How to be a Structuralist

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I henceforth refer to the "After Physics: The First Philosophy" handout as APTFP.

1 Structuralism: Preliminaries

As mentioned in APTFP §3.1-3.2, the most important motivation for structuralist *metaphysical* theses comes from philosophy of *symmetry*. It contains three steps:

• First Step: Notice that the fundamental laws of physics admit a certain group of symmetry transformations (that is, functions on the class of possible worlds that preserve, *inter alia*, the truth value of the fundamental laws).

• Second Step: Argue that the variant features under the symmetry transformations are (i) explanatorily redundant and physically superfluous, (ii) empirically undetectable or epistemically inaccessible. (This Step is uniquely Dasgupta's.)

• Third Step: All else being equal, we should prefer a theory that does not contain features which are either (i) or (ii) based on *theoretical virtue* reasons.

For more sophisticated renderings, refer to discussions on *symmetry* and *surplus structure* in philosophy of physics (e.g., Neil Dewar and Thomas William Barrett).

For a list of Structuralist and Anti-Structuralist positions, see the table at the end.

Question: Ted Sider's reservations about (i) and (ii).

2 Explanation Generates Modality

• Principle I: ϕ is metaphysically necessary iff ϕ is true in all possible worlds.

• Principle II: A possible world is a logically consistent recombination of the fundamental elements that is consistent with the *metaphysical laws*.

Remark: This or similar understanding of metaphysical modality is ubiquitous in contemporary literature (see APTFP §1.3 §2.3 §2.4, Cian Dorr and Andrew Bacon). *Question*: Other putative modal constraints that are not particularly appropriate to count as metaphysical laws, e.g., necessary *a posteriori*, *de re* modality.....

• Principle III: A proposition is fundamental iff it has no metaphysical explanation.

Question: Fundamental propositions need to satisfy FUNDAMENTAL COMPLETENESS, FUNDAMENTAL INDEPENDENCE, etc. (See APTFP §2.3.)

• Principle IV: If ϕ metaphysically explains ψ, then it is metaphysically necessary that if ϕ then ψ (that is, ψ is true in any possible world in which ϕ is true).

Remark: This kind of *non-factive* metaphysical explanation generates modal space, as it gives rise to the only constraints on the class of possible worlds (ignoring metaphysical laws). Facts about metaphysical explanation are "*prior*" to modal facts.

3 Strict and Loose: Facts and Labels

Shamik Dasgupta's distinction between strict and loose is in the venerable tradition of David Lewis's distinction between possible worlds and possibilities via counterpart relation (Lewisian Cheap Haecceitism) as well as Jeffrey Russell's distinction between thin possibilities and factual possibilities (Russell's Qualitativism).

This distinction is crucial and ingenious in at least two aspects:
• Postmodal metaphysics makes fine-grained distinctions between grounding and grounded facts, fundamental and non-fundamental elements. But there is a further coarse-grained distinction between factual matters and non-factual matters.
• After one gives an adequate articulation of the fundamental metaphysics of a structuralist position, its success then hangs centrally on how one interprets those bits of vocabulary that stand for anti-structuralists' fundamental metaphysics.
Question: Can this non-factualism be employed to other structuralist theses?

• ϕ *strictly explains* ψ iff either ϕ settles ψ (where settlement is non-factive grounding), or ψ is non-factual and ϕ explains that an utterance of ψ is correct.
• ϕ *loosely explains* ψ iff ϕ settles ψ.

By Principle III:
• ϕ is *strictly fundamental* iff no proposition settles ϕ, and either ϕ is factual or ϕ is non-factual but no proposition explains that an utterance of ϕ is correct.
• ϕ is *loosely fundamental* iff no proposition settles ϕ.

By Principle II:
• A *strictly possible world* is a logically consistent recombination of factual propositions which no proposition settles (i.e., of strictly fundamental propositions).
• A *loosely possible world* is a logically consistent recombination of all propositions which no proposition settles (i.e., of strictly fundamental *and* non-factual props).

Absolutist Reality:
Absolutist facts are factual and both strictly and loosely fundamental.
Comparative facts are factual but neither strictly nor loosely fundamental.
Absolutist facts settle and both strictly and loosely explain comparative facts.
Comparative Reality:
Comparative facts are factual and both strictly and loosely fundamental.
Absolutist facts are non-factual and loosely but not strictly fundamental.
Comparative facts do not settle, and strictly but not loosely explain absolutist facts.

Question: It is clear that loose explanation implies loose entailment. Do strict explanation implies strict entailment? But note that there is no fact of the matter as to whether a given loose fundamental fact holds in a given strict possible world! Thus strict modality and strict explanation violate Principle IV.

Anti-Structuralism	Structuralism	Symmetry Operation
Individuals	Qualitative Structures	Permutation
Properties	Nomic Structures	Permutation
Absolute Quantities	Comparative Relations	Scale Change
Spacetime Points	Spatiotemporal Relations	Shift/Diffeomorphism
Absolute Velocity	Relative Velocity	Boost (Galilean Tf.)
Absolute Simultaneity	Relative Simultaneity	Lorentz Transformation
Absolute Present	Relative Present	Temporal Translation
Absolute Handedness	Congruence Relation	Mirror Reflection
Gauge Potentials	Gauge-invariant Quantities	Gauge Transformation

Please do not circulate.
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