

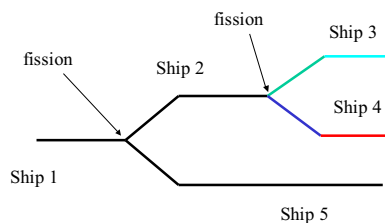
Substantial change and spatio-temporal coincidence

Thomas Bittner

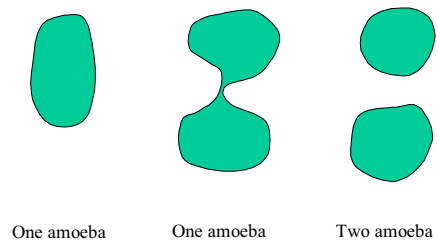
Remember

- There are (at least) three kinds of change that persisting objects can undergo
 - Change of composition: a composite object has different components at different times
 - Change of quality: the same object has numerically different qualities at numerically different times
 - Substantial change: persistent objects begin or cease to exist
- Four different solutions to the question of how change of composition and change of quality can occur

Substantial change (1)



Substantial change



Substantial change and compositional structure (1)

- One way for a substantial to come into existence is to be united together as to form its component parts
- Assembling a new car
- Assembling the ship of Theseus from scratch

Substantial change and compositional structure (2)

- Certain objects which are already united to form a composite whole are **rearranged** in such a way that a new composite whole comes into existence and the old whole ceases to exist.
- The re-assembled ship of Theseus
- Statue of Stalin → melted → lump of bronze → Statue of Lenin
- All living beings

Persistence conditions (1)

- List the kinds of changes a perduring object can undergo without ceasing to exist
- Lump of bronze can be formed into different shapes **without** ceasing to exist
 - Stalin-shaped-lump-of-bronze
 - Lenin-shaped-lump-of-bronze
- You can cut off an ear of a statue of Lenin and it remains to be a statue of Lenin

Persistence conditions (2)

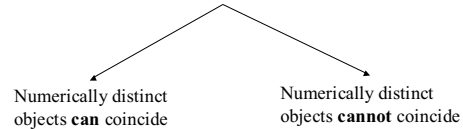
- Lumps of bronze survive change of shape but no significant gain or loss of parts
- Statues survive losses of parts but no significant change of shape
- The lump of bronze and the statue have **different** persistence conditions

Commonsense intuition:

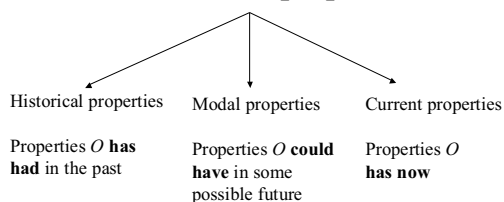
- Numerically identical perduring objects must have identical persistence conditions
- Therefore:
 - The lump of bronze cannot be identical
 - Two different perduring entities are spatio-temporally co-located during a certain period of time
 - The lump of bronze and the statue **coincide**

The problem of the statue and the bronze

- Can numerically distinct objects coincide?

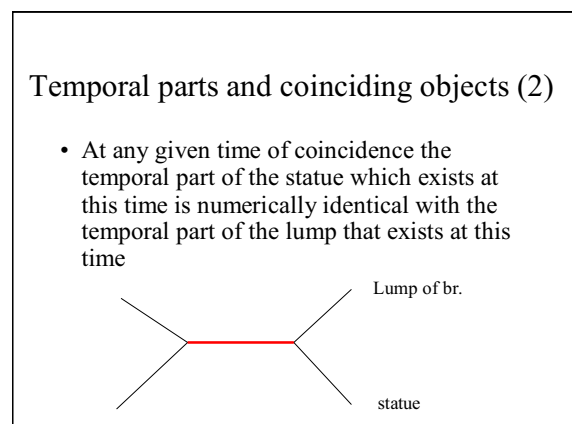
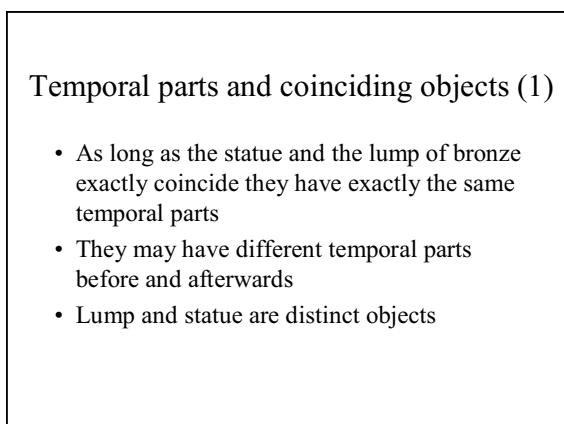
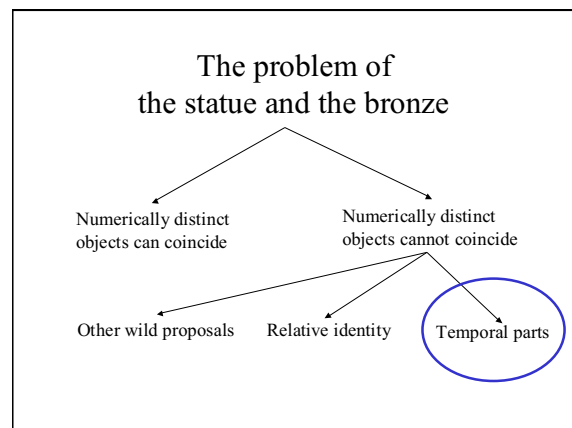
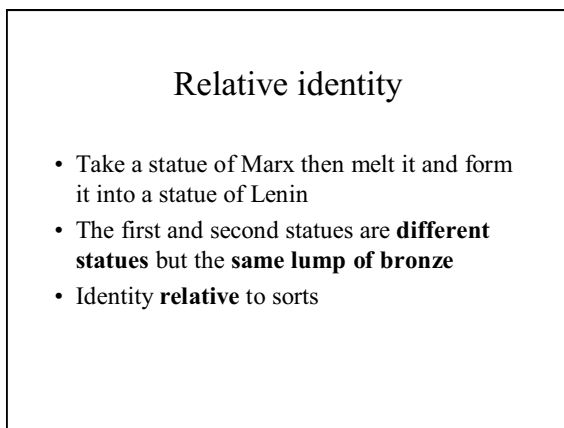
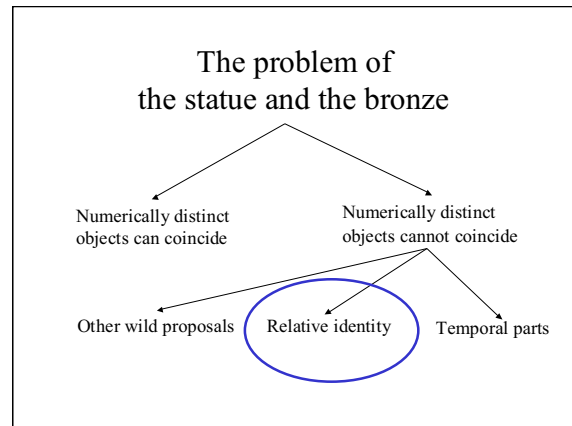
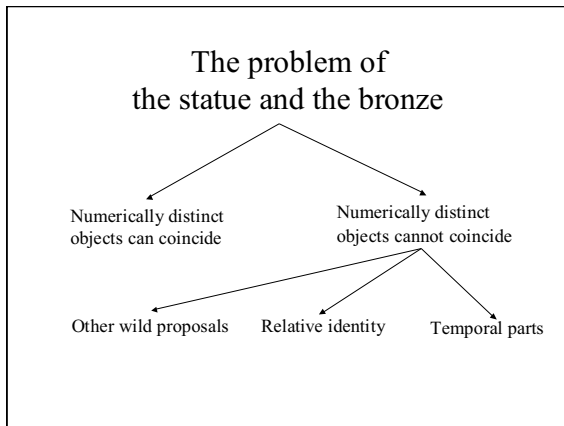


Three kinds of properties



Numerically distinct objects cannot coincide

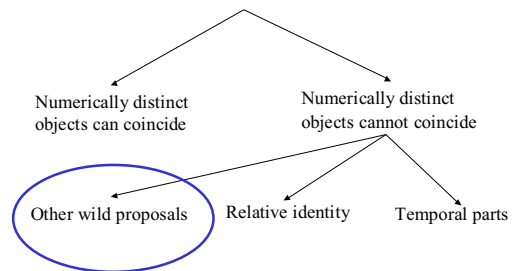
- Statue and the bronze:
 - Both have exactly the same properties while being coincident
 - But: different historical and modal properties
- Conflicts with: principle of *identity of indiscernibles*
 - No numerical distinct objects can possess exactly the same properties
- Relative identity or temporal parts



Temporal parts and coinciding objects (3)

- A problem:
 - Lump of bronze comes together the moment the statue is formed and is dispersed the moment the statue is destroyed
 - Lump and statue have exactly the same temporal parts and are therefore identical
 - Still: lump and statue have distinct **modal** properties there are changes which one **could have** survived but not the other
- After all: one might need to relativize identity

The problem of the statue and the bronze



Statues do not exist

- Statues do not exist, only statue-shaped lumps of bronze
- Being Marx-shaped at one time and being Lenin-shaped at another time then amounts to qualitative change of lumps of bronze.

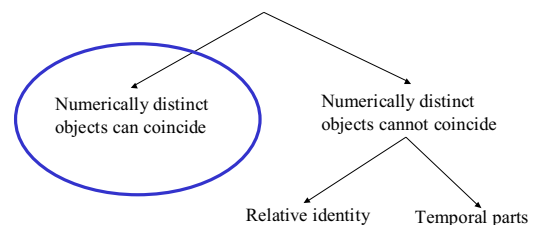
Lumps of bronze do not exist

- Bronze particles are joint together to form statues but this does not amount to the creation of an additional individual in addition to the statue

Neither lumps of bronze nor statues exist

- All there is a bronze particles
- The only persistent objects that exist are simple or non-composite ones
- Elementary particles of physics
- None of the assumed objects of common-sense way of thinking do exist
- How about living organisms like us?

The problem of The statue and the bronze



Statues and lumps of bronze are numerically distinct coinciding objects

- Problem: statue and lump seem to be indistinguishable in all properties accessible to direct perception at a given point of time during their coincidence.
- Differ only in their historical and modal properties

But: historical and modal properties are not so special:

- Property of being elastic can only be determined **over time**
- Elastic meaning being able to return to old shape

Persistence conditions (again)

- Determine what sorts of change an object **can or cannot** survive
- Depends on what kind of kind the object in question is
 - a lump of bronze is a kind of thing that survives significant changes of shape but no significant change of constitution
 - A statue is a kind of thing that does survive significant change of constitution but no significant change of shape
- A **priori** character of persistence conditions

Statues and lumps of bronze are numerically distinct coinciding objects

- Lump and statue **do not differ** at any given moment of their coincidence in any property which possession can be determined at this particular moment
- **Do not differ** with respect to their physical dispositional properties grounded in the material particles composing them
- At any given moment of their coincidence they **can differ** in their historical and modal properties

Not all of dispositional properties are grounded in material particles constituting lump and statue

- We can say that a statue is disposed to cast a shadow of a certain shape
- We cannot say without qualification that a lump of bronze casts a shadow of a certain shape

Coincidence

- Objects of **different kind** can coincide
 - Lump and statue
 - City of Vienna and Federal state of Vienna
- Objects of **the same kind** cannot coincide
 - Federal states do not overlap
 - National states do not overlap
 - Material objects cannot overlap

Summary

Substantial change and compositional structure

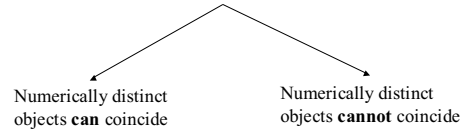
- One way for a substantial to come into existence is to be united together as to form its component parts
- Certain objects which are already united to form a composite whole are **rearranged** in such a way that a new composite whole comes into existence and the old whole ceases to exist.

Persistence conditions

- Lumps of bronze survive change of shape but no significant gain or loss of parts
- Statues survive losses of parts but no significant change of shape
- The lump of bronze and the statue have **different** persistence conditions
- Numerically **identical** perduring objects must have **identical** persistence conditions

The problem of the statue and the bronze

- Can numerically distinct objects coincide?



The problem of the statue and the bronze

