WHAT GAME DO SCIENTISTS PLAY?

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AN ECONOMIC MODEL OF SCIENTIFIC RESEARCH MUST MAINLY TAKE INTO ACCOUNT SCIENTISTS' *ACTIONS*...

...BUT...

...SCIENTISTS DO LOTS OF THINGS!

- **THE ESSENTIAL VIRTUE OF AN ECONOMIC MODEL IS ALLOWING US TO...**

  a) ...*describe* relevant aspects of reality

  b) ...offer an *explanation* of them, and

  c) ...make a *normative assessment* of them.

- **THE GAME SCIENTISTS PLAY IS ESSENTIALLY A *GAME OF PERSUASION***

- **THIS MEANS:**

  ***a) Assertions* are the 'central' type of action in the game**

  (*other types of actions exist*, but their role depends on their relation to some actual or possible assertions)

b) **Each scientist's 'pay-off' depends *directly* on the assertions of her colleagues...**

i. e., on what *they* say...

...about *her* assertions

(It also depends on her own assertions, but only *indirectly*...

...as long as what she says may affect what others say).

c) So, *recognition* is the *main* goal of scientists

Other goals are important as well...

...but the centrality of recognition has been established by empirical research in history and sociology of science

On the other hand, recognition comes with flavours...

... scientists do not pursue 'bare recognition', but 'recognition *for* having made important discoveries'

COROLLARY

- **IN ORDER TO HAVE AN INCENTIVE TO PLAY, EACH SCIENTIST MUST KNOW SOME *REGULARITIES* WHICH CONNECT HER OWN POSSIBLE ASSERTIONS (AND OTHER ACTIONS) WITH THE ASSERTIONS OF HER COLLEAGUES**

(These regularities can be ‘statistical’)

(The existence of some regularities of this type is a ‘possibility condition’ of science)

- **SO, YOUR COLLEAGUES' BEHAVIOUR MUST FOLLOW SOME *PREDICTABLE PATTERNS* (RULES?) FOR YOU TO *WANT* TO JOIN THEM...**

- **...THE QUESTION IS:**

  WHAT IS YOUR REASON TO FOLLOW SOME PATTERNS IN *YOUR OWN* ASSERTION MAKING?

CONTRACTARIAN VIEW

You follow some patterns *in exchange* of your colleagues doing the same.

- **You agree to *subject your assertions to certain rules* (what will make you to accept assertions of other scientists)...**

  ...in exchange of a similar compromise by your colleagues (so that they may end accepting some of your assertions)

- ***THIS AGREEMENT IS "THE CONSTITUTION OF SCIENCE"***

- **Essentialy, it is a *verificationist* agreement...**

...for it is a convention about how to *accept* the assertions offered by the members of a scientific community.

- **DIFFERENCE WITH FALSIFICATIONISM:**

  - **According to Popper, in order to be 'honest', you must specify -when presenting *your* theories- the circumstances under which you will recognise they're *wrong***

  - **According to our view, every scientist must make some compromise about when to *accept* the theories presented *by others*, so that the game of science becomes an interesting game to play.**

CHEMISTRY NOBEL PRIZE 2003

"Roderick MacKinnon surprised the whole research community when in 1998 he was able to determine the spatial structure of a potassium channel. Thanks to this contribution we can now "see" ions flowing through channels that can be opened and closed by different cellular signals"

From the Nobel Prize press release

"Roderick MacKinnon surprised the whole research community by conjecturing a spatial structure for potassium channels, which has not been still refuted by any provisional experimental result. Thanks to this contribution we can now produce conjectural visual models of ions flowing through channels..."

SCIENTIFIC ARGUMENTATION AS SCOREKEEPING

- **The status of a scientist at any stage of the game is given by her 'score'.**
  - ***Internal score:***

    How your colleagues evaluate the coherence of your practice with the rules of the game.
  - ***External score:***

    Which ones of the assertions proposed by you are explicitly accepted by your colleagues.

- ***Internal score:***
  - **The right to be *heard***
  - **How ‘competent’ you are in mastering the practices of your discipline.**
  - **Getting your papers accepted, your ideas discussed, projects granted...**
- ***External score:***
  - **The right to become *authoritative***
  - **What *discoveries* have you made**

- **THE GAME OF SCIENCE PROCEEDS BY EACH RESEARCHER TRYING TO MAXIMISE HER *INTERNAL* SCORE....**

- **...WHAT LEADS TO THE DETERMINATION OF THE *EXTERNAL* SCORES OF ALL OTHERS**

CONSTITUTIONAL APPROACH

- **Our fundamental assumption:**

  In any scientific community, its members will have agreed in establishing those rules which make it most likely the attainment of their goals

- **So...**

  ...if you were a scientist, what rules would you prefer the game of science is played with?

HOW ARE SCIENTIFIC RULES ‘CHOSEN’?

- By direct agreement
- By persuasion...

  ...this entails the application of ‘higher order’ rules
- By inheritance *cum* small adjustments

  ...persuasiveness of exemplars

  ...imitation of other fields
- In general: *by a mix of contractarian, argumentative and evolutionary factors*.

WHY ARE SCIENTIFIC RULES DIFFICULT TO CHANGE?

- ***Because of their 'invisibility'***

  (importance of anomalies, thought experiments, alternative hypotheses...)

- ***Because changes must be consensuated***

  (only changes favourable to everybody will be accepted by all)

  (possible seggregation: each 'coallition' must judge the pros and cons of staying with the main group)

THE ‘VEIL OF IGNORANCE’

When a rule is chosen, usually it is difficult to know how its acceptance is going to affect the fortune of *specific* theories.

This is particularly true of ‘higher order’ rules

So, general rules tend to be *impartial*

[Would the scientist and the ‘common citizen’ prefer the same rules?]

THE GENERAL FORM OF SCIENTIFIC RULES

- In the game of persuasion, *scientific norms are rules of inference*
  - Rules of *internal* inference:

  From the assertions you have already made...

  ...to other assertions you are *obliged* or *allowed* to make.

  - Rules of *external* inference:
  - From 'circumstances' to assertions ('entry rules')
  - From assertions to actions ('exit rules')

RULES OF INTERNAL INFERENCE

- ***Rules for theory evaluation***
  - **of individual theories**

    determine what aspects of a theory (hypohtesis, law, model, datum...) count as 'positive' or as 'negative'
  - **comparative**

    determine when is a theory better than another, and how better
- ***Rules for theory choice***

  essential for the 'external score'

WHAT RULES OF *THEORY EVALUATION* WOULD YOU PREFER?

Under 'the veil of ignorance'...

...rules coherent with your epistemic preferences

The more 'translucid' the veil is...

...rules tending to favour the kind of theories you are more likely to devise

WHAT RULES OF *THEORY CHOICE* WOULD YOU PREFER?

- **From the epistemic point of view...**

  ...trade-off between the *number* of theories chosen, and their *quality*

- **From the 'pursuit of recognition' perspective...**

  ...trade-off between the *easiness* of finding a 'right' theory, and the *number of 'rivals'* finding another

RULES OF EXTERNAL INFERENCE

- *Rules of evidence gathering*
  - From experience (experiments, observations, surveys, archives...)
  - From authority (community, higher disciplines, internal reflection...)
- *Rules of resource allocation*
  - Empirical work
  - Communication
  - Publication
  - Positions
  - Research projects
  - Grants
  - Prizes
  - and so on

WHAT *EVIDENCE GATHERING* RULES WOULD YOU PREFER?

- **A rule commanding *exact replication*?**

  Surely not, since most people don't gain recognition thanks to it

- **Perhaps a rule comanding to accept those 'effects' derived from a wide variety of experimental setups...**

  ...more recognition is gained by more scientists.

- **The most important property of an evidence gathering rule:**
  - **The strategy of...**
    - **efficiently devising and performing the experiment (observation...), and**
    - **critically interpreting and sincerely reporting the observed results...**
  - **...must be a *dominant strategy* for all scientists.**
- **This guarantees that *trust* can be conferred to the empirical results reported by others.**

WHAT RULES OF *RESOURCE ALLOCATION* WOULD YOU PREFER?

- **Those commanding to engage in self-critical research...?**

  ...or letting criticism to the rivals?

- **'Winner-takes-all' norms...?**

  ...or some kind of 'insurance rules'?

- **Norms making it difficult to publish...?**

  ...or more 'liberal' ones?

- **'Peer-review' allocation mechanisms...?**

  ...or other type?

THE PLURALITY OF SCIENTIFIC METHODS

- **Scientific groups in different circumstances may prefer different combinations of norms**

  ...so, methodological rules are *context-dependent*

- **The acceptance of 'low level' *methodological rules* depends on what 'assertions' (theories, empirical regularities...) have been already accepted...**

  ...so, methodological rules are also *content-dependent*

- **The virtues of economic models:**
  - ***Description*:**

    Look for regular *patterns* related to the assertions' *acceptance or rejection*.
  - ***Explanation*:**

    Look for the *reasons* why these patterns *exist* and are actually *followed*.
  - ***Evaluation*:**

    ***Critically assess* the pros and cons those patterns may have, and *propose* new patterns**