According to Toumin model,



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## Making sense of p participation in rulen using argument explication



University of Massachusetts Amherst

Talk at IC2S2, July 2024



### Overview

#### **Ehe New York Eimes**

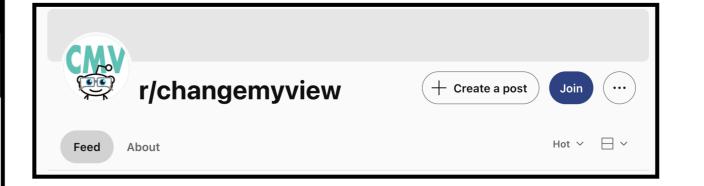
SUNDAY, APRIL 2, 1967

#### Letters to the Editor

#### College of One

TO THE EDITOR:

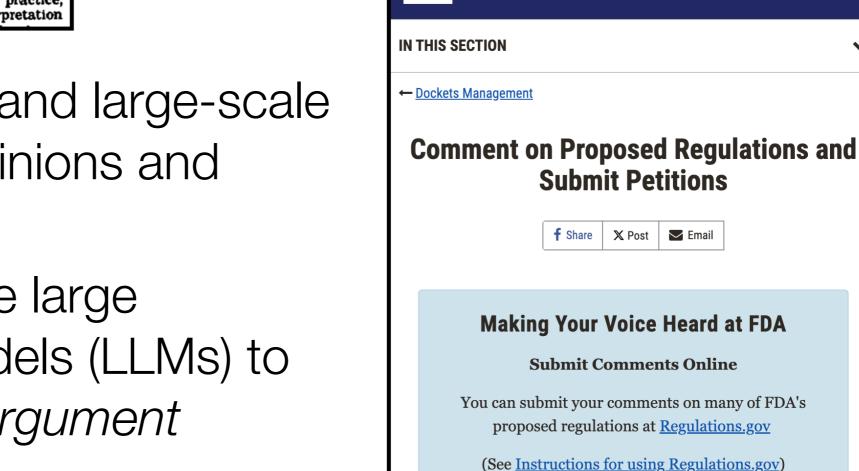
WOULD like to reply to the two questions raised by Morley Callaghan at the end of his review of "College Of One." Why, he asks, if Sheilah Graham human being. He is both player and instrument. Ideally speaking, he should be able to play upon himself with obcdience and exactitude, but it is surely my privilege as a professional to believe that obedience, practice, and "proper" interpretation



FDA

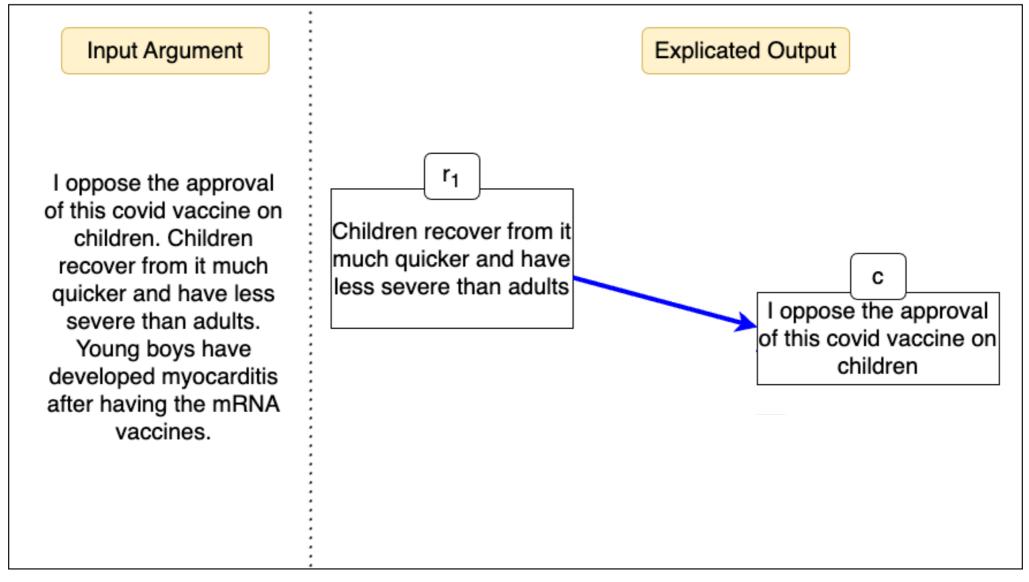
Q Search

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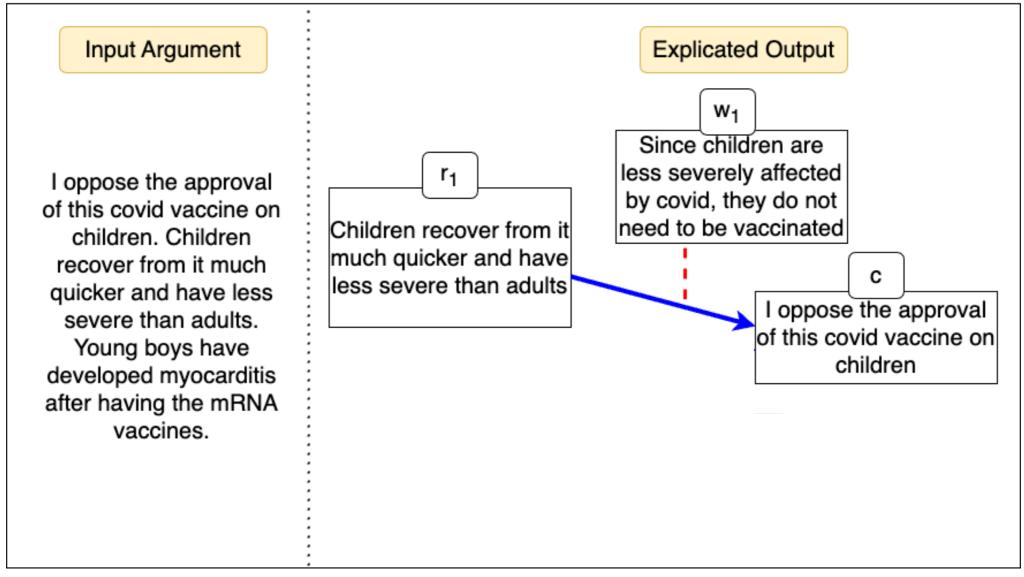
- Goal: understand large-scale corpora of opinions and arguments
- This work: use large language models (LLMs) to extract their *argument structure*

### NLP Task: **Argument Explication** Text => {(**c**laim, **r**eason, **w**arrant)}



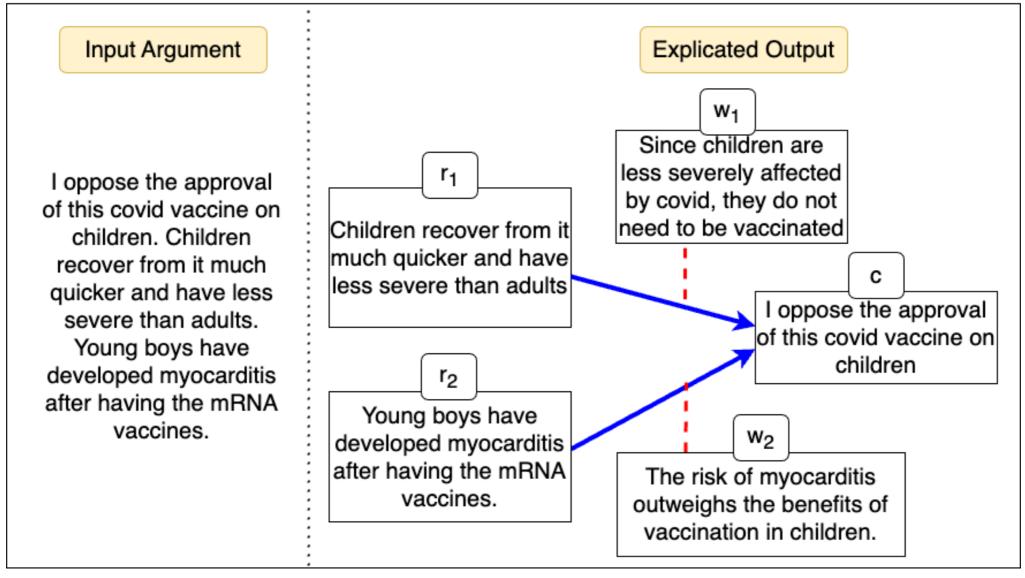
- Argumentation theory: an argument has multiple components (Toulmin 1958, Freeman 1991, Walton 1996). We focus on:
  - Claim (a.k.a. conclusion): central, normative assertion
  - Reason (a.k.a. data, grounds, premise): support for the claim
  - Warrant: logical (implicit) link from reason to claim

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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.



**User Input** 

#### According to Toulmin model,



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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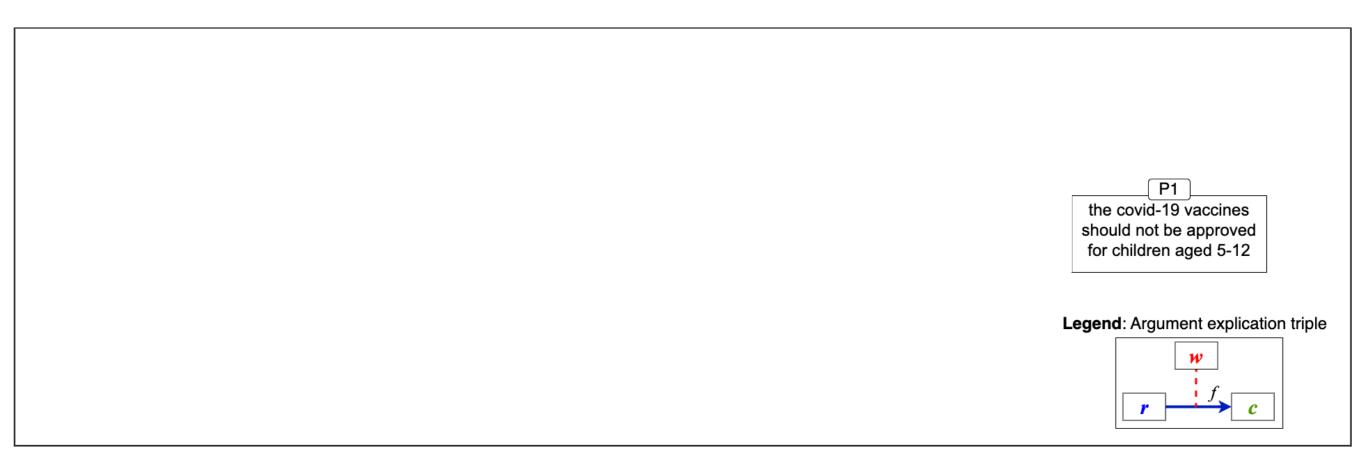
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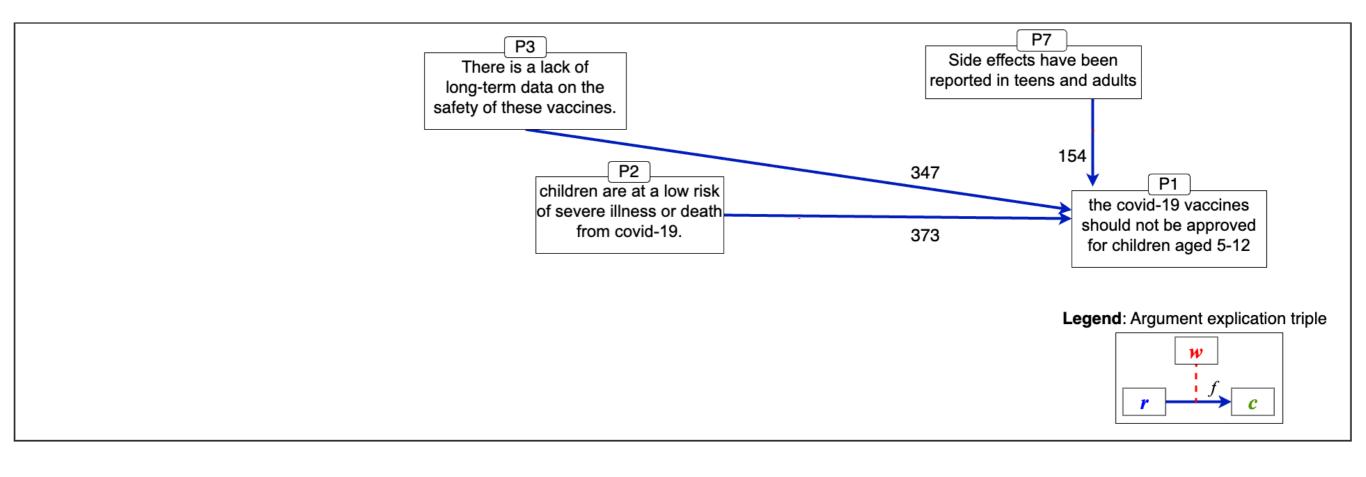
Compare LLMs:

- GPT4 (proprietary)
- Llama2 (open-weight)

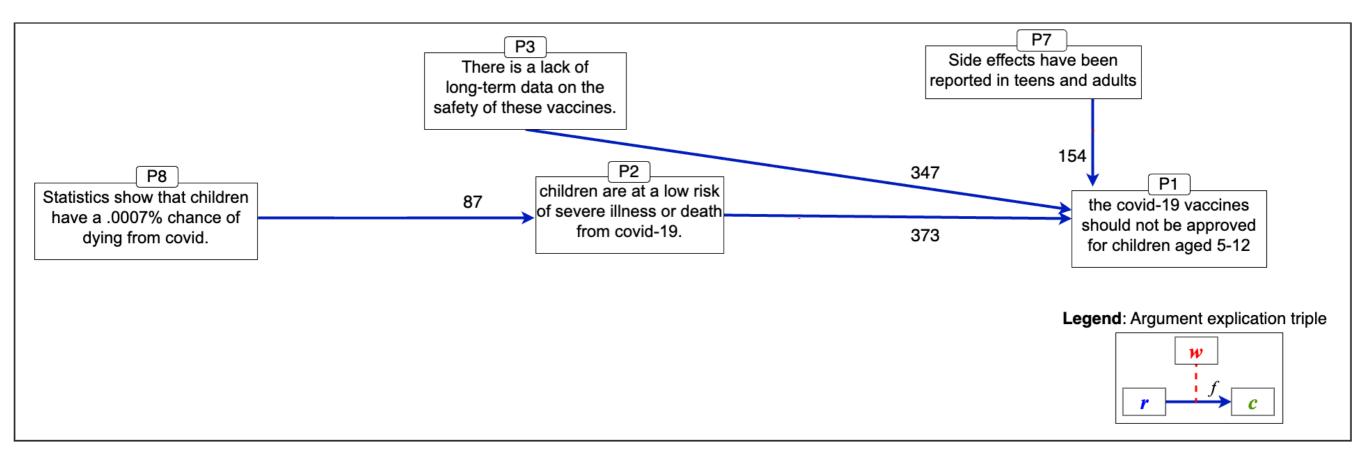
- Argument (hyper)graph extracted from public comments corpus (Hoyle et al., 2023)
  - 10,000 comments to FDA
  - Cluster all propositions from all extracted (c,r,w) triples (SentenceBERT + DP-Means)
  - Edges: (reason -> claim) pairs of proposition clusters



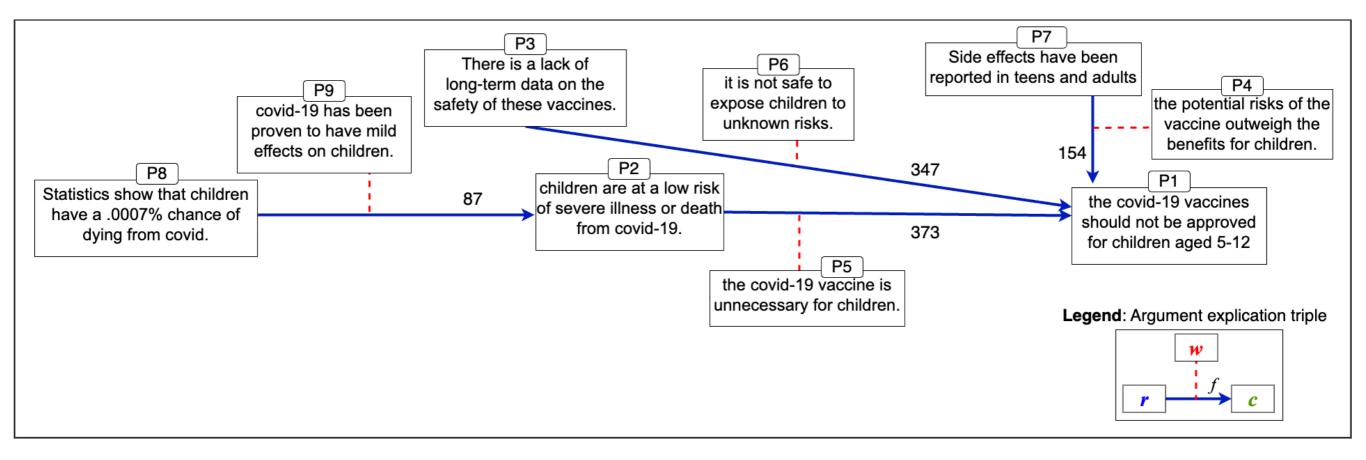
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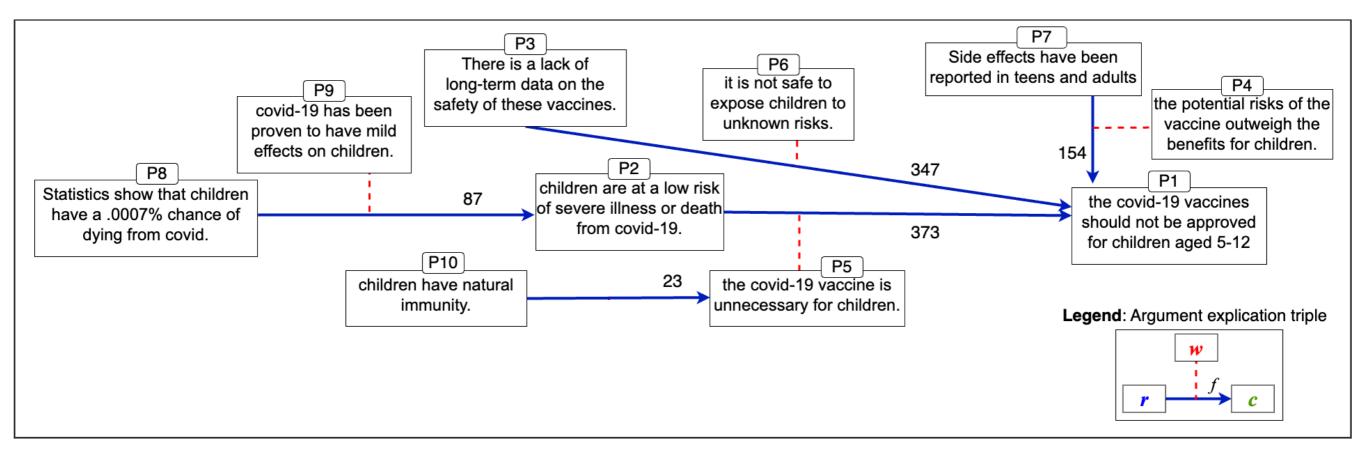
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vaccines.

The risk of myocarditis outweighs the benefits of vaccination in children.

# Conclusion

- Use NLP to analyze semantic structures for social scientific analysis of textual corpora
  - This work: argument structures
  - Method finding: effective LLM pron pedagogically popular linguistic the
- For more details...
  - Abstract: <u>ankitaiisc.github.io</u>
  - Paper at ACL 2024: Harnessing Tc shot argument explication.
- Thanks!

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