Structuralism and the Limits of Skepticism

David Chalmers
Thalheimer Lecture 3
Skepticism and Realism

- 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 $r, s$: $p(x) \& q(y) \& r(x,y) \& \ldots$
World as Graph

- According to Csarnap’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.
• 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.

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
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.

3. Computationalism about cognition: Computation can ground reality.
Limitation I: 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.
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.
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.