

Characterizing Epistemic Cognition in Academic Peer Review

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ICQE Data Challenge

Overview, Framework, and RQs

Peer review is a critical epistemic practice, yet novice scholars struggle due to:

- Checklist-based onboarding lacks reasoning guidance
- Varying domain knowledge and evaluation skills
- Implicit standards vs. explicit procedural steps

AIR Framework (Barzilai & Chinn, 2024)

Epistemic Aims: Knowledge goals being achieved

Epistemic Ideals: Standards for evaluation

Reliable Processes: Strategies to achieve aims

We are interested in:

RQ1: What epistemic aims and values do reviewers identified in manuscripts?

RQ2: What epistemic ideals do reviewers held during peer review in that specific venue?

RQ3: How do reviewers use reliable processes to evaluate knowledge-in-making?

RQ4: What patterns of alignment vs. divergence emerge in the reviewing of the same manuscript?

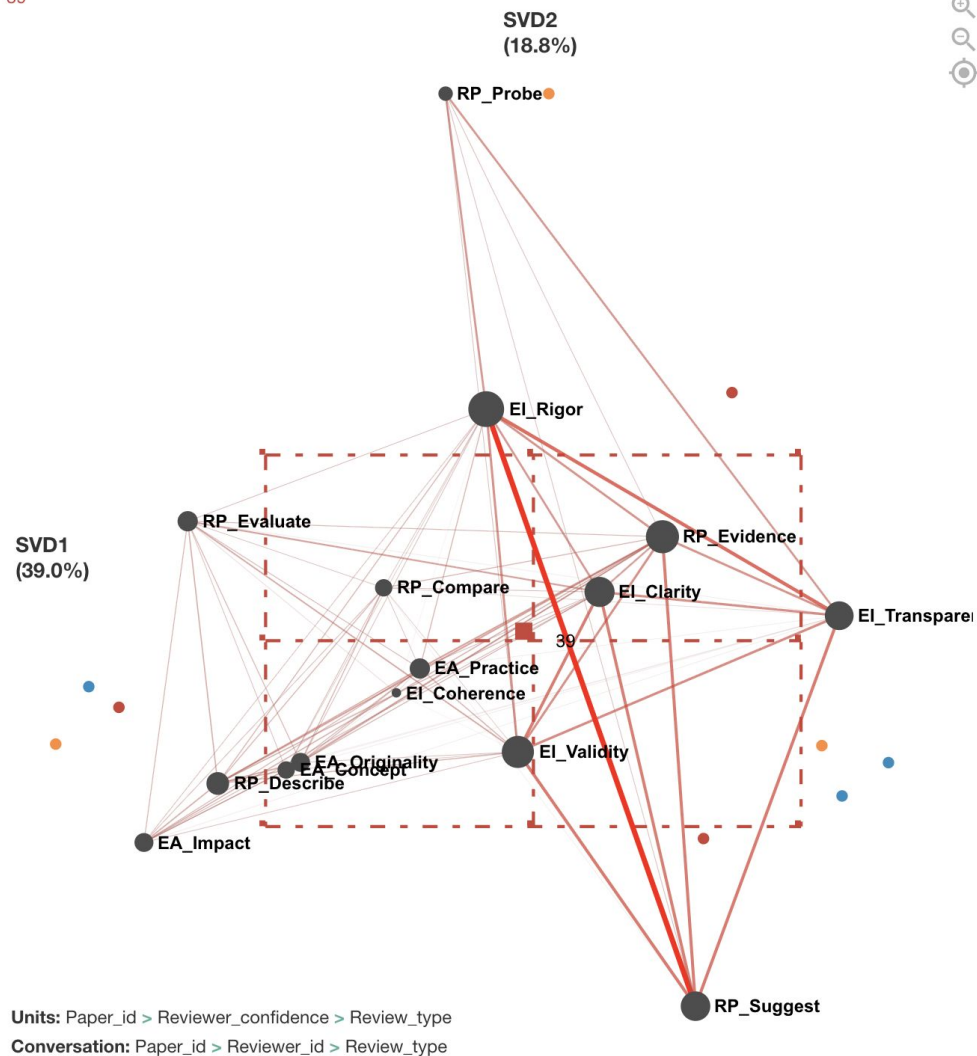
Codebook (Piloted twice)

Parent Code	Child Code	Definition
Epistemic Aims & Values What knowledge goals does the article aim to achieve through the reviewer's examination?	Conceptual Advancement	The work advances the explanation, theory, and defines a new problem in the field. (focusing on defining the problem of the research)
	Practical Advancement	The work advances technical capability, practical utility, or real-world implementation. (focusing on providing a new solution to the problem).
	Originality	<u>The work reveals new phenomena or previously unnoted relationships among those already known or proposes new topics, methodology, or insights.</u>
	Impact	<u>The work addresses an important problem in the field, and whether others are likely to use these ideas and build on them.</u>
Epistemic Ideals What standards do the reviewers hold to examine the manuscript?	Rigor	The study's technical and methodological machinery is robust, and the empirical investigation is comprehensive. (focus on the methodological process of producing knowledge)
	Validity	The study's claims are accurately warranted by specific data, results, examples, or reasoning in the manuscript. (focus on the reasoning of claims or interpretation of the data, or limitation or the methods, to produce knowledge)
	Coherence	The work is internally coherent, i.e. the research questions align with methods and findings.
	Transparency	The manuscript provides sufficient details to reproduce the result or verify the correctness of the procedures. (focus on the authors missed important details of the experiment or method)
	Clarity	The work is presented with sufficient clarity for its claims and contribution to be understood by readers. (focus on what has been written is clear or not clear).
Reliable Processes: What strategies or actions do reviewers use to achieve the epistemic aim of evaluating and improving a manuscript?	Describe the contribution	The reviewer summarizes the contribution or significance of the work.
	Evaluate quality	The reviewer makes a judgment about the quality of a manuscript dimension (novelty, rigor, clarity, significance, writing) without justifying it with specific evidence.
	Anchor evidence	The reviewer grounds their evaluation in the details of the manuscript, for example, identifying gaps, weaknesses, or naming strengths in the manuscript's methods, analysis, or reasoning.
	Probe	The reviewer asks a question that tests the limits of the paper's knowledge claims (generalizability, robustness, alternative explanations) without identifying a specific deficiency or making a specific suggestion. (focus on open-ended questions, do not code reviewer's request or suggestion questions as probe.
	Make comparison	The reviewer compares the current work with prior studies to support their judgment.
	Make suggestions	The reviewer provides actionable feedback for the issues they identified in the manuscript.

What did reviewers say?

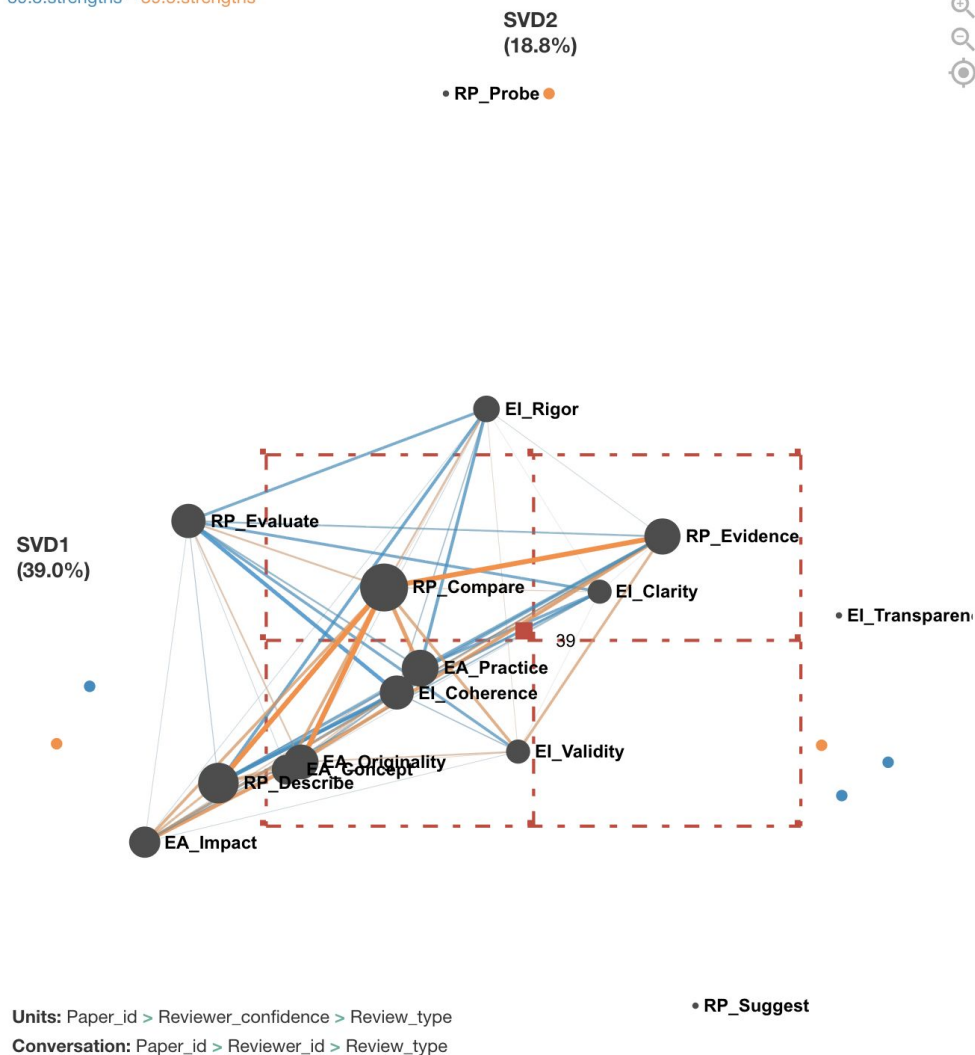
This is one article's four reviewer's comments visualization (confidence range from 3-5, full mark as 5) based on reviewer's epistemic cognition codes.

- Left corner: strengths from both more and less confident reviewers
- Right corner: weaknesses from both more and less confident reviewers and questions from less confident reviewers.
- Top corner: questions from more confident reviewers



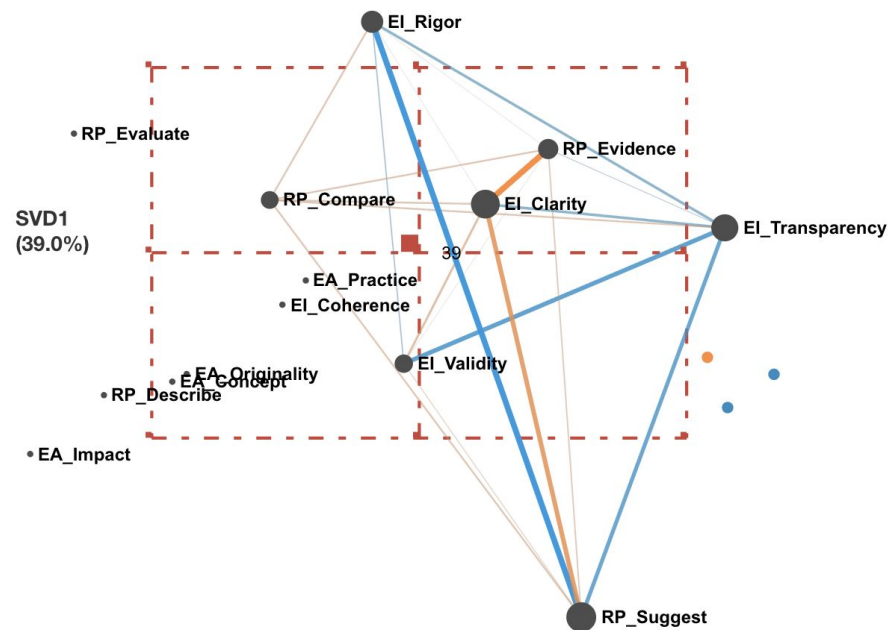
Strengths

Reviewers with higher confidence identified originality and conceptual contribution as the main epistemic aims of the article, while reviewers with lower confidence identified practical contribution as the main epistemic aims. Such strengths comments, for higher confidence reviewers, are made through comparing with literature, while through describing the current study by less confident reviewer.



Weaknesses

Reviewers with higher confidence tend to prioritize clarity as their epistemic ideal, while less confident reviewers prioritize rigor and coherence.





Questions

Reviewers with higher confidence tend to use compare and probe as their reliable processes to generate a review for the article, while reviewers with lower confidence tend to use describe and make suggestions (possibly due to they think something need to be redone?) as their reliable processes.

