Chapter 8
Ontological Indeterminacy and the Semantic Web or Why the Controversy Over Same-Sex Marriage Poses A Fundamental Problem for Current Semantic Web Architecture

Allen Ginsberg
Consultant, USA

ABSTRACT
The expected utility of the Semantic Web (SW) hinges upon the idea that machines, just like humans, can make and interpret statements about “real world” objects, properties, and relations. A cornerstone of this idea is the notion that Uniform Resource Identifiers (URIs) can be used to refer to entities existing independently of the web and to convey meanings. In this chapter, when a URI is used in this manner we will say that it is used declaratively, or that it is an R-URI. The key question is this: when an R-URI is used declaratively on the SW how is an agent, especially a non-human one, supposed to “understand” or “know” what it is intended to refer to or mean? Within the broad community of computational ontologists and SW practitioners there seems to be a widespread understanding that to provide a meaning/referent for an R-URI the responsible “web-presence” should return (or provide reference to) a formal ontology, or some set of formal “core assertions,” that can be used to “establish” the “denotation” of the R-URI. This view, which we will call the Ontology-Mediated (OM) view of SW reference/meaning, presupposes that terms can be given precise conditions for their applicability, and that the latter can be used to “pick out” the intended real world referent/meaning of terms. This chapter argues that the

DOI: 10.4018/978-1-60566-992-2.ch008
presuppositions of the OM view are incompatible with the requirement that SW terms/statements should be identical or analogous in meaning to corresponding natural language terms/statements. Natural language is a rule-governed activity, but the rules for using a term or uttering a statement are typically not fully determinate. This phenomenon is a consequence of Ontological Indeterminacy: the inescapable fact that two or more incompatible conceptual systems can often be applied to a domain of interest with equal empirical adequacy. This chapter presents a detailed “real world” example - based upon the currently controversial topic of same-sex marriage - and develops a use-case to buttress the claim that this phenomenon causes problems for the OM view. It seems, therefore, that SW developers/users are faced with a dilemma. If, on the one hand, formal semantic methods, like ontologies, are essential for “picking out” the meaning of SW terms, then those terms will not, in many cases, have the same meaning as their natural language counterparts. If, on the other hand, formal methods are not used to define SW terms, then how is it possible to provide them with meanings that can be interpreted by machines? In this chapter, we will see that this dilemma is based on the mistaken presupposition that the meanings of SW terms must always be determined by giving precise applicability conditions in order for the goals of the SW to be achieved. We show that this presupposition is bound up with the philosophical view that reference and meaning are a function of correspondence of language to reality. We will see that an alternative philosophical account, namely, a “meaning as use” point of view, can be the basis for an account of the meaning of SW terms that avoids the problems of the OM view. The key insight we draw from this account is that there is a distinction between the intention to use a term in some customary manner and the decision to adopt a formal theory that explains or explicates that usage. Formal methods provide a means of explicating the intended senses of SW terms so those senses can be processed by machines for use in certain applications. The intention to use a term according to a certain known natural language community usage, however, can be communicated and processed independently of the decision to accept a particular theory that explicates the intended sense. This account satisfies the goals of the SW and avoids the problems associated with the OM view.

**INTRODUCTION**

According to the World Wide Web Consortium’s (W3C) page on Semantic Web Activity (http://www.w3.org/2001/sw/), the Semantic Web (SW) is “about two things:”

... common formats for interchange of data... Also it is about language for recording how the data relates to real world objects. That allows a person, or a machine, to start off in one database, and then move through an unending set of databases which are connected not by wires but by being about the same thing. (Italics added.)

Though couched in terms of databases, this paragraph implies that the SW should make it possible for machines to interpret and make statements about “real world objects” that would be direct analogues to human-generated statements about the same things. In order for the formal language used by a machine to have the same kind of utility as a natural language used by a human, there must be a way for the reference/meaning of SW terms to be established. A key idea behind the SW is to use Uniform Resource Identifiers (URIs) to play this role by allowing them to be used to “identify” real world objects, properties, and relations. Although there has been some controversy concerning technical details (Clark 2002; Pepper 2003) it seems clear that schemes allowing URIs to be used to refer to things (while still allowing them to be used as addresses in URLs) is compatible