Epistemology and logics of social research

Lecture 4.
From normative to positive
From epistemology to sociology of sciences

Main themes

1. The social origins of the scientific development
2. The normative system of science
3. Deviation to the norms and sanctions for deviation
4. Science as a network of communities and a field of struggle
5. The strong program of sociology of science
6. Actor Network Theory

The social origins of scientific development

- Religion
  - Religion as an obstacle to science
  - Role of the puritans in the making of science (Merton)
    - 63% of founders Royal Society of London were Puritans
    - Culture of free-introspection favorable to science development
  - Jewish culture and science
    - 20% of Nobel prizes of Jewish origin
    - "Book culture"
    - Skeptical position towards authorities of secular Jews? (Veblen)

- Democracy
  - Freedom of speech and free discussion favorable to science development
  - Totalitarian system hostile to some sciences
    - Aryan Physics
    - Lyssenko
    - Almost always: Social sciences.
  - However, link not so unilateral
    - "Democratic" populism hostile to science :
      - Lobby in favor intelligent design/ Climate change denialist
    - Totalitarian based on science : China

The normative system of science (Merton, 1973 [1942])

- Universalism
  - scientific validity independent of personal attributes
- Communism
  - common ownership of scientific goods (intellectual property) / No secret
- Disinterestedness
  - scientific institutions act for the benefit of a common scientific enterprise, rather than for the personal gain of individuals within them
- Organized skepticism:
  - scientific claims exposed to critical scrutiny before being accepted: both in methodology and institutional codes of conduct

Mertonian externalist sociology of science

- Analysis of scientific productivity
  - Dependent variable: Publications, citations, prizes, recruitment
  - Factors of productivity:
    - Cumulative advantage dynamic (Matthew effect – Merton 1968)
    - Symbolic rewards and authorship disputes
    - Network position (Burt, Collins, Uzzi)

Presentation 1.

Merton, Robert K. 1957. “Priorities in Scientific Discovery: A Chapter in the Sociology of Science”, *American Sociological Review*, 22 (6), 635-659.

Deviation to Mertonian norm systems

- Lack of universalism
  - Role of gender (Mathilda Effect - Rossiter, 1993) , race, mentors, symbolic capital in scientific rewards
  - Science not as universal as it claims to be
- Existence or not of sanctions for deviation to the norm

Example. Academic recruitment

Academic inbreeding in France (Godechot, Louvet, 2010)

- Proxy for recruitment:
  - PhD becoming PhD advisor
  - Inbreeding: same university
- Strong favoritism for inbred applicants
  - 55% of inbred scholars recruited
  - 8% expected at independence
  - Odds-ratio: *18
- Following controversy on roots and dysfunctionality of academic inbreeding
  - Avoiding mobility costs
  - OR protecting own doctorates against competition

- Recruitment at the Ehess (Godechot, 2016)
  - Impact of "social" contacts on PhD recruitment
  - +14 percentage points when PhD advisor in recruitment committee

Applications whose PhD advisor is:	1
Randomly drawn member of the EC	0.137** (0.062)
Ex officio member of the EC	0.056 (0.076)
Member of EHESS	0.040 (0.029)
Competitive exam fixed effects	No
Field	All competitive exams

Network and structure of scientific fields

- Network of collaboration of scientific production
  - Tools: co-authorship, citation, co-citation (Small & Griffith, 1974)
  - Crane. *Invisible colleges*

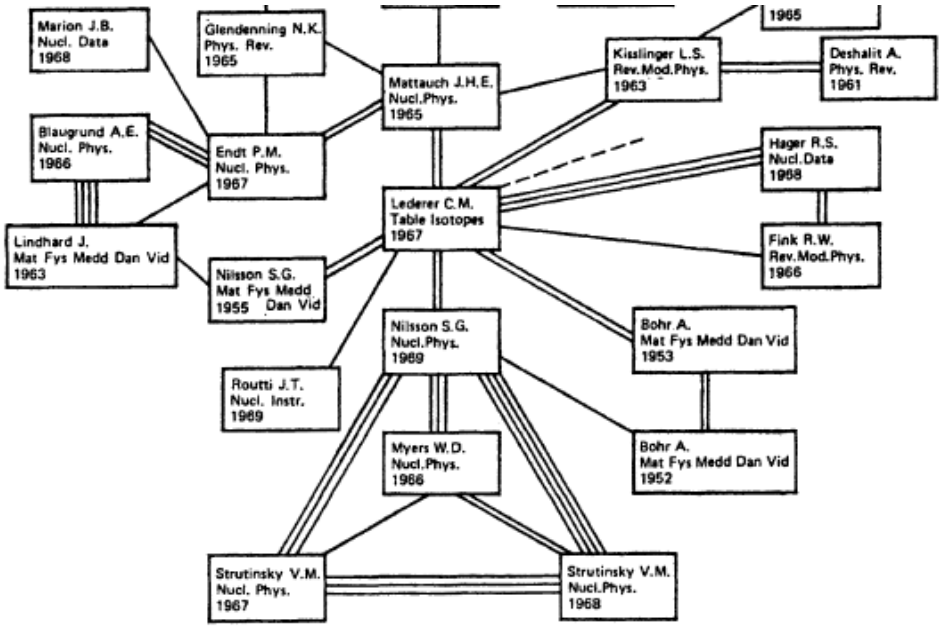
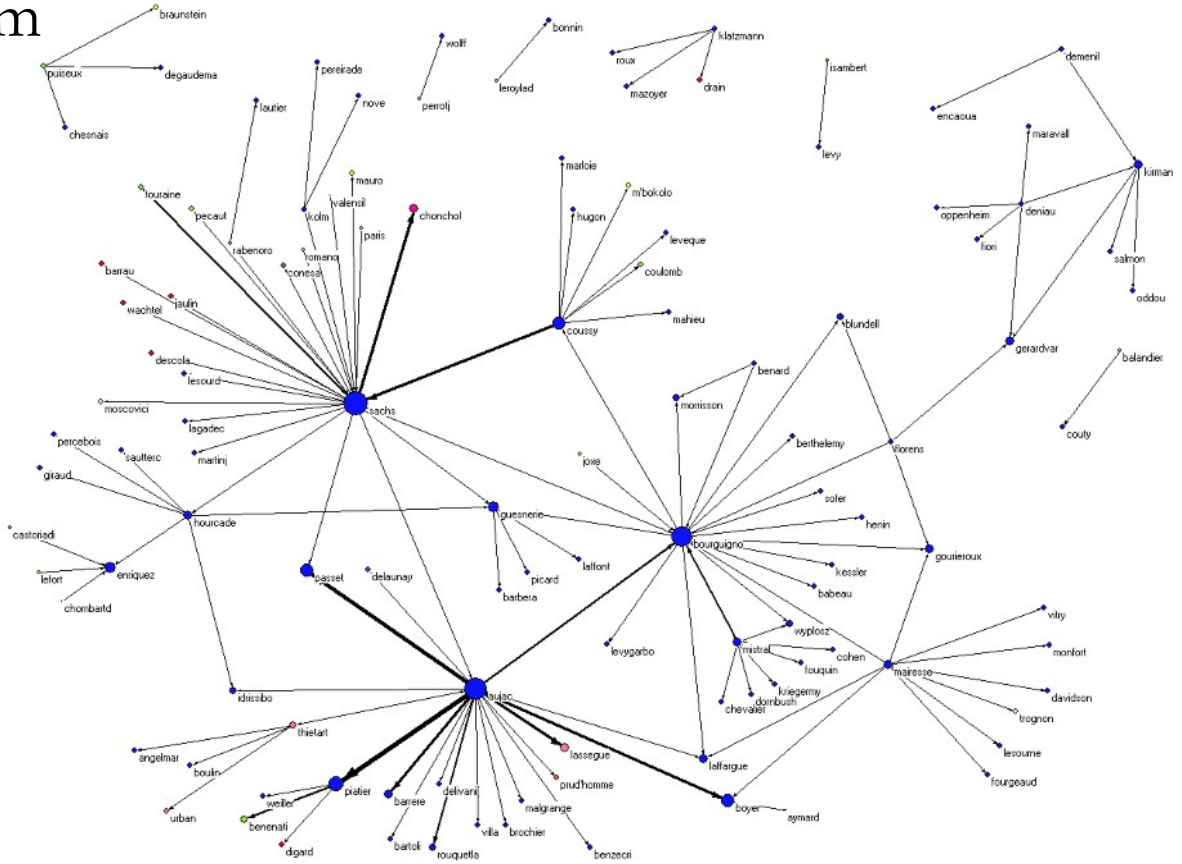


FIGURE 1. Graph of 'nuclear physics' cluster at Level 3

Example. A paradigmatic change in economics at Ehess (Godechot, 2011)

- How does neoclassic paradigm replace the old heterodox school?
  - Links: network based on PhD committees
  - Asymmetry in PhD jury invitations
    - Legitimacy differential
    - "Violence" of the shift



Bourdieu (1976): Scientific field works as any field

- Interest oriented
  - Extended version of interest (specific scientific interest)
  - Plurality of interests
- Conflictual
  - Struggle for the monopoly of scientific authority

- Structure of the field:
  - Primary opposition: Dominant/Dominated
    - Dominant => Conservation of scientific order
    - Dominated (first axis) => New entrants (subversion of scientific order)
  - Secondary opposition Specific Capital vs other forms of capital
- Structure of capitals => position in the field
- Position in the field => type of scientific position

Bourdieu (1976): But its autonomy makes it specific

- Specificity of the scientific field
  - Peers are the clients and the competitors
  - Strong autonomy of the field, no or little heteronomous sources of validation / legitimacy
  - Evolving from big revolutions to permanent micro revolutions
  - Conditions for the "progress of scientific reason"
- Example. Field of economists by Lebaron (1997)
  - MCA Techniques

Le champ des économistes français au milieu des années 1990

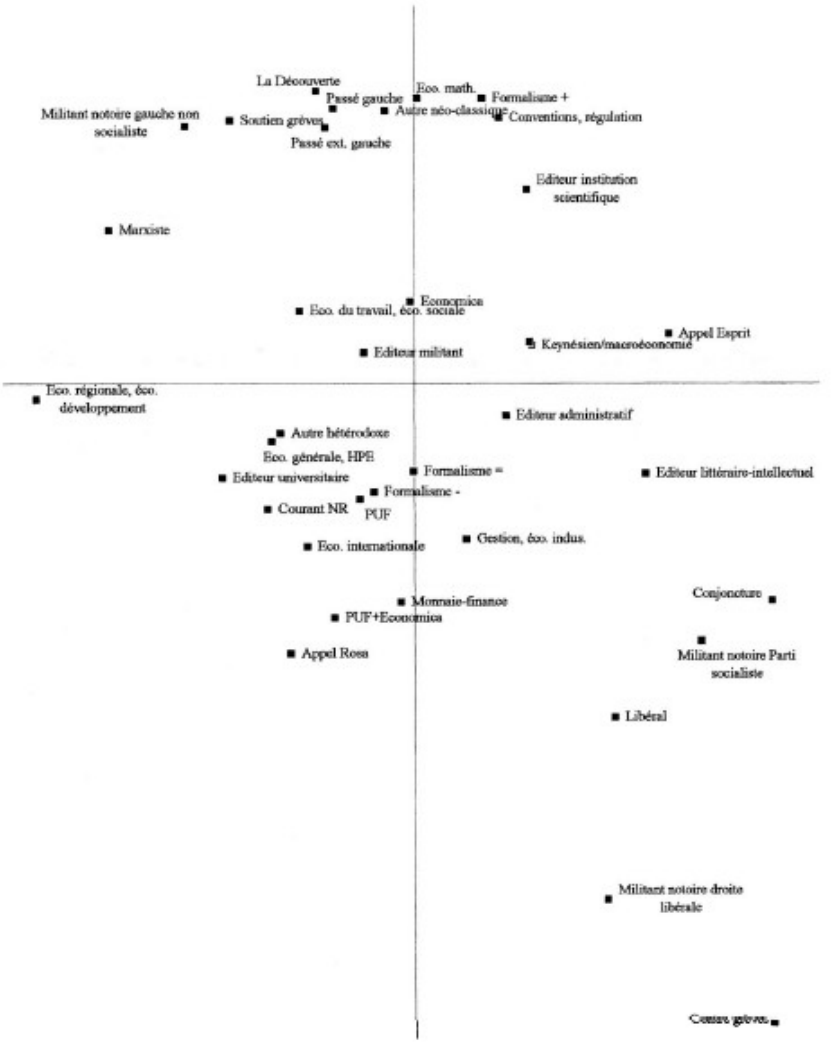
(individus, présentation partielle)

Le champ des économistes français au milieu des années 1990.

L'espace des positions (variables actives et supplémentaires)

Le champ des économistes français au milieu des années 1990.
L'espace des positions (variables actives et supplémentaires)

Le champ des économistes français au milieu des années 1990
L'espace des prises de position
(variables supplémentaires)



The strong program of sociology of science (Bloor, 1976)

- Causality:
  - conditions (psychological, social, and cultural) that bring about claims to a certain kind of knowledge.
- Impartiality:
  - successful as well as unsuccessful knowledge claims
- Symmetry:
  - same types of explanations for successful and unsuccessful knowledge claims.
- Reflexivity:
  - applicable to sociology itself.

A shift in the object of sociology of science

- Edinburgh School (Collins, Barnes, MacKenzie)
- Scientific controversies as the main object
- Methodological relativism
- However symmetry not absolute
  - Same types is not same explanations
- Example: Pearson-Yule controversy on categorical correlation. MacKenzie (1991)
  - Different ideology
    - Eugenism (Pearson)/or not (Yule)
  - Different social classes
    - Petite bourgeoisie (Pearson)/aristocrat (Yule)

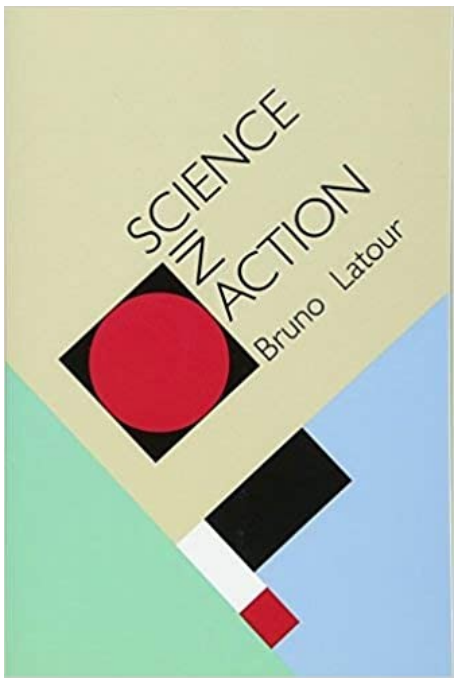
Presentation 2.

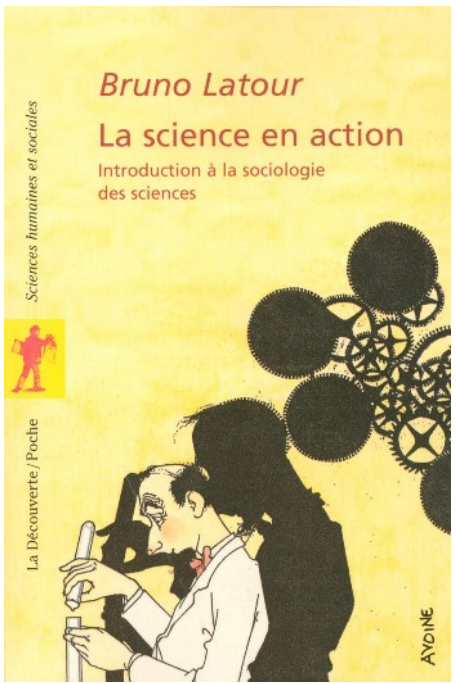
Shapin, Steven and Simon Schaffer. 2011 [1985]. "Understanding experiment" & "Seeing and Believing: The Experimental Production of Pneumatic Facts." *Leviathan and the air pump*. Princeton University Press.

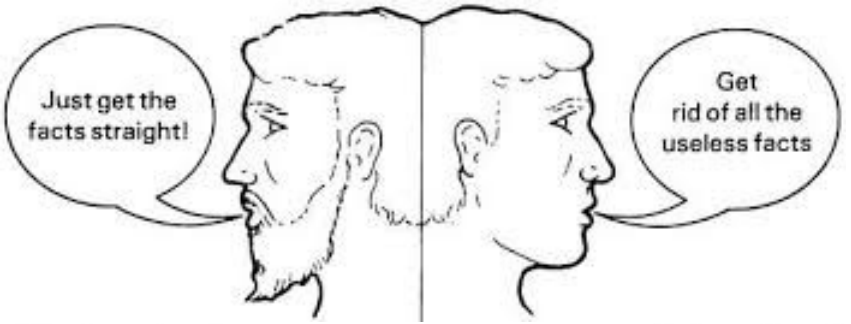
Presentation 3.

Latour, Bruno. “Machines”, in Bruno Latour, *Science in action: How to follow scientists and engineers through society*. Harvard university press, 1987, p. 103-144.

Actor network theory







Science in action (in action)

- Follow the actors
  - "Rule 1. We study science in action and not ready made science or technology; to do so, we either arrive before the facts and machines are blackboxed or we follow the controversies that reopen them."
- Scientific literature as a rhetorical combat
  - "Rule 2. To determine the objectivity or subjectivity of a claim, the efficiency or perfection of a mechanism, we do not look for their intrinsic qualities but at all the transformations they undergo later in the hands of others."

Science in action (in action) (II)

- No use of "truth or nature" related determinism
  - "Rule 3. Since the settlement of a controversy is the cause of Nature's representation, not its consequence, we can never use this consequence, Nature, to explain how and why a controversy has been settled."
- No use of "social" or "society" type of determinism
  - "Rule 4. Since the settlement of a controversy is the cause of Society's stability, we cannot use Society to explain how and why a controversy has been settled. We should consider symmetrically the efforts to enrol human and non-human resources."

Science in action (in action) (III)

- Heterogeneous networks of actors spreading in nature and society. No "autonomy" of scientific field.
  - "Rule 5. We have to be as undecided as the various actors we follow as to what technoscience is made of; every time an inside/outside divide is built, we should study the two sides simultaneously and make the list, no matter how long and heterogeneous, of those who do the work."
- Irrationality is out of the topic
  - "Rule 6. Confronted with the accusation of irrationality, we look neither at what rule of logic has been broken, nor at what structure of society could explain the distortion, but to the angle and direction of the observer's displacement, and to the length of the network thus being built."
- Follow the scriptural traces and avoid mind/psychology inferences
  - "Rule 7. Before attributing any special quality to the mind or to the method of people, let us examine first the many ways through which inscriptions are gathered, combined, tied together and sent back. Only if there is something unexplained once the networks have been studied shall we start to speak of cognitive factors."

Callon and Latour promote a new ontological agenda in order to unscrew...

Callon, Latour, 1981, "Unscrewing the big Leviathan ; or How Actors Macrostructure Reality, and How Sociologists Help Them To Do So?", in *Knorr, Cicourel, Advances in Social Theory…*

- Hobbes Leviathan problem: How do micro-actors become macro-actors?
  - Inspired by Deleuze
  - Plane of immanence where entities meet. Meeting as a trial of force
  - Generalized symmetry. Entities either human or non-human
  - Series of operation that builds micro-entities in macro-actors: Enrolling / Translating /Representing / setting equivalences / building networks
  - Building a socio-technical network

…science's privilege

- Studies of scientific controversies
  - Conflict between different socio-technical networks
  - Bloorian symmetry : symmetry between truth and error
  - Symmetry between all types of entities: human and non-human
  - Hybrid networks
  - Replacing the "question of truth and non truth by that of success and failure"

- Example: Callon (1984/1986) and the scallops
  - First successes: agencement
    - Scientist believing in domestication of scallops finding results
    - Scallops (speaking) that reproduce themselves are a delegate of all scallops
    - Fisher delegates in the name of fishers accepting to respect experimental fields of scallops
  - Final failure
    - Scientific results not reproduced
    - Scallops don't behave as their delegates
    - Fishers don't respect experimental fields and their delegate

A questionable shift

- Descriptive shift
  - Producing rich description
  - But anti-deterministic
  - Knowledge value (without explanation)?
  - Fancy paraphrase with a smart vocabulary?
- A linguistic shift
  - Looking at how scientists "linguistically" enroll nature
  - Ambiguous: Scallops talk or scientists make them talk
- An ambiguous relation to truth and reality
  - Strong form of relativism
  - Or a new form of metaphysical realism
    - When scientists enroll nature in tests of strengths and nature "talks"
- Changing the way we see science rather than explaining it

Performativity as ANT's key success

- Science making society rather than the opposite
- Callon, 1998. "The embeddedness of economic markets in economics", in Callon, *The laws of markets*, 1-57.
  - Based mainly on Garcia 1986
  - Emphasis on the role of economic theory
  - The group struggle is overlooked
- Economics is performative
  - "the *economy is embedded not* in society but in *economics"* (p. 2)
  - "economics . . . performs, shapes and formats the economy, rather than observing how it functions" (p. 2)

- Homo-economicus is not a fiction that sociology must complain about
  - "Yes, homo-economicus really does exist. (...) Of course, he exists in the form of many species and his lineage is multiple and ramified. But if he exists he is obviously not be found in a natural state – this expression has little meaning. He is formatted, framed and equipped with prostheses which help him in his calculations and which are, for the most part, produced by economics" (p. 51)

The Black and Scholes formula a a case of performativity (MacKenzie, 2006)

- Fate of Black & scholes (1973) formula.
  - Relation between price of option and underlying asset
- Progressively adopted by the market participants
  - Traders and regulators (call margins)
- Option prices start behaving as theory predicts
  - Even in zones where hypothesis questionable (No implied volatility "smile")
  - 1987 crash = pragmatic adaptation (implied volatility smile)

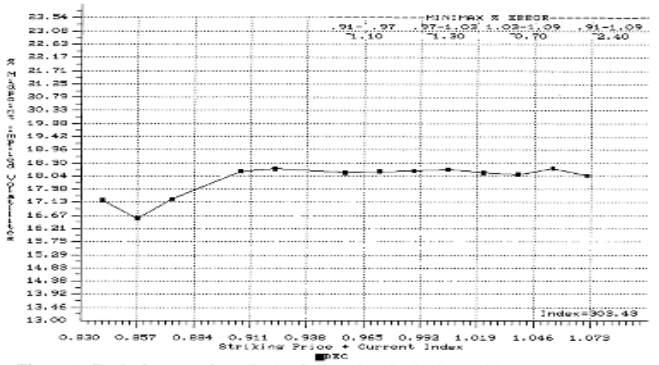


Figure 1. Typical precrash smile. Implied combined volatilities of S&P 500 index options (July 1, 1987; 9:00 A.M.).

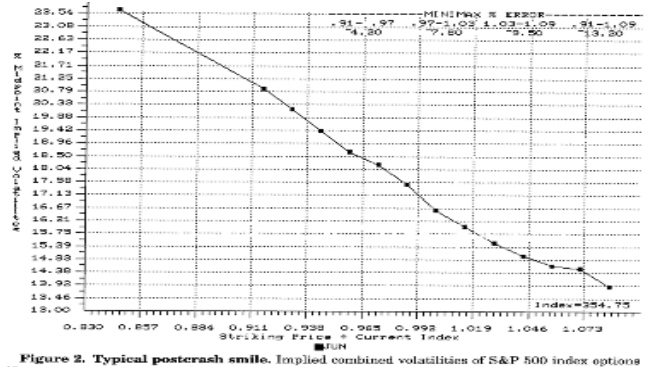


Figure 2. Typical posterash smile. Implied combined volatilities of S&P 500 index options (January 2, 1990; 10:00 A.M.).

Discussion. The performativity of science.

Latour, B. "Did Ramses II die of Tuberculosis? On the partial existence of existing and non-existing objects." *The Coming into Being and the Passing Away of Scientific Objects*, Chicago University Press,

Figure 10.1. Our scientists to the rescue of Ramses II, who fell ill three thousand years *after his death.* (From *Paris Match*, September 1956)

Sociology of science and epistemology. Conclusive thoughts

- Lack of decisive epistemological criteria for defining science → Appeal to *Communis Doctorum Opinio*
- Sociology of science instead of philosophy of science
- Enables to show norms *à la* Merton
- But also deviations to the norms, not always sanctioned
- What scientists do (especially "in the making" of science) is not what they say they do (ready made science)?
- Epistemological foundations are both necessary and impossible

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