national center for ontological research
ncor

Systematic Disambiguation

John Beverley

Assistant Professor, *University at Buffalo*
Co-Director, *National Center for Ontological Research*
Affiliate Faculty, *Institute of Artificial Intelligence and Data Science*

Outline

- Systematic Disambiguation

- Bucket Strategy

Outline

- Systematic Disambiguation

- Bucket Strategy

Systematic Disambiguation

The core of ontology engineering as a discipline is its emphasis on systematic disambiguation, a controlled process for exhausting justifiable interpretations of data within a domain

Interoperability

- Underwriting this process is an assumption that between any two vocabularies there is some common structure

- This applies to natural language (**Human-Human**) and formal (**Machine-Machine**)

- Ontology engineers work to identify such structures and encode them in machine-readable languages (**Human-Machine**)

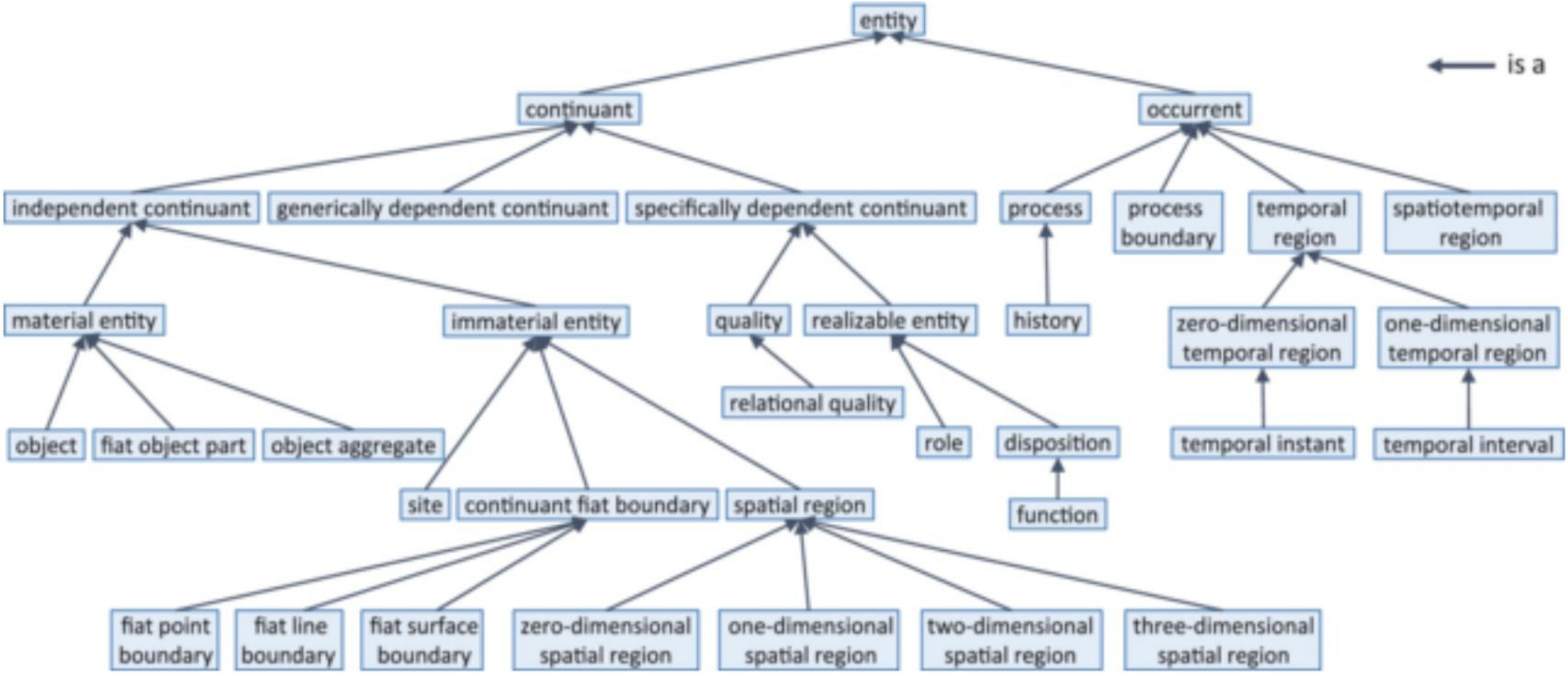
Systematic Disambiguation

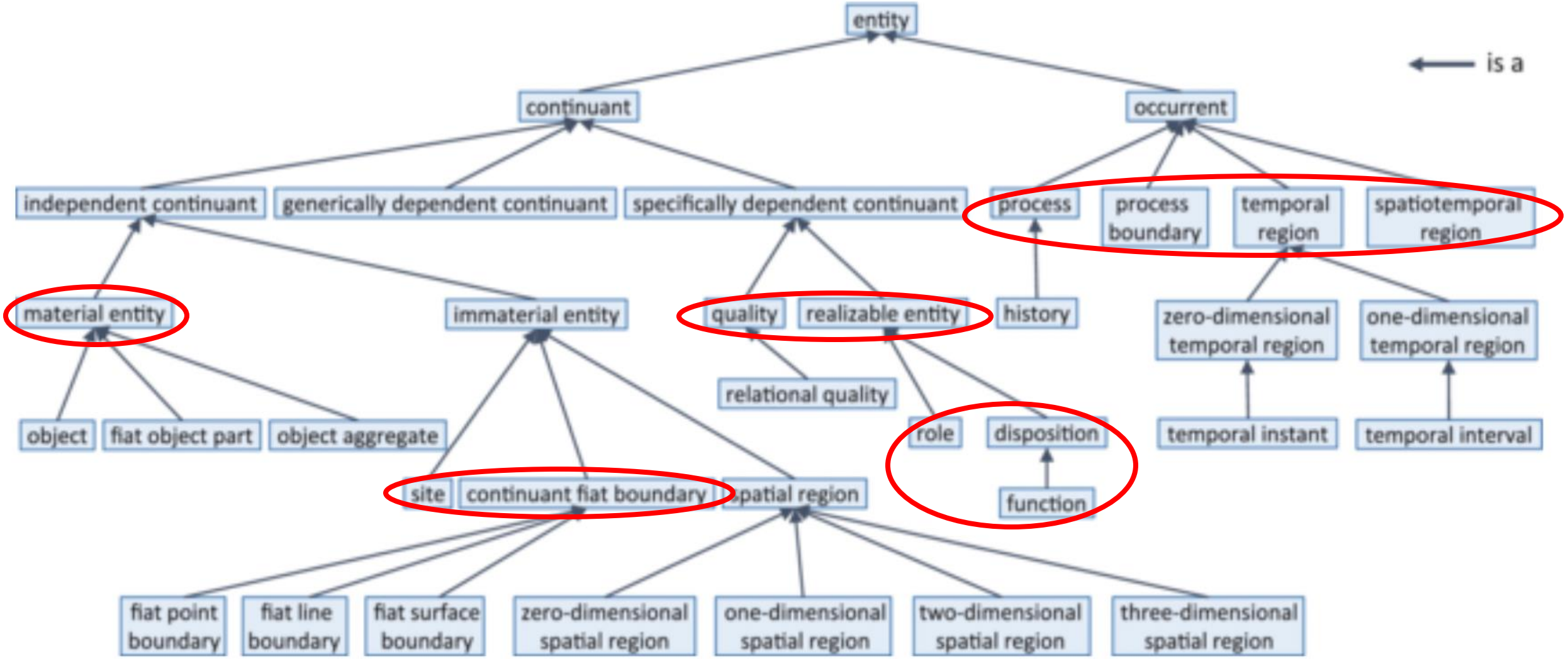
- Ontology engineering is not linguistics
- Ontologists care about words used by domain experts, but we aim to describe and derive that use rather than legislate or prescribe it
- We aim to disambiguate domain expert language in the interest of generating formal structures underwriting language use

Outline

- Systematic Disambiguation

- Bucket Strategy


entity
is a
continuant
occurrent
independent continuant
generically dependent continuant
specifically dependent continuant
process
process boundary
temporal region
spatiotemporal region
material entity
immaterial entity
quality
realizable entity
history
zero-dimensional temporal region
one-dimensional temporal region
relational quality
object
fiat object part
object aggregate
role
disposition
temporal instant
temporal interval
site
continuant fiat boundary
spatial region
function
fiat point boundary
fiat line boundary
fiat surface boundary
zero-dimensional spatial region
one-dimensional spatial region
two-dimensional spatial region
three-dimensional spatial region


entity
is a
continuant
occurrent
independent continuant
generically dependent continuant
specifically dependent continuant
process
process boundary
temporal region
spatiotemporal region
material entity
immaterial entity
quality
realizable entity
history
zero-dimensional temporal region
one-dimensional temporal region
relational quality
object
fiat object part
object aggregate
role
disposition
temporal instant
temporal interval
site
continuant fiat boundary
spatial region
function
fiat point boundary
fiat line boundary
fiat surface boundary
zero-dimensional spatial region
one-dimensional spatial region
two-dimensional spatial region
three-dimensional spatial region

Bucket Strategy

- Terms should be vetted by **subject-matter experts**

- For each term, evaluate along each column whether there is a justifiable interpretation of that term under a BFO class

- For example, "soldier" may be understood as a role or as an individual bearing the role

national center for ontological research
ncor
academy

			MAJOR BUCKETS			
TERM	*Material Entity*	*Quality*	*Disposition*	*Role*	*Process*	*Information*
soldier	soldier (person)	X	soldier disposition	role of soldier	acting as a soldier	soldier (description)

national center for ontological research
ncor
academy

			MAJOR BUCKETS			
TERM	*Material Entity*	*Quality*	*Disposition*	*Role*	*Process*	*Information*
soldier	soldier (person)	X	soldier disposition	role of soldier	acting as a soldier	soldier (description)

national center for ontological research
ncor
academy

			MAJOR BUCKETS			
TERM	*Material Entity*	*Quality*	*Disposition*	*Role*	*Process*	*Information*
soldier	soldier (person)	X	soldier disposition	role of soldier	acting as a soldier	soldier (description)

national center for ontological research
ncor
academy

			MAJOR BUCKETS			
TERM	*Material Entity*	*Quality*	*Disposition*	*Role*	*Process*	*Information*
soldier	soldier (person)	X	soldier disposition	role of soldier	acting as a soldier	soldier (description)

			INFORMATION BUCKET			SOURCE
	Theory	*Construct*	*Quality Measurement*	*Process Measurement*	*Information Measurement*	
Just War Theory	Just War Theory	Proportionality Construct	Proportionality Measurement			
			ROLE BUCKET			SOURCE

research
ncor
academy

Sound Familiar?

- When building a design pattern, describe:

1. Material entities within scope, i.e. **Material Entity**
2. Qualities these material entities have, i.e. **Quality**
3. What these material entities can do, i.e. **Process**
4. What properties underwrite what they can do, i.e. **Realizable Entity**
5. Where these material entities and their boundaries are located, e.g. **Immaterial Entity**
6. When these entities exist, e.g. **Temporal Region**
7. Information we use to talk about 1-6, i.e. **Generically Depedent Continuant**

national center for ontological research
ncor
academy

Bucket Strategy

- If you are unable to justify a reading falling under a column, mark "X"; if after making an effort it is unclear, mark "?"

- Use labels under columns that make explicit the sense you intend, e.g. "soldier role" to disambiguate

- This process helps exhaust interpretations while not being confused by language

national center for ontological research
ncor
academy

Bucket Strategy

- There may be a need to create more refined "buckets" such as an "information bucket" where further disambiguation is conducted

- For example, a theory about the nature of war

- Same for constructs, which are presumably parts of theories

national center for ontological research
ncor
academy

			INFORMATION BUCKET			**SOURCE**
	Theory	*Construct*	*Quality Measurement*	*Process Measurement*	*Information Measurement*	
Just War Theory	Just War Theory	Proportionality Construct	Proportionality Measurement			
			ROLE BUCKET			**SOURCE**

national center for ontological research
ncor
academy

			INFORMATION BUCKET			**SOURCE**
	Theory	*Construct*	*Quality Measurement*	*Process Measurement*	*Information Measurement*	
Just War Theory	Just War Theory	Proportionality Construct	Proportionality Measurement			
			ROLE BUCKET			**SOURCE**

national center for ontological research
ncor
academy

			INFORMATION BUCKET			**SOURCE**
	Theory	*Construct*	*Quality Measurement*	*Process Measurement*	*Information Measurement*	
Just War Theory	Just War Theory	Proportionality Construct	Proportionality Measurement			
			ROLE BUCKET			**SOURCE**

national center for ontological research
ncor
academy

			INFORMATION BUCKET			**SOURCE**
	Theory	*Construct*	*Quality Measurement*	*Process Measurement*	*Information Measurement*	
Just War Theory	Just War Theory	Proportionality Construct	Proportionality Measurement			
			ROLE BUCKET			**SOURCE**

national center for ontological research
ncor
academy

			INFORMATION BUCKET			**SOURCE**
	Theory	*Construct*	*Quality Measurement*	*Process Measurement*	*Information Measurement*	
Just War Theory	Just War Theory	Proportionality Construct	Proportionality Measurement			
			ROLE BUCKET			**SOURCE**

national center for ontological research
ncor
academy

Bucket Strategy

- These are not intended to be exhaustive buckets
- We will likely add more as we proceed; we may indeed drop some as well
- Throughout, you must provide a source for your decision, justification, etc. whether you are adding a class or not adding a class

national center for ontological research
ncor
academy

Group Exercise

- We will select a single term to disambiguate
- I will then walk you through how I disambiguate using this method
- Then we will select another
- Then we will disambiguate through this method together

national center for ontological research
ncor
academy