

Structuralism and the Limits of Skepticism

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Thalheimer Lecture 3

Skepticism and Realism

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- Skepticism: We don't know whether external things exist
- Realism: External things exist
- Anti-Realism: External things don't exist

- Realism tends to conflict with skepticism

Skepticism and Realism II

- Skepticism: We don't know whether things exist
- Realism: It's hard for things to exist
- Anti-realism: It's easy for things to exist

- Anti-realism tends to conflict with skepticism

Imperfect Realism

- Perfect realism: Things exist just as we conceive of them
- Imperfect realism: Things exist but fall short of how we conceive of them

Varieties of Imperfect Realism

- Anti-realism can yield an anti-skeptical strategy: e.g. phenomenalism and idealism
- Imperfect realism can also yield such a strategy: e.g. structuralism

Structuralism

- Structuralism: All truths are (grounded in) structural truths.

Structuralism About a Domain

- Structuralism about a domain: All truths about that domain are (grounded in) structural truths
- E.g. structuralism about mathematics, about physics, about computation, about space, ...

Structural Truths

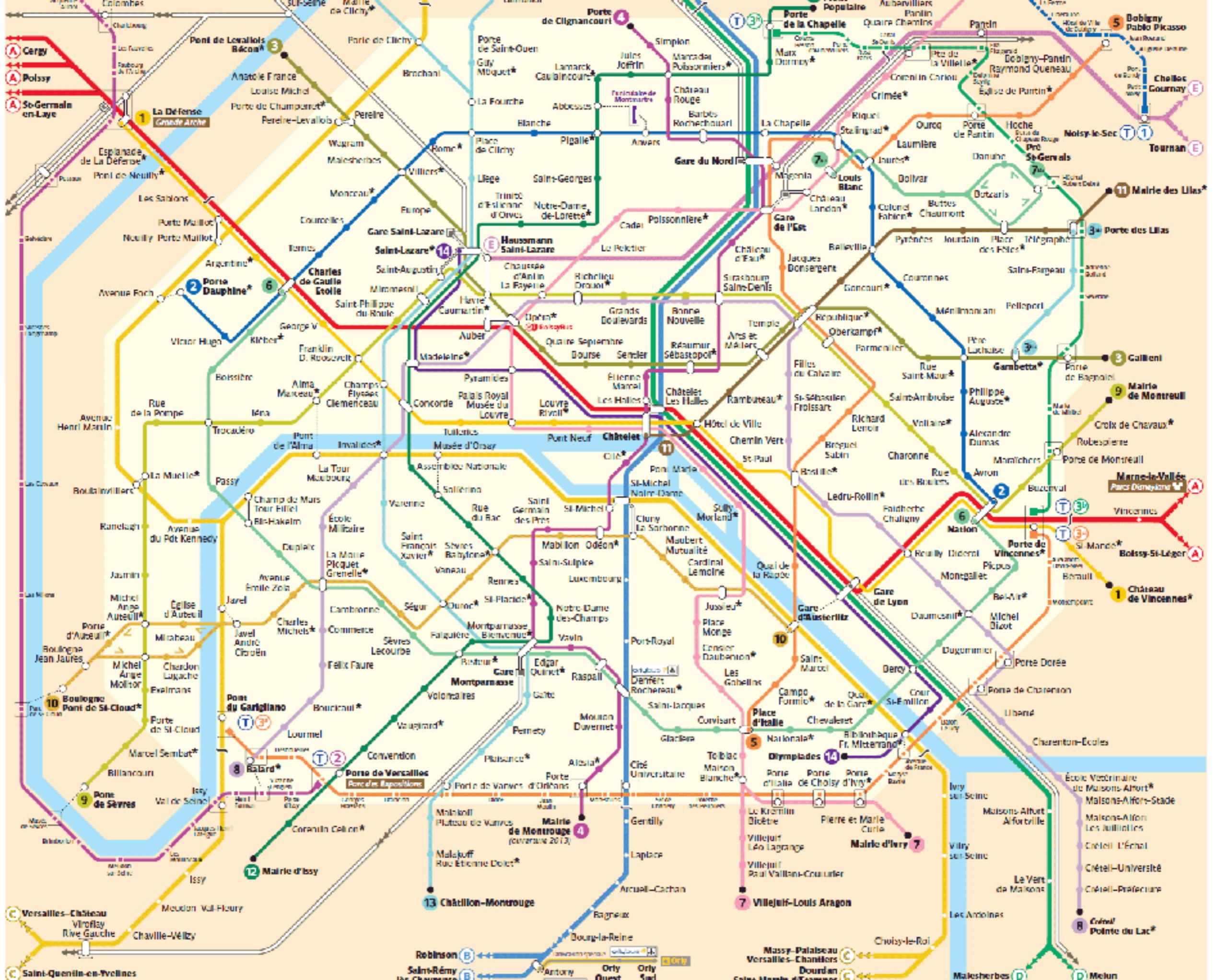
- Structural truths: truths statable in a structural vocabulary.
- Structural vocabulary: Logical/mathematical vocabulary, plus limited further vocabulary (usually relational).

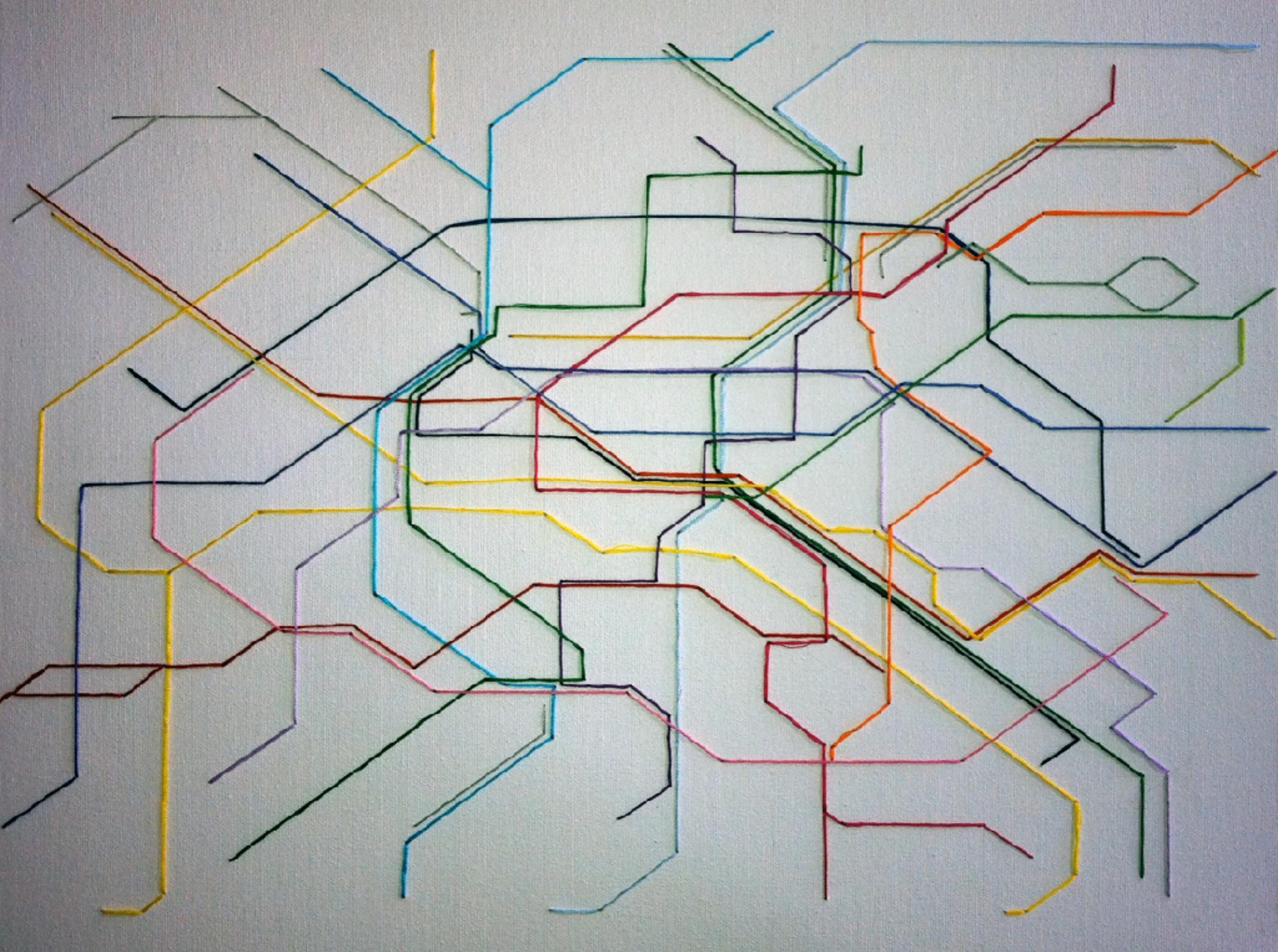
Logical Structuralism

- Carnap's *Der logische Aufbau der Welt* (*The Logical Structure of the World*): All truths are equivalent to truths in logical vocabulary
- There's a world-sentence of the form:
exists objects x, y , exists property p, q , exists relations r, s : $p(x) \& q(y) \& r(x, y) \& \dots$

World as Graph

- According to Carnap's logical structuralism, the structure of the world is represented as a giant graph of unlabeled vertices and lines





Newman's Problem

- Newman (1928): Logical structure is near-vacuous: a given structure can be found in any world containing the right number of objects.

Additional Structure

- So structuralists need additional structural vocabulary to constrain their descriptions
 - Carnap: naturalness (foundedness)
 - Russell: spatiotemporal copunctuality

Relational Structuralism

- Relational structuralism adds one or more basic relations to the structural vocabulary
- mereological relations (part/whole)
- grounding relations (fundamental/derivative)
- spatiotemporal relations
- causal relations

Causal Structuralism

- Causal structuralism (about domain X): All truths about domain X are grounded in causal/structural truths
- Causal/structural vocabulary: logic/mathematics plus causation [and/or lawhood, naturalness]

What is Computation?

- Illustration: the debate over the nature of computation in physical systems.
- What is it for a physical system to implement a given computation (algorithm, Turing machine, program, ...)?
- How does this ground the explanatory role of computation in cognitive science?

The Vacuity Objection

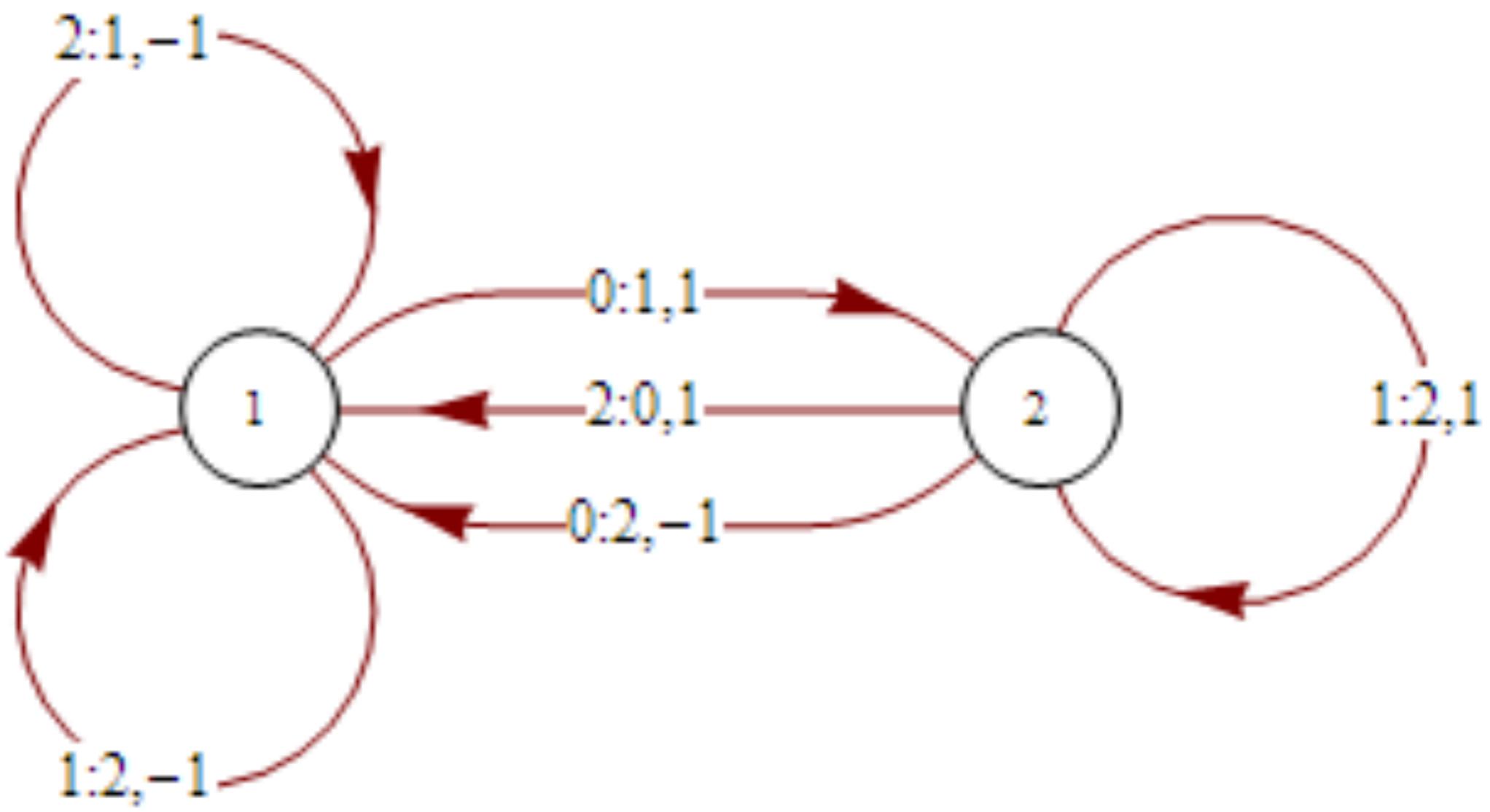
- Putnam, Searle: Every physical system implements every computation.
 - A rock implements any Turing machine
 - A wall implements Wordstar
- Computation is observer-relative, and one can always interpret a given system as implementing a given computation.

Response

- If the conditions on implementing a computation were merely logical/mathematical, they would be near-vacuous [cf. Newman's problem]
- But there are plausibly also causal conditions, which render the conditions substantive.

Causal Structuralism about Computation

- Causal structuralism about computation:
The conditions on implementing a computation are causal/nomic
- Roughly: The causal state-transitions between states of a physical system must reliably mirror the formal state-transitions between states of the formal system.



A Definition of Implementation

A physical system P implements a finite automaton M if there exists a mapping f that maps internal states of P to internal states of M , inputs to P to input states of M , and outputs from P to output states of M , such that: for every state-transition relation $(S, I) \rightarrow (S', O')$ of M , the following conditional holds: if P is in internal state s and receiving input i where $f(s)=S$ and $f(i)=I$, this causes it to enter internal state s' and produce output o' such that $f(s')=S'$ and $f(o')=O'$. (Chalmers 1996/2012)

Computation and Causation

- On this view, computational descriptions are abstract specifications of causal structure [cf. causal graphs]
- Can capture all sorts of causal structures
- Every system implements some computation, but not every computation.
- Main competition: semantic views.

Computation and Cognitive Science

- This view of computation goes with a corresponding view about explanatory role of computation in cognitive science

Causal Structuralism about Cognition

- Computational descriptions allow us to capture the (abstract) causal structures of cognitive systems.
- It is the abstract causal structure of cognitive systems that grounds their cognitive properties
- So computational properties in effect ground cognitive properties.

Cognitive Explanation

- Likewise, the key mechanistic explanation in cognitive science: explanation in terms of abstract causal structure
- Computation provides a general means for specifying causal structures here [of different sorts: classical, connectionist, ...]
- So computation allows general specification of this sort of explanation.

Functionalism

- This turns on an underlying functionalism (causal structuralism) about cognitive states: what it is to be in a cognitive state = playing a certain abstract causal role
- Opposition/qualification from biologicism, externalism, nonreductionism.

Overall Triad

1. Causal structuralism about cognition:
Cognition is grounded in causal structure
 2. Causal structuralism about computation:
Computation specifies arbitrary causal structures.
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3. Computationalism about cognition:
Computation can ground cognition.

Consciousness

- My view: functionalism is correct for some cognitive states, but not for conscious states
- What it is to be a conscious state is not a matter of playing a causal role.
- So conscious states aren't grounded in computational states (though they may still be lawfully determined by those states).

Limitations

- That's a limitation of computationalism in explaining the mind.
- It also suggests a limitation of causal structuralism in explaining reality.
- Facts about consciousness aren't reducible to facts about causal structure.

Causal/Phenomenal Structuralism

- If so: not all truths are grounded in causal/structural truths.
- But maybe: all truths are grounded in causal/phenomenal/structural truths
 - Vocabulary: logical/mathematical, causal/nomic, phenomenal
- World represented as causal graph with some phenomenal nodes?

Color

- E.g. causal/phenomenal analysis of colors
 - x is red iff x has the sort of property that normally causes reddish experience
- At least: color truths are epistemically equivalent to (or scrutable from) causal/phenomenal truths, if not metaphysically
 - Epistemic equivalence is what matters here.

Space

- What about space?
- Spatial primitivists think we have a primitive grasp of space, not functionally analyzable.
- Lecture 2: primitive space isn't instantiated in actual world.
- So the sort of space that is instantiated is functionally analyzable.

Spatial Functionalism

- Space = what plays the space role
 - Nonphenomenal roles: roles in (folk and scientific) physics
 - Phenomenal roles: roles in spatial perception
- Both are causal/nomic roles, latter has phenomenal role.

Causal Structuralism About Space

- Causal structuralism about space: space = whatever plays nonphenomenal nomic role of space in physical dynamics
- E.g. “distance = what there’s no action at”
- Newtonian differential equations

Causal/Phenomenal Structuralism

- Causal/phenomenal structuralism about space: space = whatever plays phenomenal (plus nonphenomenal) roles of space
- E.g. one-meter = what normally causes one-meter-ish experiences

Structuralism More Generally

- This causal/phenomenal structuralism can be extended to other domains:
 - mass, charge (Ramsey method)
 - time (temporal functionalism?)
 - macroscopic phenomena
 - ...

Hard Cases

- Hard cases (apart from space):
 - intentionality
 - normativity
 - ontology
 - quiddities
 - ...

Structuralism about Everything

- Possible view: causal/phenomenal structuralism about everything
- All truths are epistemically equivalent to (or at least a priori scrutable from) causal/phenomenal/structural/indexical truths
- See *Constructing the World*, chapters 7 and 8.

Consequences

- If this global causal/phenomenal structuralism is correct, it has some interesting consequences
 - for philosophy of mind and language
 - for virtual reality
 - for skepticism

Primitive Concepts

- It tends to suggest that our most primitive concepts (where the mind makes contact with reality) are causal, phenomenal, and structural concepts
- Maybe Edenic concepts of color, space, etc are also primitive (while not directly making contact with reality).
- Does this cohere with psychology?

Russell on Acquaintance

- Reminiscent of Russell's view that we have direct acquaintance with sense-data, certain universals, the self
- Maybe our basic phenomenal, causal, and indexical concepts are grounded in acquaintance with experience, with causation, and with ourselves?

Limits to Externalism

- On this view, the fundamental concepts appear to be narrow concepts
- not Twin-Earthable, content not determined by the environment
- Suggests a more basic level of internal content underlying externalist content

Virtual Reality

- It also tends to suggest: virtual reality can ground first-class reality.

Structure in Virtual Reality

- Basic idea: the relevant structures in reality can always be instantiated in virtual reality.
- If the relevant structures in reality are instantiated in a virtual reality, and if structural truths ground all truths, then all truths will hold in the virtual reality.
- So given structuralism, truths about nonvirtual reality also hold in virtual reality.

Computation and Virtual Reality

- Structuralism about computation: computation specifies arbitrary causal structure
- If so: the causal structure of reality can be specified computationally (e.g. simulating physics).
- So causal structure of reality can be instantiated in virtual reality.

Overall Triad

1. Causal structuralism about reality: Reality is grounded in causal structure
 2. Causal structuralism about computation: Computation specifies arbitrary causal structures.
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3. Computationalism about cognition: Computation can ground reality.

Limitation 1: Consciousness

- Causal structuralism doesn't work for consciousness: so one needs to ensure that relevant consciousness is present in the VR
- Multi-user VR, or functionalism about consciousness.
- Correspondingly, this structuralist reply to skepticism leaves open the problem of other minds.

Limitation 2: Epistemic Equivalence

- The structuralism I've discussed argues for epistemic equivalence between ordinary and structural claims, not metaphysical/modal equivalence.
- So if we're in a VR, ordinary truths hold (there are tables, which are virtual)
- But if we're not in a VR, they may not hold in a VR (it has virtual tables, not tables).

Limitation 3: Causal Differences

- There are some differences in causal structure between a VR and the corresponding non-virtual reality
- e.g. implementational details, levels underneath physics
- So some truths in non-VR may be false if we're in VR (e.g. “physics is fundamental”).

Upshot

- Still: if we're in an appropriately complex VR, with relevant computational structure connected appropriately to consciousness, most truths in a corresponding non-virtual world will still be true.

Generalizing

- More generally: a broad class of virtual reality scenarios (including realistic VR) are scenarios with real objects, true beliefs, and without perceptual illusions.
- Why? Structuralism about computation plus structuralism about reality.

Skepticism

- Finally, structuralism can also be seen as grounding a (limited) reply to skepticism.
- Or at least, a reply to global skepticism.

Global and Local Skepticism

- Global skepticism: for all we know, all of our positive beliefs about the external-world may be false.
- Global skeptical scenarios: e.g. brain in vat
- Local skepticism: for all p , for all we know, p may be false.
- Local skeptical scenarios: e.g. painted mule

Structuralism as a Reply to Skepticism

- Structuralism: Ordinary truths are equivalent to structural truths.
- In putatively skeptical scenarios, the structural truths are still true.
- So in putatively skeptical scenarios, ordinary truths are still true.

Causal Structuralism and Skepticism

- Here: ordinary truths are equivalent to causal/phenomenal/structural truths.
- Causal/phenomenal/structural truths are present in skeptical scenarios (e.g. Matrix)
- So in those skeptical scenarios, ordinary truths are still true.

Limitations

- Unlike Berkeley's analogous reply to skepticism, this reply undermines only some skeptical scenarios
- Those replicating causal/phenomenal structure of corresponding nonvirtual world — e.g. the Matrix.
- In other scenarios, only some of this structure will be present, so only some beliefs true.

Other Skeptical Scenarios

- Zombie scenario: Other-minds beliefs are wrong, others OK.
- Recent matrix: Perceptual beliefs are wrong, others OK.
- Macroscopic matrix: Micro beliefs wrong, others OK.
- Evil genius: Like matrix. (Genius as computer)
- Dream: Like matrix. (My brain as computer)
- Chaos: all beliefs may be wrong.

General Moral

- In a skeptical scenario, is there some explanation for the patterns in our experience?
- If yes: some relevant causal structure will be present, and some of our external-world beliefs will be true.
- If no: scenarios excluded by abduction.

Limited Anti-Skeptical Conclusion

- So: structuralism plus abduction may rule out global skepticism.

Overall Conclusions

- Spatial functionalism: space is what plays the space role
- Causal/phenomenal structuralism: all truths grounded in causal/phenomenal truths.
- Virtual realism: Virtual reality can ground much of ordinary reality.
- Anti-skepticism: Global skepticism is false.