Chapter 2

A Theory of Social Agentivity and its Integration into the Descriptive Ontology for Linguistic and Cognitive Engineering

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ABSTRACT

The agentivity of social entities has posed problems for ontologies of social phenomena, especially in the Descriptive Ontology for Linguistic and Cognitive Engineering (DOLCE) designed for use in the semantic web. This article elucidates a theory by which physical and social objects can take action, but that also recognizes the different ways in which they act. It introduces the “carry” relationship, through which social actions can occur when a physical action is taken in the correct circumstances. For example, the physical action of a wave of a hand may carry the social action of saying hello when entering a room. This article shows how a system can simultaneously and in a noncontradictory manner handle statements and queries in which both nonphysical social agents and physical agents take action by the carry relationship and the use of representatives. A revision of DOLCE’s taxonomic structure of perdurants is also proposed. This revision divides perdurants into physical and nonphysical varieties at the same ontological level at which endurants are so divided.

INTRODUCTION

The Descriptive Ontology for Linguistic and Cognitive Engineering (DOLCE) is an ontology for “comparing and elucidating the relationships with other future modules in the [WonderWeb ontology] library, and also for clarifying the hidden assumptions underlying existing ontologies or linguistic resources such as WordNet” (Masolo, Borgo, Gangemi, Guarino & Oltramari, 2003, p. 13). It was developed as part of an effort to create basic infrastructure for the semantic web, and has

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been used as a foundational ontology for creating domain-level ontologies, such as Bottazzi and Ferrario’s (2009) preliminary ontology of organizations. When DOLCE is extended and used to examine domains in more detail (as with Bottazzi and Ferrario, 2009, and the considerations of the geopolitical domain in Robinson, 2010), some issues arise that were not immediately apparent when the foundational ontology was examined in isolation.

The purpose of this article is to resolve issues uncovered in Bottazzi and Ferrario (2009) and Robinson (2010) regarding the agentivity of social objects. “Since ontologies are seen as the semantic web’s ‘basic infrastructure’, it is becoming increasingly important to ensure that ontologies can reflect the social reality that we live in” (Wood & Galton, 2009, p. 268). Thus, the goal of this article is to expand DOLCE with the ability to far more accurately describe social agentivity. How can an ontology simultaneously and in a noncontradictory manner explain the agentivity of both physical and social objects, especially since many nonphysical social objects depend upon the actions of physical agents to perform actions? In order to address this, a theory of social agentivity is proposed that is consistent with DOLCE’s basic assumptions. It is then shown how this theory can be encoded into DOLCE with some revision of its basic taxonomic structure of perdurants. The goal of this effort is to capture the natural language notion that some physical and social objects have the capacity to be agentive while recognizing the commonsense notion that they act in different ways. For example, both human beings and corporations can be agents, but corporations, being nonphysical entities, can only act indirectly though human beings authorized to act on their behalf. DOLCE has been chosen as the foundational ontology for this research because it already includes an agentive/non-agentive distinction. This in contrast with other ontologies, such as OCHRE, the Object-Centered High-level Reference Ontology, which “does not distinguish agentive vs. non-agentive entities” (Masolo et al., 2003, p. 79) and BFO, Basic Formal Ontology, which notes that its category substantial entity is taken to include “organizations and other agents” (p. 58) but does not further elaborate on agentivity.

This effort is undertaken with the assumption of social realism: that is, that “social reality exists, that entities such as claims, prices, financial transactions, elections, trials, and weddings are not mere fictions and that our talk of such entities is not a mere collection of roundabout ways of talking about other things” (Smith, 2008, p. 42). Taking a philosophically informed approach to information systems can lead to better information systems research (Lee, 2004). This is especially true in the area of ontology design for the semantic web, because, even though the technical aspects of ontology design may be derived from earlier research on databases, ontology design includes “methods similar to those employed in philosophy, including the methods used by logicians when developing formal semantic theories” (Smith, 2003, p. 161).

The structure of this article is as follows: (1) the meaning of the term “social” as it is used in this article is discussed, (2) a summary of the current problems in DOLCE that this research proposes to solve is provided, (3) the theory of social agentivity is elucidated and informally introduced into DOLCE, and finally (4) some preliminary formal axioms are supplied.

THE MEANING OF “SOCIAL” AND THE EXISTENCE OF SOCIAL OBJECTS

“Social action occurs when thought processes intervene between a stimulus, an actor, and their subsequent response. In other words, it is a process whereby an individual attaches a subjective meaning to his or her action” (Ryan, 2005, p. 714). Trypuz (2008), with reference to Kemke (2001), writes that social actions are actions undertaken
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