Chapter V

What Orders Reality: Relationship, Relatives, and Relations

Introduction

To model reality by mapping its content to computable forms, we need to know how to represent the first-class entities of any existence, relationships, the adhesive of the world. Both human and machine understanding of the universe, its parts and realms, consists in knowing the cardinal relationships and underlying rules and making valid inferences from them.

The Semantic Web ontology is often identified with a schema defining relationships between different resources. For instance, the OWL markup language is supposed to specify the types of relationships represented in RDF language employing an XML vocabulary, with a view to determine the relationships (and hierarchies) among diverse Web data resources identified by URI. And the formal specification of relationships determines the meaning (semantics) of knowledge domains, and the universality and credibility of any ontology, its rigor, cogency, validity, and richness, come from the capacity to fully describe all the possible types of relationships in a domain of knowledge or practice. Without a systematic theory of relations, it hardly is possible to form a universal account (language or theory) describing reality, its entity classes, properties, individuals with their particular properties, on which human or machine reasoning has to take place.

In the EIS world schema, an ontological entity of relationship is among the primal cuts of reality along with substance, state, and change. In the context of computer science, a top-level ontology is a knowledge base structure sought to be implemented in computer programs. The task of such a computational ontology is to supply a set of high-level classes manipulated by general rules mapping the relationships among entities in the universe of discourse about anything. So, finding the answers to the fundamental questions of the meaning, existence, and kinds of relations (*what* relation is, *whether* it exists, and *how* it is/works) appears to be crucial both for constructing world models and data -ype structures of specific realms and domains. Also, it is particularly important for building a unified [Semantic Web] ontology language to resolve the following critical issues:

- What it is to be a relationship
- What key relation types may be
- How it must be formally represented

For the extant SW languages define a property as a binary relation (or n-ary relations) connecting two or more individuals. The approach is just an extension of the set theory's axiom of choice, reducing a real relationship to a mathematical function, the sets of ordered pairs, where each individual element of one disjoint set (domain) is associated at least with one element of another disjoint set (range). Such conception comes from a long-established misplacement of relations for their relative terms: "those things are called relative, which, being either said to be *of* something else or related to something else, are explained by reference to that other thing." Or, "those terms, then, are called relative, the nature of which is explained by a reference to something else. . ." (Aristotle, 1990, Categories).

Revising the extensional definition having a strong influence on the set theory of relations and, hence, SW languages, we argue: while existing really, a relation has its own status and nature quite different from the nature of its foundation, relative things, for which the relation to something else is a necessary condition of existence. Au fond, *a relation has its own essence different from its components, it has a distinct reality*, being, and existence, although not easy to perceive. Again, a relation exists really, but not according to a conception of the human minds. Something is said to be a relative only by virtue of its relationship, as much as somebody is said to be a parent only by virtue of its real relationship of parenthood, and not other way around.

In the essence, a relation is composed of the relationship, expressed by prepositions or other relative words, and a multitude of relative entities, as in:

Relation = Relationship + N-Relatives (Components, Elements, Arguments, Terms, Relata)

Here the relationship also may enter as the relative element, and vice versa, like *less* and *greater*. In other words, as much as individual entities (as objects) are defined by their classes (kinds) of things, the class of relationship is a definition of all the relative terms of a specific type. While studying the nature of relationships, their basic properties also are properly examined. Among relational traits, the basic one is the property of being reversible (inverse), and reciprocal or correlative. Since *to be inverse and convertible is a necessary and sufficient condition of existence for any relational entity*, like the meaning (or signification) relation between names (URIs) and things (Web resources,) or causal relationship, implying correlation or co-variation as a necessary condition.