUTIONS ARE THE RESULT OF **MAJOR, LENGTHY, COLLECTIVE EFFORTS**

#### - DON'T BE OVERAMBITIOUS (RISK OF FAILURE, RISK OF BURN-OUT)

# - DON'T TRY TO CONTRIBUTE A MAJOR INNOVATION IN YOUR PhD

# - READ OTHER PHD THESES AND IDENTIFY THEIR CONTRIBUTION

- SEEK TO MAKE A SIMILAR CONTRIBUTION

#### NATURALISTIC RESEARCH...

(Exploring Reality in its 'Natural' Environment)

#### Is perfectly acceptable in "Science"! In Astronomy In Biology, Zoology In History In Sociology In Linguistics In Psychology In Medical science

#### **EXPERIMENTAL RESEARCH**

(Experimental research: research under conditions created specifically for scientific investigation of the phenomenon at hand)

- Contrary to a myth, Experimental research can be exploratory
  - Best known for hypothesis-testing

#### but

- Hypothesis-testing is also possible in naturalistic research)

# **Experimental hypothesis-testing**

- Simple fictitious case for illustration:
- Hypothesis derived from Theory: A glass of (French) wine *improves translation*
- *Experimental group* of translators: drink glass of French wine, translate
- *Control group* of translators: no wine, translate
- Compare translations. If wine translations better, the evidence *supports* the theory

(but does not prove it!  $\rightarrow$  later)

# Theoretical advantage of experimental research

- Can isolate the factor one focuses on (wine) by *controlling other factors*. So, if output quality is different, this is probably due to wine
- Note: it is also possible to isolate factors in naturalistic studies *after the fact (ex. epidemiology)*, but this requires much more data collection

(collect info about many translators' output, check who drinks glass of wine before translating, compare outputs)

# **Experiments and variability**

- Why use groups rather than single individuals ?
- Because of potential variability: it is not possible to control all relevant variables, and some phenomena are intrinsically variable.

(Not all translators are equally 'good', irrespective of the wine – and their extra-wine qualities may confuse the issue)

• Using groups allows smoothing out some variability

## FIGHTING VARIABILITY

- By tightening the experimental setup
- By tightening implementation procedures
- By increasing sample size
- Through *replications* Very important in ESP, because every experiment is a 'case study'

How feasible is it in translation and interpreting research to increase sample size and conduct many replications ?

#### WHY DOES AN EXPERIMENT IN TS NOT 'PROVE' THAT A HYPOTHESIS IS CORRECT?

- Because only a small number of relevant variables can be controlled and others may well tip the scales
   So experiments are always case studies with respect to one or several variables
- Because inferential statistics only assess error probabilities they do not provide certainties

These two points apply no matter how sophisticated the design

#### DOES EXPERIMENTAL RESEARCH EVER 'PROVE' THAT A HYPOTHESIS IS CORRECT?

• When many replications reach similar conclusions, the scientific community gradually gains more confidence in the hypothesis

But does one ever get a 'proof' in the mathematical sense of the word?

#### EXPERIMENTS VS NATURALISTIC CASE STUDIES

Which is more convincing:
An experimental study with 10 subjects?
Or 50 converging naturalistic case studies?
Or 3 converging experimental studies (2 replications) with 10 subjects each?

???????

# **Risks in experimental T&I research**

#### The highest risk resides in attitudes Unjustified sense of security because the procedure is 'scientific' and 'rigorous' (if it is!):

- Neglect of potential existence of other relevant variables, especially if findings support hypothesis
- Loss of awareness of subjective factors when using quantitative procedures (ex. fidelity strategies)
- Neglect of other procedures (observe people, ask people, use less stringent experimental designs) with which *triangulation* helpful

# **Summary and conclusions**

- Empirical science is primarily an *approach* 

- Techniques and paradigms are customised and evolving manifestations of an approach
- They are submitted to social pressures and therefore do not necessarily evolve as fast as 'objective' reality calls for
- Sophisticated techniques and paradigms are not necessarily the best
  - Experimental research is not necessarily the best or 'most scientific' 'most scientific' is what complies best with the relevant scientific norms
    - ESP and LAP comply with partially different norms, Choose **one** for your doctoral work