

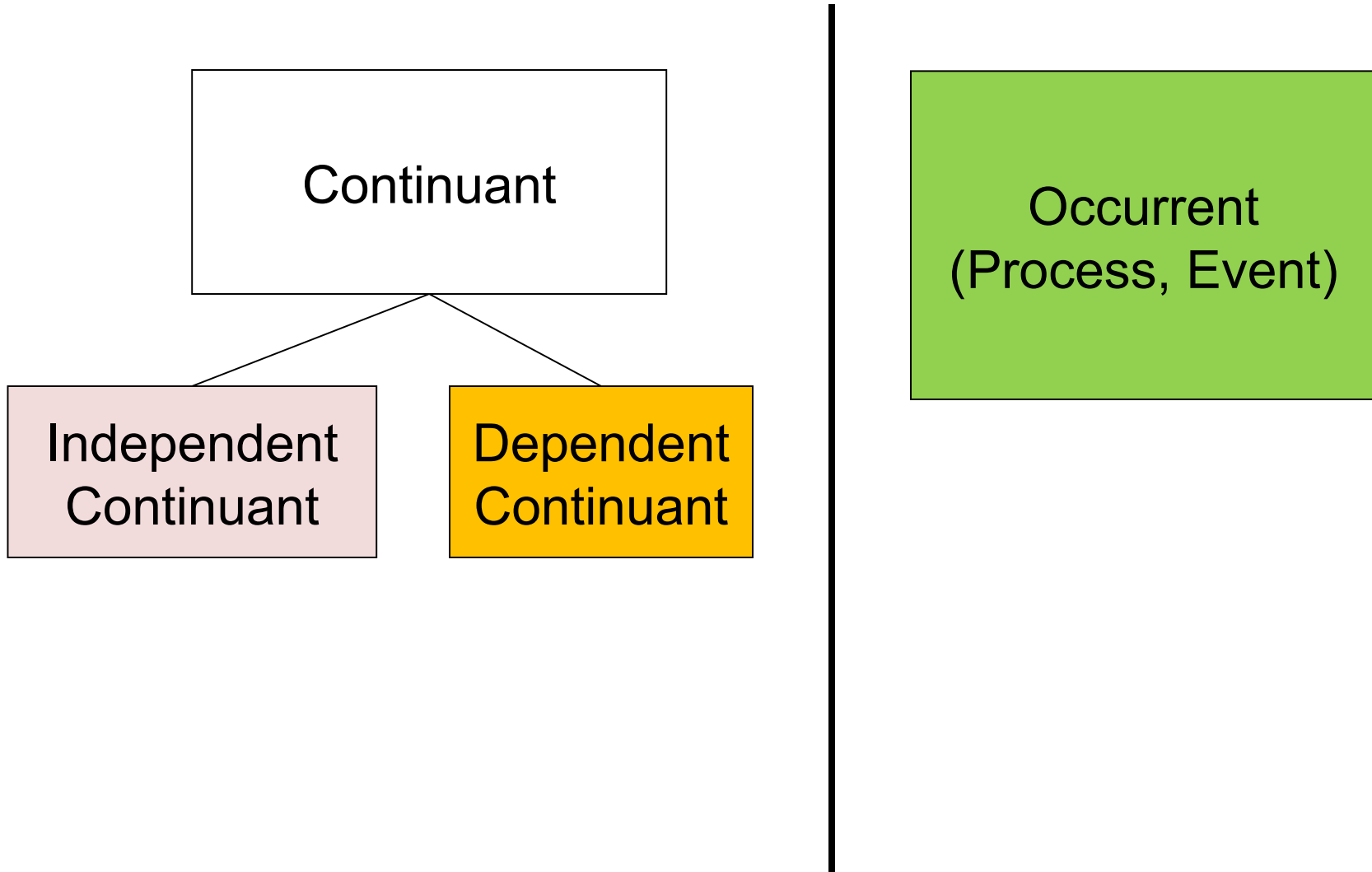
# BFO for Plants

Barry Smith

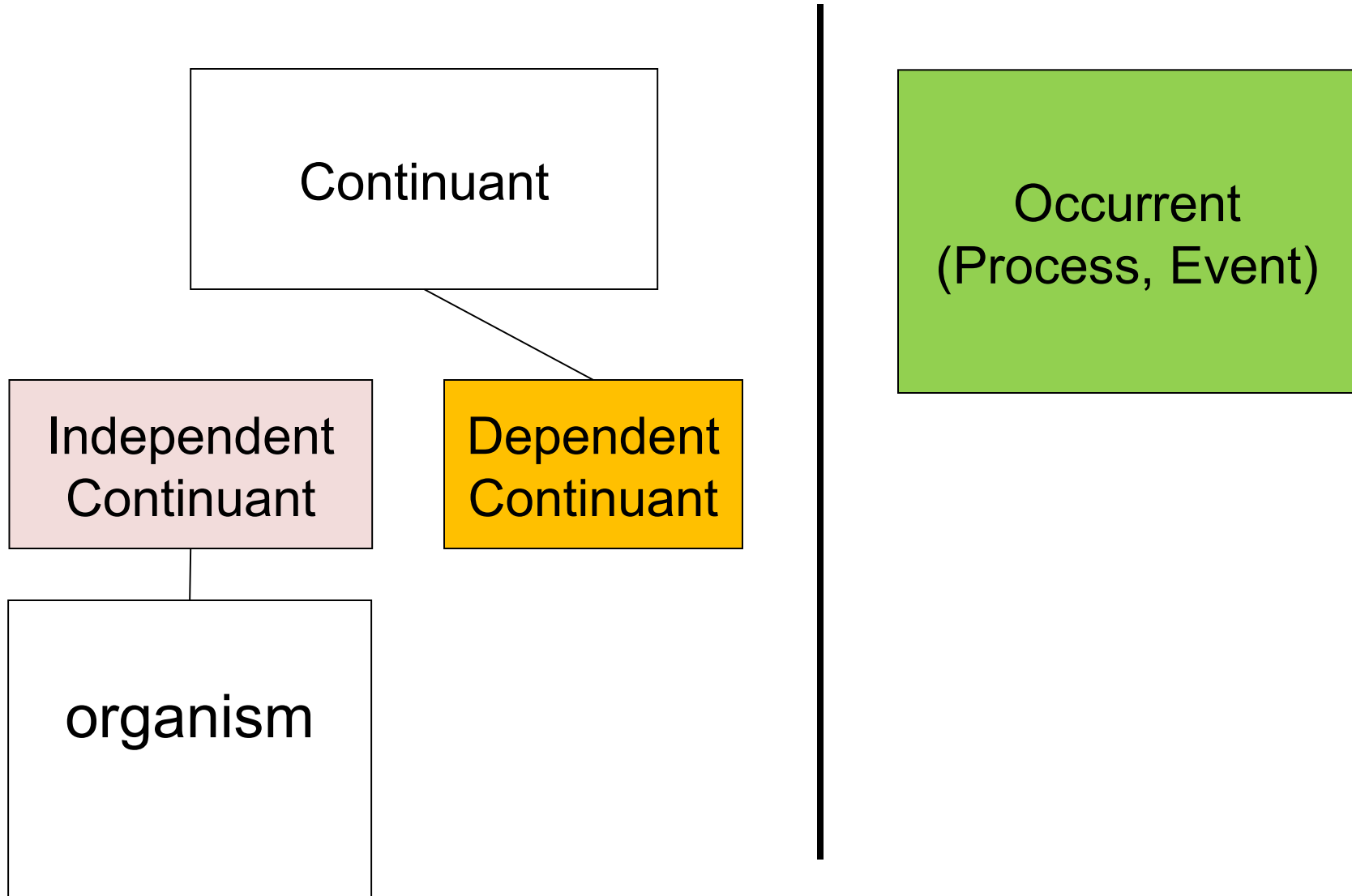
New York Botanical Gardens

November 5, 2010

# BFO: the very top



# BFO: the very top



RELATION TO TIME  GRANULARITY	CONTINUANT				OCCURRENT
	INDEPENDENT		DEPENDENT		
ORGAN AND ORGANISM	Organism (NCBI Taxonomy)	Anatomical Entity (FMA, CARO)	Organ Function (FMP, CPRO)	Phenotypic Quality (PaTO)	<b>Biological Process</b> (GO)
CELL AND CELLULAR COMPONENT	Cell (CL)	<b>Cellular Component</b> (FMA, GO)	Cellular Function (GO)		
MOLECULE	Molecule (ChEBI, SO, RnaO, PrO)		<b>Molecular Function</b> (GO)		Molecular Process (GO)

## OBO Foundry

<b>RELATION TO TIME</b>	CONTINUANT			OCCURRENT		
	INDEPENDENT		DEPENDENT			
<b>GRANULARITY</b>	ORGAN AND ORGANISM	<b>Organism</b> (NCBI Taxonomy)	<b>Anatomical Entity</b> (FMA, CARO)	<b>Organ Function</b> (FMP, CPRO)	<b>Phenotypic Quality</b> (PaTO)	<b>Organism-Level Process</b> (GO)
	CELL AND CELLULAR COMPONENT	<b>Cell</b> (CL)	<b>Cellular Component</b> (FMA, GO)	<b>Cellular Function</b> (GO)		<b>Cellular Process</b> (GO)
	MOLECULE	<b>Molecule</b> (ChEBI, SO, RnaO, PrO)		<b>Molecular Function</b> (GO)		<b>Molecular Process</b> (GO)

obofoundry.org

# Basic Formal Ontology

continuant

independent  
continuant

*cellular  
component*

dependent  
continuant

*molecular  
function*

occurrent

*biological  
processes*

# BFO: The Very Top

continuant

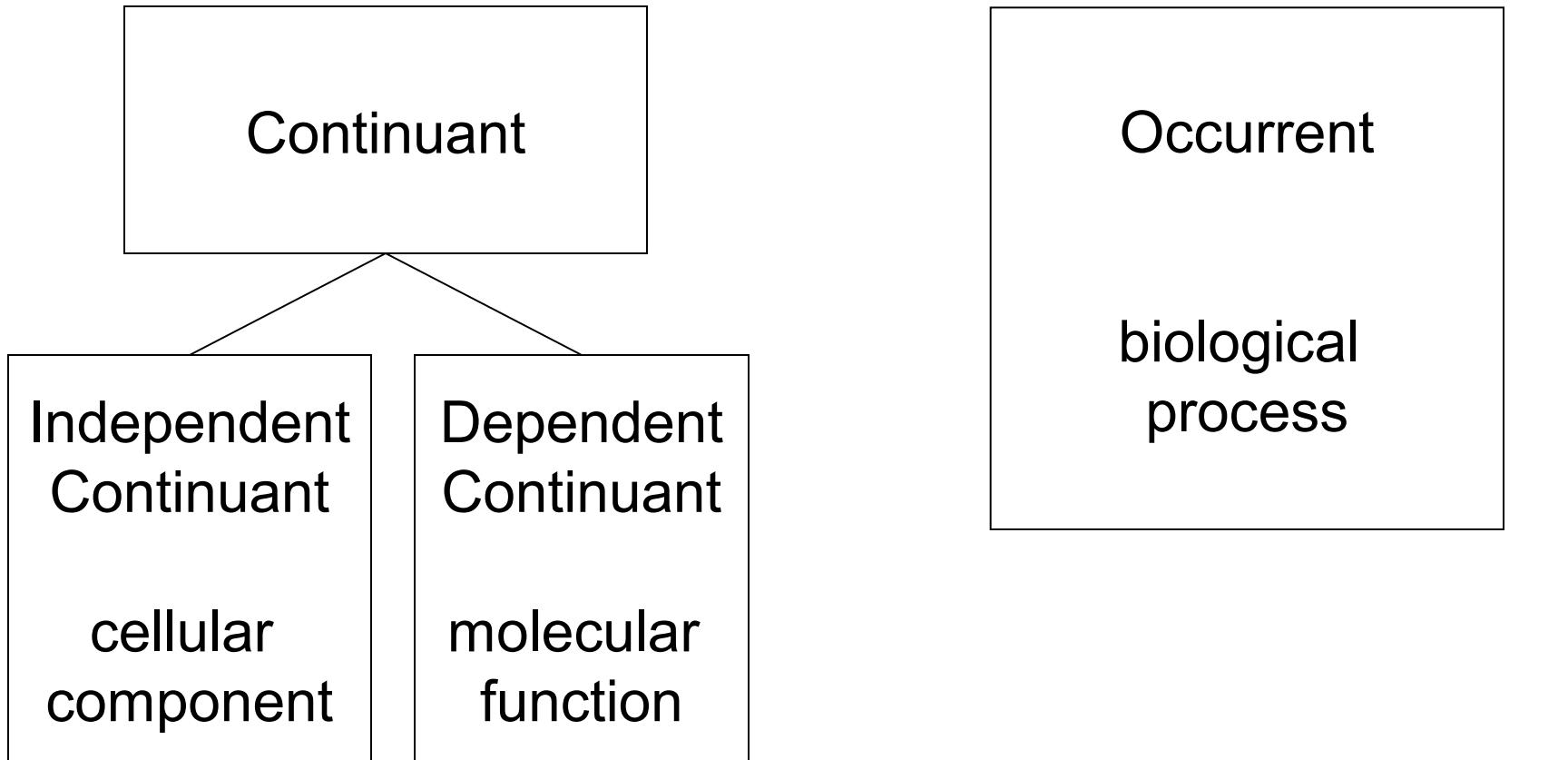
occurrent

independent  
continuant

dependent  
continuant

quality  
function  
role  
disposition

# Basis of BFO in GO





# Example: The Cell Ontology

## SUBCLASS EXPLORER

For Project:  DC\_CL

### Asserted Hierarchy

 owl:Thing

  Entity ≡ Entity

  Continuant

  DependentContinuant

  IndependentContinuant

 FiatObjectPart

  Object

  Biological\_Macromolecule ≡ Biological\_Macromolecule

  Cell

  CD11c\_Low\_\_Plasmacytoid\_Dendritic\_Cell

  CD11c\_Negative\_Plasmacytoid\_Dendritic\_Cell

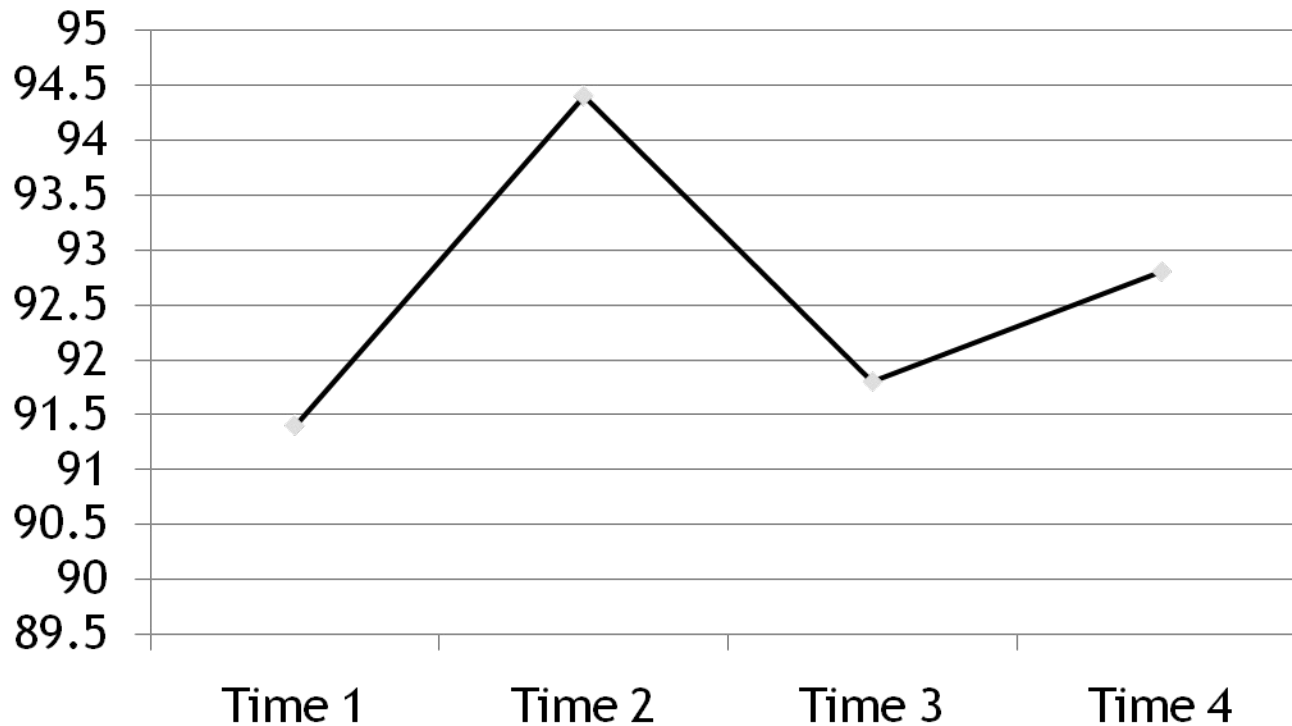
  Conventional\_Dendritic\_Cell

  CD8\_alpha\_Neg\_CD11b\_Neg\_Dendritic\_Cell

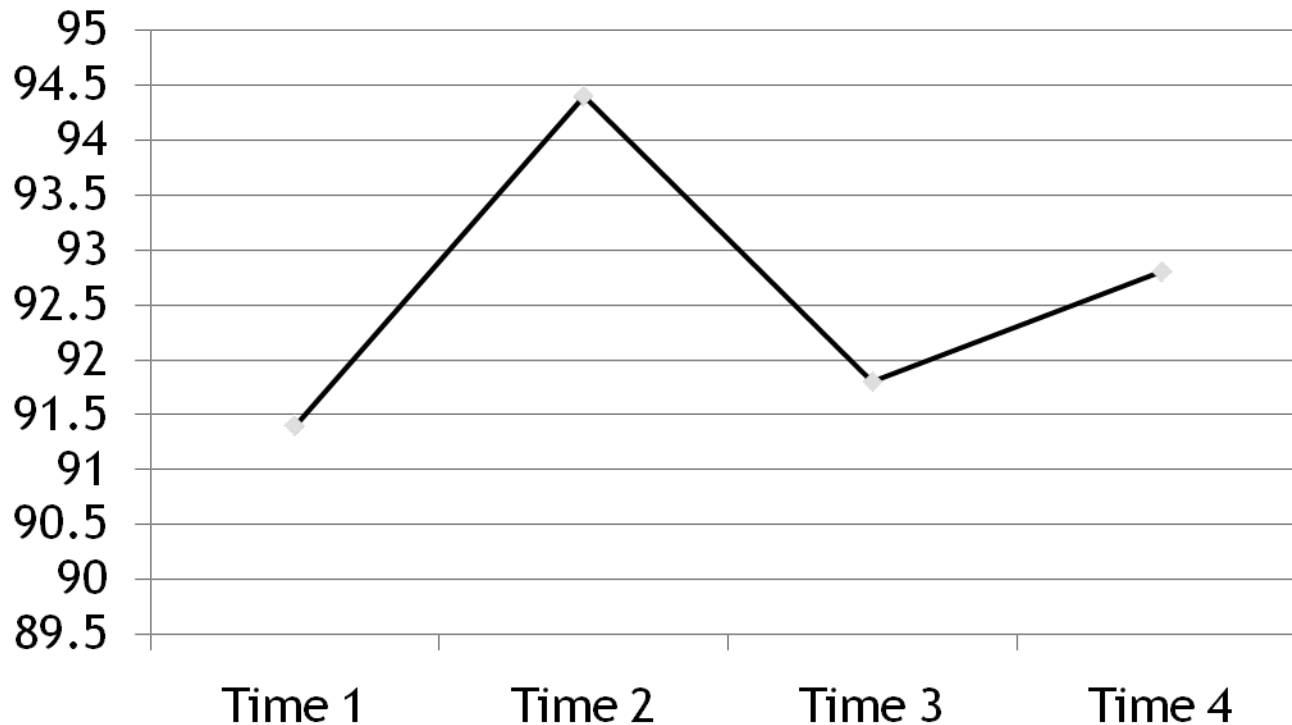
 Immature\_CD8\_alpha\_Neg\_CD11b\_Neg\_Dendritic\_Cell

 Mature\_CD8\_alpha\_Neg\_CD11b\_Neg\_Dendritic\_Cell

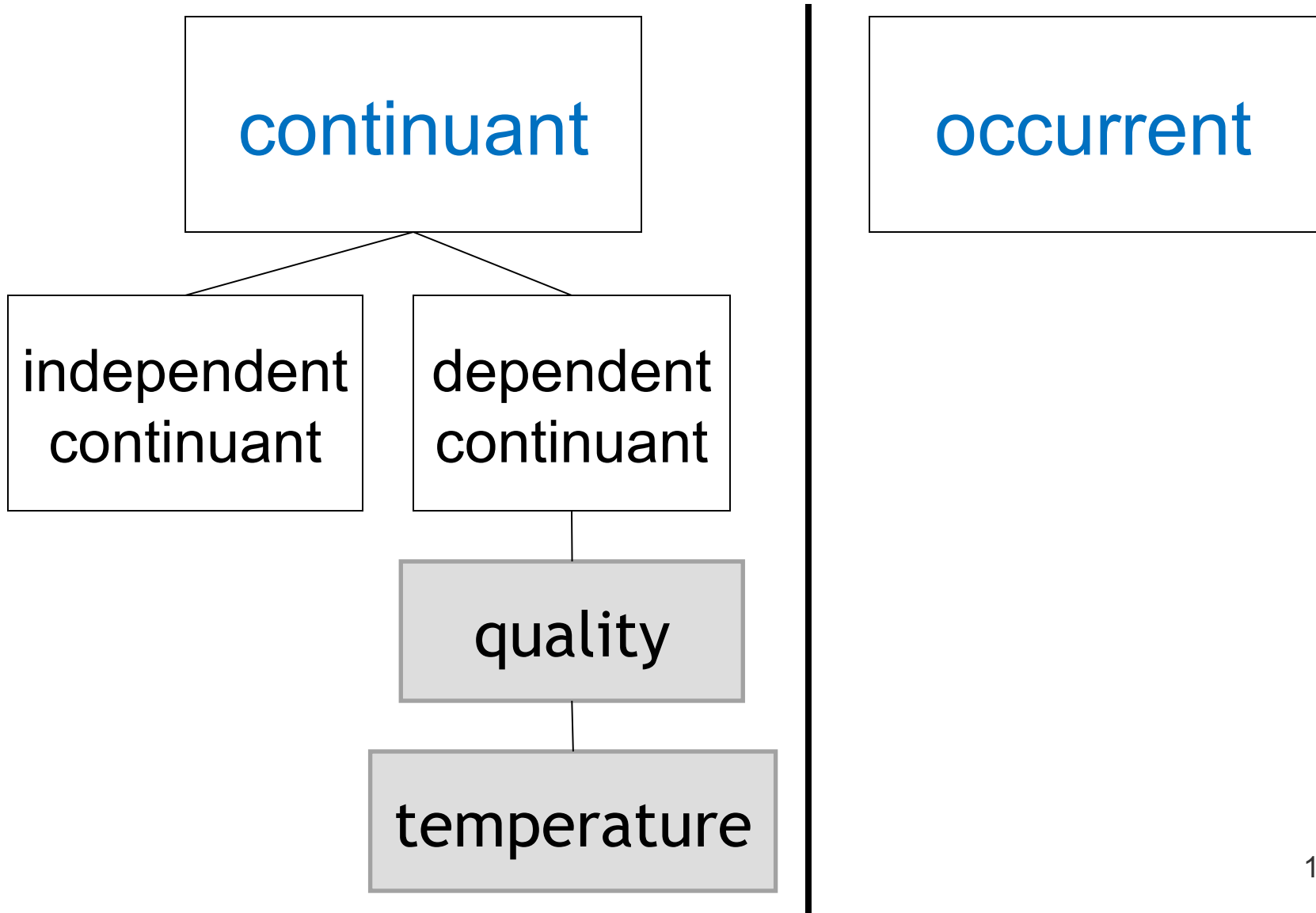
# A Chart representing how John's temperature changes



# A Chart representing how **John's temperature** changes



# BFO: The Very Top



# Blinding Flash of the Obvious

independent  
continuant

dependent  
continuant

organism

quality

temperature

types

John

John's  
temperature

instances

# Blinding Flash of the Obvious

independent  
continuant

dependent  
continuant

organism

quality

temperature

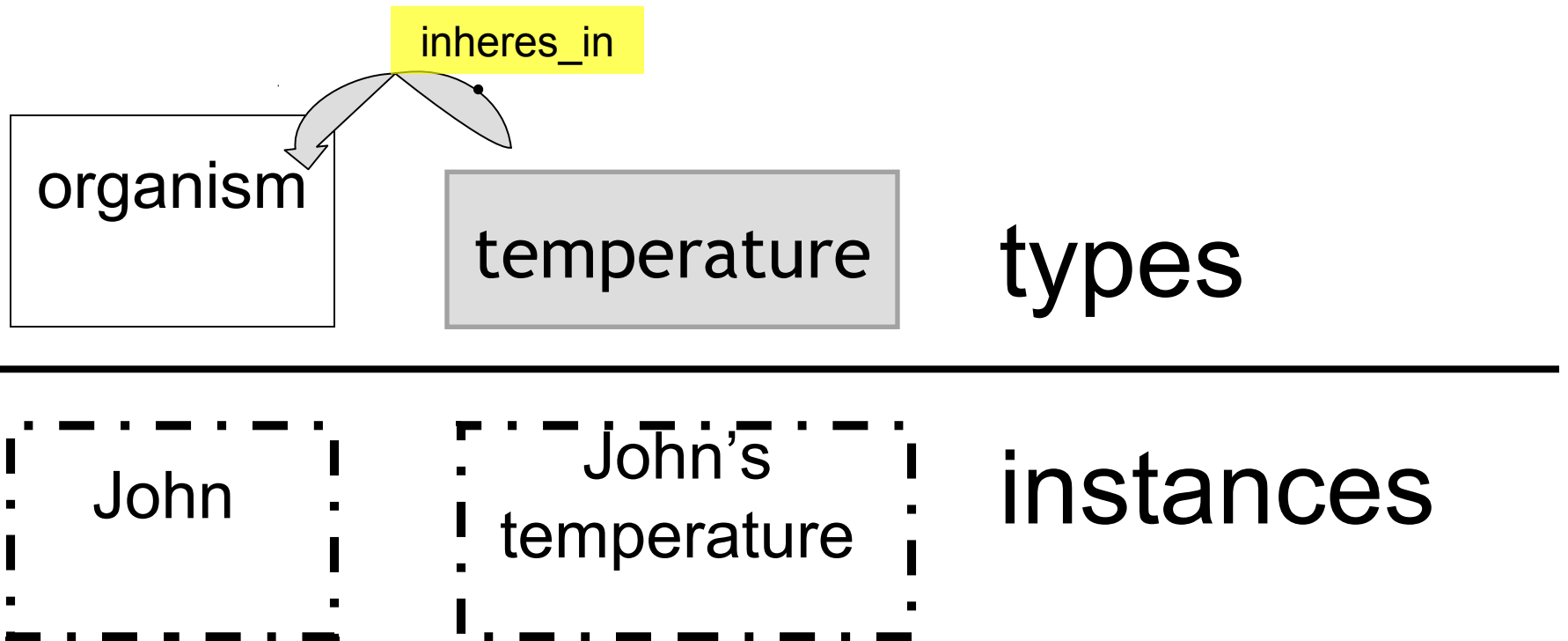
types

John

John's  
temperature

instances

# Blinding Flash of the Obvious



temperature

types

37°C

37.1°C

37.2°C

37.3°C

37.4°C

37.5°C

instantiates  
at  $t_1$

instantiates  
at  $t_2$

instantiates  
at  $t_3$

instantiates  
at  $t_4$

instantiates  
at  $t_5$

instantiates  
at  $t_6$

John's temperature

instances



human

types

embryo

fetus

neonate

infant

child

adult

instantiates  
at  $t_1$

instantiates  
at  $t_2$

instantiates  
at  $t_3$

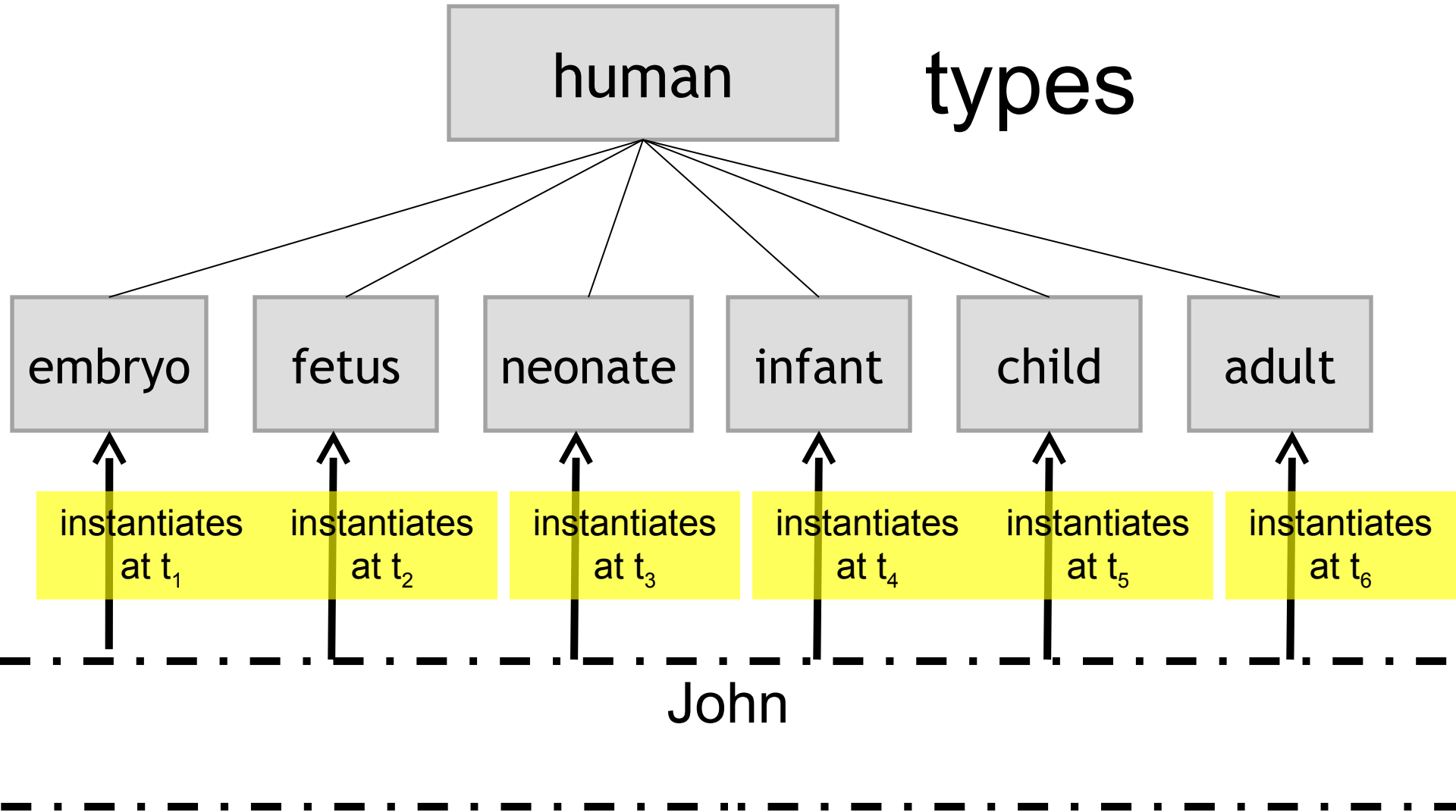
instantiates  
at  $t_4$

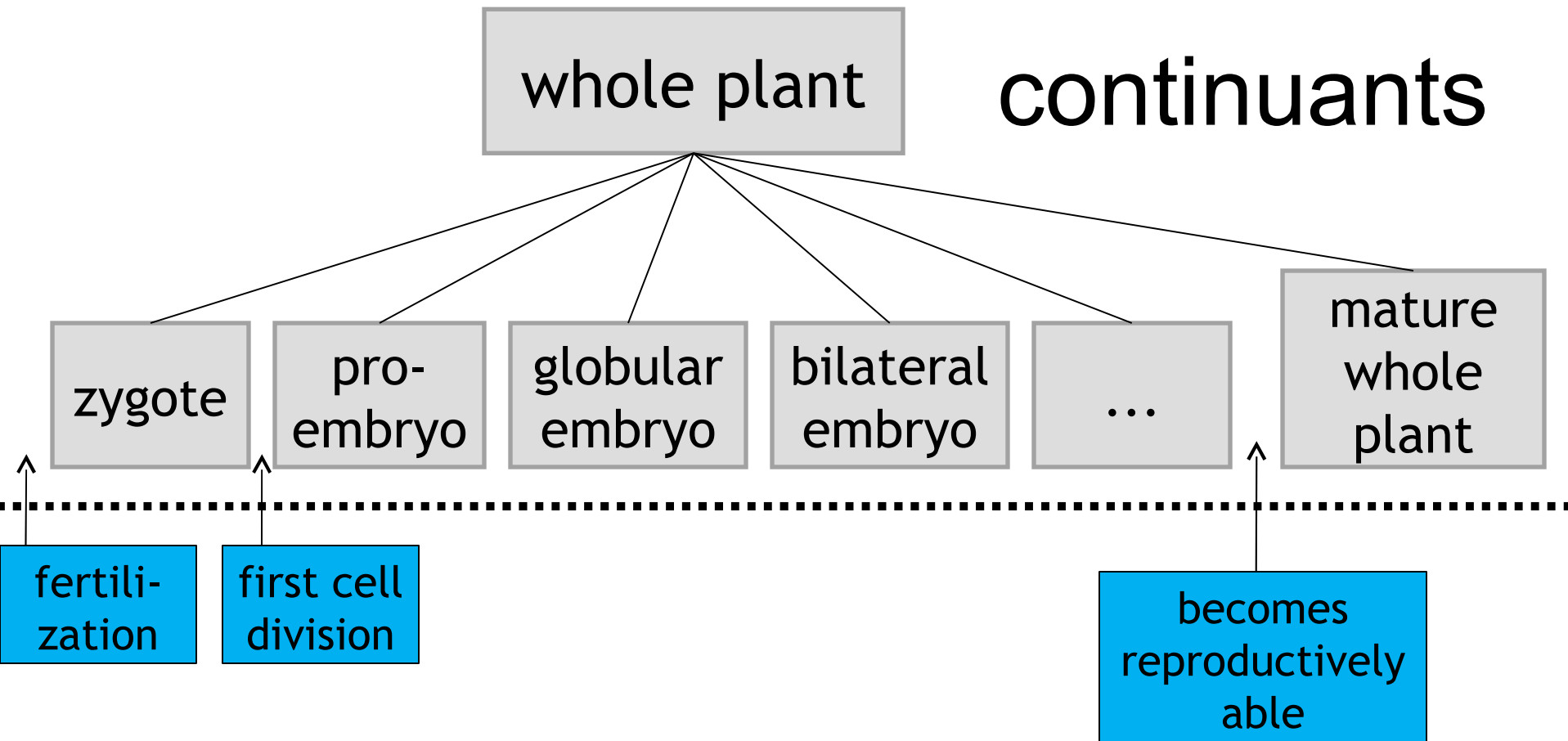
instantiates  
at  $t_5$

instantiates  
at  $t_6$

John

instances <sup>17</sup>





occurrents<sub>8</sub>

independent  
continuant

dependent  
continuant

organism

quality

temperature

types

John

John's  
temperature

instances

independent  
continuant

dependent  
continuant

occurrent

organism

quality

process

temperature

course of  
temperature  
changes

John

John's  
temperature

John's  
temperature history

independent  
continuant

dependent  
continuant

occurrent

organism

quality

process

temperature

life of an  
organism

John

John's  
temperature

John's  
life

independent  
continuant

dependent  
continuant

occurrent

eye

function

process

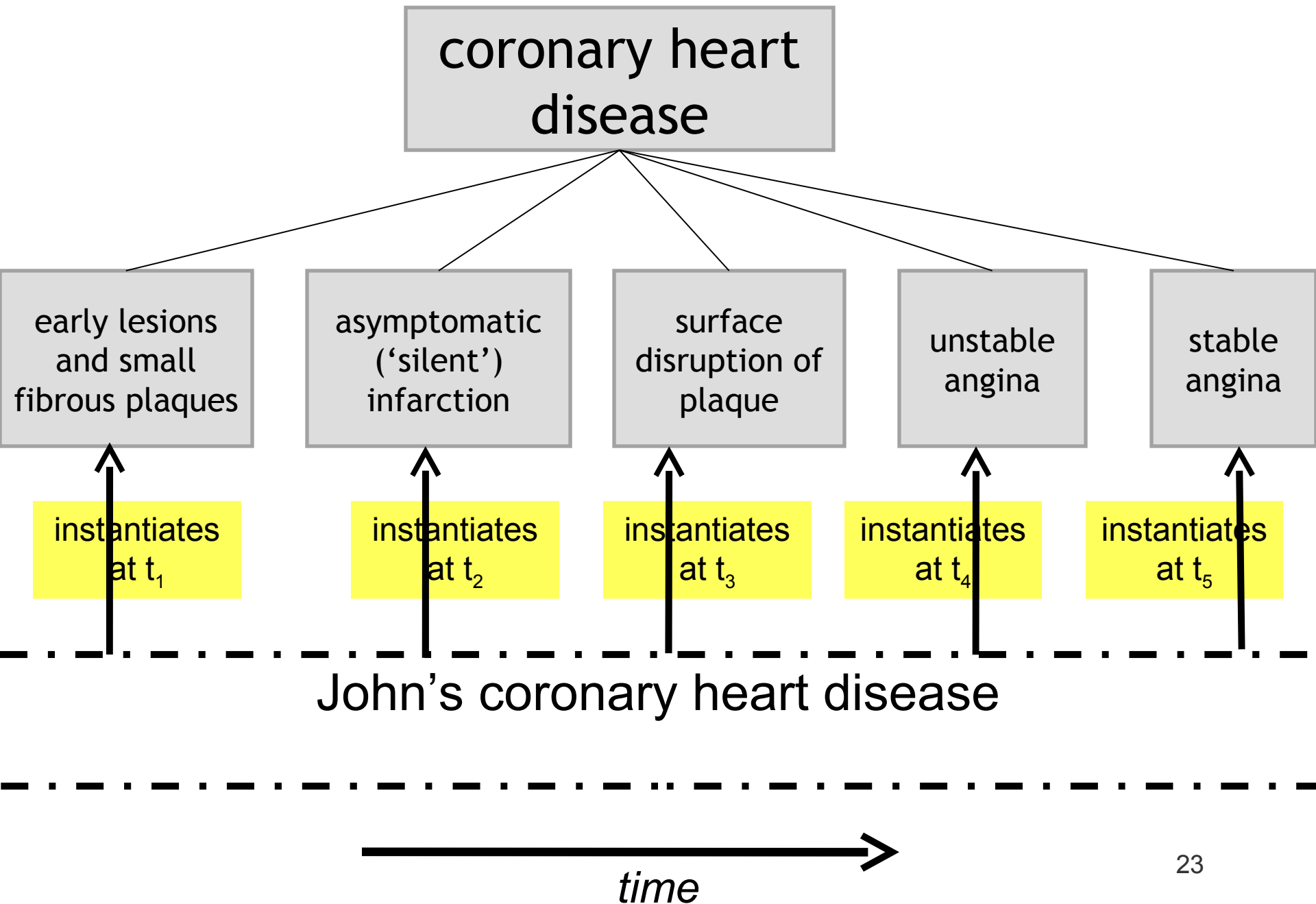
to see

process of  
seeing

John's eye

function of John's  
eye: to see

John seeing



independent  
continuant

dependent  
continuant

occurrent

disorder

disposition

process

disease

course of  
disease

John's  
disordered  
heart

John's  
coronary heart  
disease

course of John's  
disease