



# Functional Roles and their Realizations

(my own view of the P101 problem)

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# Summary

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- The (many!) problems of *roles*
- *Realizations*: from the abstract to the actual
- Abstract *contexts* and their realizations
- The drama metaphor: roles as *abstract parts*
- Different ways of role realization

# The (many!) problems of roles

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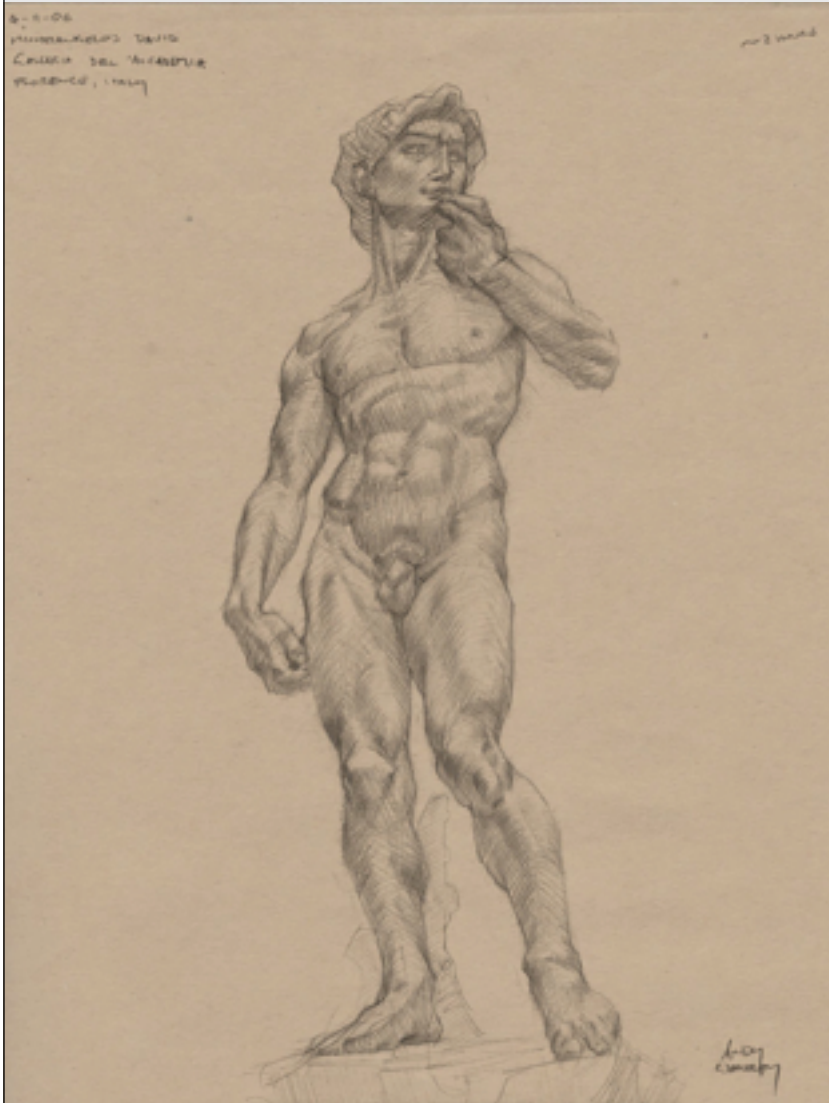
- Problem 1: what's the nature of the *role playing* relationship?
  - does a *pedestrian* or an *ocular witness* really *play* a role?
  - What's the difference between *driving/teaching* and *driver/teacher*?
  - Is there a difference between *driver* and *passenger*?
  - What about *customer* and *employee*?
- Problem 2: What are roles, after all? What the implicit ontological assumptions we make when we refer to them?
  - Counting problem:
    - *Lufthansa transported 100,000 passengers to Berlin in one year*
  - Player replacement problem
    - *Lufthansa replaced the pilot of flight LH828 two times last year*
  - Conflicting properties problem
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## Our cognitive motivations: linguistic differences marking different ontological assumptions

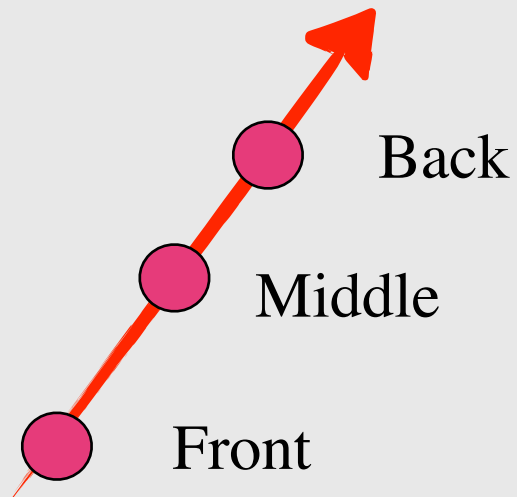
- Verbs vs. nouns:
  - *driving vs. driver*
- Comparatives:
  - *John has a good friend*
  - *\*John has a good classmate*
  - *He is a good driver*
  - *\*he is a good pedestrian/passenger*
  - *He is a good president*
  - *\*he is a good ocular witness*
  - *\*she is a good widow*
- Replaceability:
  - *John replaced his teacher*
  - *\*John replaced his friend*

# Realization: from the Abstract to the Actual

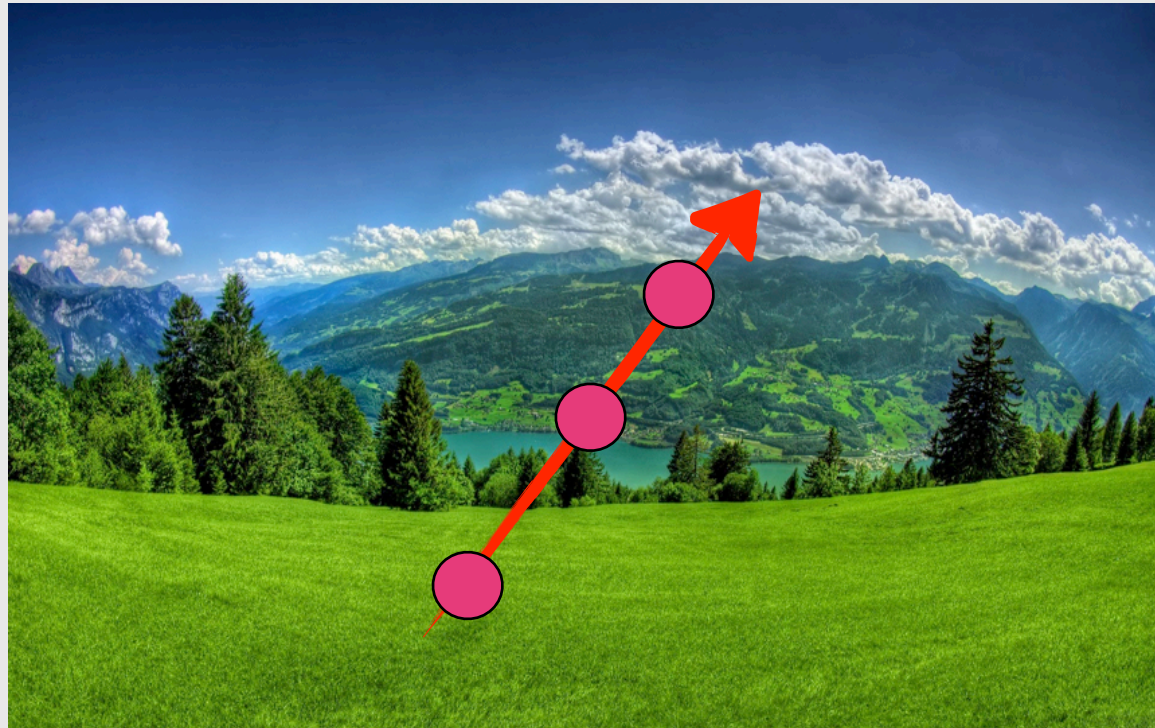
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# An abstract *context*



# An *undeliberate* realization of an abstract context



The meadow is in the *front*, the mountains in the *back*, the lake is *between* the meadow and the mountains. All these positions correspond to *ordinary roles*, resulting from the ideal projection of an abstract reference scheme on the reality.



## *A designed* abstract context



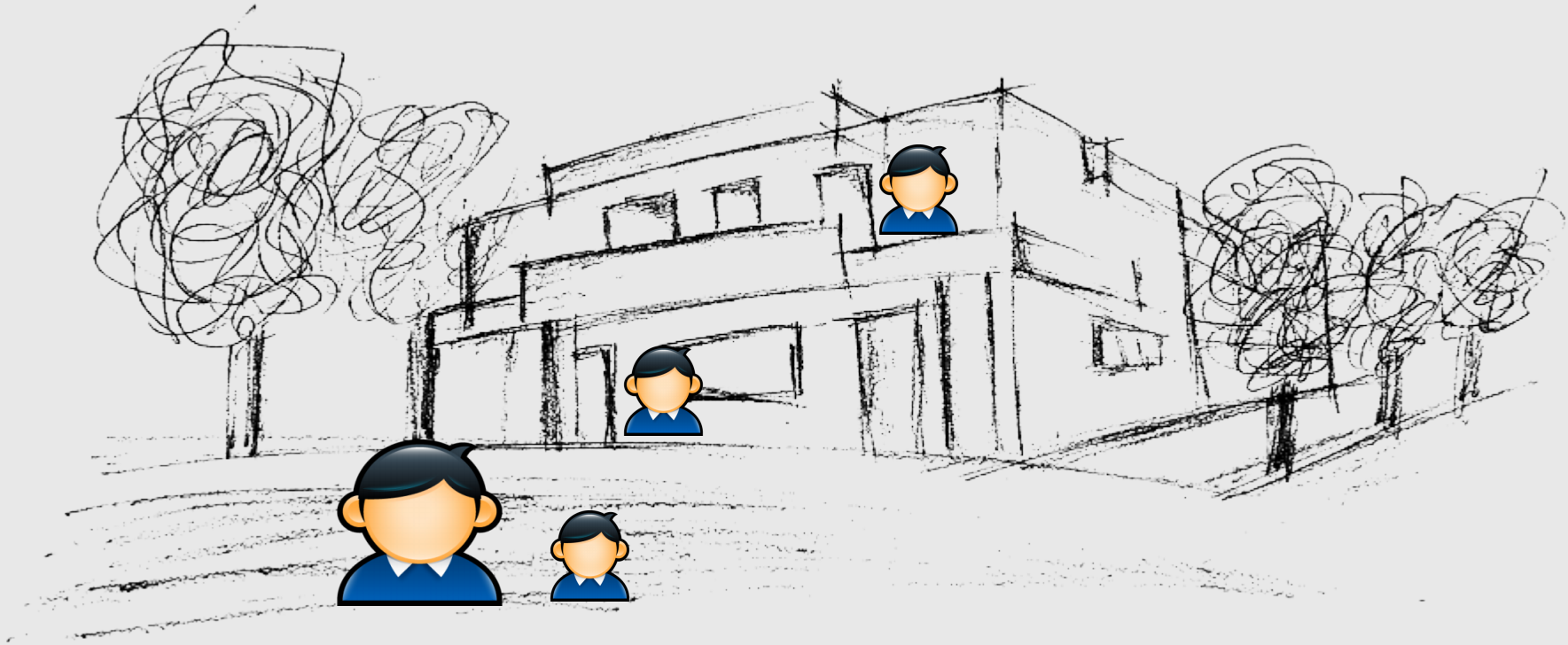
Drama metaphor: windows, rooms, walls in the abstract specification are like characters in a play. *Roles are parts of an abstract structure (relational context).*



# Deliberately Realizing an abstract context



...with an *expected situation* in mind:



Consider now these different roles:

- *content* (no expectations; change without replacement )
- *owner, guest..* (expectations; change without replacement)
- *door, roof, furniture* (functional part; replacement allowed)

## Virtual realizations of functional roles emerge



We are in the living room. The window is here on my back.

# Intentionally Realizing an abstract context

Once the location is *selected* and the first stone posed, the house starts to exist virtually. Walls and windows in the abstract specification are *functional roles* whose realizations exist in a *virtual state*. They wait to be actually realized by *arbitrary selection* of the appropriate components.

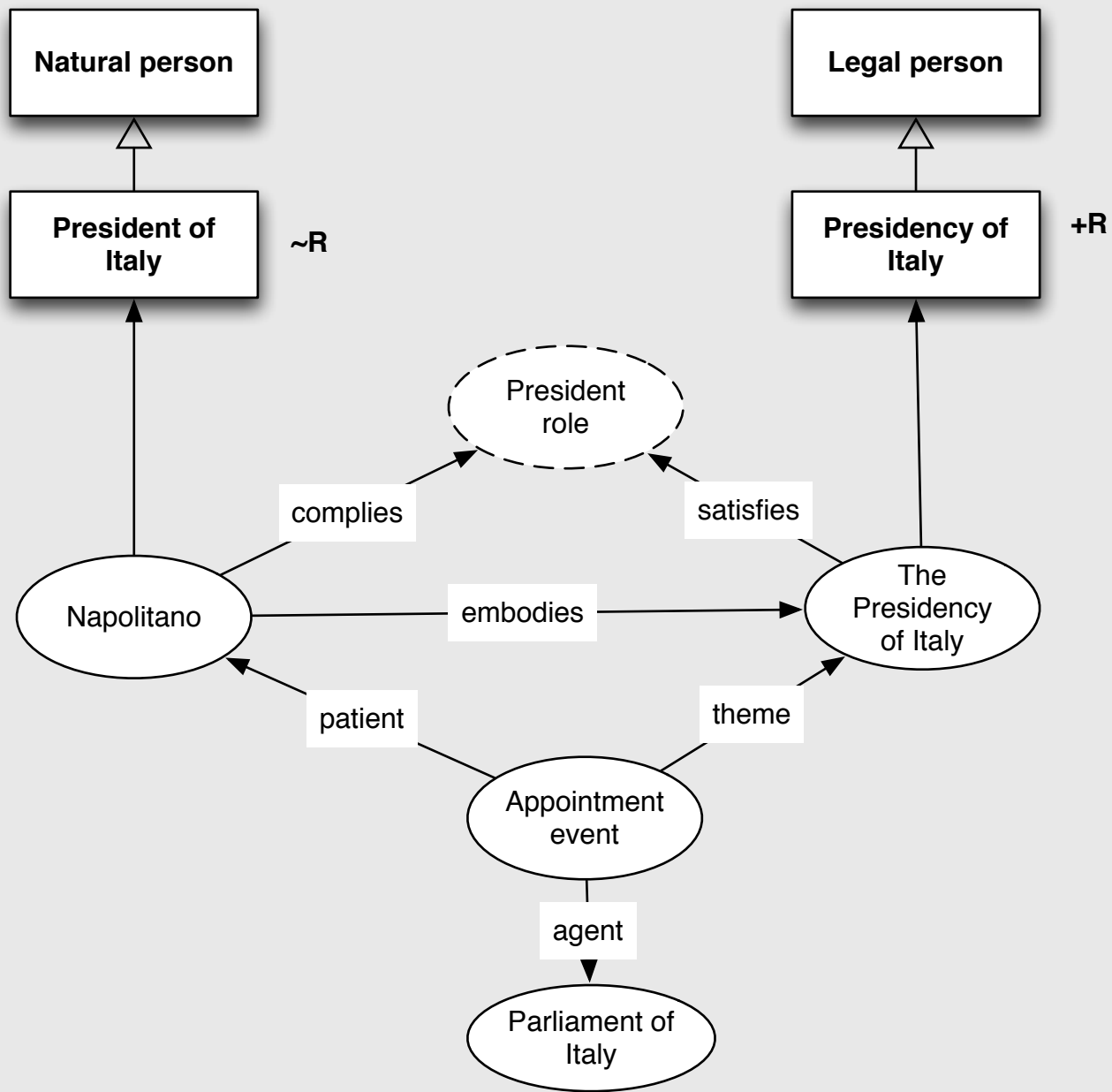


## Functional roles, functional parts, and replaceability

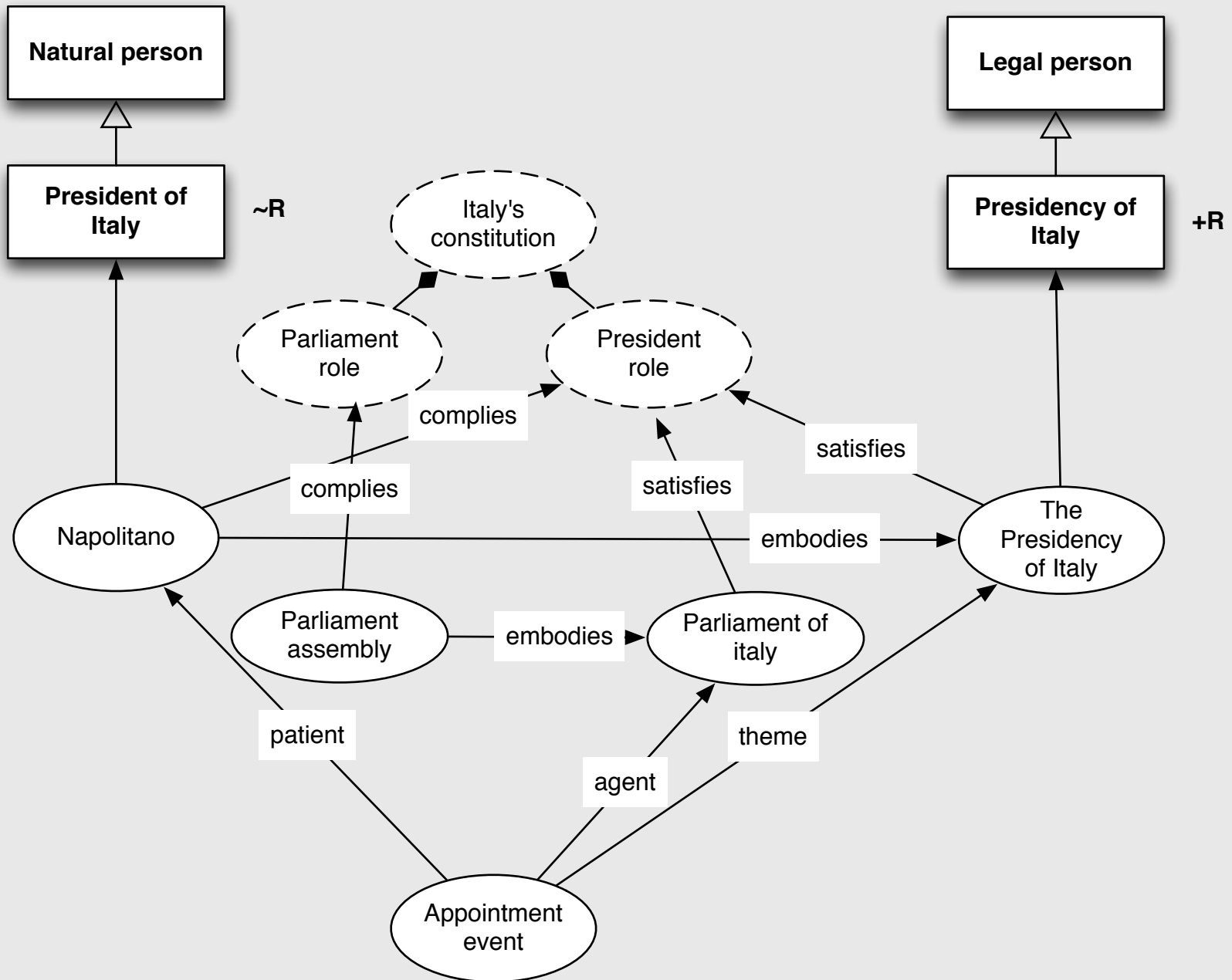
- Arbitrary selection of realizers for roles describing functional parts implies their *replaceability*. Differently from ordinary roles, these roles are ***replaceable***. Indeed, replaceability is a test for functional roles.
  - *classmate vs. teacher*
  - *employee vs. customer*
- Replaceability presupposes a *new entity* in people's mind ontology, i.e. a ***virtual, idealized role player***
- In the distillation unit, P101 denotes a particular pump unit which might be *embodied* by a certain physical component at a certain time, and can be in a *virtual state* when such component is removed.

# Functional roles and virtual components in organizations

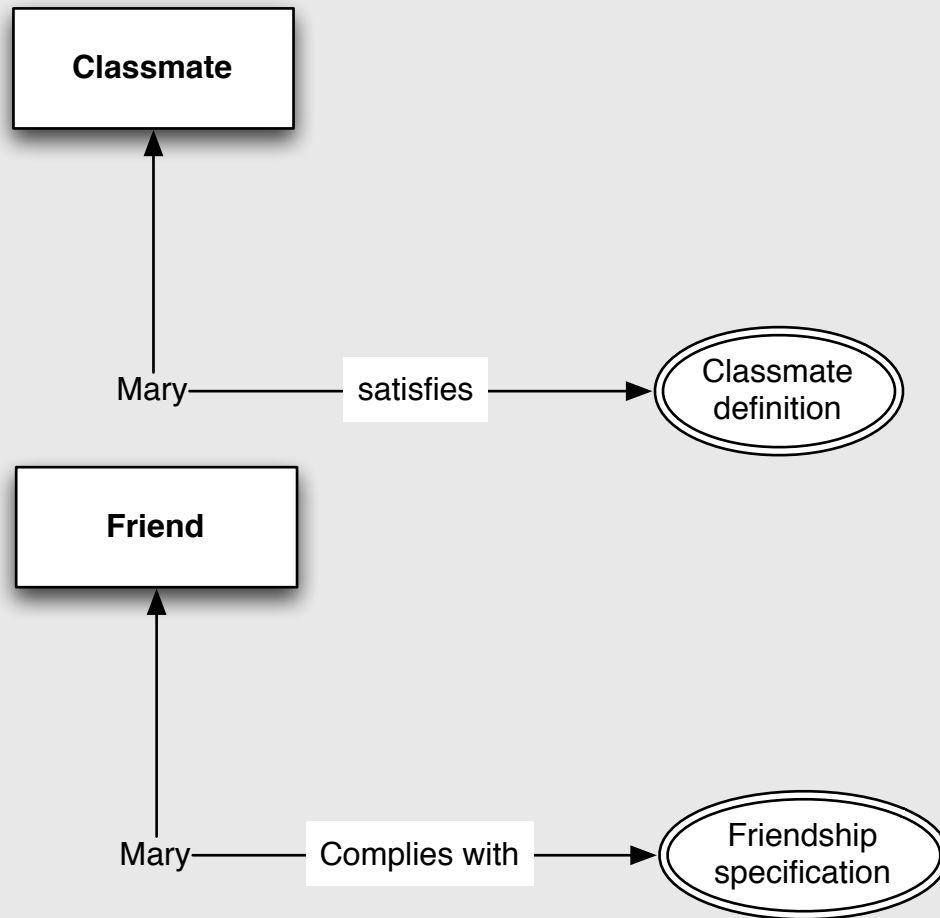
- *President vs. presidency*
- *The presidency is vacant*
- *The presidency never acted against the parliament*
- *People can send letters to the presidency (even while the presidency is vacant)*







## Relational roles vs. social roles



Note: satisfaction implies compliance, but not viceversa!

## Functional roles and functional parts in artefacts

1. The right headlamp of my car was not working
2. The right headlamp of my car is *uninstalled/missing*
3. This cable connects the battery to the right headlamp
4. The right headlamp of my car has been replaced 2 times

What are the referents of role terms?

## Virtual players and nominal players

- Virtual players: located within the artifact, can be “materialized” or not, but they are physical, so to speak
- Nominal players: abstract prototypical particulars, *which however can have physical qualities*

# Partial and Virtual Realization: Michelangelo's Prisoners (\*)



(\*) Suggestion from Emanuele Bottazzi