

# Visualizing Worldviews: A New Notation for Diagramming Belief Systems

Hakob Barseghyan, Nichole Levesley, Paul Patton, & Jamie Shaw

University of Toronto

hakob.barseghyan@utoronto.ca; nichole.levesley@mail.utoronto.ca;  
paul.patton@mail.utoronto.ca; jamienco.shaw@utoronto.ca;

The purpose of this talk is to present a new diagrammatic notation and diagram templates for visualizing belief systems, soon to be published in a collected volume, titled *Visualising Worldviews: Diagrams for Belief Systems* (Barseghyan, H.; Patton, P.; & Shaw, J. (Eds.) (2020). *Visualizing Worldviews: Diagrams for Belief Systems*. Open Book Publishers). Constructing diagrams properly calls for an interdisciplinary approach: it requires knowledge from digital humanities, human psychology, and philosophy. Despite the recent surge of interest in knowledge visualisation, there is little agreement as to how different elements of a belief system (e.g. questions, theories, methods, reasons) can be efficiently depicted. Importantly, these depictions should be not only aesthetically appealing but also practically useful for highlighting key features of diverse worldviews and revealing important points of concordance and conflict between these worldviews. To that end, we present a new diagrammatic notation, applicable to a broad range of belief systems – both individual and communal – across time and space. This notation helps visualise the key features of a belief system in a precise and succinct manner, without compromising the depth or quality of the depiction. As a relatively simple notation, it is highly intuitive and avoids a steep learning curve for operation, while still allowing for the creation of complex and comprehensive depictions. Importantly, it allows highlighting those aspects of belief systems that can be easily overlooked in purely textual representations.

We start by showing that for a set of diagrammatic symbols to qualify as a systematic notation, it has to be both *comprehensive* and *consistent*. To fulfil the former requirement, a set of diagrams must be based on a solid theoretical foundation that states what types of entities, relations, actions, processes etc. populate the respective domain and, therefore, what types of entities, relations, actions, processes etc. should have their corresponding visual elements in the diagrammatic notation. Without such a theoretical foundation, any set of diagrams will face the risk of remaining a mere set of loosely connected templates. Thus, an acceptable diagrammatic notation should reflect our accepted ontology of types of epistemic elements, epistemic stances, epistemic agents, as well as the relations between these elements, stances, and agents. Our point of departure is theoretical scientonomy, which purports to provide such an ontology of epistemic entities and relations.

After a quick outline of the current scientonomic ontology, we proceed to providing diagrammatic tools for visualizing the types of entities that are customarily found in

belief systems, such as questions, theories, and methods, as well as relations between them. These include visualizations for epistemic elements (questions, theories, norms, etc.), epistemic agents (communal or individual), and epistemic stances (acceptance, use, pursuit, employment, etc.), as well as epistemic relations (implication, consistency, compatibility, implementation, authority delegation, etc.). Thus, our system presents both a new diagrammatic *notation*, i.e. visual elements with specific well-designed usage, such as rounded boxes for events and stealth arrows for logical implications, and several new diagram *templates* that use this common notation. The types of diagrams presented fall into two categories: *synchronic*, which includes theory relation diagrams, question-theory diagrams, and mosaic comparison diagrams, among others; and *diachronic*, which includes various types of timelines and influence diagrams. Importantly, each of these diagram templates have unique advantages and limitations and is designed to showcase specific facets of belief systems according to the author's intent. For example, a theory relation diagram showcases an agent's line of reasoning and can therefore illuminate potential implicit premises or invalid deductions in the agent's argument. A theory-stance timeline, on the other hand, illustrates how an agent's stance towards theories changes over time – for example, a theory that was once only *pursued* becoming also *accepted* – and thus is useful in identifying impactful events and potential gaps in the historical record. Other uses are discussed in the application section of the volume, and include, but are not limited to, comparing and contrasting opposing belief systems, showcasing flaws and/or ambiguities in arguments, identifying important agents, and events in the given community, and illustrating relations between concepts. The system therefore showcases how a relatively basic notation can produce diagrams with a variety of purposes and specialties.

Finally, we illustrate how this new diagrammatic notation can be effectively applied to a wide range of belief systems. To that end, we showcase a series of diagrams depicting various aspects of belief systems from a broad range of time periods and fields of inquiry, including medieval Islamic medicine, early modern European magic, late-eighteenth century French chemistry, nineteenth century views on the localization of function in the cerebral cortex, and contemporary physico-mathematical methodologies. As the main goal of this is to illustrate the potential applicability of our diagrammatic notation to a variety of belief systems, we do not engage in primary research of those historical belief systems but instead rely exclusively on reputable secondary sources. By visualizing different aspects of these belief systems as they are presented in these secondary texts, we aim to highlight the advantages of diagrammatic representations over pure text and showcase the great potential of our diagrammatic notation. Thus, while our visualizations often reveal gaps in the current body of historical knowledge, here we refrain from engaging in filling in those gaps, as the latter is a massive task best approached separately.

Below is a legend – a cheat-sheet – of the new diagrammatic notation, which includes the visual depictions of the various elements and relations that form the foundation of diagram templates.

