DAVID J SAAB: RESEARCH PROFILE

As a scholar of information science and technology, I am interested in the complex philosophical, conceptual and cultural underpinnings of information. Information and its dynamics are central to the foundations of AI, to cognitive science, communication, epistemology and philosophy of science. Philosophers of information must understand the diverse epistemologies and ontologies of other domains and cultures, as well as the sociological foundations of knowledge creation and information flows among a variety of sociotechnical systems. Being a transdisciplinary philosopher of information allows me to work at a meta level in areas as diverse as philosophy, social media, intercultural communication, geography & GIS, and information science.

The issues I explore are necessarily transdisciplinary and require the integration of theory, method and praxis from disparate disciplines such as anthropology, cognitive science, computer science, and philosophy–including philosophy of mind, philosophy of science, and ethics. There is a flavor of critical theory in my writing, as well as vivid threads of cultural schema theory and Heideggerian phenomenology. I tend to favor a hermeneutic approach to scientific inquiry, but my dissertation work could also be rightly compared to Habermas' universal pragmatics. I'm interested in looking at complex sociotechnical systems in situated informational contexts regarding agency, adaptation, communicative understanding, cultural/institutional structures, cultural schemas, ethics, hermeneutic discourse, networks (self-organizing, social, sociotechnical, structural), ontology, phenomenology and semantics.

The nature of my work, with its strong focus on transdisciplinary theory development, creates a challenge to finding the right academic position. And while philosophy is a significant part of my skill set, it is not the only one I bring to the academic table. I bring empirical skills as a social science researcher, especially as pertaining to cross-cultural and intercultural technology use, the design of quantitative and qualitative survey instruments, and ethnographic methods.

Research Interests

philosophy of information, semantic interoperability, new media, culture & cognition, social metadata (folksonomies & tagging), technology & culture, sociotechnical systems, intercultural communication, identity, information ethics, philosophy of science, philosophy of mind, Heidegger, phenomenology & hermeneutics, universal pragmatics

Dissertation Research

Its role in the creation of meaning makes culture integral to the study of semantics and, consequently, the study of ontologies and information, communication and media technologies. Based on my understanding of ontologies as manifestations of cultural schemas shaped by cultural identity, I am working on ways to make formal ontologies more adaptable and contextual using folksonomic tags, i.e., create *schematic ontologies*.

My dissertation research focused on the question of semantic interoperability among sociotechnical systems--how a meaningful exchange of information can be accomplished across human cultural and technological boundaries using tags in folksonomies. Folksonomies reflect the cognitive schemas of dominant cultures when they are aggregated. The minority cultural voices that contribute to folksonomies get lost in the long tail of the tag set. Disaggregating tag sets into cultural groupings provides us with a diversity of semantic networks of tags--entry points into our human conceptual ontologies, i.e., our cultural landscapes. The patterning of our semantic networks with lexical tags

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provides the foundation for a phenomenological hermeneutic that allows humans to explore these cultural landscapes through the continual schematic reconfiguration of our semantic networks. It is this exploration that is the essence of semantic interoperability. Semantic interoperability, therefore, is not simply an exchange of meaningful information, but rather also a pragmatic communication of understanding that facilitates the integration of new schemas--new patterns of entry points into a shared cultural landscape.

The meaningful exchange of information, in this view, forces information onto a phenomenological footing. Information is not something that can be captured, isolated and objectified. It cannot be exchanged, per se. Information is a phenomenon of ontologization, the core of which consists in the transformation of patterns through an entwined process of individual sense-making and sociocultural meaning-making. Moreover, the transformation of these patterns is handled schematically, which provides a consistency to these transformations such that data and knowledge are merged into one being--information as an ontological whole. By characterizing information as a phenomenology of ontologization, we can account for its variable manifestation within cultural landscapes and across semantic networks. If we can identify the cultural patterns embedded in tag sets, we can create a schematic form of ontologies to facilitate semantic interoperability and the "exchange of information" among our sociotechnical systems.

Research Themes
Because my research tackles fundamental concepts related to information, it can be applied in a variety of domains—philosophy, communications, information science and other transdisciplinary fields. The research I engage in can be grouped into four basic themes: information integration, social media & semantics, knowledge representation & visualization, and information ethics.

Information Integration
Beyond the potential for enhancing the semantic interoperability of our machine systems, the ability to understand and integrate a multiplicity of schematic ontologies will become an essential component of our human response to the global climate crisis, for example. In a planetary context, information about the effects of climate change, including natural and man-made disasters, will come from a diverse array of sources, filtered and structured according to a diverse array of cultural schemas. Schematic ontologies will help to facilitate this information integration by helping to bridge the gaps among the diverse semantic networks and cultural landscapes. Information integration is an umbrella theme that encompasses the more specific themes described below.

Social Media & Semantics
The ability to tag entities, spaces and phenomena provides users of social media technologies with the ability to embed a cultural semantics. My research opens new avenues of research into tags and the tagging process. It introduces ways for researchers to disaggregate folksonomies into tag sets specific to cultural groups, thereby allowing them to disambiguate the semantics of tags by identifying cultural schemas. Designers of information systems can draw upon these cultural semantics to create adaptive data environments in a variety of domains. Libraries can organize data in ways more accessible to traditional domains, user groups and transdisciplinary endeavors. Museum curators can use the cultural semantics of tags to create technology-enabled custom navigation paths and link descriptive narratives for visitors. Disaster response teams can stream tagged data from a variety of social media sources, enabling a more comprehensive situational awareness information environment--whether geospatial, organizational or intercultural--and prioritize particular schematically structured data for action.

Knowledge Representation & Visualization

Each culture has its own ways of conferring legitimacy and meaning. Necessarily linked to the data environments created in the domains mentioned above is the knowledge patterns that are structured in ways particular to a cultural group. Schematic ontologies using tag sets could be used to create coherent visual narratives that represent knowledge in intercultural contexts. Schematic ontology representations, structured and visualized using information systems, would provide a foundation for hermeneutic discourse involving varying cultural perspectives around a phenomenon of interest. Metaphors are often a key mechanism that enable us to overcome seemingly incommensurable ontologies by allowing us to traverse and reconfigure our semantic networks in ways that reflect others' cultural landscapes. Visualizing knowledge patterns metaphorically involves varying levels of abstraction in ways that resonate with semantic networks represented through text, sound, image or combinations of these. Spatial data infrastructures, for example, would need to include representations of indigenous cosmologies if it hopes to seriously involve local communities in the management of geospatial environments. Lectures visualized as animated comics using culturally resonant metaphors and images can help bridge divergent sets of cultural schemas.

Information Ethics

The proliferation of sociotechnical and informational systems in a variety of contexts, including artificial agents in our financial, educational, and defense systems, have them making increasingly independent decisions that affect the lives of many people. Yet, we do not yet understand well what ethical frameworks are being embedded within artificial agents nor how they are capable of making ethical analyses of their actions and making moral decisions as they adapt to new tasks and environments. Achieving ontological interoperability among our machines and information systems requires cultural understanding. Entwined with the cultural background in which our conceptual ontologies are situated are ethical frameworks and schematics that our machines will also have to use. The question of how we define or characterize these ethics regarding information and how we create the ability for our machines to choose among the frameworks of virtue, deontology, teleology, and care ethics as appropriate to the context becomes more important as our machines become more autonomous. An ability to engage in ethical discourse and decision making will become significantly more important as artificial agents act more independently. Floridi's Information Ethics framework offers an interesting and compelling lens through which to assess, if not build, ethics into our machines, be they robots, drones, or algorithms.

Research Proposals in Development

Overcoming the Semantic Barrier

Semantic technologies are intended to provide for a meaningful exchange of information using formal descriptions of concepts, terms and their relationships. Usually, the structure provided by these descriptions is limited to a given knowledge domain. As Web 2.0 facilitates the collaboration and contribution of information among increasing numbers of people using social networks, blogs, wikis, video sharing, mashups and folksonomies, the importance of meaningful exchange among governments, non-governmental organizations, academic institutions, communities and individuals is also increasingly important. The promise of collaborative exchange using semantic technologies has been limited for a variety of reasons--social, cultural, information, and technological. The proposed research promises to lead to significant conceptual advances and develop frameworks for solutions to the practical problem of overcoming the semantic barrier that exists between human cultural understanding (i.e., shared cognition and consensus) and the semantic technologies that support collaborative networks (i.e., knowledge networks and e-Science collaborations).

Semantic technologies are meant to facilitate the meaningful exchange of data, information and knowledge by inferring context, meaning, logic and reasoning. The intention of semantic technologies is to automatically generate topics and discover associations between them. To accomplish these inferences and automatic associations, semantic technologies rely upon abstraction layers that transform the information object into a meaningful set of conceptual associations. These abstraction layers are most often developed as formal ontologies, which specify in great detail the types of entities and their interrelationships within a particular domain. Ontology artifacts embed inferences and associations based on the logic and reasoning of a particular perspective (i.e., domain) in order to keep the data, information and knowledge contextualized and meaningful. This approach works intraculturally, but is problematic when applied interculturally. Intracultural semantic networks, which include ontology artifacts, work because they are based upon a similar set of cultural landscapes that comprise the meaningful conceptual ontologies upon which ontology artifacts rely. The intercultural interaction of semantic networks is problematic because the semantic networks are based upon dissimilar cultural landscapes with different ontological commitments. Semantic technologies, if they are to fulfill their promise of interoperability must be able to facilitate meaningful communication both intraculturally and interculturally. The importance of semantic technologies working interculturally becomes more important as individuals, communities and governments become increasingly networked and engage in complex endeavors that require coordination, cooperation and collaboration across geospatial and geopolitical boundaries.

Uncovering the Ethics of Algorithms

As information and communications technologies becomes ubiquitous, so do algorithms. Algorithms are crawling the web, crunching data, negotiating financial trades, navigating spaces, collecting intelligence, monitoring network traffic, and much more. They have become indispensable participants in a variety of complex human endeavors, from information gathering to warfighting. Algorithm creation has led physicists to work on Wall Street, creating high frequency trading algorithms that manage hundreds of thousands of trades per second. Internet based companies use algorithmic recommender systems that match customer profiles with potentially interesting goods and services. Search engine algorithms rank results that influence the ways people obtain information and to what information people have access. Algorithms have become so ubiquitous that we are dependent upon them for our economies, our education, our communications and our government functioning.

Algorithms function at the level of micro- and milliseconds. They make assessments and make decisions that lead them to particular courses of action. Because algorithms are computational artifacts, we rarely attribute responsibility to them for the decisions they make. We may hold them accountable as players in the moral spreadsheet of responsibility, but we don't recognize them as sentient players with moral culpability. Yet many of the decisions they make are of ethical import. Financial trading algorithms, for example, influence stock prices, which can be a determining factor in laying off personnel, appropriating or dispensing resources, and shifting balances of trade between nations. Algorithms operate weapons drones that make decisions about geospatial features and human activities that may result in attacks and death. Algorithms, in short, perform evaluative functions that result in decisions of ethical import. Whether their moral functioning comes from the persons who create the algorithms' code or from the algorithms' own learning, our understanding of their moral calculus is becoming increasingly important in an increasingly networked world.

Yet, how do we account for them as players in distributed decision-making systems? Are they designed for a consequentialist ethics, where cost-benefit analyses hold sway? Are they designed for a deontological ethics, where doing the right thing takes precedence? Are they designed to be anti-ethical, where what is right is defined solely by what confers advantage upon them or their designer? Are their information gathering and learning capacities making them capable of coordination, cooperation or

collaboration with other algorithms, in which case they might form their own set of ethical norms at the expense of human and other life, which is the stuff of apocalyptic science fiction? There are many questions about the ethics of algorithms and bots for which we have few answers. This research proposes to investigate the ethical understanding and behavior of algorithms in a variety of informational ecosystems using several normative ethical frameworks--virtue ethics, consequentialist ethics, deontological ethics, feminist/care ethics, and the recently proposed information ethics. The results of this research will enhance our understanding of these ubiquitous algorithms and their ethics; whether ethics is hard-coded or the result of emergent interaction; how they engage in evaluation of their environments to make decisions of ethical import and consequence; and how they are designed to learn and share information whether through coordination, cooperation and collaboration, or through deception, dismissal and destabilization.