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IMPROBABLE FAIRNESS
REVIEWING UNDER THE LENSES OF IMPACT FACTOR
Call for Papers

Computer modelling and simulation are increasingly used to support decision-makers in developing, testing and implementing policies and strategies in real world business domains. In this context, this special issue will address the general subject of "Model-based Governance in a Sustainable World", specifically aiming at establishing whether, and under which conditions, computer models and simulations may provide the capability of taking correct choices, hence effectively and accurately dealing with complexity in policy-making and strategy development and implementation. The impacts generated by policy/strategy implementations have historically been very difficult to anticipate, due to the many complex and interconnected phenomena. Among them, factors such as dynamic complexity, causal ambiguity and path dependency may severely hamper the ability of decision-makers to design and implement effective strategies and policies aimed at obtaining organizational resilience and hence sustainable results.

The general notion of ‘sustainability’ has been associated to environment, society and polities. Therefore, a perspective inspiring this collection of contributions looks at the deep structural relationships the underpin dynamics of sustainability in different domains. In this context, different paradigms, techniques and approaches to computer modelling and simulation may play a relevant role, spanning from System Dynamics and Systems Thinking, to Agent-Based Modelling, Discrete Event Simulations, etc. Among them, System Dynamics and ABM have demonstrated their validity for decades, supplying models and tools particularly well suited in providing the basis for strategy development and implementation, and for meaningful learning experiences about the relationships between the structure and the dynamics of complex systems.

Starting from these considerations, this special issue will bring together researchers and practitioners to share their experiences and insights about the opportunities and challenges of using computer modelling and simulation in the field of policy and strategy modelling.
MAIN ASSUMPTIONS

ALL DECISIONS ARE BIASED

- Limits and biases can be attributed to the **social** and **institutional** environment in which decision makers operate

- Drawing on psychology and cognition we assume that:
  - cognition (rationality) is limited
  - decision makers enact judgement biases

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How do attitudes toward the impact factor (IF) affect the review process?

We answer this question using an agent-based computational simulation model.
Modeling Organizational Cognition: The Case of Impact Factor

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This article offers an alternative perspective on organizational cognition based on e-cognition whereby appeal to systemic cognition replaces the traditional computational model of the mind that is still extremely popular in organizational research. It uses information processing, not to explore inner processes, but as the basis for pursuing organizational matters. To develop a theory of organizational cognition, the current work presents an agent-based simulation model based on the case of how individual perception of scientific value is affected by and affects organizational intelligence units' (e.g., research groups', departmental) framing of the notorious impact factor. Results show that organizational cognition cannot be described without an intermediate meso scale – called here social organizing – that both filters and enables the many kinds of socially enabled perception, action and behavior that are so characteristic of human cognition.

Keywords: Organizational Cognition, Distributed Cognition, E-Cognition, Impact Factor, Perceived Scientific Value, Social Organizing, Agent-Based Simulation Modeling
IMPACT FACTOR
WHY?
“The impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years”

Eugene Garfield (1994)
IT IS AN EXTRAORDINARY SOURCE OF BIASES!

- **Unreliability**: no clear path between citations and IF
- **Disciplinary specificity**: the chosen time horizon is a one size fits all solution for extremely different needs
- **Distribution**: few articles determine high IF for any given journal

perceptions of IF characteristics may derive from:

- **institutionalized** beliefs in various forms of lists
- pressure from peers in **academic communities**, departments, associations, else
- pressure to **conform** or adapt (being too ‘docile’ as opposed to ‘inquisitive’)

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SUMMARY

THE MODEL
THE MODEL: SUMMARY

TWO TYPES OF AGENTS: (A) PAPERS, AND (B) REVIEWERS

PAPERS

REVIEWER IU2: IF LOVERS

REVIEWER IU1: IF AGNOSTICS
THE MODEL: SUMMARY

PAPERS

» associated to a journal’s IF [0, 5]
» all have an inherent “value”
» are randomly attributed to reviewers (up to three)

REVIEWERS

» attitudes towards IF (high vs low)
» general perception of scientific value (PSV)
» they are docile (…to some extent)
THE END PROCESS

- **End result:**
  - accept (exit)
  - revisions (remain)
  - reject (remain)

- New papers enter the system at every step following a random algorithm
PROCEDURES

- All papers are evaluated by reviewers as a function of the inherent value of the paper “discounted” by the perception of scientific value (PSV) of the reviewer.

- Papers are either accepted, rejected, or revised & resubmitted depending on reviewers’ inter-agreement rate.

- *group affiliation* (IU1: IF agnostics) or (IU2: IF lovers) affect reviewers’ judgement.
VALUE VS PSV
Mean inherent value of rejected papers as predicted by the mean perceived scientific value (PSV) of IU1 (IF agnostics)
Mean inherent value of rejected and R&R papers as predicted by the mean perceived scientific value (PSV) of IU1 (IF agnostics)
Mean inherent value of rejected, R&R, and accepted papers as predicted by the mean perceived scientific value (PSV) of IU1 (IF agnostics)
Mean inherent value of rejected papers as predicted by the mean perceived scientific value (PSV) of IU2 (IF lovers)
Mean inherent value of rejected and R&R papers as predicted by the mean perceived scientific value (PSV) of IU2 (IF lovers)
Mean inherent value of rejected, R&R, and accepted papers as predicted by the mean perceived scientific value (PSV) of IU2 (IF lovers)
RESULTS AS A FUNCTION OF INVOLVEMENT
Number of papers rejected compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer
Number of papers rejected and R&R compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer.
Number of papers rejected, R&R and accepted compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer.
PSV AND TIME
Perceived scientific value (PSV) increase as time goes by for the two groups when they refer to a community and when they do not.
**Inherent value** (value - IF) compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer (in the last 20% of time—when PSV increases)
A FEW POINTS AND TENTATIVE CONCLUSIONS

IMPLICATIONS
overall, it seems that there is an impact of IF on publications:

- IF lovers develop higher PSV and show some problems in the interpretation of inherent value

- Prevalence of IF lovers in the review process show impact on the number of rejections and on that of revisions

- We could detect an organizational/community impact on the distortion that both groups show in the evaluation of papers
A FEW FINAL POINTS

- Additional results may become available with more/different configurations of parameters.
- Group to be analyzed at the micro level (network).
- Refine the model through empirical data.
THANK YOU VERY MUCH
A FEW MORE SLIDES JUST IN CASE

ADDENDUM
IF-AGNOSTICS AND REVIEWING
Mean perceived scientific value of IU1 (IF agnostics) and mean IF of journals where R&R papers were submitted
Mean perceived scientific value of IU1 (IF agnostics) and mean IF of journals where R&R and rejected papers were submitted.
Mean perceived scientific value of IU1 (IF agnostics) and mean IF of journals where R&R, rejected, and accepted papers were submitted.
IF-LOVERS AND REVIEWING
Mean perceived scientific value of IU2 (IF lovers) and mean IF of journals where R&R papers were submitted
Mean perceived scientific value of IU2 (IF lovers) and mean IF of journals where R&R and rejected papers were submitted.
Mean perceived scientific value of IU2 (IF lovers) and mean IF of journals where R&R, rejected, and accepted papers were submitted.
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2. Theoretical background
3. Model assumptions
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6. Implications and conclusions
...until last week
IMPACT FACTOR: WHAT'S IT FOR?

0.992
AIM OF THIS STUDY

RESEARCH OBJECTIVES
IT MAY BE DIFFICULT TO FIND CONSISTENT CORRELATION BETWEEN IF AND ARTICLE CITATION

THE IMPACT FACTOR: RELIABILITY

TWO-YEAR TIME IS AN APPROPRIATE TIME SPAN FOR SOME DISCIPLINES BUT NOT FOR OTHERS

THE IMPACT FACTOR: BIASES

The number of papers with very high citations are (astonishingly) few even in high-IF journals (Nature articles in the picture: selected years and articles)

MORE PRACTICALLY...

- ...the IF is a number, and this gives the impression of some sort of ‘objective’ value (anchor)
- ...most academics know what this metric is and relate to it either by loving or hating it

Some academics use IF as an assessment/evaluation bias that plagues their judgement.

The underlying assumption is that there is an abstract idea of what scientific value is and how it is assessed, coming from either:

- professional associations
- editorials/structure/format of high IF journals

Scientific value for IF “lovers” is (probably) more static or inflexible than for those who are IF “agnosticis"
WE ASSUME INDIVIDUALS ADAPT

- Human beings have the tendency to lean on recommendations, advice, suggestions to make decisions.
- The strength of this tendency is called socially-oriented decision making (or ‘docility’).
- Highly docile individuals tend to listen and adapt more due to information coming from their reference group (or peers).

OVERVIEW

MODEL ASSUMPTIONS
MODEL ASSUMPTIONS

PEER REVIEW

- The process assigns reviewers to papers
  - association is random
  - the number of reviewers ≤ 3
  - reviewer reports are immediately available
Each paper under review gets

- a mean evaluation score (derived from the reports)
- a standard deviation score (derived from the reports)

When reviewers agree (sd ≤ 0.01) the verdict is “accept”

When reviewers disagree slightly (0.01 < sd ≤ mean sd evaluation) the verdict is “revisions”

When reviewers disagree completely (sd ≥ mean sd evaluation) the verdict is “reject”
When a reviewer’s “docility” is higher than the mean of the population times one st-dev then:

- the agent-reviewer is **more critical** of its own evaluations
- leans on the **other reviewers** to learn whether to update its beliefs on science or not

**Group effects**: the update is performed in relation to ‘peers’ – i.e. other reviewers with similar IF attitudes
LEARNING FROM PILOT RUNS

- we performed a few pilot runs to test code and conditions
- we settled on a limited number of conditions framed as a factorial design of $2^4 \times 3^3$
- we used statistical power to determine the number of runs
  - 25 runs per configuration of parameters
INHERENT VALUE
VS IF
Mean inherent value of papers with "revisions" and respective mean journal IF
Mean inherent value of rejected papers and respective mean journal IF
ATTITUDES TOWARD IF
Mean perceived scientific value (PSV) and respective mean journal IF for IF agnostics
Mean perceived scientific value (PSV) and respective mean journal IF for IF lovers
# REVIEWERS INVOLVED
Number of papers rejected as a function of the number of active IF agnostics (IU1)
Number of papers rejected as a function of the number of active IF lovers (IU2)
Number of papers with revisions as a function of the number of active IF agnostics (IU1)
Number of papers with revisions as a function of the number of active IF lovers (IU2)
DOCILITY
Number of papers with revisions as a function of reviewers' beliefs adjustment

Number of papers with revisions as a function of reviewers' beliefs adjustment

$beta = 46.239, p < 0.001$
Number of papers with rejection as a function of reviewers’ beliefs adjustment

Number of papers with rejections

\[ \text{Beta} = -26.943, p < 0.001 \]