Perception and Illusion in Virtual Reality

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Technophilosophy

- The philosophical analysis of technology
- Using analysis of technology to illuminate philosophical problems.

Mind and World

- Much philosophy concerns the analysis of the mind, the world, and the relation between them.

Artificial Minds and Artificial Worlds

- These philosophical questions can be illuminated by thinking about artificial minds and artificial worlds.

Artificial Minds

- Artificial minds: AI technology.
- Augmented minds: cognitive extension and enhancement technology.
- Questions: Are these genuine minds? Do they have the same status as non-artificial minds?

Artificial Worlds

- Artificial worlds: virtual reality technology.
- Augmented worlds: augmented/mixed reality technology.
- Questions: are these genuine realities? Do they have the same status as non-artificial realities?

Key Question Today

- Question for today: Is perception in virtual reality environments illusory?

Virtual Reality

Virtual Reality

- Virtual reality technology: produces immersive, interactive experiences as of an external reality grounded in a computer simulation.

Permanent and Temporary VR

- Permanent VR: lifelong embedding in virtual reality, so that one's experiences always have virtual causes.
- Temporary VR: short-lived experiences in virtual reality, where one's experiences normally have non-virtual causes.


THE
MATRIX

Permanent VR and Illusion

- In "The Matrix as Metaphysics" I argued that normal experiences in a permanent VR are non-illusory.
- People have veridical experiences of virtual objects in a virtual space.
- If we turn out to be living in the Matrix, our ordinary experiences will be mostly veridical and our beliefs will be mostly true.


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Temporary VR and Illusion

- Is perceptual experience in temporary VR illusory? Or is it veridical?
- That is: when using VR devices, are things the way they look to be?

My Claim

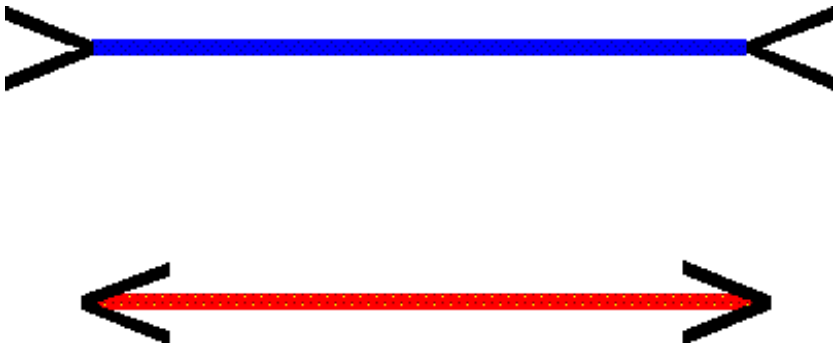
- At least for many users of temporary VR, many/most experiences will not be illusory.

Mirrors and Illusions

- Is ordinary experience on looking at a mirror illusory?

Illusion

- Illusion: An perceptual experience where things look to be a certain way, and they aren't that way.



- Müller-Lyer illusion: one line looks longer than the other, but it isn't.

Are Mirrors Illusory?

- View 1: It perceptually appears that there are objects so-arranged on the far side of the glass, when there aren't (an illusion).
- View 2: It perceptually appears that there are objects so-arranged on the near side of the glass, when there are (not an illusion).

Clear Cases

- In some cases, mirror experiences clearly seem illusory.
- E.g. when one doesn't know that a mirror is present…

Rear-View Mirror

- When driving a car and looking in the rear-view mirror: do the cars visible in the mirror perceptually appear to be in front of you, or behind you?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My View

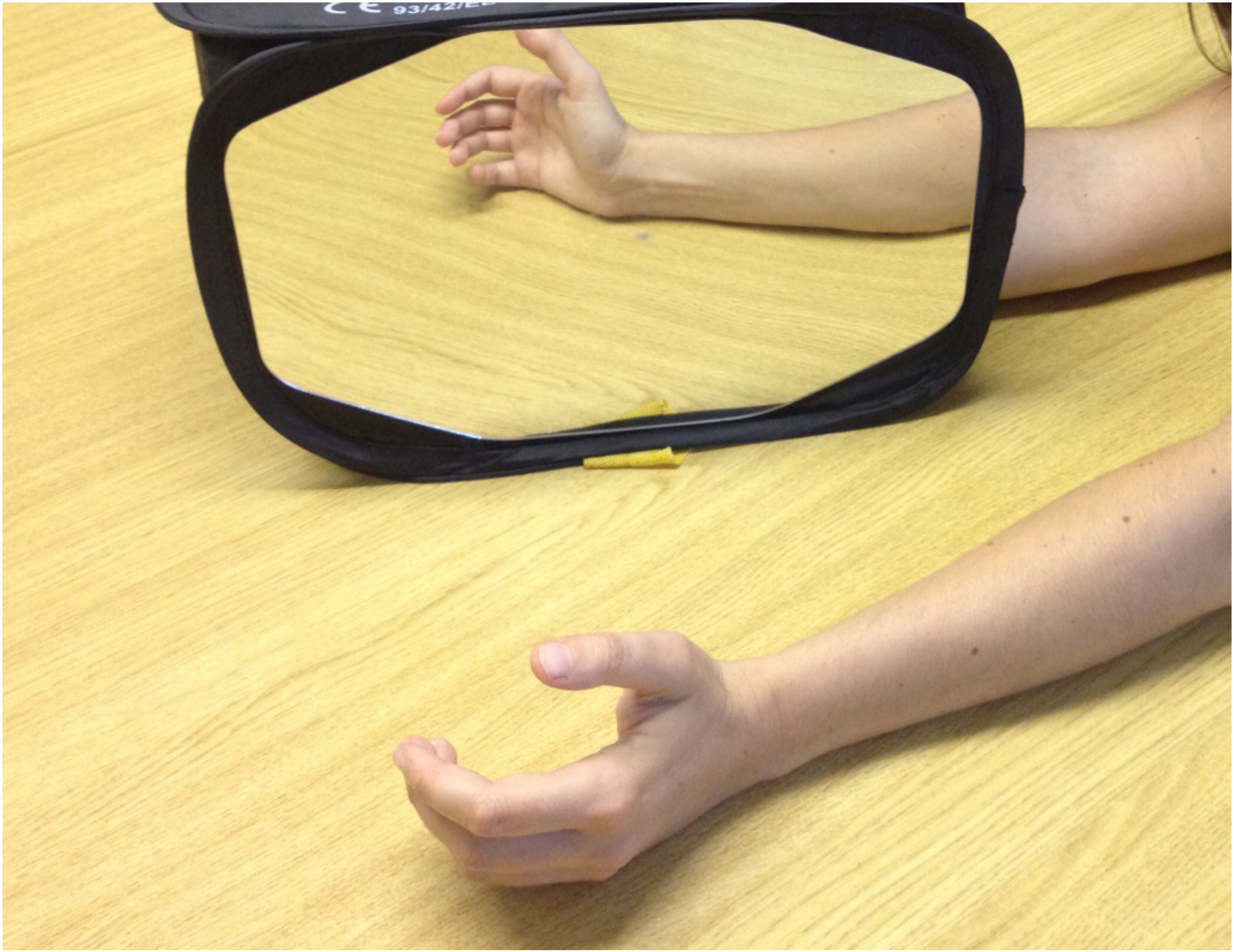
- Phenomenologically, it seems incorrect to say that the cars visible in the mirror appear to be in front of you.

Illusion View

- A proponent of the illusion view will say that we *judge* that the cars are behind us but that they *look* to be ahead of us.
- Or: they look to be behind us, because "look" claims involve judgment, but that perception represents them as ahead.
- I think: this gets the perceptual phenomenology wrong.

Mirror Illusions

- Mirrors can sometimes yield illusions, even when you know it's a mirror…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Key Features

- What are key features of the car case that make it a plausible case of illusion?
  - Knowledge: we know it's a mirror
  - Familiarity: we're used to using the mirror
  - Action: action dispositions depend on it
  - Naturalness: the scene presented on the in-front-of interpretation is unnatural.

Cognitive Penetration

- One can argue that this is a case of cognitive penetration of perception: what one knows or believes makes a difference to how things are perceived as being

Contrasting Pair

- There might be two near-identical cases involving a subject looking into a mirror
- In case 1 the subject know it's a mirror — and experiences objects as being in front of the glass
- In case 2 the subject doesn't know it's a mirror — and experiences objects as being behind the glass.

Belief Matters

- In these cases: depending on whether or not one believes it's a mirror, objects seem to be ahead or behind of oneself.
- To reject cognitive penetration here: one presumably has to deny that objects ever seem behind oneself in a mirror.

Change in Phenomenology

- Does the phenomenology (what it's like to have the experience) change?
- I'd say yes: so cognitive penetration of perceptual phenomenology
- But if no, an equally interesting conclusion: change in perceptual represention without change in phenomenology.

Cognitive Orientation

- I call this the *cognitive orientation* of perception
- Background knowledge determines the general orientation of how things seem to be in a perceptual experience, so perception changes with changes in what one believes.

Perceptual Adaptation

- Inverting goggle adaptation: Initially everything is upside down, but one adapts
- Mirror adaptation: objects initially seem on far side of glass, but one adapts.
- Cognitive orientation: Immediate change with change in belief, after a period of adaptation.

Side Viewing

- Mirror at 45 degrees in front of one: objects seem off to the left or the right

Extending to Video

- Video screens (or holograms) in front showing objects behind: objects seem to be behind
- Video screens in front showing objects to the side: objects seem to be to the side

Remote Video

- Video screens in front showing cameras attached to remote objects: objects seem to be in front of those objects.
- Video screen attached to remote robot body: objects seem to be in front of the robot.

Virtual Reality

- What about virtual reality?
- In the experience of virtual reality an illusion? Are things as they seem to be?

Permanent VR

- In "The Matrix as Metaphysics", I argued that if we've been in a VR all our lives, things are as they seem to be
- There are still tables and chairs: they're just constituted by computational processes (no worse than being constituted by quantum processes).

Virtual Objects

- If we're in a VR, we're perceiving virtual objects in a virtual space.
  - Virtual objects are real objects, though they're ultimately constituted by computational processes.
  - In a computer running VR, there really are virtual objects in a virtual space.

Virtual and Non-Virtual

- Virtual tables aren't the same as non-virtual tables (assuming we're not in VR)
- Virtual space isn't the same as non-virtual space.
- But it's a sort of space.

Spatial Functionalism

- Underlying this is a sort of spatial functionalism: space is what plays the space role.
- In VR, a computational relation between data structures plays the space role.

Temporary VR

- What about temporary VR?
- What if one enters VR with/without previous experience?
- With/without knowing it's a VR?

VR and Mirrors

- My view: the VR case is analogous to the mirror case.

Illusions in VR

- One can certainly get illusions in VR
- E.g. if one enters a VR without knowing it's a VR, one will perceive objects as in front of one (in ordinary space), when the objects aren't there.

Misperception

- On my view: one is perceiving virtual objects (which are in virtual space), but misperceiving them as real objects in real space.

Experienced VR User

- What about after much time in VR, when one knows one is in VR?


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Non-Illusion View

- After some time in VR, one adapts to VR, treating it as a separate space with separate objects.
- One takes the objects to be located in virtual space, as they are.
- One perceives the objects as located in virtual space too.

Sensorimotor Contingencies

- In realistic VR the sensorimotor contingencies are different
  - Movement and action involves different sorts of control, and special sensorimotor dispositions


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Sensorimotor Dispositions

- Also: distances initially look shorter than they are in VR, so one has to adjust action.


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Cognitive Orientation

- Upon entering VR the experienced user deploys cognitive orientation to virtual space, with its own sensorimotor contingencies
- As in the mirror case, this plausibly deploys a sort of special representation
- Veridical representation of virtual space.

Phenomenology of Virtuality

- Arguably: this cognitive orientation is associated with a distinctive phenomenology of virtuality
  - E.g. associated with visible and audible but intangible objects?
  - In mixed actual/virtual reality, one might have some of each

Robot VR

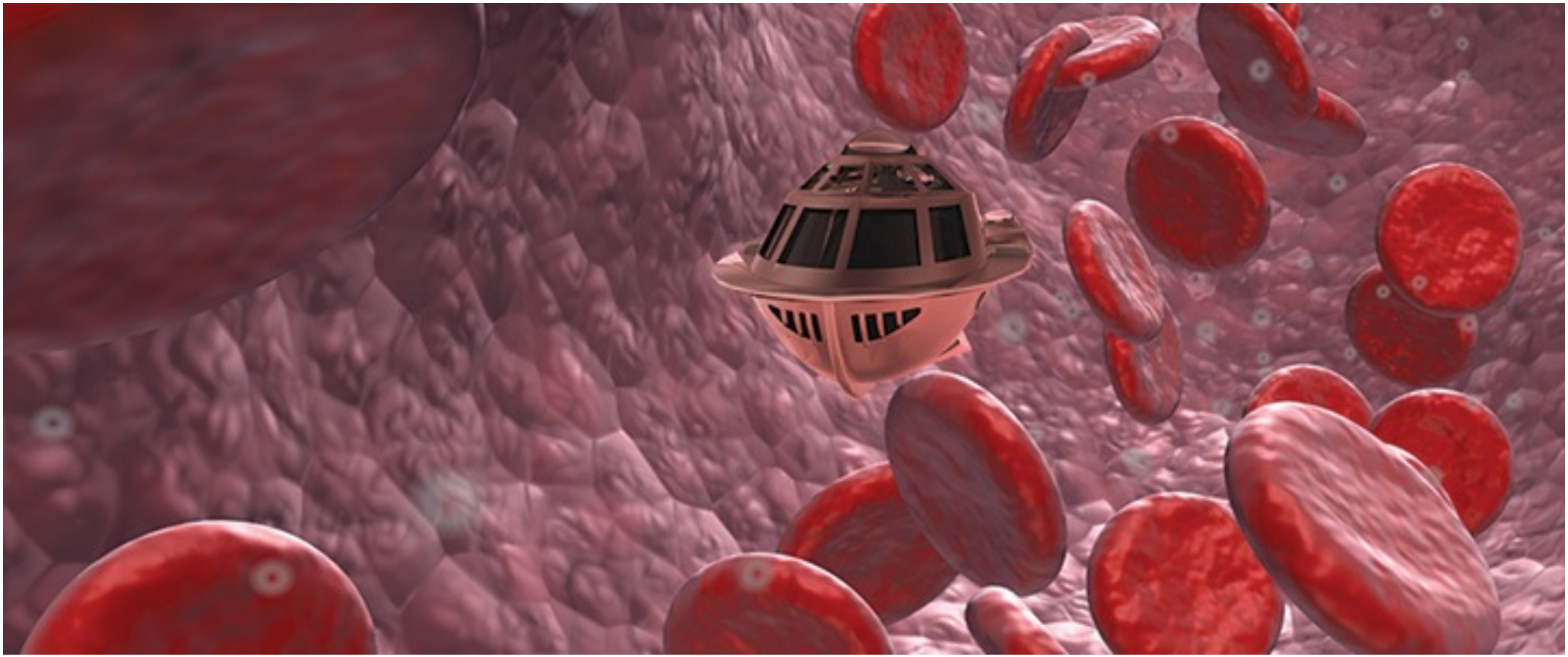
- What about virtual reality coming from camera on a robot body, with your actions controlling that body
- Plausibly: like the TV screen on that body.
- One is cognitively oriented to the robot, and thereby accurately perceives the space in front of the robot (whether or not there are special sensorimotor contingencies).

Temporary Perfect VR

- What about familiar/temporary use of perfect VR, deploying the same sensorimotor contingencies as in normal reality.
- Analogous to a perfect robot case: one is cognitively oriented to the VR, and thereby accurately perceives virtual space.

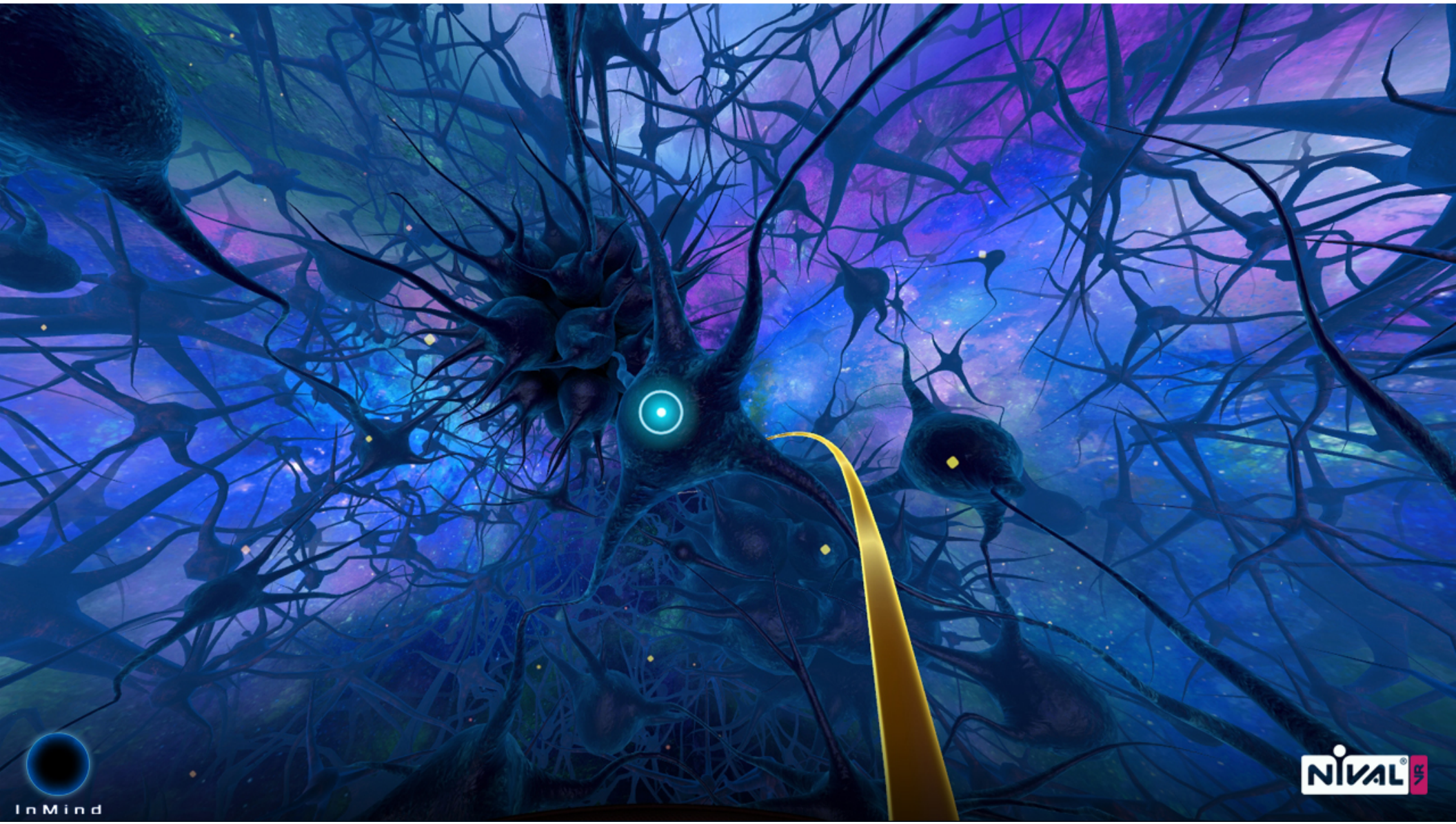
Fantastic Voyage

- Another analogy: temporary *Fantastic Voyage*-style shrinking, perceiving a shrunken world.
- At first (not knowing one has shrunk) one might have spatial illusions.
- But upon becoming cognitively oriented, one will veridically perceive the environment.



VR Fantastic Voyage

- The same goes for VR deriving from a shrunken robot body perceiving a shrunken world.
- With cognitive orientation, we'll veridically perceive that world.
- Same for VR deriving from virtual world.


InMind
NIVAL VR

Plausibility

- I think as we use VR more and more, this view will come to seem increasingly plausible.
- There will be illusions in VR, but these will be special cases where action goes wrong.
- Normal/familiar/expert action will be correctly representing virtual space.

Back and Forth

- What about people who go back and forth between normal reality and virtual reality?
- As long as they know which is which, their perception will be cognitively oriented, and will not be illusory.

Language in VR

- Plausibly: The meaning of language will also switch easily between e.g. "real object" and "virtual object" (or perhaps acquire a broader content that subsumes both).
- This plausibly already happens e.g.with virtual objects in video games.
- Like a knowledgeable Twin Earth switch case: 'water' switches from H2O to XYZ.

Open Questions I

- What are the precise conditions for representing virtual objects in virtual space? (When do we move from illusion to veridical perception, and in virtue of what?)

Open Questions II

- What to say about cases of mixed perception of virtual and real environments (e.g., augmented reality)?
  - If virtual objects are distinguishable: cognitive orientation for those objects?
  - If they're not: cognitive orientation to a disjunctive world?

Conclusion

- In everyday interactions with virtual reality, things are as they seem to be, much as in ordinary reality.
- This is one plank in making a general case: virtual reality is a genuine reality.


OCULUS