Constraining Metaphysics: Theories, Structures, and Ontology

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0.0 Introduction and Aim

The early twentieth century saw the rise of a broadly anti-metaphysical spirit which was perhaps best exemplified by Carnap's "Empiricism, Semantics, and Ontology."[1] In that work, Carnap posited linguistic frameworks as systems of rules that enable communities of speakers to talk about salient entities. According to Carnap, we come to select linguistic frameworks on the basis of thoroughly pragmatic considerations. Linguistic frameworks involve two kinds of ontological questions. *Internal questions* concern the status of entities posited by particular frameworks and *external questions* either concern the status of linguistic frameworks themselves or the extra-linguistic nature of entities posited by particular linguistic frameworks. According to Carnap, traditional metaphysical questions such as "Do the *X*'s *really* exist?" fall into the latter category (as they attempt to get at the extra-linguistic nature of entities) and are semantically vacuous insofar as they attempt to ask about *X*'s in way independent of the system of rules governing the use and meaning of '*X*'. Some external questions are legitimate and meaningful, namely those that concern whether or not we ought to accept a framework. Importantly, when we accept a particular framework (say one which enables talk of *X*'s) as satisfactory for our purposes, we can truly and meaningfully say that there are *X*'s insofar as the framework we have come to accept employs talk of *X*'s.

A key criticism of Carnap's view was leveled by Quine. Quine famously questioned the validity of the analytic/synthetic distinction and called for its dismal.[2] Quine's argument has been very influential and most philosophers have subsequently followed Quine in rejecting the analytic/synthetic distinction. For Carnap, the untenability of the analytic/synthetic distinction seems to be a decisive objection to the plausibility of linguistic frameworks in the first place at least insofar as the internal/external distinction presupposes the analytic/synthetic distinction.[3]

The aim of this paper is to offer an alternative to Carnap's linguistic frameworks that avoids the presupposition of both the internal/external distinction and the analytic/synthetic distinction while retaining Carnap's anti-metaphysical spirit.

To this aim, I will adumbrate what I call the *Structure Constrained Ontology* (henceforth, SCO) view which takes as its central thesis an articulation of the linguistic relationship between *theories* (sets of statements or assertions) and *structures* (the things which interpret and make theories true). Through the course of outlining this view, I will come to discuss the theoretical commitments of the view, how the view differs from Carnap's proposal, how the view attends to metaphysical assertions, and then finally how the view avoids the major pitfall of Carnap's proposal.

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[1] See Carnap (1950).
[2] See Quine (1951).
[3] See Yablo (1998) pp. 229-242 for a thorough explanation of Quine's critique.

1.0 Structure Constrained Ontology: Overview

The view I call SCO is a meta-ontological/meta-philosophical position according to which traditional metaphysical utterances like "The *X*'s *really* exist" are understood to be meaningless. In this respect, SCO is in agreement with Carnap's linguistic frameworks proposal. The view also differs sharply from Carnap's proposal in a few key respects. On the SCO view, there is no sense in which there are distinct linguistic frameworks or systems. According to SCO, *theories* (sets of statements) and *structures* (things that interpret theories) are embedded into and are continuous with other theory-structure pairs, language games, and linguistic activities. Thus, there is no sense in which one speaks internally or externally to a theory-structure pair.

The key tenet of the SCO view is that theories and the statements that comprise them are made meaningful and true by the structures that interpret them. This basic configuration is a familiar presupposition of model-theory and formal semantics. On the SCO view, such a configuration is given a strict and literal reading. What accepting such a tenet precludes is the ability for statements or structures to reach out in some transcendental relation to the world. According to SCO, structures do not represent the world, statements are not true or false of the world, and non-logical linguistic terms do not refer to things in the world. Each of these sorts of claims, the proponent of SCO contends, is to violate the logical relationship between theories and structures in the first place. That is to say, to assert that there is a relationship between a structure and the world is just to invoke a theoretical claim and one which itself must be given an interpretation and structure. But if structures make true and meaningful theoretical assertions, then there is no sense in which structures can stand in a relationship to the world *qua* world in the first place.

If one were to desire to do traditional metaphysics, one would need to be committed to the existence of a transcendental relation between word and world. Such a relation could take many forms. It could, for instance, be a representation relation between structures and objective structures in the world or a kind of truth-correspondance relation. But such commitments are unattractive insofar as they propose empirically unobservable relations between linguistic items and the world. Further, just what these relations are supposed to amount to remains a sore subject of controversy and then there's the further question of how one is supposed to adjudicate between the various proposed analyses of those relational concepts. What these considerations ultimately show is that traditional realism is committed to empirical unobservable relations whose respective analyses are radically undetermined by available empirical evidence. Such commitments appear untenable and motivate the key tenet of SCO.

On the SCO view, there is room for both substantive metaphysical disagreement and ontology. Metaphysicians can debate whether or not a particular structure is the one we should accept to be the best interpretation of a theory, whether one theory or another is the best description of a structure, and in some cases they can decide whether a structure for one theory can also act as a structure for others (thereby linking the two theories together under one structure). Furthermore, ontology is recast as the activity of clarifying and characterizing ontological concepts like 'sets', 'objects', 'relations', and so on by way of formal theories. Such concepts are invoked and presupposed in the construction of

structures for other theories. In this way, we can separate ontological work of this kind from 'metaphysical' work. In other words, some theories and their corresponding structures define an ontological concept and these theories and their corresponding structures provide the conceptual building blocks for higher-level theories. This contrasts with traditional metaphysical theories that either attempt to link some class of statements to the world (bypassing structures) or by holding that the structures themselves stand in some relationship to the world.

In short, the core commitments of SCO are given as follows:

(1) The meanings and truth-conditions of theories are always given by structures.
(2) There is no meaningful sense in which structures or theories "reach out into the world."
(3) The items of a structure can be interpreted by phenomena but this is a process of associating observable or sensory experiences or features with items in the structure.
(4) Ontological theories (by this I mean the theories that characterize ontological concepts) have as the constituents of their structures what amount to conceptual "building blocks" which are ways of organizing, categorizing, and dividing up our phenomenal experience whose characters are made explicit by the particular ontological theory itself. Such defined building blocks are utilized in constructing other theories.
(5) Theory-structure pairs are embedded into and continuous with other theory-structure pairs, language games, and linguistic activities. As such, there is no internal/external distinction to be drawn.
(6) Because structures are the items that make theories and their statements true, there is no distinction to be drawn between analytic and synthetic statements. The very concept of analytic or synthetic statement is undermined by the SCO proposal. All sentences are true or false in virtue of the structure that interprets them and there can be any number of structures that interpret the same theory and its sentences.

I will spend some time elaborating and making explicit these commitments below.

1.1 Structure Constrained Ontology: Components

In this section, I'll spend some time explicating the key components of SCO and how they interact. I'll begin by giving a brief overview of the chief components. The basic building blocks of the view that I have in mind are given as follows:

Theories	Linguistic items that describe a structure. A theory can be broadly conceived of as a set of statements or assertions.
Structures	Linguistic items that interpret theories. In most cases this involves setting up the truth-conditions for statements in a theory, assigning each non-logical term in the theory with an item in the structure, and assigning a truth-value to each sentence in a theory.
Phenomenal Structures	Particular regimentations of phenomenal and sensory experience.

Phenomenal Experience The aggregate unity of our sensory experience.

Each of these components should be familiar and intuitive. The major inspiration for the conception of *theories* and *structures* laid out here is found in the familiar model theory (more on this later). *Data structures* are commonly invoked as the intermediary between observed *phenomena* and *structures* in the philosophy of science.[4] *Phenomenal experience* is just the unity of our first-person sensory experience.

Historically, model-theoretic conceptions of 'theory' have dominated analytic philosophy.[5] On the model-theoretic view:

[a] A *theory* is a set T of sentences which is consistent and closed under logical consequence; in other words, T has at least one model, and $\tau \in T$ whenever τ is a sentence such that $\text{sig}(\tau) \subseteq \text{sig}(T)$ and $M \models \tau$ for all $M \in \text{Mod}(S)$ (where the *class of all models* of S is denoted $\text{Mod}(S)$ and sig(S) denotes the *signature*[6] of S).

Such a conception of 'theory' takes its inspiration from systems of first-order axioms. Conceiving of a theory solely in this way is probably inadequate, however. For starters, the conception precludes many formal system that are presently employed to do theoretical work (those that are built off of lambda calculus come to mind) which we would naturally want to call theories. Second, adequate model theories have not been developed for many higher-order logics that are required to formalize many theoretical systems that are presently employed in theoretical physics and mathematics. Third, many theories do not exhibit the degree of formalization required by the model-theoretic conception.

So, by 'theory' I have in mind something more expansive than a strictly model-theoretic conception. The proposal here takes a theory to simply be a set of statements or assertions. On such a view, theories need not be consistent (though it is desirable that they be). Theories need not be formalized or formulated within an artificial language though many are. The idea here is that a theory is a set of grammatically concatenated strings of symbols that acquire their meaning and truth-values by way of an interpretation supplied by a structure. The selection of a particular interpretation is subject to pragmatic considerations in a particular context and the assignment of an interpretation indicates the acceptance of a use and meaning for the symbols employed in the theory.

The word 'structure' is notoriously ambiguous. The most familiar notion is probably that employed in model theory (what I shall call Tarskian structures) which are essentially interpretations of first-order theories. A Tarskian structure that makes all of the statements of a theory true is called a *model* of that theory. It is important to note that there is also a more general sense of a structure which is simply a class of entities along with a class of relations defined on those entities[7] (a definition which is compatible with the non-objectual structures employed in category theory). Both kinds of structure can be said to interpret

[4] See Brading and Landry (2006).
[5] Consider the so-called syntactic view of scientific theories popular among logical positivists.
[6] The set of non-logical constants employed by the theory.
[7] See Roman (2011) pp. 229 and Suppes (2002).

theories though the specific ways in which they do so are very different. I do not intend this paper to be a survey of formal systems, so I will prescind from the technical details about how this is possible here.[8] So by 'structure', I do not necessarily mean first-order Tarskian structures. Essentially, a structure is a domain of salient items suitably organized to support the interpretation of things like predicates, operators, functions, and the like. I also envision such structures to be equipped with a truth-function that assigns all or some of the statements of a theory with truth-values according to some procedure or stipulated set of truth-conditions. Such structures need not be classically constrained (more on this later) and the truth-functions do not need to be total. Such a conception of structure squares with the broader use of the word structure as it is employed throughout mathematics and formal semantics. So, structures here include Suppes's set-theoretic structures[9], modal logic's Kripke frames, categories, propositional interpretations, Tarskian structures, and more.

Many philosophers of science have noted that the process of getting to a theory or a model of a theory is not as straightforward as one might think. There is growing consensus that observed phenomena comes pre-structured (what I call a *data structure*) and that it is from the structure of the phenomena that one constructs their scientific theories and/or models, not from the phenomena directly.[10] The takeaway idea is that we can organize or regiment our phenomenal experience in many different ways and each of these different ways is what I call a 'data structure.' According to the SCO view, there is no 'correct' way to organize or regiment our phenomenal experience but there may be better ways at least insofar as a particular data structure better satisfies pragmatic criteria (theoretical virtues) toward the end of some cognitive project than the rest.

Lastly, by 'phenomenal experience' I intend simply the unity of our sensory experience. What the constituents of our phenomenal experience are I leave open here. The only claim that I wish to make about phenomenal experience is that we associate certain items in our theories and structures with certain phenomenal experiences. This should not necessarily be understood as a reductive claim or a claim about the meaning of the items in a structure or theory but rather simply the claim many of the items that constitute a structure are often distinguished by the phenomenal experiences that we associate with them.

The figure below illustrates the relationship of these parts:

[8] See Suppes (2002) for an overview of how various structures can be taken to interpret various theories.
[9] See Suppes (2002).
[10] Or at least the claim that we develop our scientific theories and/or models from the phenomena directly is very controversial. See Brading and Landry (2006).

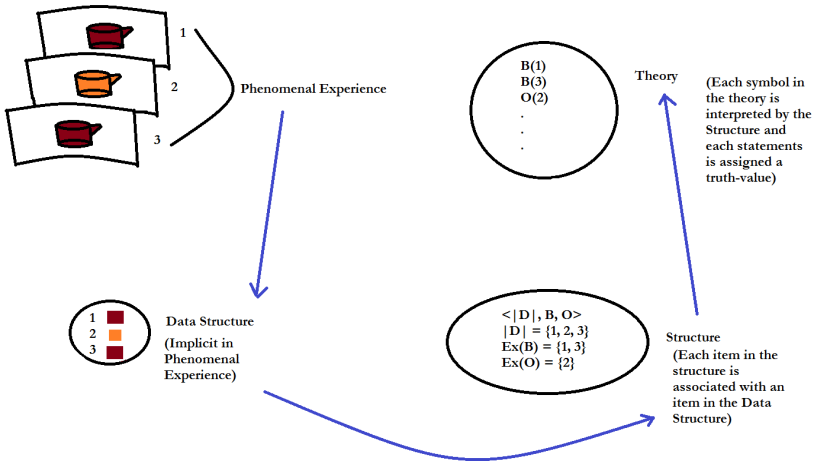

Fig. 1

Here, one has the phenomenal experience of seeing a brown cup at time one, an orange cup at time two, and a brown cup at time three. That gives rise to a specific data structure. The data structure in turn supports the construction of a structure which interprets and makes true the statements of the theory. To illustrate the connection between the different building blocks, the particular case is kept very simple and utilizes only the familiar model-theoretic notion of structure and theory. Each item in the structure is associated with various phenomenal features 'B' being associated with the color brown, for instance. I note that certain features like the truth-function equipping the structure have been omitted from the illustration.

I must stress that theory construction is not necessarily a process of constructing a theory from the "bottom-up." Indeed, the colored-cup theory invokes ontological concepts that are themselves explicitly defined by other theories - namely, the concepts of "property-hood" and "object-hood." Theories and structures are always constructed in a milieu of other (background) theories and structures. It is also important to note that the structure illustrated in Fig. 1 is just one of any number of structures that could be taken to interpret the color-cup theory. The selection of a structure to interpret a theory or the selection of a theory to describe and be interpreted by a structure parallel Carnap's selection of linguistic frameworks at least insofar as the process is thoroughly a comparative and pragmatic one. One structure may be more parsimonious than another, a particular theory may be easier to implement as a computer program, a particular theory-structure pair may cohere best with another accepted theory-structure pair, and so on.

Having laid down the basic building blocks and how they are related, I will now turn to explicate a few other salient issues more fully.

1.2 Structure Constrained Ontology: No Linguistic Frameworks

A crucial difference between the SCO proposal and Carnap's linguistic frameworks is the idea that on the SCO view, there are no sharp boundaries between "language systems." Theories, structures, meta-languages, patterns of use, fragments of language be they artificial

or not, are interconnected in such a way so as to preclude the idea of sharply bounded language systems in the first-place. Theories are interpreted by structures, a process that is pragmatic and which participates in wider language activities (like playing the reasons game and naming baptisms). Such theories invoke ontological concepts that are characterized by ontological theories. In this way, each 'non-ontological' theory has many theories utilized and presupposed in its background. Furthermore, a particular structure that is used to interpret one theory may be simultaneously used to interpret another theory. In some such cases, the items constituting the structure are associated with multiple phenomenal or sensory features. Such cases are examples of what I call *intertheoretic structures* which are structures that are used to interpret many theories.

Theories and structures are constructed within meta-theories which are often fragments of natural or artificial language (though they need not be). Such fragments employ other theory-structure pairs in turn. The process of constructing a theory or a structure finds one naturally embedded in a larger milieu of various other theories, structures, and language activities each of which is continuous with other theory-structure pairs and language activities. So, on the SCO view, there are no autonomous linguistic systems. Accordingly, there is no internal/external distinction to be drawn on the SCO view, because there is no place to draw a sharp boundary which would distinguish "being inside" a language system and "being outside" it.

Traditional metaphysical statements are meaningless not because they exceed the rules of use constituting a linguistic framework, but because they violate the logico-linguistic relationship between theory and structure.

Thus, the SCO view is immune to the chief criticism leveled against Carnap's linguistic frameworks proposal - there is no internal/external distinction on the SCO view and no analytic/synthetic distinction introduced thereby.

1.3 Structure Constrained Ontology: Representation

The SCO view rejects the view that names refer to entities in the world, that statements stand in correspondence to the world, and that structures represent the world. The first two claims are implicitly rejected by the core thesis of the SCO view. Upon accepting the core thesis of the SCO view, all of the three transcendental theses are shown to be meaningless. Consider the claim that:

[*] Structures represent the world.

Now, that claim, [*], is a statement at least insofar as it is intended in the indicative mood and is a grammatically correct string of symbols. It is thereby a theory in the sense that I have defined above. According to the key tenet of SCO, theories and their statements are only made true and meaningful by the structures that interpret them. Furthermore, structures and their constituents are linguistic items. But then there is no way to model the relationship between a structure and the world *qua* world only world *qua* linguistic item of a structure. The claim then that structures represent the world thereby has no interpretations

that can model the relationship between a structure and the world *qua* world. As such, the claim is meaningless.

The chief argument motivating the core tenet of SCO, I have already alluded to. For one, the idea that names refer to entities in the world, that statements stand in correspondence to the world, or that structures represent the world would require a commitment to a transcendental relation between linguistic items and the world. Such a relation is empirically unobservable and whatever analysis that one might give to the define the relation is undetermined by empirical evidence. To the anti-metaphysician, such commitments are mysterious, intractable, unnecessary, and ought to be given up.

I should note that there are at least two kinds of representation that are acceptable under the SCO view. The first is the idea that various items in a structure can be said to represent various sensory or phenomenal features. This kind of representation is little more than stipulating that a particular item of a structure stands for a particular feature of our phenomenal experience. The second kind of representation is the kind found in so-called representation theorems whereby a particular model is taken to be representative of a model class.[11] Both kinds of representation seem indispensable for theoretical inquiry and the SCO view does good by them.

2.0 Avoiding the Analytic/Synthetic Distinction

A string of symbols can have multiple interpretations (structures interpreting them). This is true of any string of symbols whether statements of pure logic, mathematics, science, or otherwise. Under some of these interpretations the symbols will come out true, under others they will not. There is no stable sense in which a string of symbols can be said to be analytic or not. They are true or false under different interpretations. Recollect further that each statements may very well be interpreted by numerous structures.

But what about the tautologies of say propositional logic? Aren't those good candidates for being analytic statements? What justifies the move to say that propositional tautologies are analytic is that they are true under any classically constrained zero-order structure - in other words, there is no way for a statement like $p \rightarrow p$ to come out false under any classically constrained zero-order structure. The idea I have in mind is that the structures which interpret statements like $p \rightarrow p$ may not come out true under certain non-classical structures - say one in which '$\rightarrow$' is handled in a manner different than that of the material conditional. With this more expansive notion of structure in mind, even the purportedly analytic statements of propositional logic cannot be said to be in a stable sense analytic or not.

Furthermore, insofar as the meanings of the statements of any theory in some way trace back to phenomenal experience there is no principled grounds for asserting that a statement is synthetic on the basis that some symbols are associated with phenomenal or sensory experience and others not. Every structure that interprets a theory invokes some ontological concepts, and these ontological concepts are all manners by which to divvy up one's phenomenal experience. This is true of many ontological theories as well.

[11] See Suppes (2002) pp. 57-63.

3.0 Concluding Remarks

The view that I have outlined stays true to the broadly anti-metaphysical spirit exemplified in Carnap's "Empiricism, Semantics, and Ontology" while overcoming the shortcomings of the linguistic frameworks proposal. The SCO view rejects the idea that there are autonomous language systems and thereby avoids commitment to the internal/external distinction. Because of this and for other independent reasons, the SCO view does not presuppose the analytic/synthetic distinction overcoming the major criticism to Carnap's original proposal.

4.0 Bibliography and Works Cited

Brading, Katherine and Elaine Landry. "Scientific Structuralism: Presentation and Representation." *Philosophy of Science* no. 73 (2006): 571-581.

Carnap, Rudolph. "Empiricism, Semantics, and Ontology." *Revue Internationale de Philosophie* no. 4 (1950): 20-40.

Frigg, Roman. "Everything you wanted to know about structural realism but were afraid to ask." *European journal for philosophy of science* 1 no. 2 (2011): 227-276.

Quine, Willard Van Orman. "Two Dogmas of Empiricism." *The Philosophical Review* no. 60 (1951): 20-43.

Suppes, Patrick. *Representation and Invariance of Scientific Structures*. Stanford, CA: CLSI Publications, 2002.

Yablo, Stephen. "Does Ontology Rest on a Mistake?" *Aristotelian Society Supplementary Volume* 72 no. 1 (1998): 229-262.