Functional Roles and their Realizations
(my own view of the P101 problem)

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Summary

• 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

- 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
Our cognitive motivations: linguistic differences marking different ontological assumptions

- Verbs vs. nouns:
  - *driving vs. driver*

- Comparatives:
  - *John has a good friend*
  - *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
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.
Once the location is *selected* and the first stone posed, the house starts to exists virtually. Walls and windows in the abstract specification are *functional roles* whose realizations exist in a *virtual state*. The 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 \textit{replaceability}. Differently from ordinary roles, these roles are \textbf{replaceable}. Indeed, replaceability is a test for functional roles.
  - \textit{classmate} vs. \textit{teacher}
  - \textit{employee} vs. \textit{customer}

- Replaceability presupposes a \textit{new entity} in people’s mind ontology, i.e. a \textbf{virtual, idealized role player}

- In the distillation unit, P101 denotes a particular pump unit which might be \textit{embodied} by a certain physical component at a certain time, and can be in a \textit{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)
President of Italy embodies Natural person.

The Presidency of Italy is a Legal person.

Napolitano

President role: Napolitano embodies the President role.

Appointment event: Napolitano is appointed to the Presidency of Italy.

Parliament of Italy

agent

patient

satisfies

theme

complies

embodies
Relational roles vs. social roles

Classmate

Mary satisfies Classmate definition

Friend

Mary Complies with Friendship specification

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