

Ontological Analysis as a Search for Truthmakers

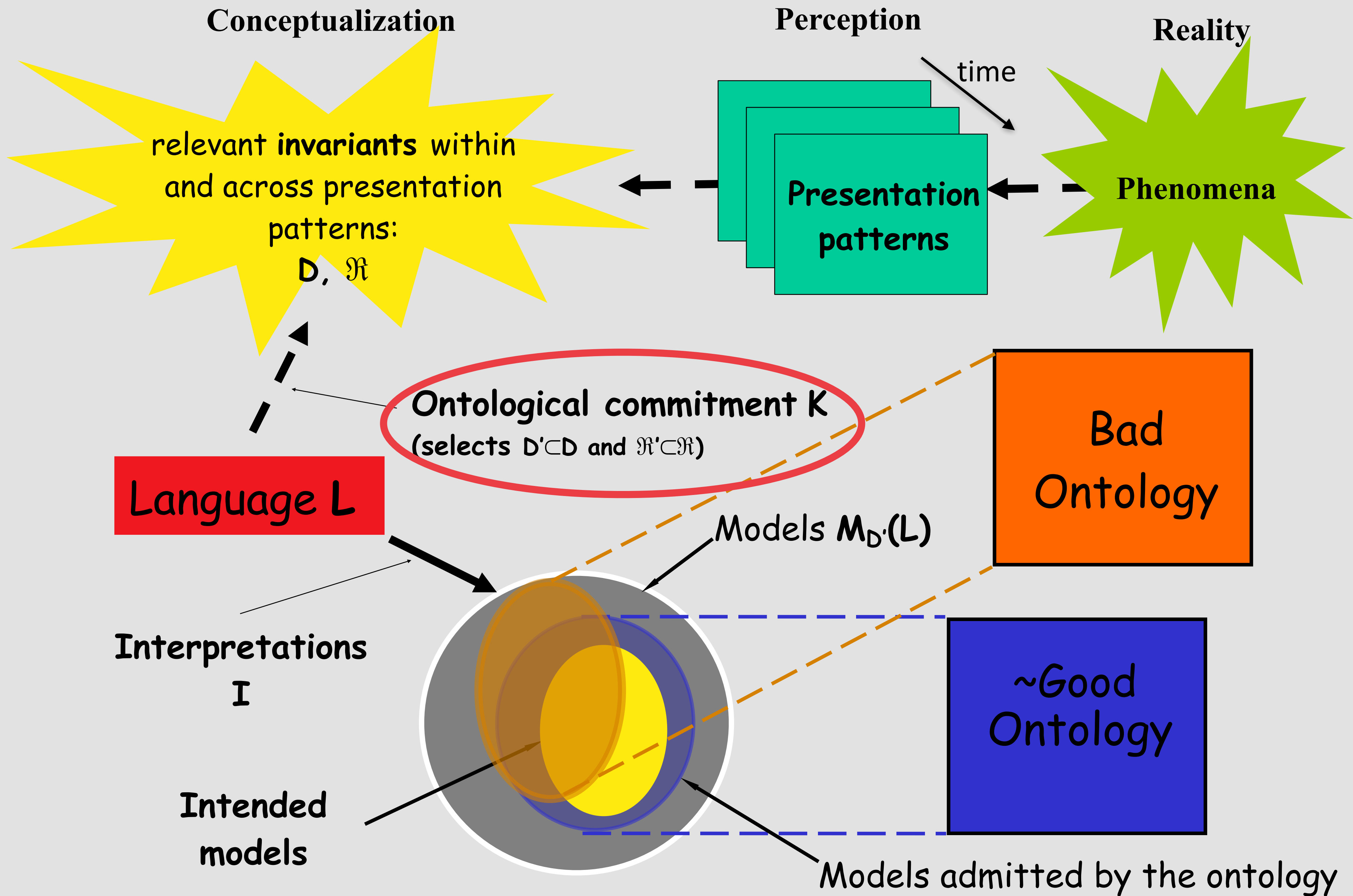
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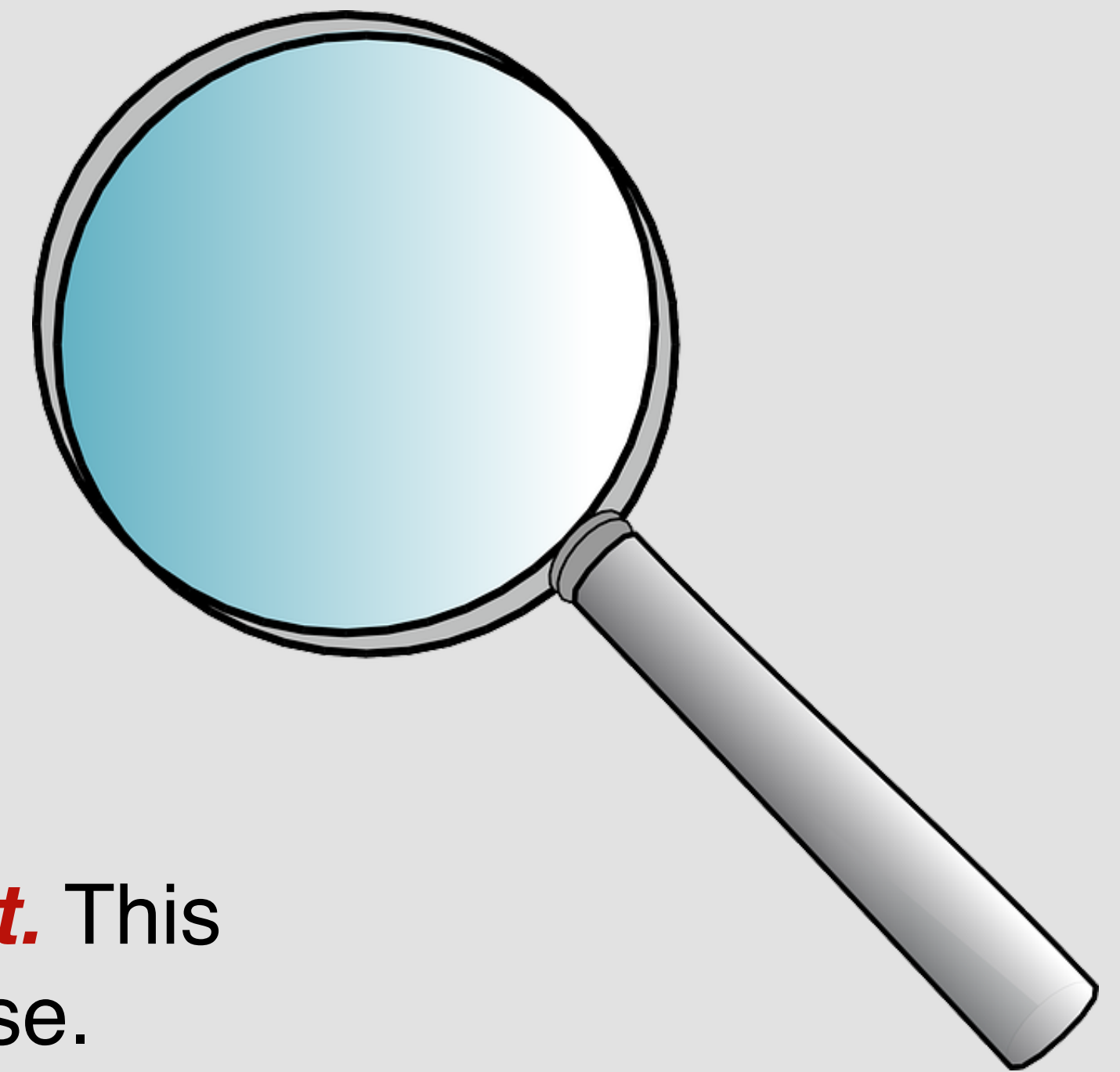
Ontological analysis as a search for truthmakers

What to include in our ontology?

Ontological answer: those entities that are responsible for the truth of our propositions.

Ontological analysis as a search for hidden entities: **truthmakers**

- **What** makes our statements about the world **true**?
- **How do we believe the world is**, when we say
 - John is married with Mary
 - This rose is red
 - My name is Nicola
- Ontological analysis is all about **making truth-makers explicit**. This means **reifying** them by putting them in the domain of discourse.



Truthmakers: the standard view

- The truthmaker of a proposition φ is a suitable entity *in virtue of which* φ holds.
- What's the meaning of *in virtue of*?
- Trivial answer: φ holds in virtue of the *fact* that φ (not very informative)
- Standard answer: φ holds in virtue of the *existence* of a certain x (more interesting)
- If φ is *contingent*, we assume that its truthmakers are *events*
 - This is obvious if φ involves *historical properties*: *I am a father; My name is Nicola...*
- No clear agreement when φ is *necessary*.
 - Our choice: necessary statements don't need truthmakers.

Strong truthmakers: their mere existence entails the proposition's truth

The assumptions (and the problems) behind strong truthmaking

- Truthmaker *essentialism*, a.k.a *necessitarianism* (standard assumption)
if t is a truthmaker of ϕ at w , then t is a truthmaker of ϕ in every w
- Truthmaker *maximalism* (debatable assumption - many variants):
every true sentence must have a truthmaker.
 - Serious problems for necessary propositions, negation, disjunction...
- Parsons' (2005) modest position:
“the best we can demand is that every contingent truth either has a truthmaker, or is a conjunction, disjunction, negation, or some other more complicated Boolean function of propositions that would have truthmakers were they true.”

The interesting case of descriptive properties

- **Descriptive properties** hold in virtue of **how** their arguments are: *Red(x); Tired(x); Married(x)*
They have *events* as strong truthmakers (*).
- **Non-descriptive properties** hold in virtue of **what** their arguments are, i.e., their *nature, structure, and external relationships*: *Apple(x); Person(x); Father(x)*
If they are not rigid, they have *events* as strong truthmakers.

(*) Some philosophers say that the truthmakers of descriptive properties are **tropes** (i.e., particularized properties), but I see tropes as events, more exactly *states*.

A second option for descriptive properties: weak truthmaking

- Strong truthmaking: $P(x)$ holds in virtue of the *mere existence* of something ...i.e., in virtue of *whether* something exists in any possible world
- **Weak** truthmaking (Parsons 1999): $P(x)$ holds in virtue of the *way* something is ...i.e., in virtue of *how* y is



Red(Rosie) @t1



Brown(Rosie) @t2

Different strong truthmakers (the two states)

Same weak truthmaker (Rosie)

Truthmaker essentialism is rejected

J. Parsons, "There is no 'truthmaker' argument against nominalism," 1999.

J. Parsons. "Truthmakers, the past, and the future", 2005.

Parsons' criterion for weak truthmaking

For every true sentence, there is some thing such that the sentence *cannot become false* without a *qualitative change, a non-Cambridge change*, in that thing. That thing, whatever it is, is the sentence's truthmaker.

Minimal weak truth-makers

What's the *minimal* weak truthmaker of
'This rose is red'?

The rose's corolla, or –more exactly– *its color!*

The rose, its corolla and the color of its corolla are all weak truth-makers. The corolla's color is the *minimal* one.

'This rose is red' cannot become false without
a *change* in an *individual quality*.



Individual qualities as *aspects* of things



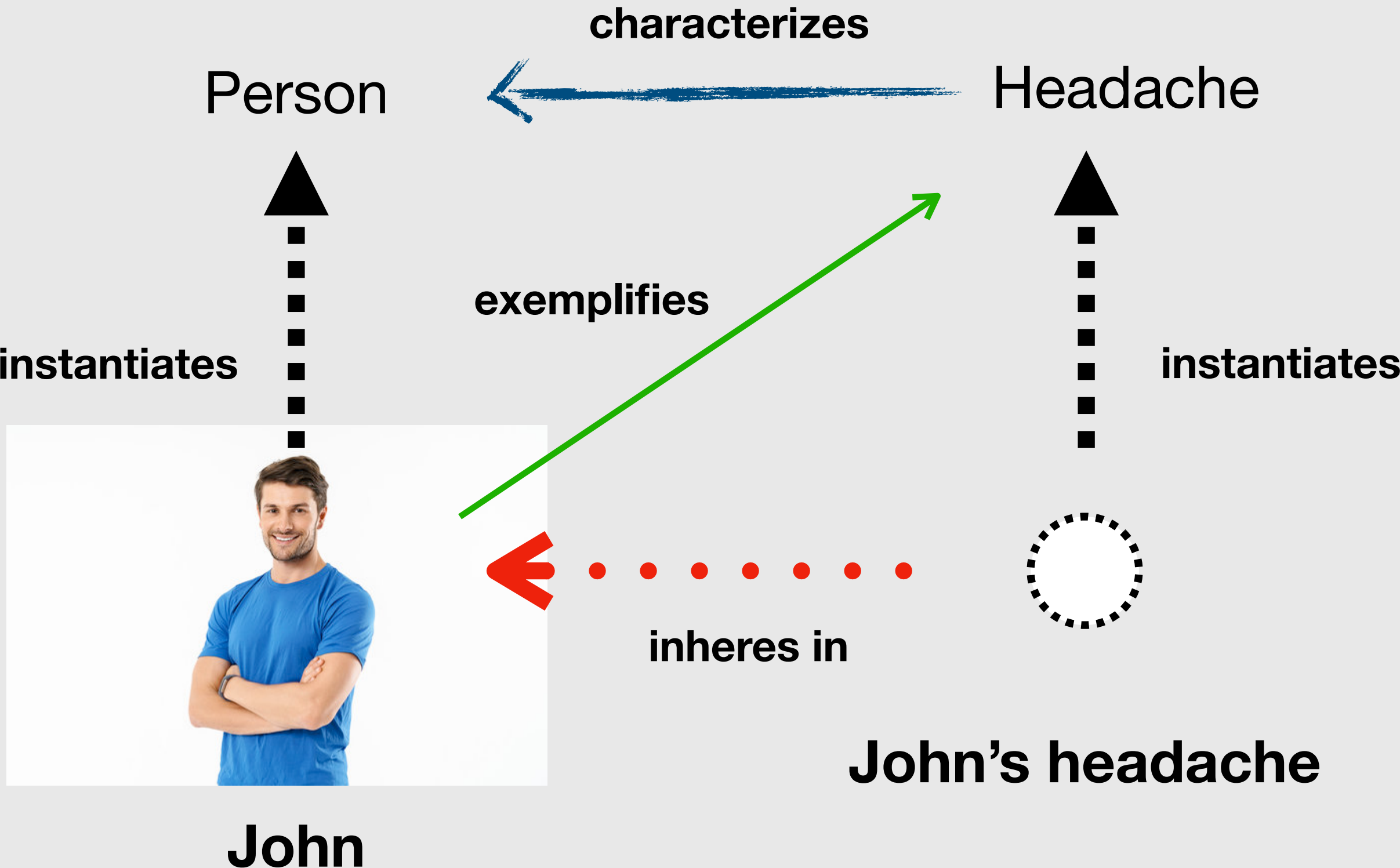
- Are ***specific aspects*** of things we use to ***compare*** them: they are directly comparable, while objects and events can only be compared with respect to a quality kind.
- ***Inhere*** in specific individuals. This means that they are *existentially dependent* on such individuals, *and* their properties affect the properties of such individuals.
- Are distinct from their values (a.k.a. ***qualia***), which are abstract entities representing what exactly resembling individual qualities have in common, and organized in ***quality spaces***. Each quality type has its own quality space.
- At different times, may keep their identity while “moving” in their quality space.
- Properties ***hold***, qualities ***exist***.

The explanatory power of qualities as weak truthmakers

- Compare:
 - The rose is red because of its redness
 - The rose is red because of its color
- In the second case, the sentence refers to a particular aspect of the rose that is responsible for the truth of the sentence, among many others that are irrelevant. This *explains the nature* of the red predication

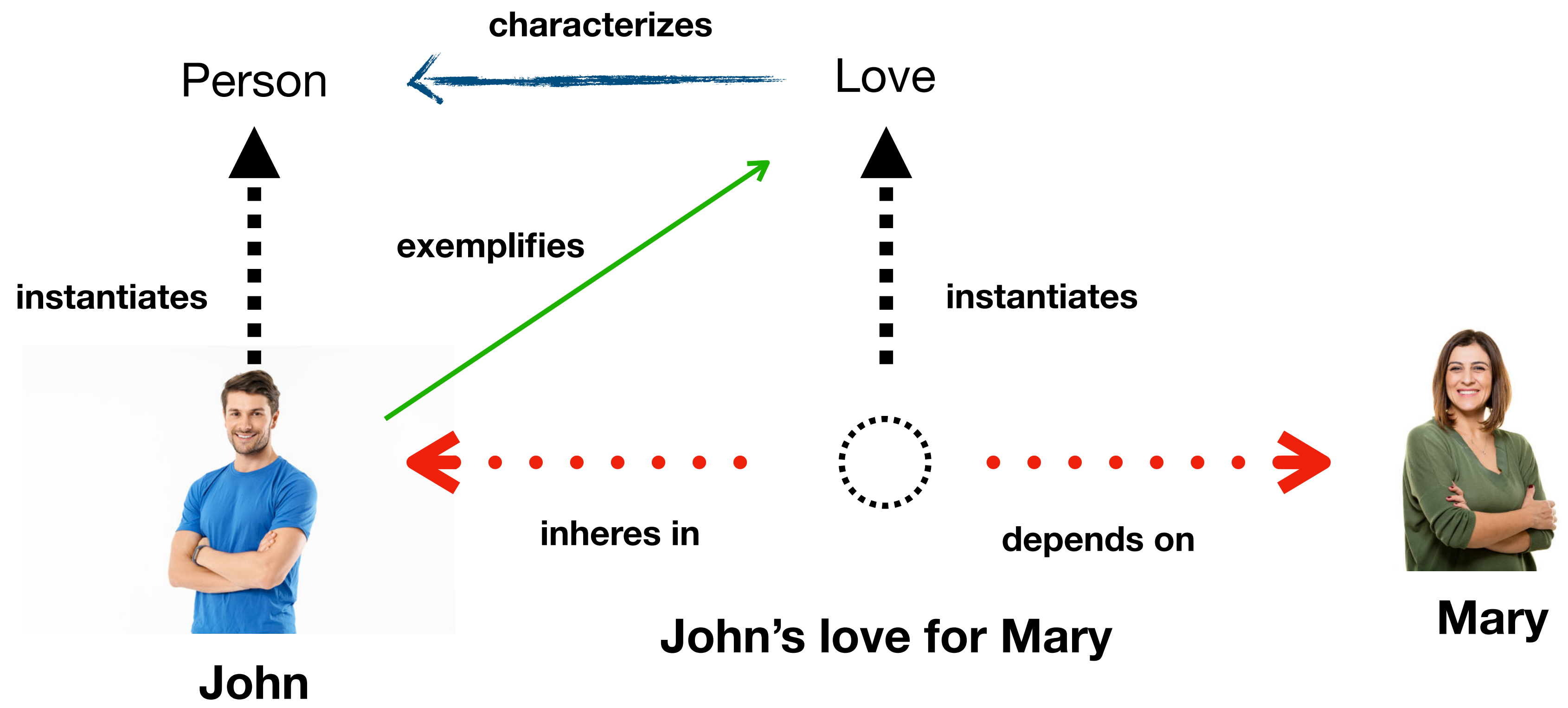
Qualities and Modes

- An aspect associated with a single quality domain is named a **quality**. In contrast, aspects associated with several quality domains are named **modes**

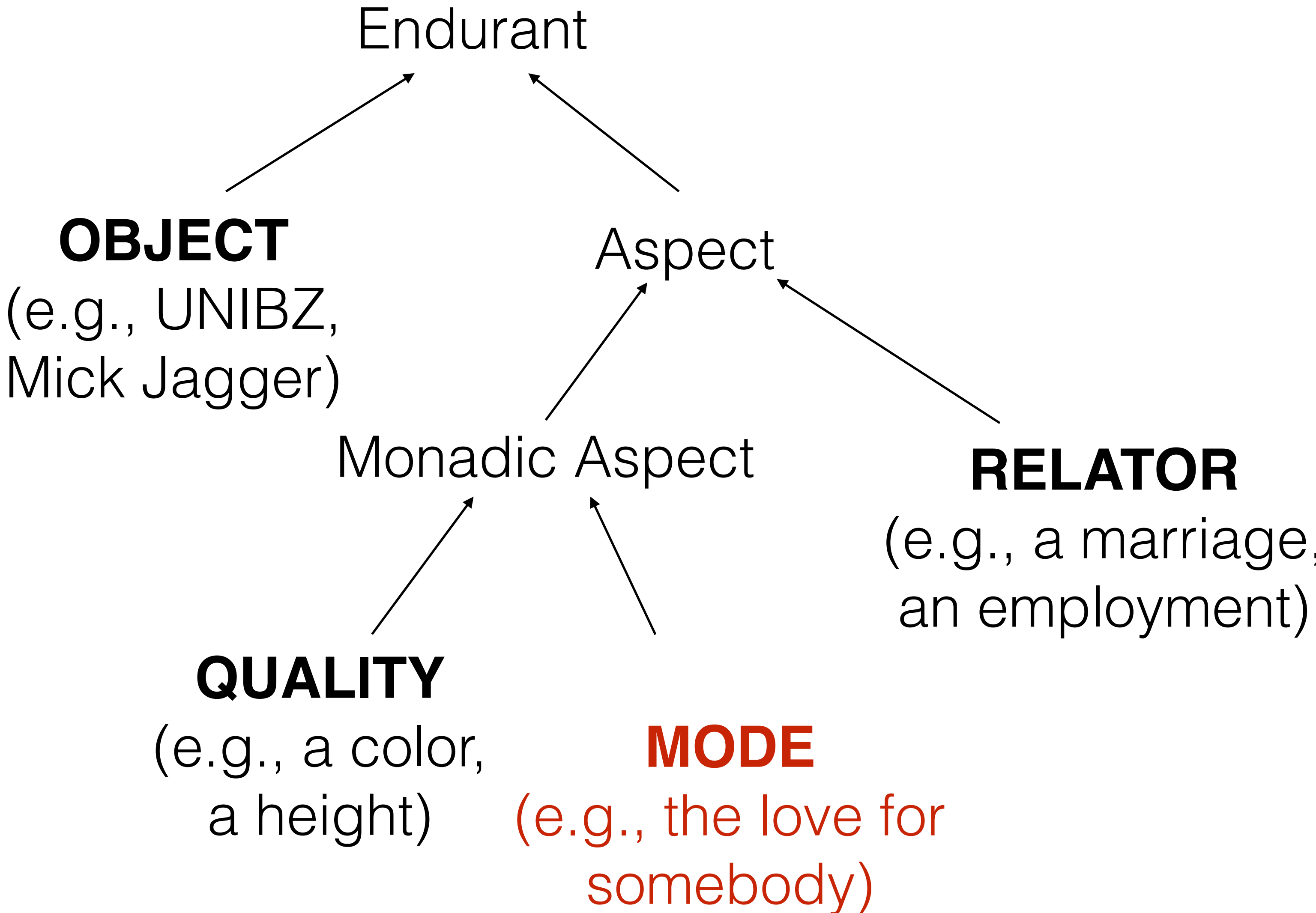


(*) Sometimes we just talk of qualities as including modes, for the sake of simplicity

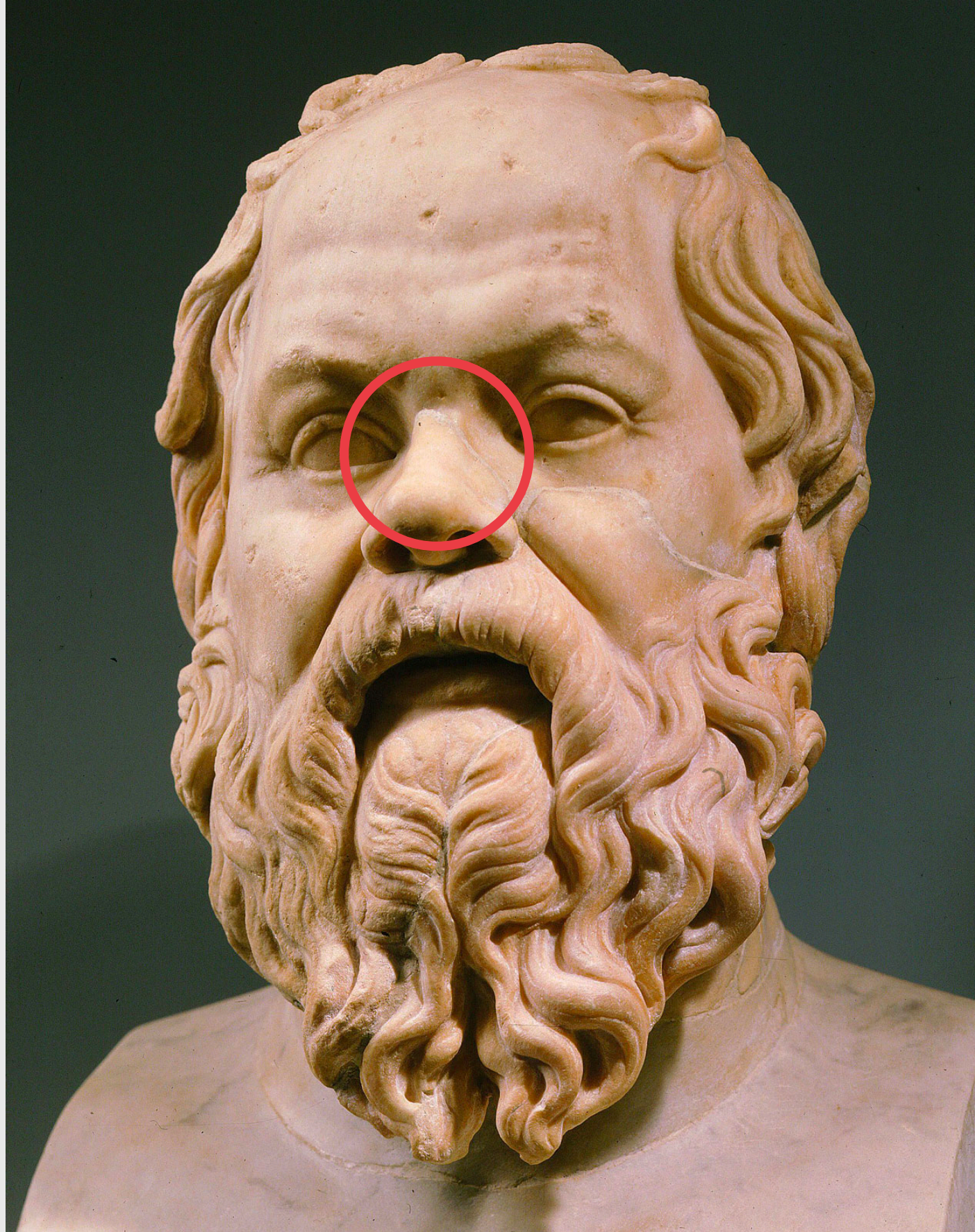
Relational Modes



Qualities and modes as *aspects* in the UFO ontology



Also parts can be weak truthmakers



What's the minimal weak truthmaker of
'Socrates is snub-nosed'?

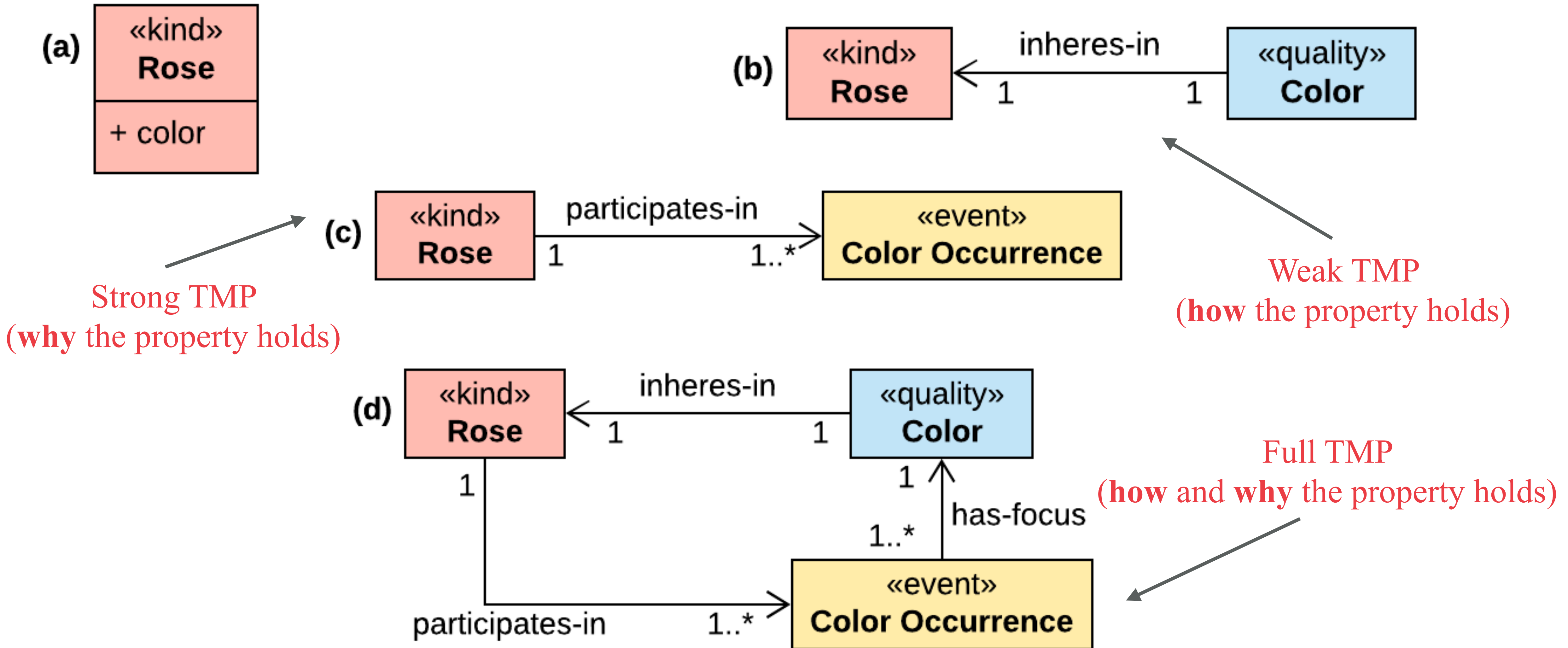
Socrates' nose, or –more exactly– its shape!

Both the nose and its shape somehow *ground* the statement, which cannot become false without a qualitative change of these entities.

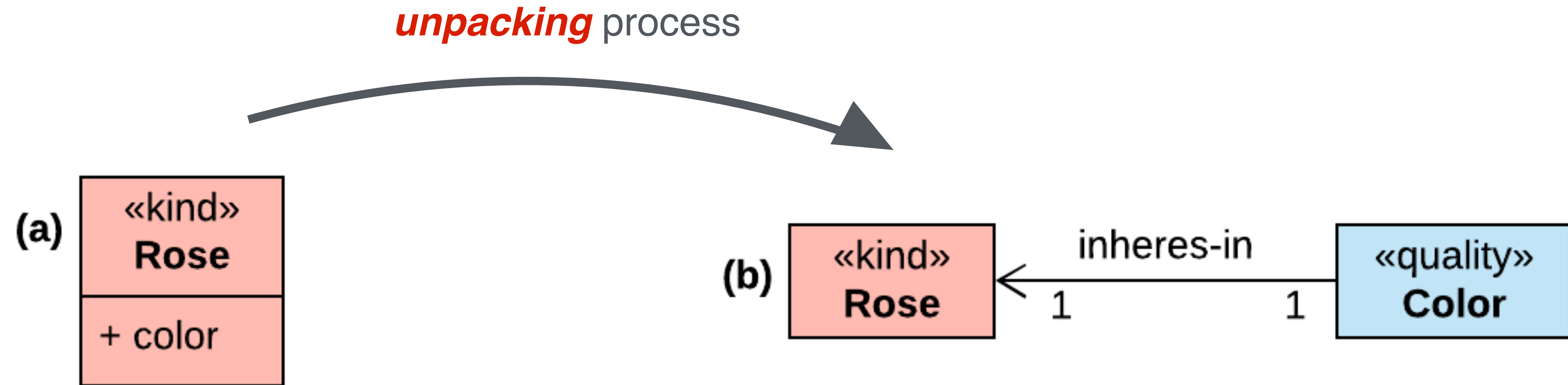
Truth-Making Patterns: a *Systematic Approach*

1. ***Properties*** and their truth-makers
2. Truth-making ***patterns*** for properties
3. ***Relations*** and their truth-makers
4. Truth-making ***patterns*** for relations

Truthmaking patterns: making both strong and weak truthmakers explicit



Making truthmakers explicit: the *unpacking process*



Talking of a relationship

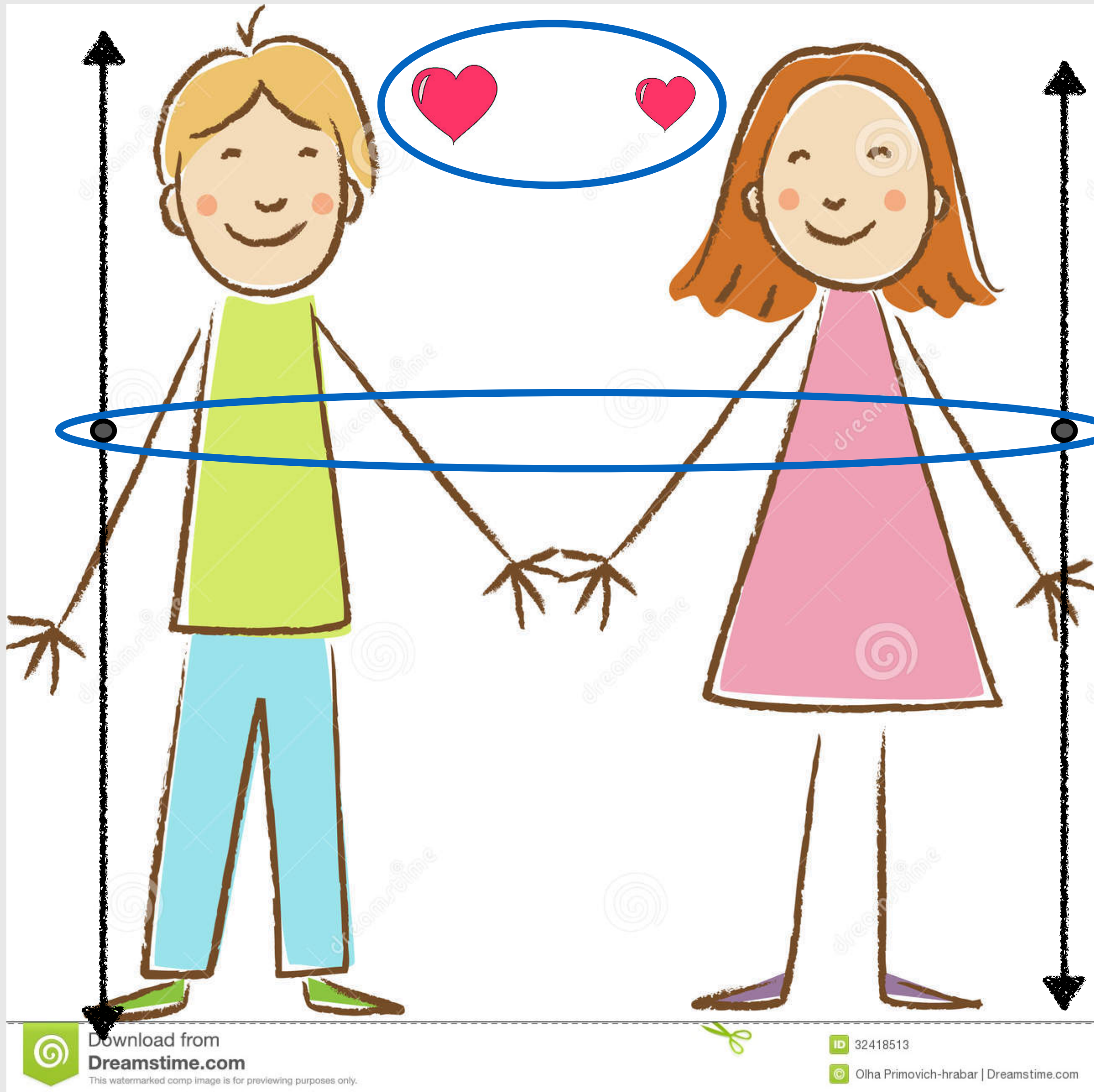


Sometimes, we must talk of a relationship...

- Talking of a relationship means talking of a *truthmaker of a relation*: what makes it true that the relation holds.
- Reifying those truthmakers allows us to talk of:
 - the nature of the relationship
 - the way it changes in time
 - its interaction with the world

N. Guarino and G. Guizzardi, “We need to discuss the relationship”: revisiting relationships as modeling constructs, CAISE 2015

Relationships as sums of qualities (or modes)

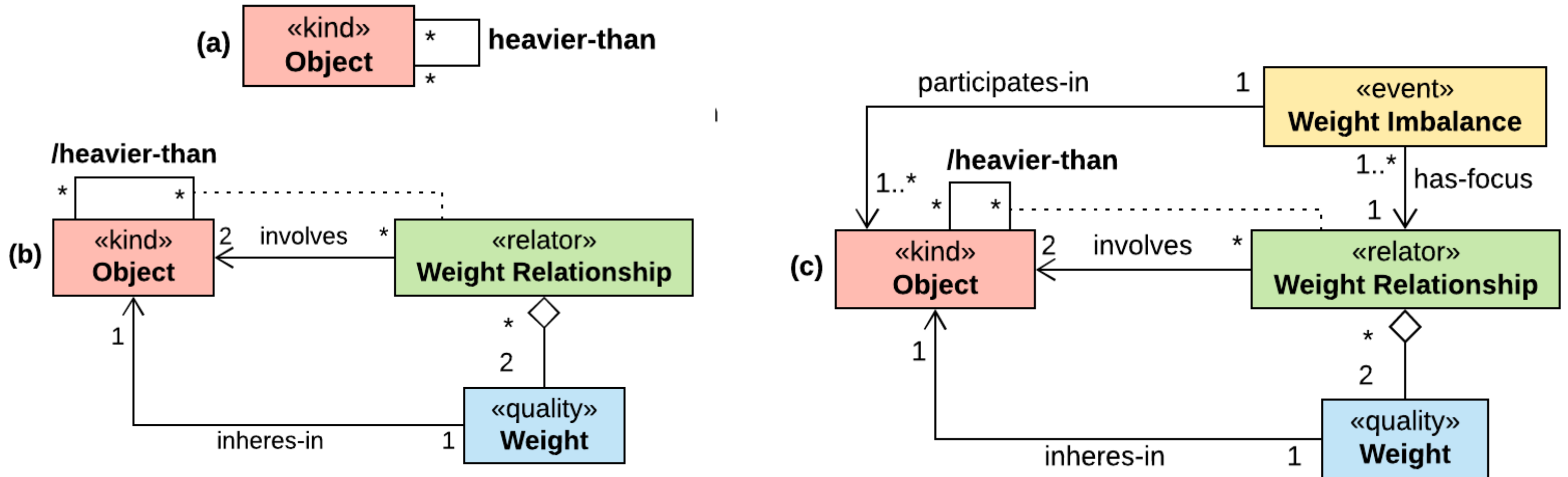


- Talking of *in-love*(John, Mary) means talking of **John's love for Mary** and **Mary's love for John**
- Talking of the *taller-than*(John, Mary) means talking of the **height of John** and the **height of Mary**.

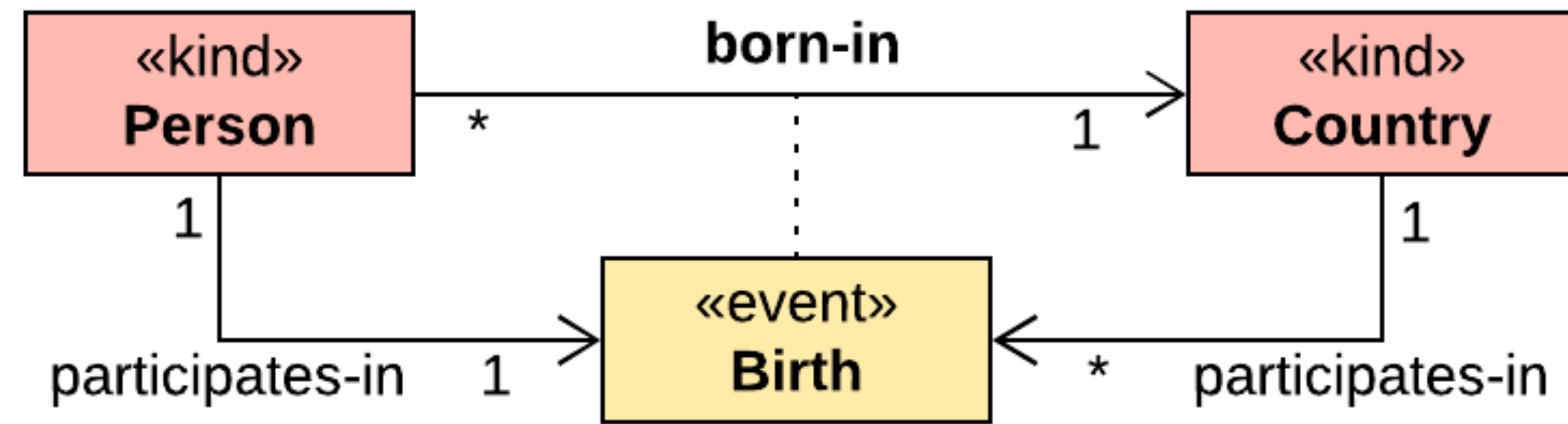
Each of these relations holds ***in virtue of*** a sum of qualities (or modes) of its relata: these sums, which are ***weak truthmakers***, are called ***relators***

(a key construct in OntoUML!)

Truthmaking patterns for comparative relations



Truthmaking pattern for historical relations



A more complex relation: *married with*

John is married with Mary.

The properties of the relata are typically relational, consisting of ***mutual commitments and obligations*** with respect to the other partner, such as living together, helping each other, caring the children, and so on.

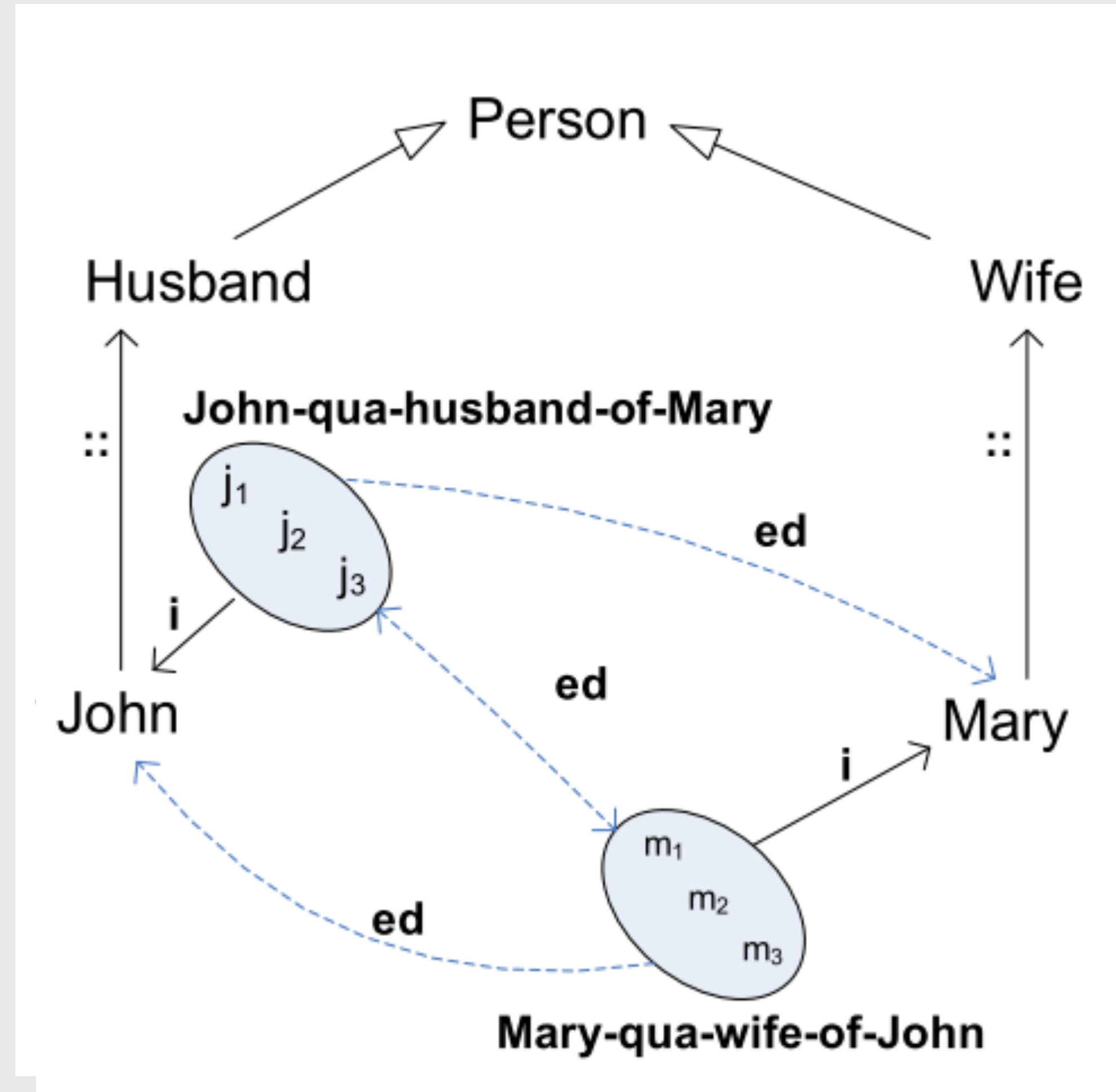
These commitments are reified in UFO as relational modes inhering in the relata.

Since the marriage relationship typically presupposes many of such commitments, which are wholly distinct from each other, none of them alone is a truthmaker.

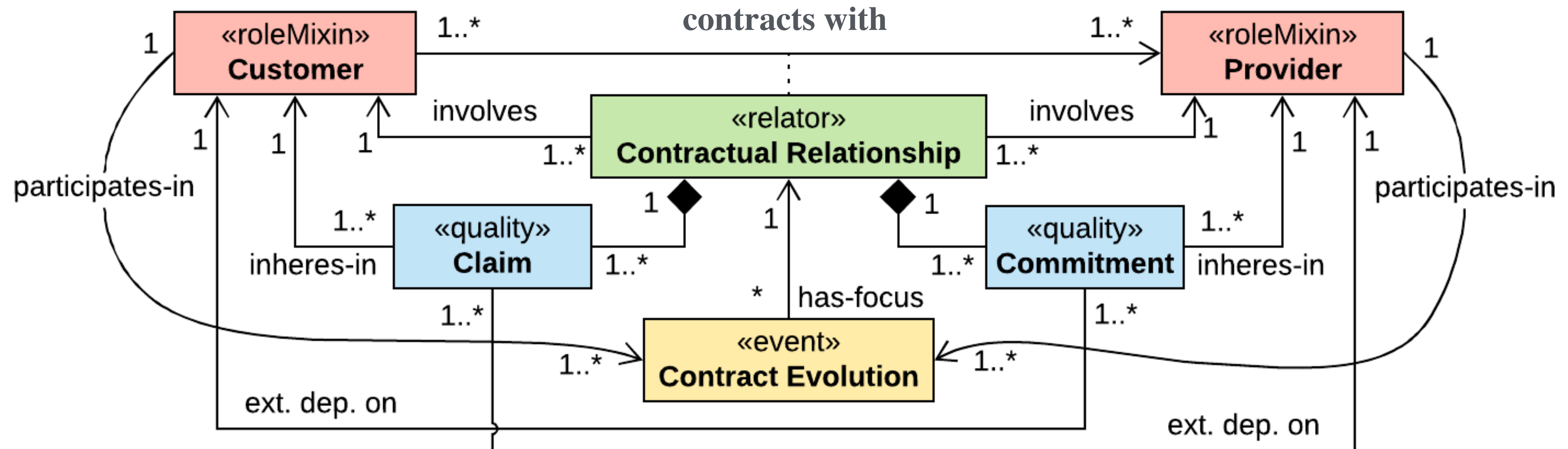
In this case the truthmaker is the ***maximal mereological sum*** of such commitments, and in general of all modes of the relata that are required for the relation to hold.

Such mereological sums are called ***relators*** in the UFO ontology

Relators: inside a relationship



Applying a full truthmaking pattern for modelling a contractual relationship



Ontological commitment: the interplay between signature and domain

According to Quine, the commitment of a logical theory is just its domain of discourse

...but the search for truthmakers forces us to look also at the predicates

“The great advantage of the search for truthmakers is that it focuses us not merely on the metaphysical implications of the subject terms of propositions but also on their *predicates*. Quine has told us that the predicate gives us ‘ideology’ rather than ontology.

This saying is rather dark, but it is clear that, to some degree, he has stacked the ontological deck against predicates as opposed to subject terms. But when we look to truthmakers, *for truths, subject and predicate start as equals*, and we can consider the implications of both in an unbiased way.”

D. M. Armstrong 2004, *Truth and truthmakers*, p. 23-24

Conclusions

- Formal ontology gives us a useful criterion to afford a crucial design problem for a computational ontology: deciding the domain of discourse.
- Making strong and weak truthmakers explicit certainly improves the explanatory value of ontologies, although this its not *full explanation*. Truthmaking is different from *grounding*.
- In some cases, weak truthmakers are trivial: *glass is fragile because of its fragility*.
- In other cases, they really mean something, revealing the internal structure of a relationship: marriage *means* mutual commitments.
- In any case, for descriptive properties, weak truthmakers appear to have more explanatory power than strong truthmakers.

Questions?