

## **Supporting Pluralism by Artificial Intelligence: Conceptualizing Epistemic Disagreements as Digital Artifacts**

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# Supporting Pluralism by Artificial Intelligence: Conceptualizing Epistemic Disagreements as Digital Artifacts

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**Abstract** A crucial concept in philosophy and social sciences, epistemic disagreement, has not yet been adequately reflected in the Web. In this paper, we call for development of intelligent tools dealing with epistemic disagreements on the Web to support pluralism. As a first step, we present POLYPHONY, an ontology for representing and annotating epistemic disagreements.

## 1 Introduction

While artificial intelligence is considered as both threat and opportunity for the modern democracies, many have called for immediate action for development of AI tools to support pluralism (see e.g. Helbing et al, 2017). Detection, representation and visualization of epistemic disagreements, we propose, is one of the important steps to support pluralism and dialog in the Web. Here are two concrete examples: (I) consider a controversial article in Wikipedia that is the matter of different disagreements. If we would be able to detect and represent disagreements, disputable parts could be visualized for people, users could simply compare different points of view (or request particular versions of the article based on their preferences). (II) Imagine you have recently read an article and like to find some articles that disagree with the proposed point of view. If it would be possible to automatically identify and link disagreeing articles, one could simply find them without the need to exploring all related articles one by one and thoroughly to discover disagreeing contents.

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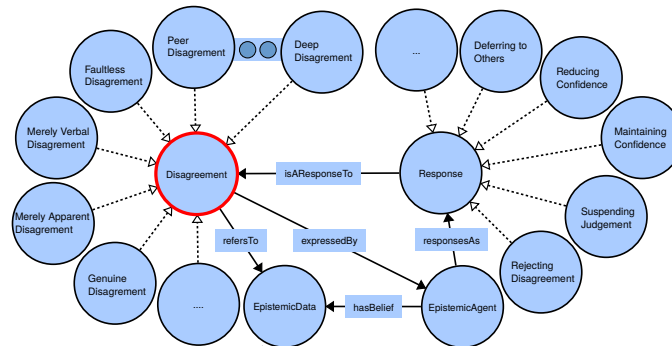
Due to its nature, Semantic Web and Linked [Open] Data are perfectly fit to capture disagreements: producing two different descriptions of the same phenomenon and publishing them suffices to produce a potential disagreement. What remains to be done is making the disagreement between descriptions co-existing, e.g., at different sources, explicit. This paper advocates a particular instance of the general Linked Open Data (LOD) principle, according to which explicit links between entities and resources are essential. The special type of link, we advocate in this paper, is explicit *disagreement annotations*, making explicit the disagreements using standard LOD linking by means of IRIs. We call the design pattern of providing several alternative descriptions of the same subject its *pluralist description*. This pattern requires either (a) authors of description to be aware of alternative views on the subject, and taking care of encoding these alternative descriptions, or (b) the disagreeing contents are detected, linked and visualized by artificial intelligent agents. Considering the huge and increasing amount of available data, the former option seems to be unrealistic, leaving us no choice but to develop intelligent tools that can perform such tasks. Here, we take the first step towards development of intelligent tools dealing with epistemic disagreements on the Web by conceptualizing epistemic disagreements as digital artifacts and proposing an ontology for representing epistemic disagreements, called POLYPHONY.

## 2 Conceptualizing Epistemic Disagreements as Digital Artifacts

Study of epistemic disagreements is a fresh and active field of research (Goldman, 2010; Frances, 2014, p.16). Besides the very fundamental questions regarding existence and importance of disagreements, many epistemologists have tried to answer two main questions: (1) What types of disagreement exist? (2) What is the rational response to each type? In order to conceptualize epistemic disagreements as digital artifacts, the answers to these questions should be considered. Therefore, after a literature review, some of the most important types of epistemic disagreements, such as *peer disagreements*, *deep disagreements*, *genuine disagreements*, *merely apparent disagreements*, *merely verbal disagreements*, and *faultless disagreements* (Siegal, 2013; Fogelin, 1985; Cohnitz and Marques, 2014; Jenkins, 2014), along with binary distinctions between them were identified, and real-world examples of each type were documented. Next, possible responses to disagreements, such as (a) *rejecting the existence of the disagreement*, (b) *maintaining one's confidence*, (c) *suspending judgment*, (d) *reducing one's confidence*, and (e) *deferring to the other's conclusion* and the relationship between these responses and different types of epistemic disagreements based on the real-world examples were identified and documented<sup>1</sup>.

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<sup>1</sup> See the documentations of the POLYPHONY ontology for detailed descriptions, here: <http://purl.org/epistemic-disagreement>.



**Fig. 1** Core concepts of POLYPHONY <sup>1</sup>

Based on the conceptualization of epistemic disagreements outlined before, we designed, POLYPHONY (see Fig. 1) a generic OWL ontology for annotating disagreements in Linked Data. To this end, POLYPHONY supports disagreement annotations of varying granularity: from the ontology level to the level of single triple, or a collection of triples. As a proof of concept, POLYPHONY was applied to OPENED, a modular ontology for human needs data proposed by Human et al (2017), to represent disagreements between different modules of the OPENED ontology, i.e. to annotate epistemic disagreements between needs theories.

**Conclusion** — Epistemic disagreement has been argued to be valuable for most crucial aspects of society, such as science (Cruz and Smedt, 2013) and politics. In this paper, we took the first step towards development of intelligent tools dealing with epistemic disagreements on the Web by presenting POLYPHONY, an ontology for representing epistemic disagreements. We hope that our research will serve as a base for future studies on development of intelligence tools for automatic detection, annotation, and visualization of epistemic disagreements on the Web.

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