On Property: Property vs. Attribute
-- Ontology representation language: OWL--

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Abstract: You must be careful in using the term “property”, since there are multiple meanings in “property” as discussed below. It is a bit dangerous to directly use OWL as an ontology representation language because it is an assembler or an interlingua for ontology interchange.

1. In logic, they call unary predicates a property. That is, “human” in human(X) is a property just like “red” in red(X). Although human is classified as a Sortal and red is as nonsortal to distinguish them in Sortal logic, it is not enough to avoid confusion.

2. In OWL, they call links between two nodes property, since OWL is designed by bringing the concepts used in semantic network into its conceptual framework. I could say, OWL conceptualization might lead users to lower level of abstraction at which nodes and links are the main conceptual constructs close to implementation level. In contrast with logic, OWL property corresponds to a binary predicate, while it does to a unary predicate.

3. In AI, they clearly distinguish between property and object: The former is necessarily associated with the latter which in turn cannot exist without any property. That is, human is an object and tall is a property.

4. In ontological engineering, they share a lot with AI people in the use of property. Furthermore, they believe an ontology has to be representation-independent, even from logical expression.
   Logicians might say X in p(X) stands for an individual before class identification, so there is no difference between human and red because both are predication of what X is. Ontology researchers who use logic extensively have to accept this position and they follow the terminology in logic with sortal logic. But, Some of the ontology researchers including me use logic as a secondary dealing with ontological reality as the primary and do distinguish the two.

5. The main issue: property and attribute
There exists serious terminological/ontological confusion between property and attribute. Ontologically, “being red of a rose” and “the color of a rose is red” are different. It is apparent when you see red(rose) and color(rose, red). Ontologists do not care about the terminology, however, the differentiation between the two are essential. According to the logic terminology, let us call the former property and the latter attribute.

Now we are ready to explain how OWL is inappropriate for end users to write/design an ontology. OWL does not help users distinguish among role, relation, attribute, action, etc. It only provides nodes for concepts and property(link) to tie them together. It is apparent from that teacher, left-of, color, buy are intrinsically different from each other in spite of the fact that they can be represented by binary predicates. Ontologically, there are many different things which can tie two nodes with different meanings. Even worse, OWL: property is very misleading, since it reminds us of unary property defined in 5. What you can represent by OWL:property is attribute rather than property.

Furthermore, some people represent roles by OWL:property; which is incorrect, of course. A role is not a binary relation or an attribute. In short, it is not what can be represented by OWL:property. Let us take father as an example. Father is not a relation. What is a relation is father-of. Father is a role and represented as father(X) which is intrinsically dependent on children and defined in the context of the relation: father-of(X, Children).

It is worth to pay a close attention to what people mean by property!