

Making sense of public participation in rulemaking using argument explication



Ankita Gupta



Ethan Zuckerman



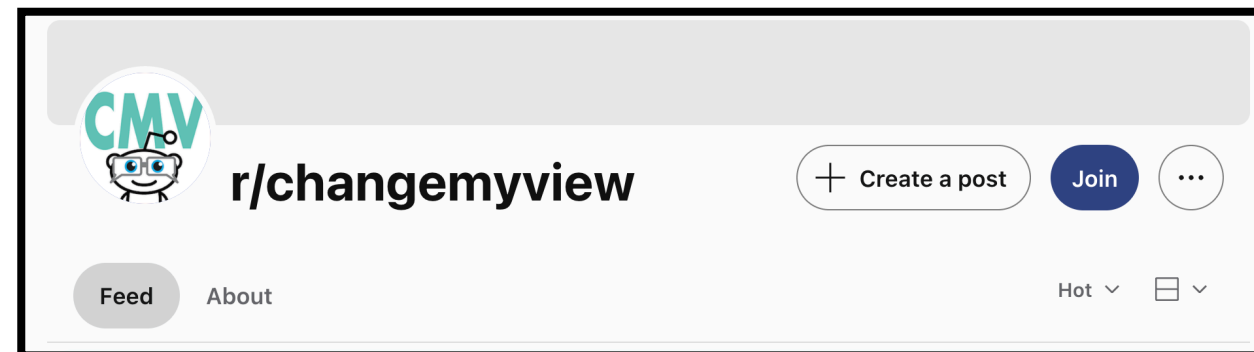
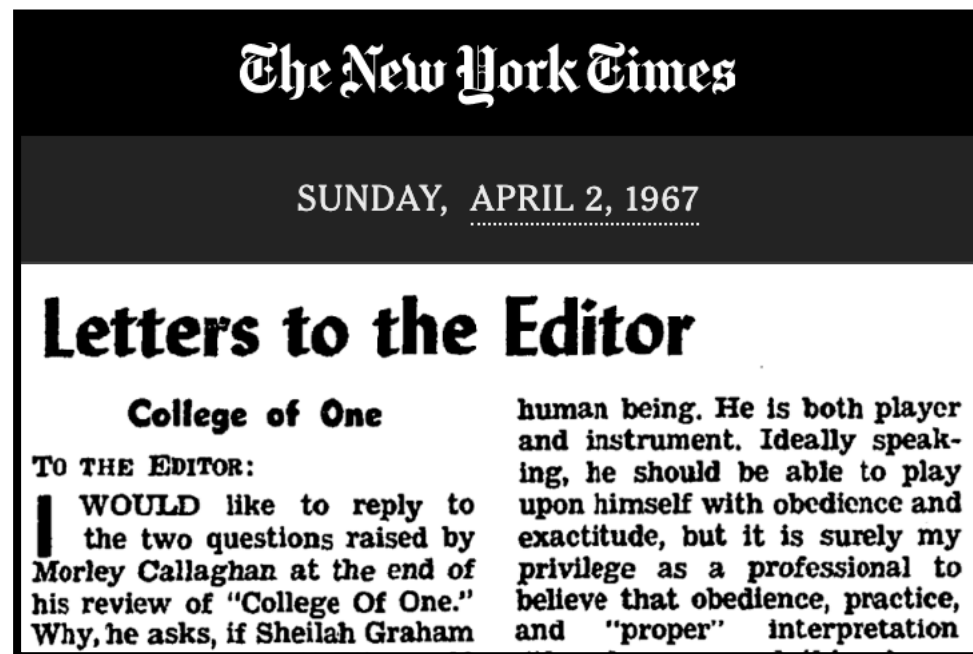
Brendan O'Connor

University of Massachusetts Amherst

Talk at IC2S2, July 2024



Overview

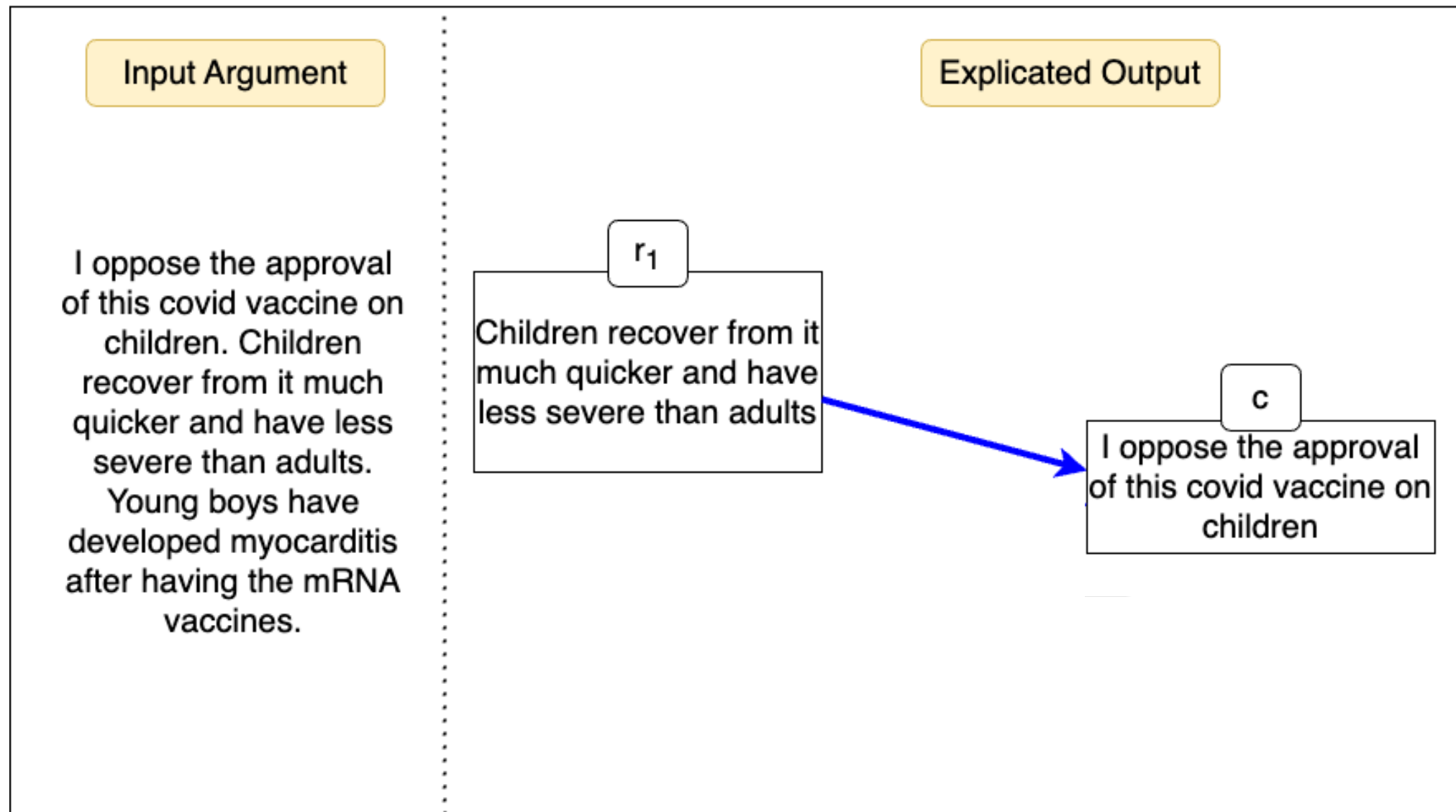


- Goal: understand large-scale corpora of opinions and arguments
- This work: use large language models (LLMs) to extract their *argument structure*



NLP Task: **Argument Explication**

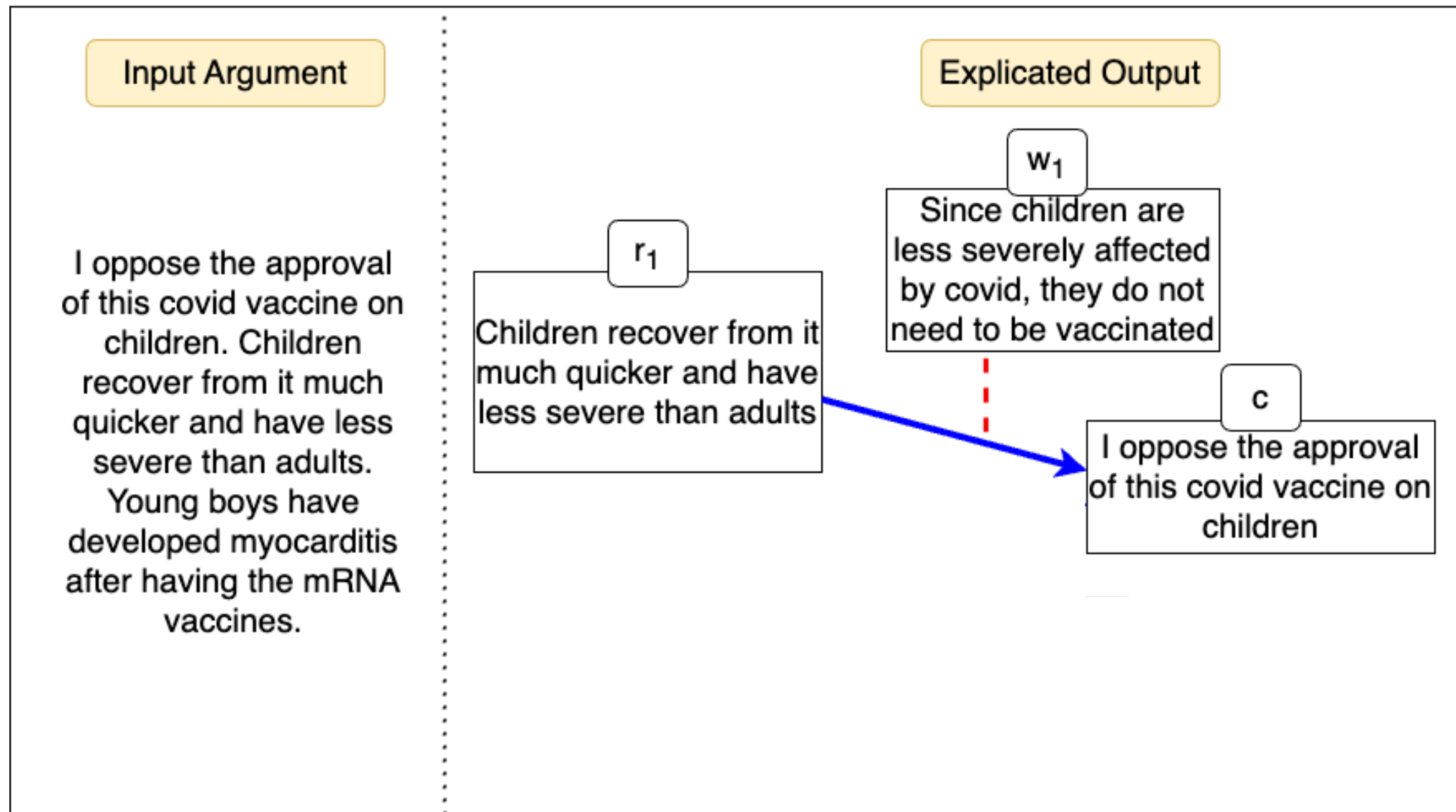
Text => {(claim, reason, warrant)}



- Argumentation theory: an argument has multiple components (Toulmin 1958, Freeman 1991, Walton 1996). We focus on:
 - **C**laim (a.k.a. conclusion): central, normative assertion
 - **R**eason (a.k.a. data, grounds, premise): support for the claim
 - **W**arrant: logical (implicit) link from reason to claim

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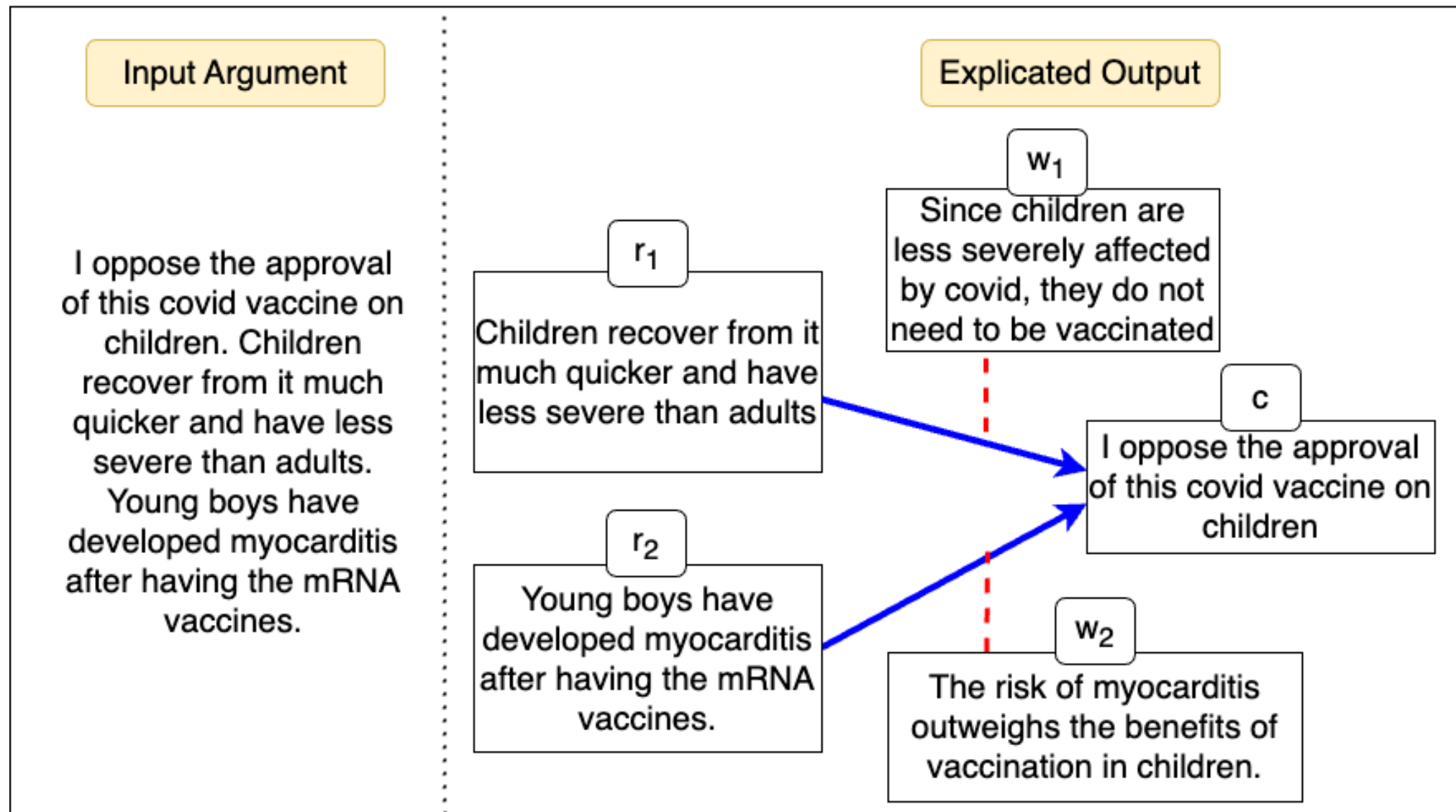
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Method: LLM prompting

Capital punishment is not a solution, as it cannot be ruled out that the judicial process may make mistakes. Criminals should not be put in luxury prisons, though. After all there are criminals who enjoy 'living' in prison for its decent board, no taxes to be paid, no stress with work. Still, the state needs the death penalty as a deterrent to horrific crimes.

According to Toulmin model,



User Input



Generated Response

The **claim** is "the state needs the death penalty as a deterrent to horrific crimes." The **grounds** are "criminals should not be put in luxury prisons" and "there are criminals who enjoy 'living' in prison for its decent board, no taxes to be paid, no stress with work." The **warrant**, which is the underlying assumption that connects the grounds to the claim, is that the death penalty will deter criminals from committing horrific crimes. The **rebuttal** is "capital punishment is not a solution, as it cannot be ruled out that the judicial process may make mistakes." The **qualifier** and **backing** are not explicitly stated in the argument.

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Automatic eval + human study with prior argument component datasets

[ARCT (Habernal and Gurevych 2017), Microtext Corpus (Peldszus and Stede 2015, Becker et al. 2020)]



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Method: LLM prompting

Capital punishment is ruled out that the judicial process should not be put in the hands of criminals who enjoy no taxes to be paid, and the death penalty as a deterrent.

Analyzed prompt sensitivity; correlate output quality to theory names' web frequency (C4≈LLM training data)

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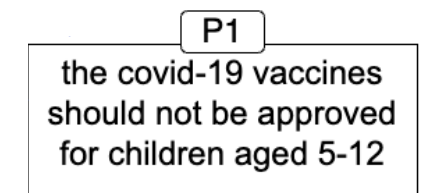


Generated Response

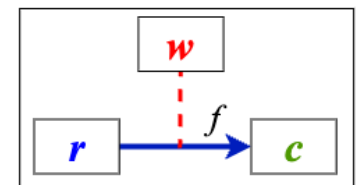
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Compare LLMs:
- GPT4 (proprietary)
- Llama2 (open-weight)

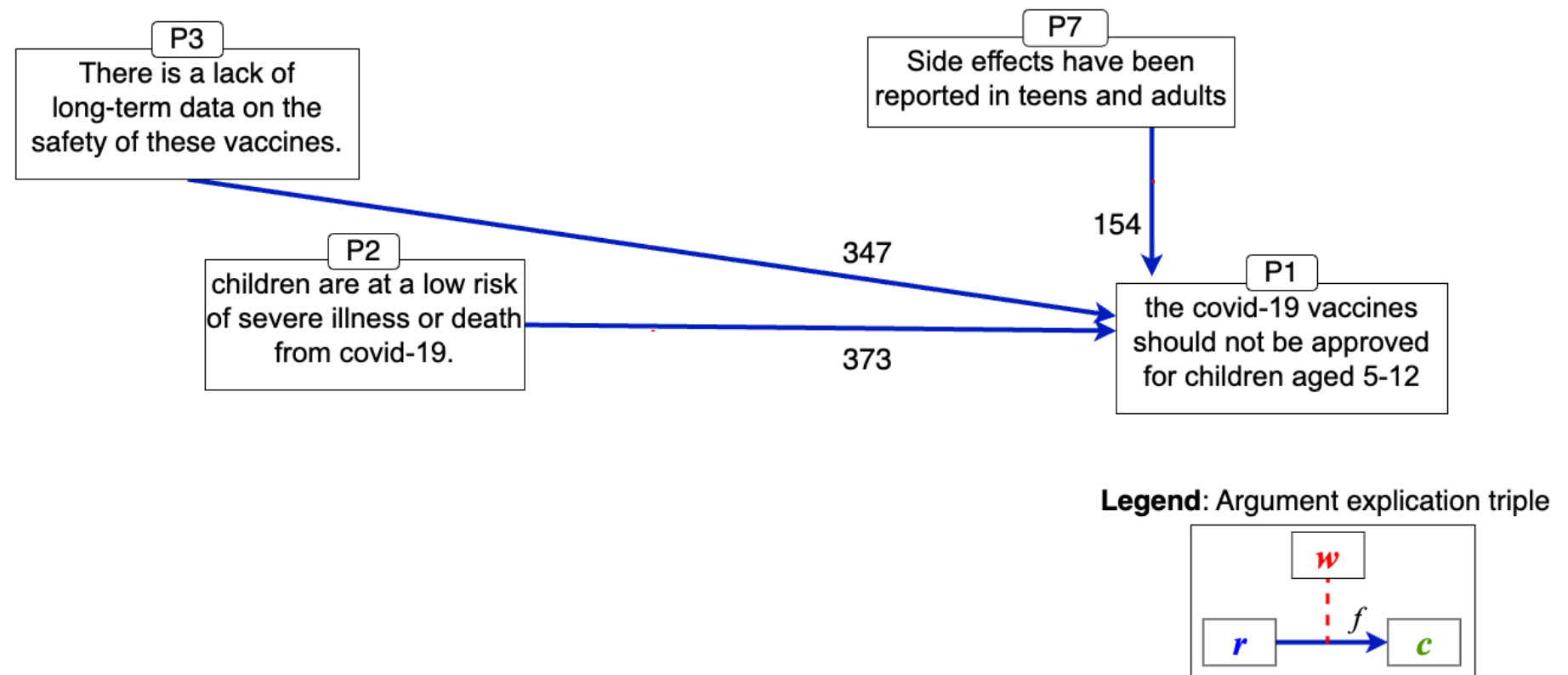
- Argument (hyper)graph extracted from public comments corpus (Hoyle et al., 2023)
 - 10,000 comments to FDA
 - Cluster all propositions from all extracted (c,r,w) triples (SentenceBERT + DP-Means)
 - Edges: (**r**eason -> **c**laim) pairs of proposition clusters



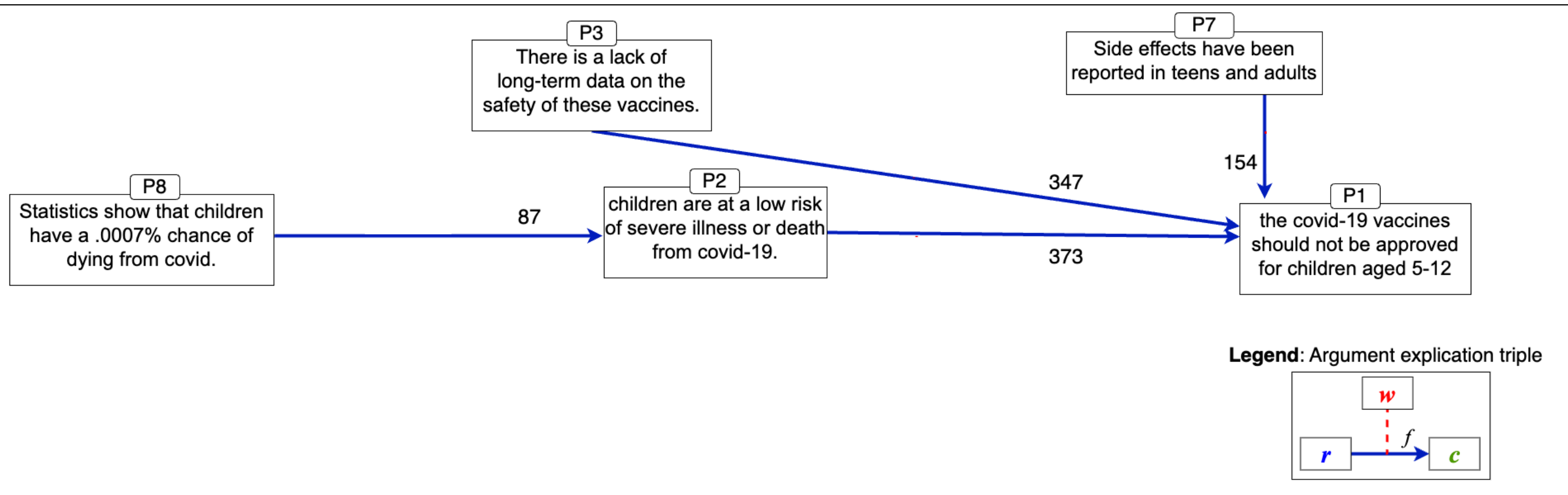
Legend: Argument explication triple



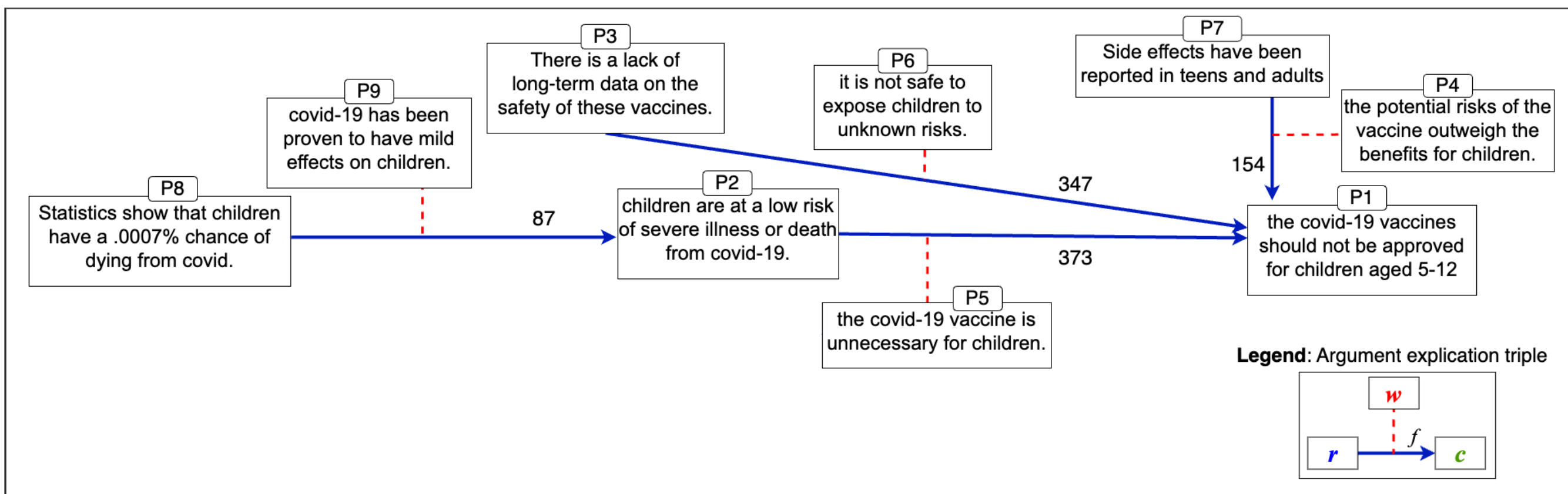
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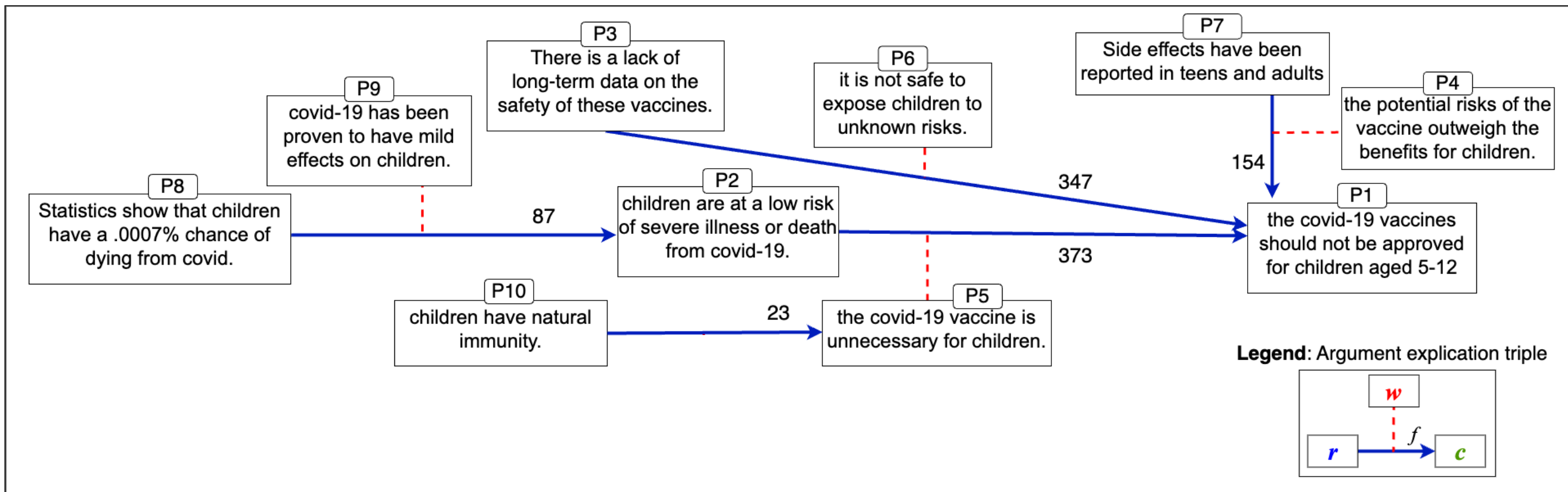
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Conclusion

- Use NLP to analyze semantic structures for social scientific analysis of textual corpora
 - This work: argument structures
 - Method finding: effective LLM prompt by using name of a pedagogically popular linguistic theory
- For more details...
 - Abstract: ankitaiisc.github.io
 - Paper at ACL 2024: *Harnessing Toulmin's theory for zero-shot argument explication.*
- Thanks!



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