Manifesto of Justification Logic

Classical Logic is concerned, loosely, with the behavior of truth. As such, we find its foundations in the work of the 19th century giants. Epistemic Logic shifts the emphasis to the intensional context and has to do with the behavior of known or believed truths. This field has been actively developed through the second half of the 20th century.

Justification Logic is a logic of the 21st century. We cannot simply accept a claim that a given proposition is true. It is also not appropriate to accept a proposition just on the basis of another's claim of knowing it. With an overabundance of easily accessible and yet unreliable information, we need checkable evidence that a given proposition is true. Justification Logic provides a well-principled logical framework for the corresponding reasoning.

Justification Logic introduces to the logical language a long-anticipated general notion of justification. Such a development was suggested by Gödel in his 1938 "Lecture at Zilsel," generally unknown for almost 60 years, wherein he called for the introduction of proofs into the object language. This suggestion has been rediscovered and developed into a general logic of justifications with new atomic propositions

"*t is a justification for F*."

We now have the capacity to reason about justifications, both simple and compound. We can compare different pieces of evidence pertaining to the same fact. We can measure the complexity of justifications, thus connecting the logic of knowledge to a rich complexity theory and to other fields of study.

Justification Logic furnishes a new, evidence-based foundation for Epistemic Logic according to which "*F is known*" is interpreted as "*F has an adequate justification.*" This enables us to then contrast cases where *F* is known because it has the right justification with those where *F* is justified but remains unknown because it has the wrong justification. Situations like these have been central topics in Epistemology since the introduction of the well-known Russell and Gettier examples.

Prospective development and applications of Justification Logic include contributions in:

- Argumentation Theory;

- Artificial Intelligence and Computer Science;
- Belief revision;
- Constructive semantics and provability semantics;
- Constructive foundations of Mathematics;
- Cryptography;
- Epistemic Logic and applications;
- Epistemology;
- Evidence aggregation;
- Evidence tracking and information reliability;
- Hyperintensional logics;
- Knowledge representation and truth maintenance systems;
- Logic of Proofs, Provability, and Verification;
- Logics of resources;
- Paraconsistent reasoning;
- Theory of verification;
- Type Theory and Typed Programming Languages.

In particular, Justification Logic realizes Gödel's aforementioned suggestion of modeling constructive reasoning in classical logic augmented by an explicit representation of proofs. This led to a formalization of the paradigmatic constructive semantics offered by Brouwer, Heyting, and Kolmogorov.

Justification Logic is an attractive area with many promising research avenues in sight. Though its potential is still being explored, Justification Logic is a vibrant and lively field which — due to its foundational contributions — emerges as a basic logical paradigm of the present.

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