



Science behind the scenes: myths and facts of the peer review process



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**FONDECYT Funding N° 1130290: The socio- discursive interaction in
the collective construction of scientific knowledge: the internal
dynamics of the peer review process**

Outline

- The Scientific Industry and its product → The Research Article
- The normative structure of science
- Peer Review as the heart of science
 - Simple and complex definitions
- Some paradoxes and critiques of the Peer Review Process:
 - Reliability, Fraud, Bias, Agreement, Rejection/Acceptance Rates, Obstruction of innovative ideas
- Variables in the study of Peer Review
- Discursive studies on Peer Review
- What we still don't know about the Peer Review
- Why should we know about it?
- Some conclusions

The Scientific Industry and its product: The Research Article

- Ulrichs Web:
 - 1.3 million papers per year
 - 40 million papers published between 1970-2001
 - More than 50,000 journals
- The pressure to write and publish is so big that:
 - There is neither the time nor the possibility to read all that is published
 - The quality of the knowledge produced is decreasing (*Learn to write badly* by Michael Billig, 2013)



Our experience in scientific discourse

- Teaching scientific writing
- Content citation analysis
- Prodicyt (www.prodicyt.org)

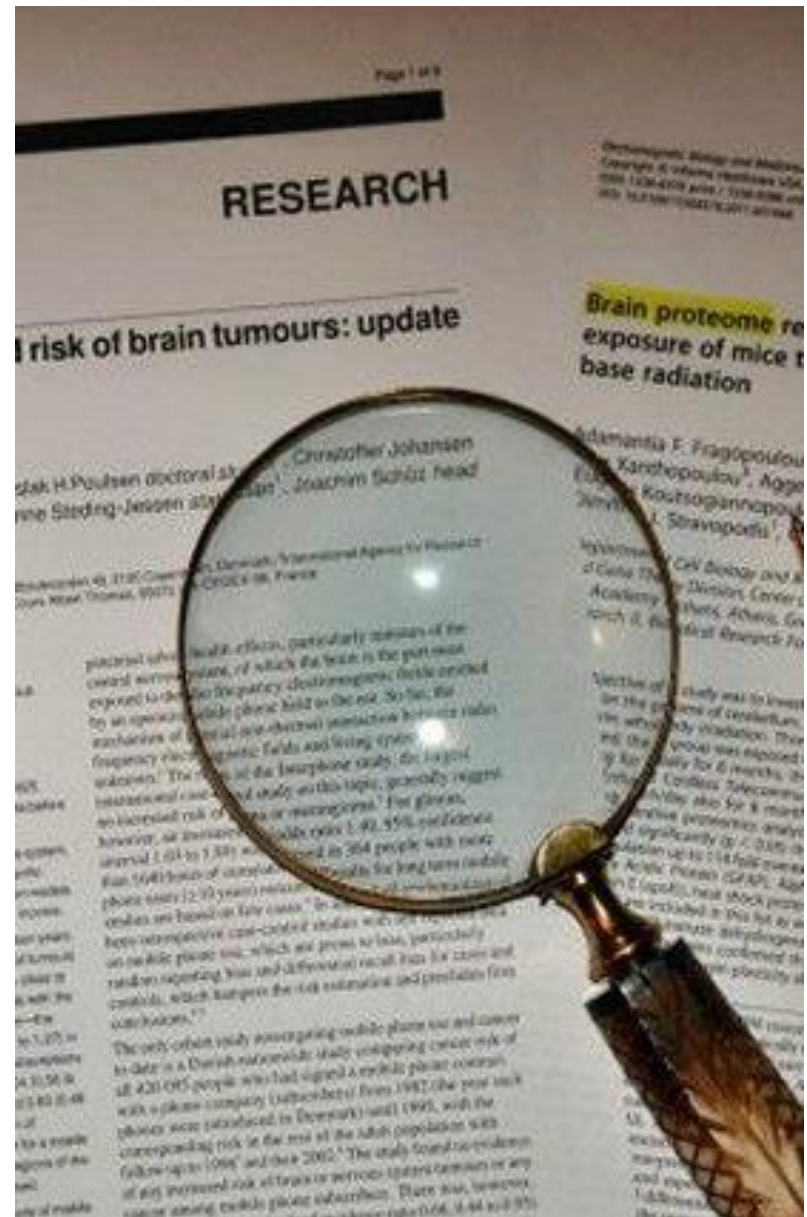
Our initial motivation

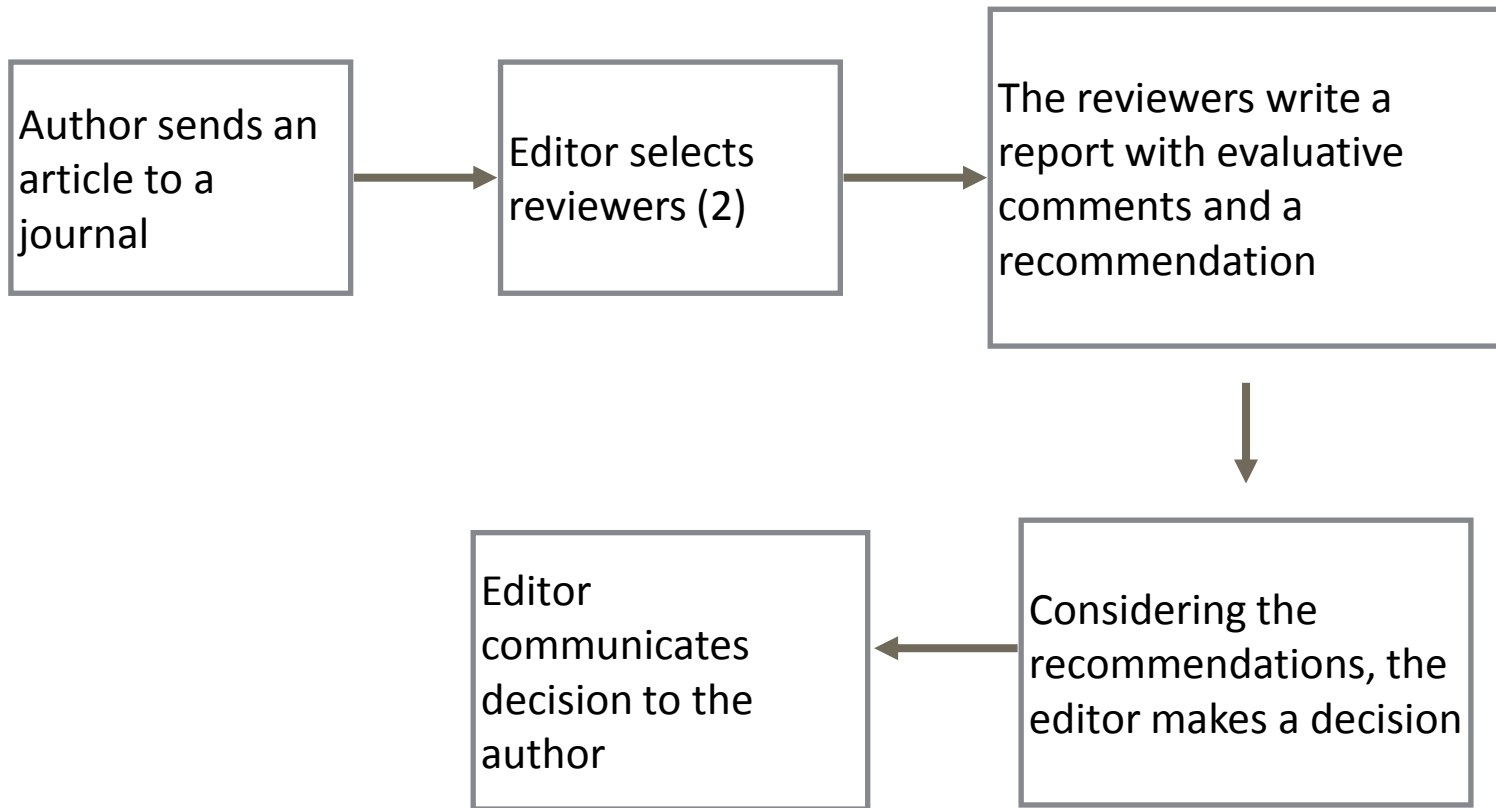
- Going from the product to the process
- Interdisciplinarity
- Going social

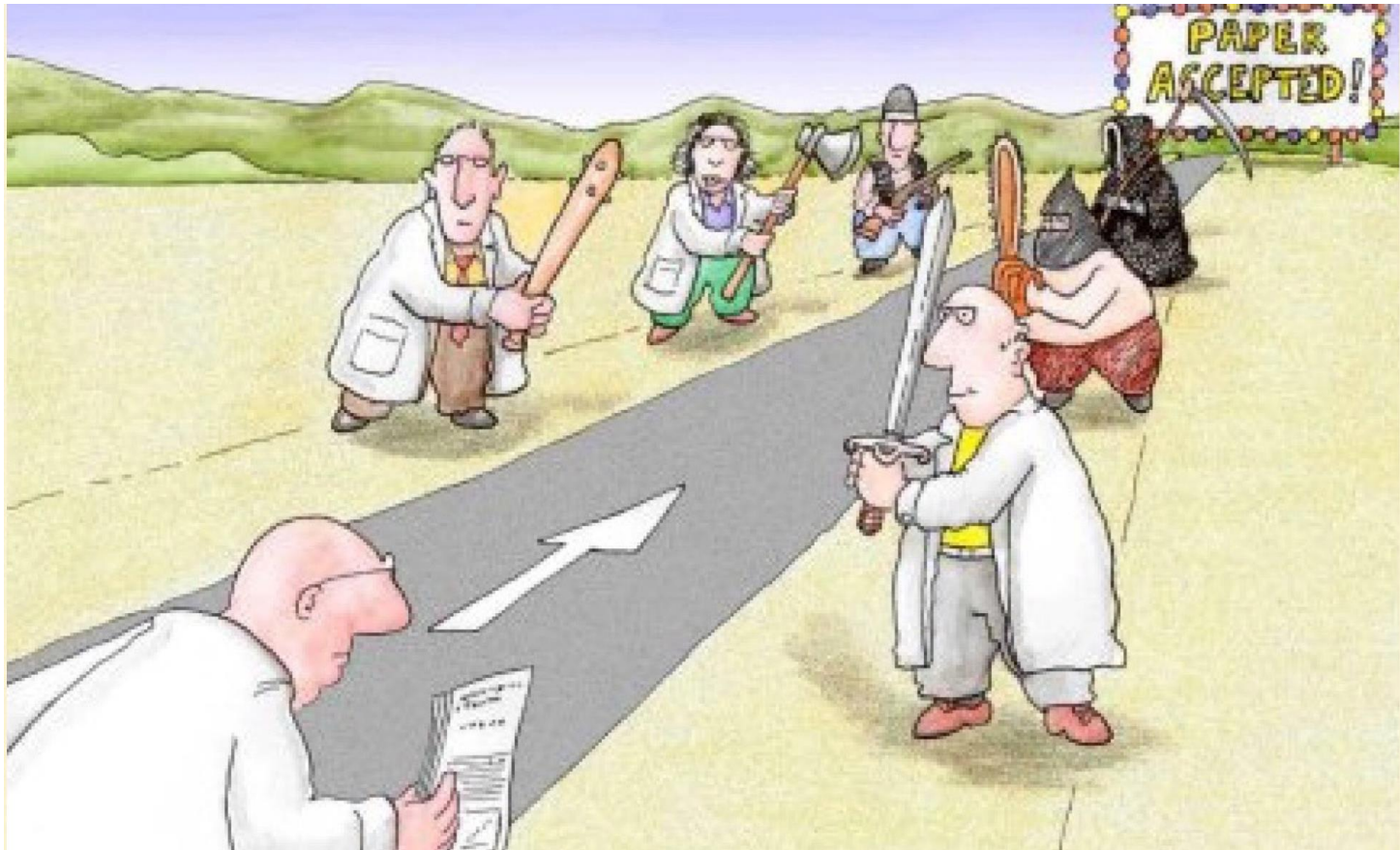
The Normative Structure of Science (Merton, 1942)

- **Communalism:** All scientists should have equal access to scientific goods (intellectual property), and there should be a sense of common ownership in order to promote collective collaboration.
- **Universalism:** All scientists can contribute to science regardless of race, nationality, culture, or gender.
- **Disinterestedness:** Scientists are supposed to act for the benefit of a common scientific enterprise, rather than for personal gain.
- **Originality:** Scientific claims should contribute something new; whether it is a new problem, a new approach, new data, a new theory or a new explanation (Ziman, 1968).
- **Skepticism** (Organized Skepticism): Scientific claims must be exposed to critical scrutiny before being accepted.

Is peer review a simple process?

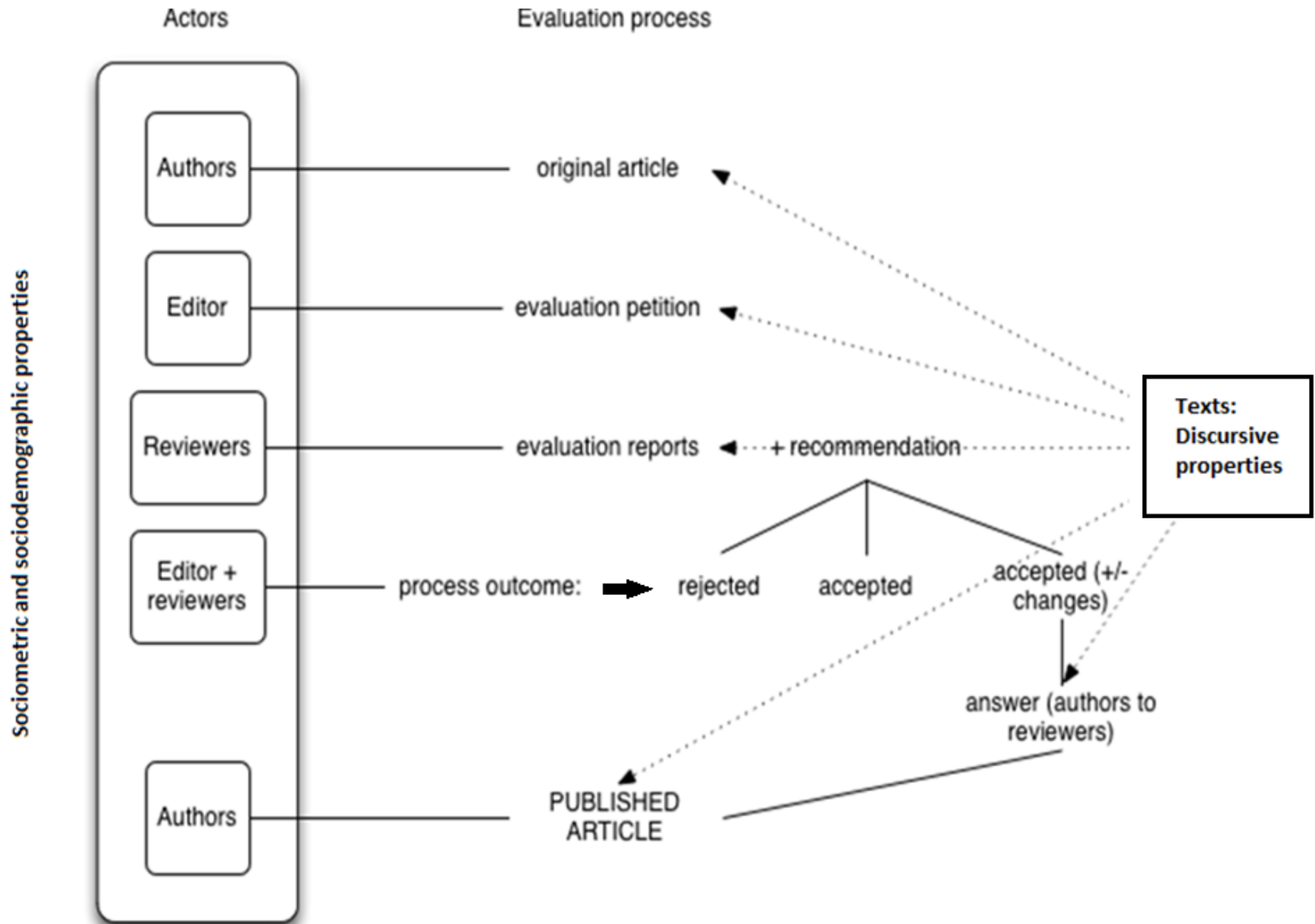






How does the Peer Review Process
feel like?

Peer Review as a socio-discursive process



Peer Review as a socio-discursive process

- The definition depends on the perspective used to define it (actors)
- The Peer Review Process (PRP) is an interaction among actors who have specific social attributes and exchange texts with specific purposes.
- PRP is a collective action in which actors epistemically coordinate.
- In particular, it is a socio-technical judgmental discursive practice that determines the production, dissemination and consumption of scientific knowledge.
- Peer Review as the Heart of Science: a complex genre.
- Types of PRP according to secrecy: simple blind, double blind, open and public (Peer Review as democracy).

Some paradoxes about the Peer Review Process

Paradox 1: The process affects everything, but affects nothing (the invisibility of the reviewer).

Paradox 2: An imperfect economic exchange (Squazzoni, 2010).

Critiques of the Peer Review Process

The process is not reliable, i.e., it cannot distinguish the good from the bad

- Type I Error (wrong acceptance): Many of the papers published may contain procedural errors and are not replicable (Munafò & Flint, 2010)
- Type II Error (wrong rejection): Rejections of Nobel Prize winners' papers (Campanario, 1998)

Myth or fact: Inconclusive → the process is reliable when articles are clearly bad or good. The problem arises with medium quality papers

Critiques of the Peer Review Process

The process cannot detect fraud or data fabrication

Diederick Stapel



Andrew Wakefield



Hwang Woo Suk



Critiques of the Peer Review Process

The process cannot detect fraud nor data fabrication

Myth or fact: Fact!!!

The process cannot detect fraud because it is not intended to do so.

Peer review is based on trust.

Peer review is a chain of trust:

- The editor trusts that the authors have sent an original article with actual data.
- The author trusts that the editor will select competent and unbiased referees.

Peters D., Ceci: Peer review practices of psychological journals: the fate of submitted articles, submitted again. *Behave Brain Sci*, 1982; 5: 178-255

Critiques of the Peer Review Process

The process is highly biased

- Institutional bias (Crane, 1967)
- Positive results bias (Steinhauser et al., 2012)

Confirmation bias
(Sokal, 1996)



Myth or fact: Fact!!!

Critiques to the Peer Review Process

The probability of agreement of the recommendations of the referees is random



Critiques of the Peer Review Process

The probability of agreement of the referees' recommendations is random

- As with reliability, agreement depends on the quality of papers:
- When the quality is high or low, agreement tends to be high,
- But, as the quality of the majority of the papers submitted is somewhere in between, the most frequent outcome is low agreement.
- The sources of disagreement: Criteria in evaluation formats, attitudes toward science, application of the criteria.
- The problem of agreement from the point of view of the editor/author.

Myth or fact: Fact!!!

Critiques to the Peer Review Process

If I submit a paper to a Journal the most probable outcome will be a rejection

Rates of Rejecting Manuscripts for Publication in Scientific and Humanistic Journals, 1967

	Mean rejection rate %	No. of journals
History	90	3
Language and literature	86	5
Philosophy	85	5
Political science	84	2
Sociology	78	14
Psychology (excluding experimental and physiological)	70	7
Economics	69	4
Experimental and physiological psychology	51	2
Mathematics and statistics	50	5
Anthropology	48	2
Chemistry	31	5
Geography	30	2
Biological sciences	29	12
Physics	24	12
Geology	22	2
Linguistics	20	1
Total		83

Zuckerman & Merton, 1971

Critiques of the Peer Review Process

If I submit a paper to a Journal the most probable outcome will be a rejection

The rejection/acceptance rates depend mostly on the nature of the discipline in terms of:

The level of institutionalization of the discipline

The degree of consensus (the research frontier)

The future, or past, focus of the discipline

Myth or fact: Myth

Because it depends on the nature of the discipline

Critiques to the Peer Review Process

The process obstruct the generation of innovative ideas

Barriers to Scientific Contributions: The Author's Formula
J. Scott Armstrong

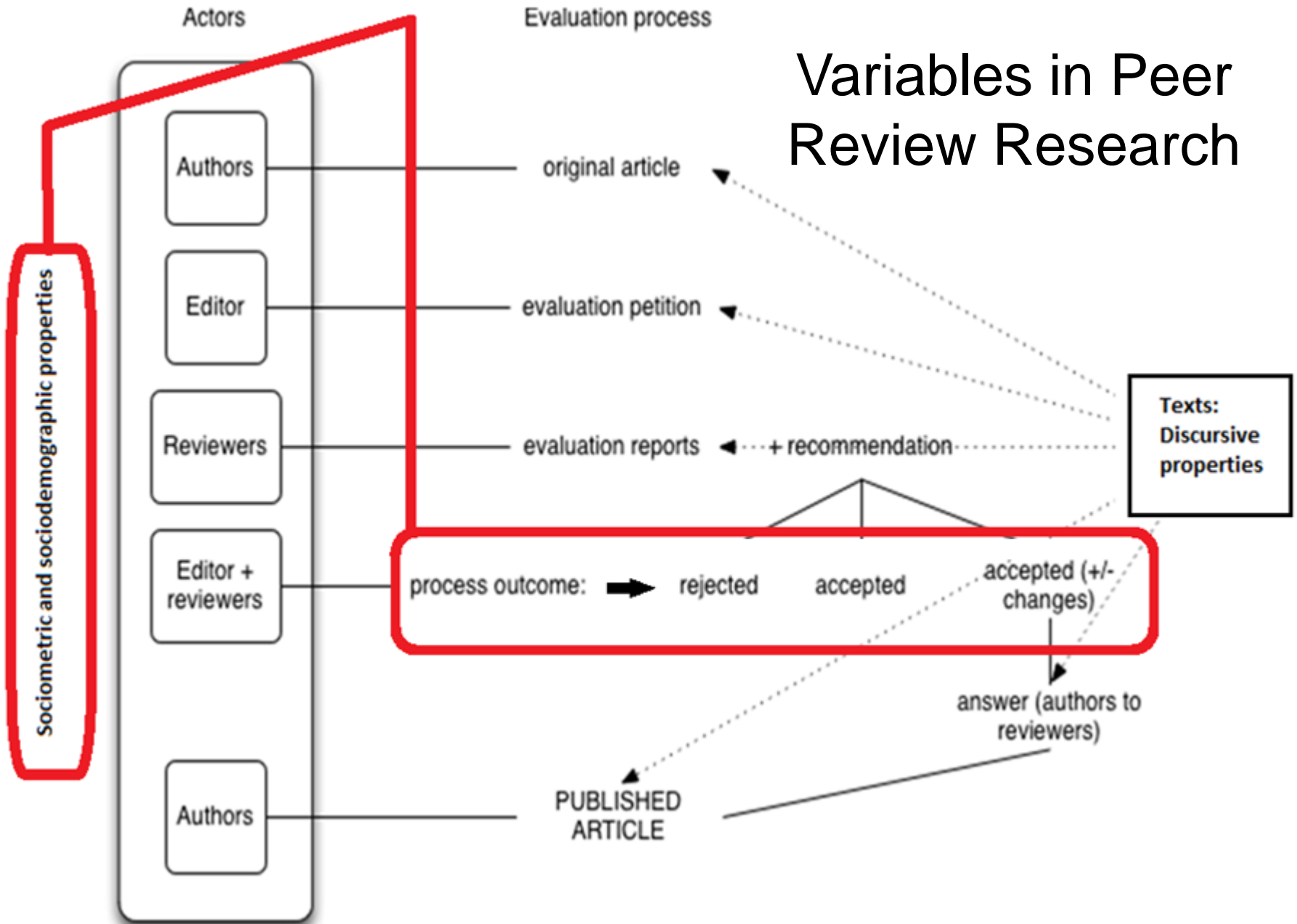
A set of rules that authors can use to increase the likelihood and speed of acceptance of their manuscripts.

Authors should:

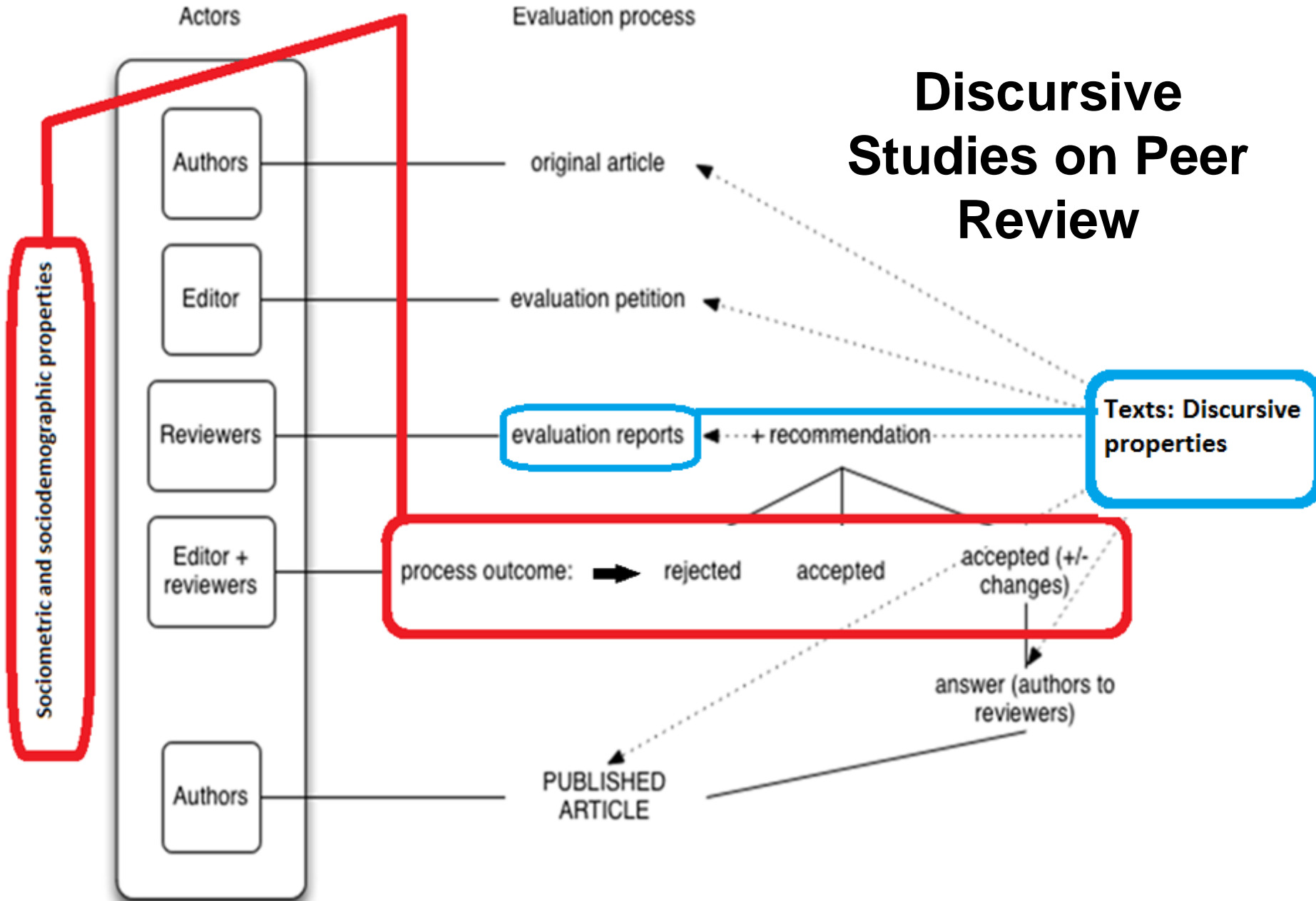
- (1) not pick an important problem**
- (2) not challenge existing beliefs**
- (3) not obtain surprising results**
- (4) not use simple methods**
- (5) not provide full disclosure**
- (6) not write clearly**

Myth or fact: Inconclusive, it depends on the scientometrical attributes and the prestige of the author. Senior researchers can take more risks than junior researchers.

Variables in Peer Review Research



Discursive Studies on Peer Review



Gosden (2003)	Fortanet (2008)	Weber y Mungra (2010) Tharirian y Sadri (2013)	Bolívar (2011)
Categories of referees' comments	Evaluative patterns	I. Content comments dealing with scientific data	Funciones discursivas
1. Claims 2. Technical details 3. References 4. Discussion 5. Format	1. Criticism 2. Recommendation 3. Questions Aspects evaluated	1. Sampling errors 2. Scientific reasoning errors of own data 3. Incorrect scientific interpretation of other authors 4. Procedural infelicities and lack of rigor 5. Statistical irregularities 6. Technical details 7. Lack of association between claim and prior research 8. Lack of association between claim and data 9. Explain why data are unusual 10. Incomplete literature references 11. Terminology or definitions	1. Detractive 2. Correctivae 3. Epistemic 4. Relational
		II. Language-use comments	
		A. Lexis and syntax comments 1. Lack of clarity 2. Not well written/use of English 3. Verbosity 4. Repetitions 5. Typos, improper citation or suggestions for text editor 6. Incoherence B. Discourse and rhetorical comments 7. Improve information flow 8. Up-tone or give more salience to novelty feature 9. Down tone or hedge	

Critiques to Discourse Analysis Studies

- Discourse analysis studies are relatively scarce in comparison to other fields
- Confidentiality, or the occluded nature, of the texts involved in the PRP
- Ethical issues
- All models combine in their analyses, reports with different outcomes (accepted, rejected, accepted with minor or major revisions).
- The actors who produce these reports are undetermined
- The studies only focus on one text, so they do not account for the process

Exception: Myers, 1985

Texts as Knowledge Claims: The Social Construction of Two Biology Articles

Greg Myers

Social Studies of Science, Vol. 15, No. 4 (Nov., 1985), 593-630.

Analysis of the process of two articles:

One senior researcher with weak research networks

A researcher publishing his first paper with an unorthodox idea

Paper 1: Nature, Science (twice) → Journal of Molecular Evolution

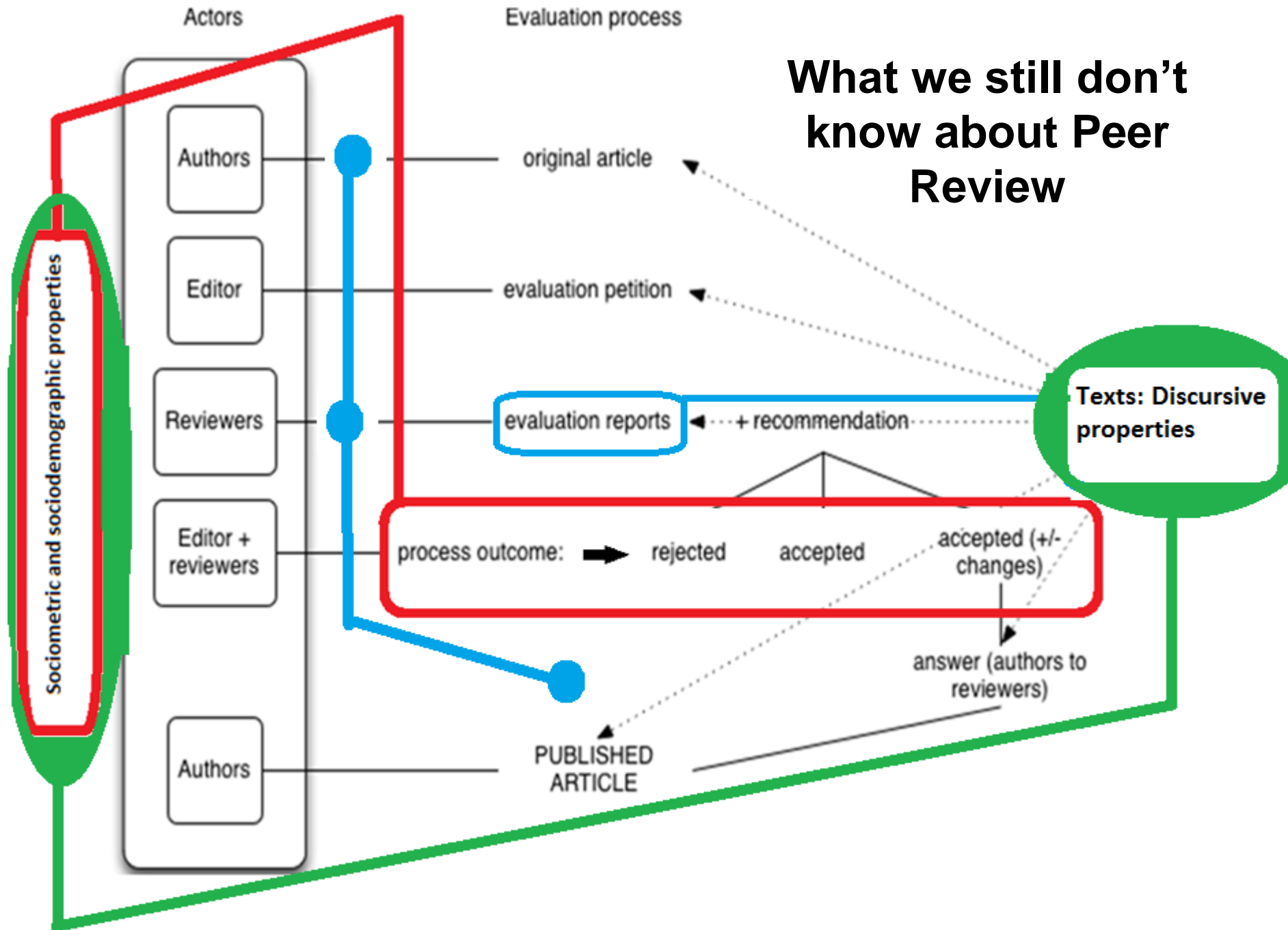
Paper 2: Nature, Science (twice), PNAS → Hormones and Behaviour

Level of claims: Description of one species, interpretation of a process applicable to all species, arguments about how this process evolved.

Claim A: X produces Y

Comments: A is not true, A is true only in certain conditions; there is no evidence to support A although it may be true

What we still don't know about Peer Review



What we still don't know

- The relationship between the sociological (and scientometrical) attributes of the actors and the discursive acts they devise when participating in the process
- Does a referee concentrate more on specific parts of the article according her/his productivity?

What we still don't know

- In discourse analysis the outcome should be isolated if one wants to describe these texts, because the results obviously affect the nature of the report
- Are there linguistic differences between accepted and rejected ones?
- What happens in the process: How the articles are changed or how meaning is negotiated (Authors / referees)
—> resistance versus alignment

Why we should know about it?

- Answering these questions will give us key information on how science is collectively generated
- Different stages in entering a scientific community
- The need to teach not only how to write papers, but also how to revise them
- The visibility ,and recognition, of the referee
- This information will provide important orientation to researchers that are in formation
- Scientific literacy
- Towards a theory of scientific behaviour

Some conclusions

- Science has changed dramatically since Merton proposed his norms.
- His conception is too idealistic and does not account for the interests of the actors

Some conclusions: Counternorms (Mittrof, 1971)

Mertonian Norm	Counternorm (Mittrof, 1972)
Communalism	Solitariness (secrecy, miserism): Researchers often keep findings secret in order for them, or their employers, to be able to claim patent rights, and/or to ensure primacy when published.
Universalism	Particularism: Whilst in theory there are no restrictions as to who can contribute to the body of knowledge, in practice this is a real issue, particularly when considering the ratio of researchers in rich countries to those in poor countries, and this can be extended to other forms of diversity as well. In addition, scientists do judge contributions to science by their personal knowledge of the researcher.
Disinterestedness	Interestedness: Scientists have genuine interests at stake in the reception of their research. Well- received papers can result in good prospects for their careers, and, conversely, being discredited can undermine the reception of future publications.
Originality	Unoriginality: Highly original work is not the norm, but the exception.
Skepticism	Dogmatism: Some careers have been built upon a particular premise (theory) being true, which creates a dilemma when it comes to considering alternative scientific explanations.

Some conclusions

- Much of the evidence we have about the Peer Review is inconclusive, so
- The research on Peer Review must be enhanced to cover all those aspects (especially the discursive ones) that are occluded, specifically, the need to relate sociological with discursive data .

Thanks!!!