Seeing-in & Virtual Reality

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Virtual and augmented realities:
Epistemological and metaphysical issues
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Introduction

Virtual Reality, between reality and fiction

- “Virtual reality" allows us to do some amazing things:
  - We can *see* monsters (*as if* they were right in front of us).
  - We can *act* on these monsters (*fight* them, *kill* them...).

  Are these genuine *seeing* and *acting*?

- Realistic and anti-realistic conceptions of VR
  - Chalmers (2017) defends a realistic conception
  - Many fictionalist accounts (Tavinor, Velleman, Meskin & Robson...).
  - I propose an alternative conception: (Pseudo)Dualism of VR (PDVR)

- Does VR introduce a radical break?
  - According to Chalmers, yes:
    - ★ a new type of property, virtual properties.
  - According to the conception proposed here, no:
    - ★ *seeing a virtual object* resembles other ways of seeing;
    - ★ *acting on a virtual object* resembles other ways of acting.

Presentation outline

Chalmers' Realism

What status for virtual objects?

Chalmers' virtual realism (2017)

(1) Virtual objects really exist.
(2) Events in virtual reality really take place.
(3) Experiences in virtual reality are non-illusory.
(4) Virtual experiences are as valuable as non-virtual experiences.

Virtual objects are digital objects formed by computer processes or data structures based on such processes, carried out by physical processes on one or more computers.

Virtual objects have two types of properties:

- *physical properties* as digital objects, by virtue of which they enter into causal relationships;
- *virtual properties*, such as *being red* (for a virtual flower), *being a dragon*...

What status for virtual properties?

Chalmers' functionalist account

A virtual flower is not red in the ordinary sense (non-virtually red), but it is virtually red. The corresponding digital object is also not red in the ordinary sense, but it is virtually red. . . . What is virtual redness? To answer this, we can step back and ask: what is redness? On an orthodox view, the property of redness is picked out in virtue of a certain sort of *effect*: in particular, the fact that red things normally cause red experience. . . . We can say that an object is *virtually red* when it produces reddish experiences in the conditions that are normal for virtual reality. Normal conditions for virtual reality currently involve access through an appropriate headset.

Difficulties... (1/2)

- “Seeing a virtual object...”
  - To see a *red* virtual object is to see a *virtually red* object:
    OK, secondary quality
- Chalmers’ hypothesis:
  - We can generally give a functionalist analysis of real properties and transpose it to virtual properties.
  - e.g. to see a red virtual object *close to* a green virtual object is to see that the two objects are *virtually close*:
    according to spatial functionalism, distance is reconstructed in terms of possible causal interactions between objects. (but see Ney 2019)

Difficulties... (2/2)

- But...
  - To see a red flower is also to see a digital object that is a *virtual flower*. Does it mean that it produces a “floral experience” under normal VR conditions?
  - To see a red monster eating a green elf...
    is it to see two digital objects interacting in such a way as to produce a monstrous, elfin and devouring (structured) experience of redness and greenness? $\Rightarrow$ complexity of adverbial theory

- ... and beyond *seeing*
  - *kicking* a virtual ball, *killing* a virtual monster
  - *exploring* or *walking through* a virtual world...

  $\Rightarrow$ Can we reconstruct everything in functionalist and phenomenological terms?

- Regarding VR, Chalmers’ realism is physicalist monism
  - accompanied by a dualism of properties (virtual / non-virtual)
    $\Rightarrow$ ontologically expensive. (Beisbart 2019)

PDVR and *Seeing-in*

An alternative view

- (Pseudo)Dualism of Virtual Reality (PDVR):
  - a virtual object O_V is dual:

    a (real) digital object O_D + an intentional object O_I
    (real or fictional, but always in a fictional environment)
  - the relationship between O_D and O_I is *representation*, like in depiction
  - O_D must not be confused with its variable *presentations* (on screens...) $P_1(O_D)$, $P_2(O_D)$...

- Examples
  - a virtual red flower is a digital object + a fictional red flower
  - a virtual dragon is a digital object + a fictional dragon
  - an avatar is a digital object + a character or a real person, in a fictional environment. ▸ Falling Bush
  - a virtual calculator is a digital calculator + an intentional (real) calculator in a fictional environment. (Brey 2014)

- PDVR is based on a dualistic view of virtual objects
  PDVR is *pseudo* dualism since it does not commit us to some new world.

Seeing or seeming to see?

- When one sees a virtual object, is one victim of an illusion?
  - No (in general) according to Chalmers: one sees the (real) virtual properties of a (real) digital object.
  - No (in general) according to PDVR:
    one intentionally sees the fictional properties of an object (fictional or not) by looking at its (real) representation.
- What does it mean to *see* a representation?
  - An entry point for understanding VR (screen/headset).
  - An analysis to be extended to actions.
- The analysis is based on:
  - Anscombe: two uses of *seeing*
  - Wollheim: *seeing-in*
  - Walton: *make-believe*

Anscombe: intentional seeing

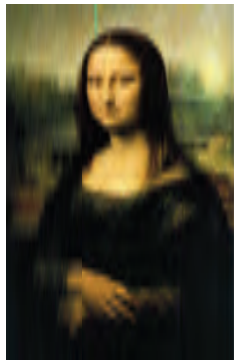
E. Anscombe, The intentionality of sensation (1965)

A man aims at a stag; but the thing he took for a stag was his father, and he shoots his father. A witness reports: "He aimed at his father". Now this is ambiguous. . . . We can ask what he was doing –what he was aiming at– *in that* he was aiming at a stag: this is to ask for another description "*X*" such that in "He was aiming at *X*" we still have an intentional object, but the description "*X*" gives us something that exists in the situation. For example, he was aiming at that dark patch against the foliage. The dark patch against the foliage was in fact his father's hat with his father's head in it.

Two uses of *seeing*:

- factive: if X sees that p, then p; if X sees Y, then Y exists.
  $\Rightarrow$ refers to (veridical) perception . see_P (physicalist)
- non-factive: it is possible that X sees that p and that non-p;
  it is possible that X sees Y and that Y does not exist.
  $\Rightarrow$ refers to perceptive experience. see_I (intentional)

Wollheim: *seing-in* (picture perception)



- In a given situation, different perceptions/experiences can be ascribed to a subject:
  - (1) Igor sees$_P$ the *Mona Lisa* (the painting).
  - (2) Igor sees$_I$ Lisa Gherardini (the person), [or Caterina Sforza...].
  - (3) Igor sees$_I$ his grand-mother.
  - (4) Igor sees$_I$ the goddess Demeter.
  - (5) Igor sees$_I$ a woman.
- Two conceptions:
  - E. Gombrich: a disjunction between (1) and (2) ((2) being like an illusion) on the model of *seeing-as*.
  - R. Wollheim: a conjunction of (1) and (2).

Walton: make-believe

- Like novels or movies, photos and paintings are *props* in games of *make-believe*

- Novels prompt us to imagine that their content is true
  - As readers, we make as if the content were seriously asserted, while simultaneously knowing that this is not the case
  - so we pretend believing in the content, while not actually believing in it.

- Paintings prompt us to imagine that their content is reality
  - As observers, we make as if the content (the portrayed scene or object) were really in front of us, while simultaneously knowing it is not
  - so we pretend seeing the content (scene or object), while not actually seeing it: we imagine both the content as really in front of us and our mediated perception as direct and true.

Seeing a pictural representation: summary

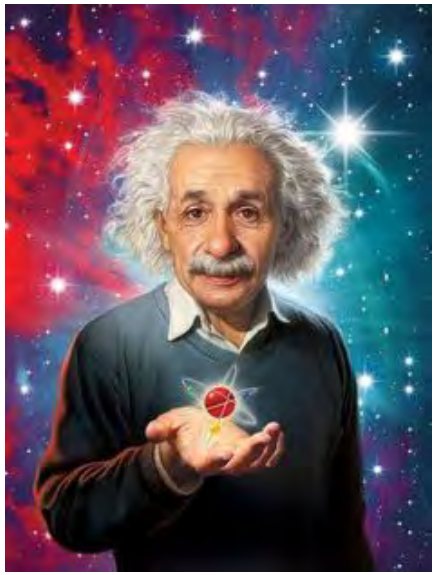
- When one sees the *Mona Lisa*:
  - one sees_P the painting
    which is a (*prop*) in a game of make-believe
  - and one simultaneously sees_I Lisa Gherardini
    i.e. makes *as if* she sees_P Lisa Gherardini,
    or *fictionally* sees_P Lisa Gherardini.

- Seeing a painting
  - involves *double seeing* (one sees both the medium and the content)
  - where the medium *contrains* the intentional projection.

- Understanding mediatized seeing
  - two ways of seeing (Anscombe)
  - conjunction of these two ways (Wollheim)
  - one of the ways involves fiction (Walton)

  $\Rightarrow$ two spheres are at play.

Fictionally seeing?



- Double-seeing:
  - one sees_P the painting or the photo which is a *prop* in a game of make-believe
  - and one simultaneously sees_I Einstein i.e. makes *as if* she sees_P Einstein, or *fictionally* sees_P Einstein.

- NB. The (Waltonian) fictionality of the act of *seeing* a picture is *not* the fictionality of its content.

Images as “modal windows” (a glimpse)

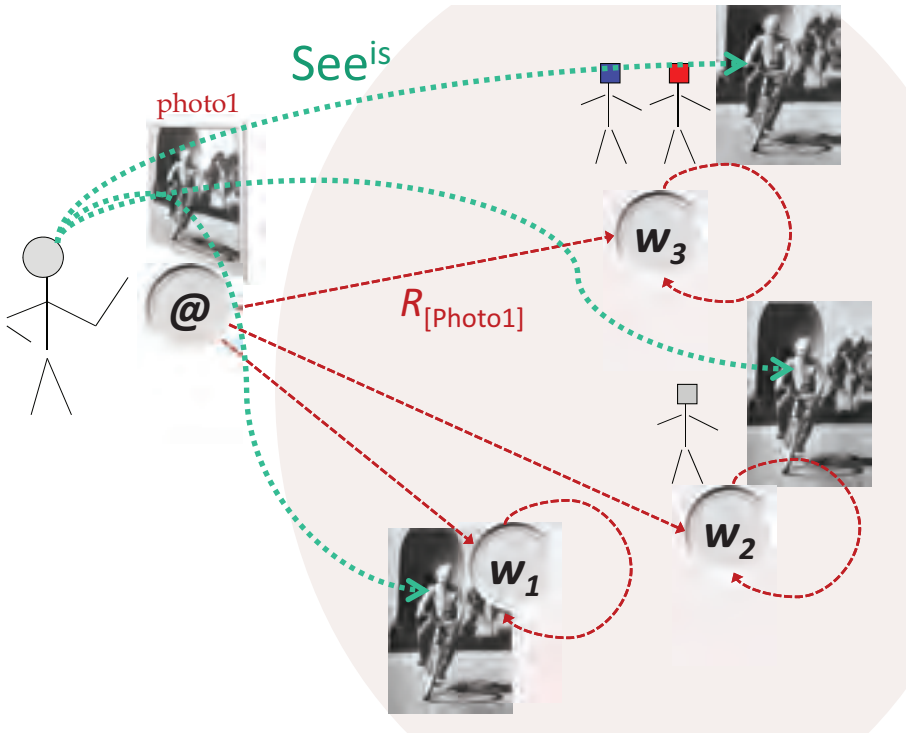
- What images have in common with novels is that they are incomplete:
  - images do not show what lies outside the frame
  - stories do not fully describe a fictional universe.

- In order to (formally) represent the content of images or novels:
  - one can consider the totality of situations compatible with this content
  - technically: a set of possible worlds... (Lewis 1978) tech. details

- Images are “windows” onto these possible worlds.

- Looking at and *seeing-in* an image:
  - is seeing$_P$ the image, which is a physical relation entirely located in the actual world
  - is also (fictionally) seeing$_I$ its content in other possible worlds
  - *seeing*$_I$ is a *quasi-relation*, modelled by a cross-world “relation” that enables one to see actual or non-actual (fictional) objects, in fictional or non-fictional environments.

Seeing-in as a quasi-relation



Igor sees$_I$ Einstein riding a bicycle.

$$[\mathit{Photo1}]\,(\mathtt{See}^{\mathit{is}}(\mathtt{igor},\mathtt{einstein}_{/[\mathit{Photo1}]}) \wedge \exists x(\mathtt{Bicycle}(x) \wedge \mathtt{Ride}(\mathtt{einstein}_{/[\mathit{Photo1}]}, x)))$$

tech. details

Back to virtual objects

- When one sees the *Mona Lisa*:
  - one sees_P the painting
    which is a (*prop*) in a game of make-believe
  - and one simultaneously sees_I Lisa Gherardini
    i.e. makes *as if* she sees_P Lisa Gherardini,
    or *fictionally* sees_P Lisa Gherardini.

- When one sees a virtual object O_V (an avatar, a virtual dragon...):
  - one sees_P the digital object O_D
    (through one of its presentations $P_k(O_D)$ on a screen or video headset)
    which is the (*prop*) in a game of make-believe
  - and one simultaneously sees_I the object O_I represented in a fictional environment by O_D
    i.e. makes *as if* she sees_P this object O_I,
    or *fictionally* sees_P O_I

  the screen or video headset acting as a modal window.

Double acting

Seeing and beyond

- A conceptual framework for thinking about virtual worlds
  - *Seeing-in* involves double seeing: medium + content
  - two (sets of) worlds: the actual world + (fictional) possible worlds
  - framework of fiction: pretence and suspension of disbelief
  - seeing or being aware of the medium $\Rightarrow$ no *illusion of reality*: psychological *immersion* and *presence* are not correlated with beliefs.

- Acting in a virtual world means double acting:
  - it is acting$_P$ via appropriate interfaces (keyboard, joystick...) on a digital object O_D of the actual world
  - and simultaneously acting$_I$ on the intentional object O_I represented by O_D in fictional worlds.

- A videogame example
  - By pressing$_P$ the red button on the joystick...
  - ... I killed$_I$ the monster “in front of me”.

Back to seriousness in VR

- A remote conference...
  - occupies a physical space on servers
  - determines a fictional place/world where participants are (fictionally) co-present.

- Participants can act (non)fictionally
  - by typing$_P$ on the keyboard and clicking$_P$ on the mouse
  - they can write$_I$ on the chat, show$_I$ their faces... change$_I$ their background, add$_I$ a fictional moustache...

- Participants can interact (non)fictionally
  - by typing$_P$ on the keyboard... and speaking$_P$ in the microphone
  - *they* can speak$_I$ and listen$_I$ to what others say$_I$ in the fictional place/world
  - Although the participants are fictionally co-present in this place, they can *really* interact.

$\Rightarrow$ The interactivity characteristic of VR induces a porosity between fictional and real worlds.

Double acting... below and beyond VR

- Theater, or when children imitate their grandfather
  - the medium is invisible (but we're aware of it)
  - the content is assumed to be fictional
- Boxing matches
  - the medium is visible (the ring)
  - the content is partly fictional (punches score points)
    ... and partly non-fictional (punches hurt)
- Flying drones (and AR?)
  - the medium is visible (the digital interface)
  - the content is partly fictional (the content of the image on the screen, possibly augmented)
    ... and partly non-fictional (the source of the image comes from a camera)

Conclusion

Conclusion

- Ontological status of virtual objects?
  - Chalmers 2017: Real digital objects with real virtual properties
  - PDVR: Digital objects are (real) representations of intentional objects (real or not) in a fictional environment; only ordinary properties.
- Ontological status of virtual events?
  - Chalmers 2017: Real digital events vs. fictional events
  - PDVR: Digital events are (real) representations of intentional events (real or not) in a fictional environment;
    the reality of the event partly depends on that of the intentional objects.
- Seeing in virtual worlds?
  - Chalmers 2017: one sees the virtual properties of real objects
  - PDVR: By seeing$_P$ images on a screen, one sees$_I$ intentional objects through some modal window.
- Acting in virtual worlds?
  - Chalmers 2017: "Ordinary" actions on (real) virtual objects
  - PDVR: Physicalist actions on digital objects + intentional actions on the corresponding intentional objects.

References

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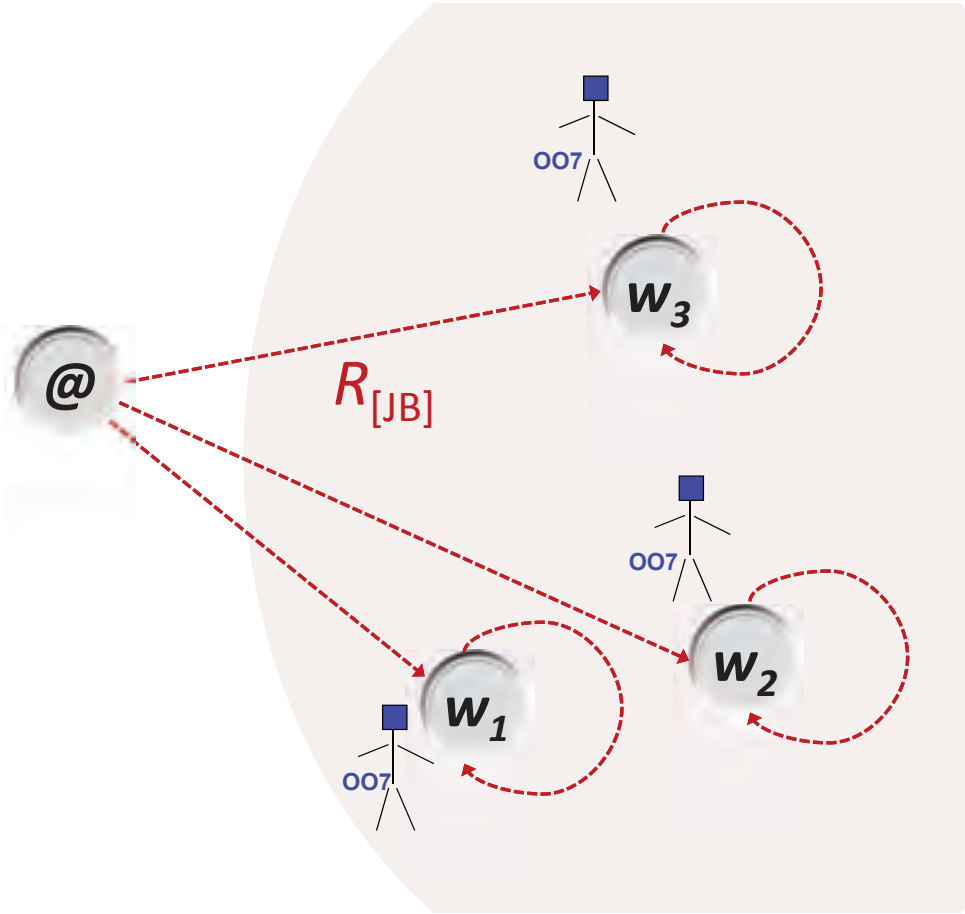
Appendix

Fiction (Lewis 1978)

- A semantics of fictions based on modalities: one operator per fiction, e.g. [JB] for *James Bond*.
- (Serious) assertions express beliefs.
  Fictional assertions are *make-believe* assertions (Walton 1990)
- [JB] is a universal modality, like $\Box$.
  Its dual, $\langle \text{JB} \rangle$, is an existential modality, like $\Diamond$.
- $[\text{JB}]\varphi$ means that φ is implied by the content of the fictional work *James Bond* by Ian Fleming.
  $\langle \text{JB} \rangle \varphi$ means that φ is consistent with the content of *James Bond*.
- Truth in fiction
  - $\mathbf{M}, w \vDash [\text{JB}]\ \varphi$ iff $\forall w'$, if $\mathcal{R}_{[\text{JB}]} ww'$ then $\mathbf{M}, w' \vDash \varphi$
  - $\mathbf{M}, w \vDash \langle \text{JB} \rangle \varphi$ iff $\exists w'$, s.t. $\mathcal{R}_{[\text{JB}]} ww'$ and $\mathbf{M}, w' \vDash \varphi$

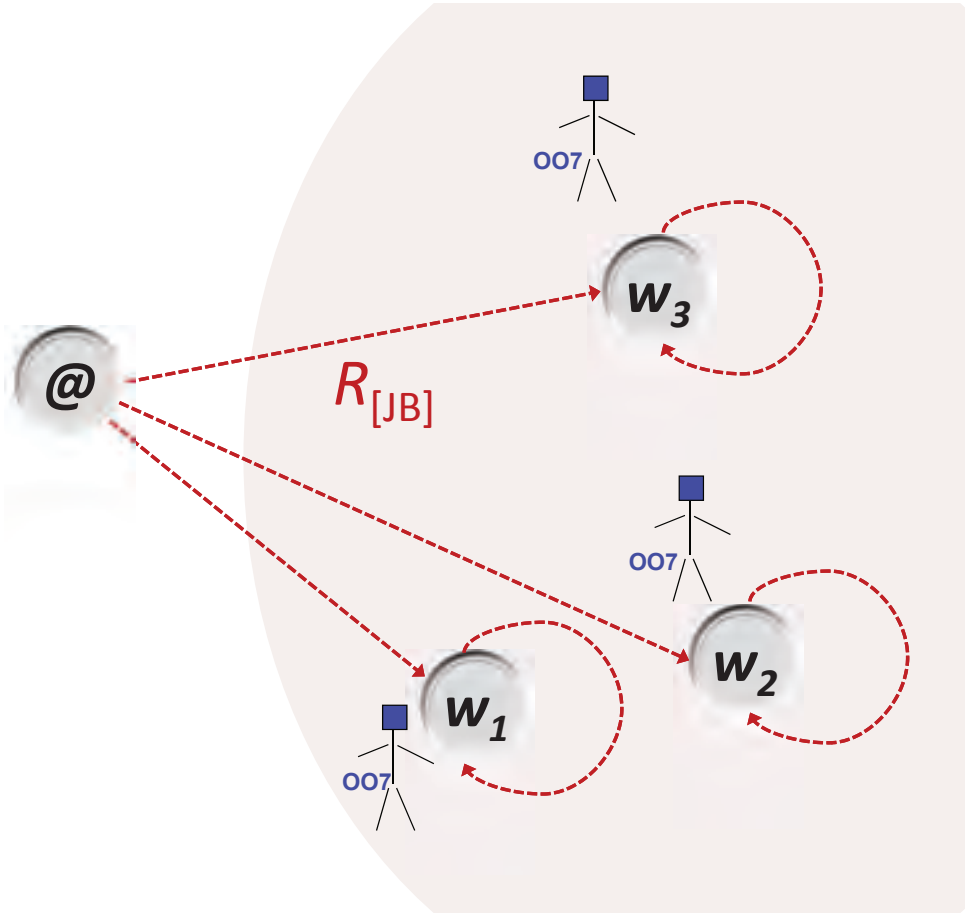
Fictional truth



James Bond is a secret agent

[JB] $\texttt{SecretAgent}(\texttt{jamesbond}_{/[JB]})$

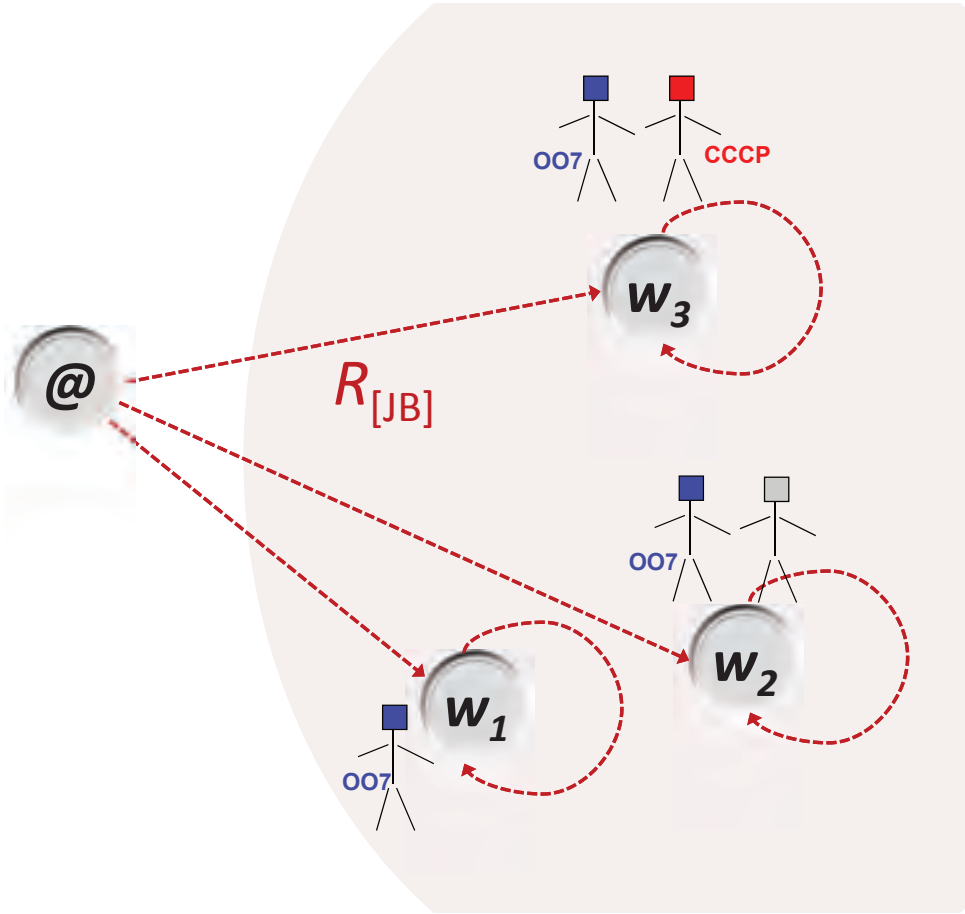
Meta-fictional truth



James Bond exists in fiction, but not in reality.

$$[\text{JB}]\ \exists x\ (x = \texttt{jamesbond}_{/[\text{JB}]}) \wedge \neg \exists x\ [\text{JB}]\ (x = \texttt{jamesbond}_{/[\text{JB}]})$$

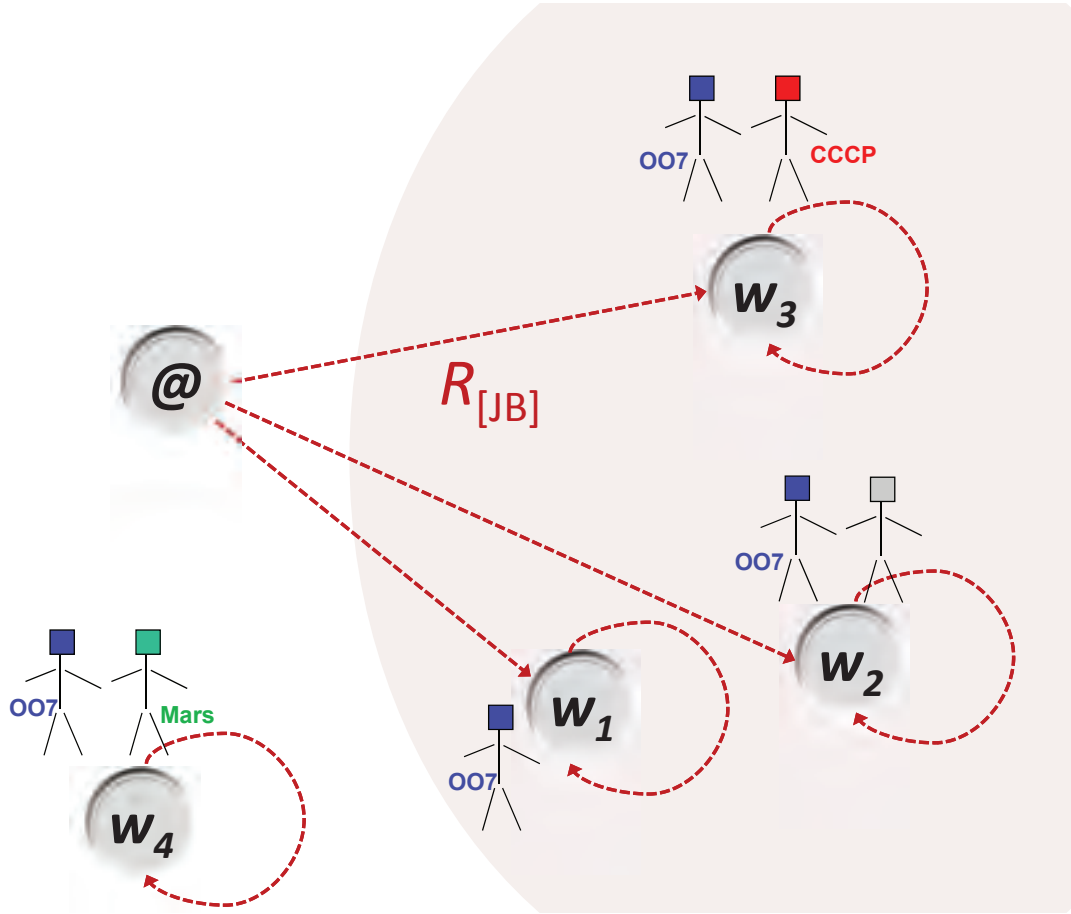
Incompleteness of fictional objects



James Bond had a Russian friend at nursery.

$\langle \text{JB} \rangle \; \exists x \, (\texttt{Russian}(x) \wedge \texttt{NurseryFriend}(x, \texttt{jamesbond}_{/[\text{JB}]}))$

Restriction to “relevant possible worlds”



James Bond had a Martian friend at nursery.

$$\neg\langle JB\rangle\ \exists x\ (\texttt{Martian}(x) \wedge \texttt{NurseryFriend}(x, \texttt{jamesbond}_{/[\text{JB}]}))$$

back

Language with cross-world extensions

Syntax

For a given vocabulary $\Sigma = \texttt{Cons} \cup \texttt{Pred}$, we define the first-order language with subjunctive markers $\mathcal{L}_{is}(\Sigma, [\alpha])$ as follows:

$$\begin{array}{lll} \text{Terms:} & t ::= & x \mid a \\ \text{Formulas:} & \varphi ::= & \top \mid (t_1 = t_2) \mid Pt_1 \dots t_n \mid R^{is} t_1 t_2 \mid (t_1 =^{is} t_2) \mid \\ & & \exists x\, \varphi \mid \neg\varphi \mid (\varphi \wedge \varphi) \mid [\alpha]\varphi \end{array}$$

where x is an individual variable, a an individual constant of $\texttt{Cons}$, P a n-ary predicate and R a binary predicate of $\texttt{Pred}$.

Kripke models

A *Kripke model with cross-world relations* for a language $\mathcal{L}_{is}(\Sigma, [\alpha])$ is a tuple $\mathbf{M} = \left\langle W, @, R_{[\alpha]}, \{D_w\}_{w \in W}, V, V^{is} \right\rangle$, where:

- W is a non-empty set of possible worlds;
- $@$ is a distinguished world ("*the actual world*");
- $R_{[\alpha]} \subseteq W \times W$ is the accessibility relation between poss. worlds;
- D_w is a non-empty local domain of individuals, with $D := \bigcup_{w \in W} D_w$;
- V is a (more or less standard) valuation function that assigns:
  - an individual object $d_a \in D$ to each individual constant a;
  - an *intra-world* extension, i.e. a subset $V(P, w)$ of D^n to each n-ary predicate P and possible world w;
- V^{is} is a cross-world valuation function that assigns:
  - a *cross-world extension*, i.e. a subset $V^{is}(R, w)$ of $D_@ \times D_w$ to each binary predicate R and possible world $w \in W$, such that $V^{is}(R, @) \subseteq V(R, @)$;
  - the identity relation on the global domain to the identity symbol, i.e. $V^{is}(=, w) = \{\langle d, d \rangle : d \in D\}$.

Evaluation

Terms and formulas are evaluated relative to a Kripke model $\mathbf{M}$, a possible world w, and an assignment $g : \mathtt{Var} \longrightarrow D$.

Value of terms

$$
\begin{array}{lcl}
[x]_{\mathbf{M},w,g} & = & g(x), \text{ where } x \text{ is a variable;} \\
[a]_{\mathbf{M},w,g} & = & V(a), \text{ where } a \text{ is an individual constant.}
\end{array}
$$

Evaluation of formulas

$$
\begin{array}{lll}
\mathbf{M},w,g \vDash Pt_1 \ldots t_n & \text{iff} & \langle [t_1]_{\mathbf{M},w,g}, \ldots, [t_n]_{\mathbf{M},w,g} \rangle \in V(P,w) \\
\mathbf{M},w,g \vDash R^{is} t_1 t_2 & \text{iff} & \langle [t_1]_{\mathbf{M},@,g}, [t_2]_{\mathbf{M},w,g} \rangle \in V^{is}(R,w) \\
\mathbf{M},w,g \vDash t_1 = t_2 & \text{iff} & [t_1]_{\mathbf{M},w,g} = [t_2]_{\mathbf{M},w,g} \\
\mathbf{M},w,g \vDash t_1 =^{is} t_2 & \text{iff} & [t_1]_{\mathbf{M},@,g} = [t_2]_{\mathbf{M},w,g} \\
\mathbf{M},w,g \vDash \neg\varphi & \text{iff} & \mathbf{M},w,g \nvDash \varphi \\
\mathbf{M},w,g \vDash \varphi \wedge \psi & \text{iff} & \mathbf{M},w,g \vDash \varphi \text{ and } \mathbf{M},w,g \vDash \psi \\
\mathbf{M},w,g \vDash \exists x\, \varphi & \text{iff} & \exists d \in D_w \text{ such that: } \mathbf{M},w,g[x/d] \vDash \varphi \\
\mathbf{M},w,g \vDash [\alpha]\varphi & \text{iff} & \text{for all } w', \text{ if } R_{[\alpha]} w w' \text{ then } \mathbf{M},w',g \vDash \varphi
\end{array}
$$

back