INTERVIEW WITH GILA SHER BY CHEN BO – PART II

SUBSTANTIVE THEORY OF TRUTH

1. OUTLINE OF SUBSTANTIVE THEORY OF TRUTH

CHEN Bo (hereafter, 'C' for short): Truly speaking, when I read your substantive theory of truth and foundational account for logic, I'm quite excited: these are what I like and what I want. I strongly agree with you about truth: the concept of truth is very substantial, utterly non-trivial. When we say a sentence is true, we do a significant thing: comparing what the sentence says with the situation in the world; in so doing, we need evidence, justification, clarification, and many other intellectual endeavors. Moreover, the concept of truth is essentially loaded with a metaphysical and epistemological burden which cannot be deflated. Could you sum up what you have done in developing a substantive theory of truth? What are the main claims of your theory of truth? What open questions are there still waiting to be answered? What further work is still waiting to be done?

Gila Sher (hereafter, 'S' for short): What I have done so far in my work on truth can be divided into two parts: I. An explanation and articulation of the substantivist approach to truth and a critique of the deflationist approach. II. A development of a new, substantivist theory of truth and articulation of some of its general principles: (i) the "Fundamental Principle of Truth," (ii) the principle of "Manifold Correspondence" (and a new theory of Mathematical Truth based on, and

exemplifying, this principle), and (iii) the principle of "Logicality" (and a new interpretation of Tarski's theory of truth, related to this principle.

I. *Substantivism with Respect to Truth and a Critique of Deflationism.* My substantivist approach to the theory of truth is rooted in my general approach to knowledge, including philosophical knowledge: For a field of knowledge, or a theory within this field, to be epistemically worthwhile, it has to be substantive in the everyday sense of the word (deep, important, explanatory, etc.), or at least seriously aim at being substantive. This is a central part of my general principle of epistemic friction. Now, I believe that the subject-matter of the theory of truth is substantive in this sense and that it is important (and possible) to develop a substantive theory of this subject matter. This is the root of my substantivist approach to truth. My objection to deflationism, or rather to those versions of deflationism which say that the subject-matter of the theory of truth is largely trivial and that an adequate theory of this subject-matter could, and indeed should, be trivial as well, follows directly from my general substantivist approach to knowledge. One such version of deflationism is advanced by Paul Horwich in the first pages of his book *Truth* (1990), so my objection has at least one real, and indeed influential, target.

In explaining my substantivist approach to truth and its theory, I emphasize a number of things. One of them is a reason truth is important for human beings, and another is a challenge facing the theory of truth. Deflationists usually say that there is one reason we, humans, need a concept of truth or a truth-predicate, and it is largely technical and linguistic/logical: to help us make certain claims that it would be more difficult (though often not impossible) to make otherwise. For example, we may want to assert the claims of relativity theory but find it difficult to

formulate all its claims, so we may simply assert: “Relativity theory is true.” Or we may want to assert the law of excluded middle but find it difficult to formulate it in full generality. So we may assert instead: “The law of excluded middle is true.” In my view, this is at most a secondary reason for our interest in truth. A more important and deeper reason for our interest in truth, and one that explains why truth is *very* important for humans, comes from what I call “our basic cognitive/epistemic situation:” For one reason or another we, humans, want to know and understand the world we live in in its full complexity. But such knowledge is very often difficult for us. We don’t automatically know the world, and in fact we have several limitations that make us prone to error. For this reason, we need to create a norm of correctness, a norm that enables us to distinguish knowledge of the world from mere fiction about the world and guides us in our attempt to acquire such knowledge. Truth is such a norm. It is one of the most important norms guiding our pursuit of knowledge. (In the book I explain why it cannot be replaced by some other norm, e.g., the norm of justification.) But the norm of truth is not just a norm we need. It is also a norm we can make use of. Alongside our cognitive limitations, we also have certain capacities that enable us to make use of the norm of truth – in detecting errors, making discoveries, justifying/refuting our hypotheses. The combination of seeking to know the world, needing a norm of correctness (that is not reduced to justification), and being able to make use of this norm explain why truth is so central and fundamental for humans (above and beyond any technical use of the kind identified by deflationists).

But in trying to develop a theory of truth we come up against great difficulties. One of these arises from the enormous scope and great diversity of the world as target of our knowledge and, accordingly, of the enormous scope of truth and the great diversity of situations to which it has to

apply. This gives rise to a severe problem of "disunity" in the field of truth: Is truth in everyday physics based on exactly the same principles as, say, truth in mathematics? This problem is further magnified by philosophers' habit of thinking of the theory of truth as taking the form of a single and simple definition or definition-schema. Given the disunity problem on the one hand and philosophers' expectations of the simple form a theory of truth would take on the other, it is not surprising that many philosophers despaired of the feasibility of a substantive theory of truth. My own solution to the disunity problem of truth is to adopt a solution recommended by some scientists and philosophers of science to the disunity problem in science. According to this solution, we need to find a fruitful balance between the generality and particularity/diversity of our scientific theories. Similarly, we need to find a fruitful balance between the generality and particularity/diversity of the theory of truth. The theory of truth is a family of theories of various degrees of generality, some attending to the universal principles of truth, others to its more particular principles. This approach places me in a group of recent pluralists with respect to truth, such as Crispin Wright and Michael Lynch. But my approach differs from theirs in two significant ways: (a) Wright and Lynch treat the universal principles of truth as "platitudes," hence as non-substantive principles. In contrast, I view these principles as substantive principles, requiring a substantive account. (b) Wright's and Lynch's pluralism is more radical than mine. While they allow that in different fields truth is based on radically different principles, say, correspondence in physics and coherence in mathematics, I require greater unity in the theory of truth. For reasons that I will explain shortly, truth, for me is always correspondence, but the "patterns" of correspondence may vary from field to field.

II. *Positive Development of a Substantivist Theory of Truth.* In searching for both general and particular principles of truth, my general approach can be summed up by three words from Wittgenstein: "Look and See." Don't decide in advance what truth is or must be, but look and see! My first step of "looking and seeing" was the one described above: looking and seeing how the basic human cognitive/epistemic situation raises both the need for a norm of truth and the ability to make use of such a norm. The next steps lead to several universal principles of truth. Three of these are:

1. *The Fundamental Principle of Truth.* To arrive at this principle, I start with a semi-Kantian question: Under what conditions is a full-fledged concept of truth possible for humans? What cognitive capacities, or modes of thought, are needed for such a notion to arise? My investigation of this question leads to the following answer: For a concept of truth (of the kind that we, humans, need and can use in the context of our pursuit of knowledge) to arise, we need (at least) three modes of thought. I call these the "immanent," "transcendent," and "normative" modes. First, we have to be able to look at the world and attribute some properties (relations) to something in it. Without this, we have no occasion to raise the question of truth (the question whether X is true or correct about the world). I call this mode of thought "immanent" because it is the mode of thinking *from within* a theory – thinking that the world is so and so, object *o* has property *P*, etc. But this mode by itself is not sufficient for truth. To have a concept of truth we need to step *outside* our immanent thoughts and occupy a standpoint from which we can see both our immanent thoughts and those aspects of the world they target. (For example, we need to be able to see both the thought that snow is white and snow and its color.) I call such a standpoint a "transcendent" standpoint. To avoid misunderstandings, I explain that all we need is a *humanly-*

transcendent standpoint, not a Godly standpoint. One example of such a (humanly) transcendent standpoint is the standpoint of a Tarskian meta-language – a powerful yet perfectly human language. But immanence and transcendence by themselves are still not sufficient for truth. The question of truth is one of many questions we can ask about our immanent thoughts. (We can also ask various other questions about such thoughts, e.g., whether they are simple or complicated thoughts about their target in the world). The question of truth is a *normative* question: Are our immanent thoughts *correct* about the world? Do they get the world right? Do they satisfy high standards of correctness? And to arrive at truth we need, therefore, a "normative" mode of thought. Our notion of truth arises in the juncture of these three modes of thought, and the fundamental principle of truth says that truth is, therefore, *immanent, transcendent,* and *normative.* Isn't truth a *property* of immanent thoughts? Truth, in my view, is primarily a norm for immanent thoughts, and only secondarily a property of such thoughts. If you want, you may say that truth is a normative property of immanent thoughts. (Incidentally, many transcendent thoughts are immanent as well. In particular, thoughts of the form "X is true" are immanent, and therefore the question of truth arises for them as well.) The fundamental principle of truth is a substantive principle. It is substantive both because what it tells us about truth is substantive and because it raises many substantive questions – substantive questions about the immanence, transcendence, and normativity of truth – questions that call for substantive answers. The fundamental principle of truth is also rich in consequence. For example, it enables us to address *skepticism* with respect to truth, something I do in my book.

2. *The Principle of "Manifold" Correspondence*. If truth is a norm of correctness for immanent thoughts, correctness with respect to what is the case in the world, then truth is essentially a

correspondence norm, not in the naive, simplistic, and overly rigid sense of correspondence familiar in the literature (copy, mirror-image, or direct isomorphism) but in a more general sense. That is to say: truth is a matter of a substantial and systematic connection between immanent thoughts (theories) and their target in the world. But the correspondence standard (or norm) of truth is a norm created by and for humans, and a such it has to take into account the complexity of the world relative to our cognitive capacities (limitations). It is quite possible that some facets of the world we can reach (cognitively) quite easily and directly, while others we can reach only indirectly and in relatively complicated ways. This will reflect on the correspondence standards we set on theories of these facets. In the first case, our theories may correspond to the world in a simple and direct way, based on simple semantic principles of reference and satisfaction. In the second case, our theories might be able to correspond to the world only in circuitous ways, based on more complicated principles of reference and satisfaction. It is important to remember that complex correspondence is not, as such, less robust than simple correspondence. But it exhibits a different pattern of correspondence (I will give an example in a minute.) Here, too, there are many substantive questions about the general principles involved in manifold correspondence, and these require substantive answers.

3. *The Principle of Logicality.* Whereas the fundamental and correspondence principles of truth are "core" principles, principles that capture something very basic about truth in general, and this is the source of their universality, the logicality principle is a different kind of principle and its universality is of a different kind as well. The logicality principle deals with a partial and very specific aspect of truth, namely, the influence of the logical structure of an immanent thought on its truth value. Logical structure is just one of many things that affect the truth value of immanent

thoughts, and for that reason the logicality principle is not a core principle of truth. But because of certain special features of logical structure, its influence on the truth value of immanent thoughts does not vary from field to field and as such is universal. The principle of logicality is partly spelled out in Tarski's theory of truth, which offers a recursive definition of truth based on the logical structure of given sentences (and only on this). Tarski's theory does not say anything substantive about the truth-conditions of logically atomic sentences (sentences that have no logical constants, hence no logical structure), but it systematically delineates the role played by logical structure in determining the truth-value of sentences. It is not surprising that Tarski's theory of truth immediately led to a theory of *logical consequence*. It is to be expected that a theory focused on the logical "factor" in truth will have important uses in logic. I will explain the special features of logicality shortly, in response to your questions on logic.

What about the more particular principles of truth, those exhibiting its diversity (or plurality)? These, for the most part, reflect the "manifoldness" of the correspondence principle of truth, namely, the variability of *patterns* of correspondence from one field of knowledge (thought) to another. To show what complex correspondence might amount to, how it might differ from simple correspondence, and how recognition of such correspondence might enable us to overcome problems that arose with respect to "standard" correspondence, I investigate the workings of truth in mathematics. This leads to a new theory of mathematical truth (mathematical correspondence).

A New Theory of Mathematical Truth. In discussing truth in mathematics, philosophers usually start with the language of mathematics. They look at the language of, say, arithmetic and they

use our standard (simplistic, direct) semantics to determine what must be the case in the world for arithmetic statements to be true. Since the language of arithmetic uses individual constants (numerals) and variables to denote, and range over, its objects, correspondence-truth in mathematics is taken to require the existence, in the world, of arithmetic individuals, i.e., numbers. But there is no evidence for the existence of numbers (numerical individuals) in the world, and this leads to the association of mathematical correspondence with the existence of a Platonic reality, independent of physical reality. This, in turn, leads to severe problems: the problems of identity, cognitive access, applicability of arithmetic truth to empirical science, and so on. (Some of these problems were famously raised by Paul Benacerraf in articles written in the 60's and 70's.)

My own approach to mathematical truth is different. First, I don't see language as a good guide to ontology. While language is an indispensable tools for constructing theories, language is also an obstacle, as Frege emphasized. And this is also true of standard semantics. Standard semantics assumes that language can be connected to the world only in one way: singular or individual terms (constants or variables) can only denote individuals in the world, 1^{st}-level predicates – only 1^{st}-level properties/relations in the world, and so on. But language was created a long time ago, when our understanding of the world was very different from what it is today, it was created in a partly haphazard manner, influenced by a variety of factors, from our biological make up to historical accident. It has many tasks, including tasks, like communication, that are not geared toward correct description of the world. And so on. On the other hand, our cognitive resources (as I have noted earlier) are such that they allow direct and relativity simple access to some facets of the world and require indirect and relatively complex access to others. So it is

unreasonable to expect that one simple semantics can serve us in theorizing about all facets of the world. For that reason, the starting point of my investigation of truth in mathematics is the world rather than language. First I look for formal or mathematical features in the world (formal or mathematical features of objects in the world), and then I ask how the language of mathematics is connected to these features. Mathematical theories are true or false of formal features in the world, and if these features are properties rather than individuals, then the singular terms of mathematics denote properties rather than individuals, albeit in an indirect manner.

Showing that we have good reasons to presume that objects in the world have formal/mathematical properties (1^{st}-level properties like self-identity, 2^{nd}-level properties like cardinality, inclusion, reflexivity, symmetry and transitivity, operations like complementation, union, intersection, and so forth), while we have no evidence for the existence of mathematical individuals (e.g., numbers), I suggest that it is reasonable to expect that individual terms refer, indirectly yet systematically, to formal properties rather than individuals. Numerals, for example, refer to 2^{nd}-level cardinality properties rather than to numerical individuals, and arithmetic statements are true or false of finite cardinalities rather than of numbers (numerical individuals). This suggests that the pattern of correspondence in, say, arithmetic and set theory is "composite," in a way that I spell out in my book. This account does not require a Platonic reality, parallel to physical reality. There is just one reality, with objects and properties having both physical and formal features. (So, among other things, many of the problems associated with Platonism do not arise.) This account can be expanded beyond arithmetic, but once again, I cannot go into this here. What I said is enough, though, to indicate what a complex pattern of correspondence might look like.

There is still much work to be done in my theory of truth on all levels. Since completing *Epistemic Friction* I have published and lectured on a number of issues concerning truth, some new, others offering further development of issues I addressed in my book. These works include "Substantivism about Truth," "Lessons on Truth from Kant," "Truth and Scientific Change," "Truth & Transcendence: Turning the Tables on the Liar Paradox," "Is There Truth in Ethics?," and "Pluralism and Normativity in Truth and Logic." They will serve as a basis for a new book on truth, tentatively titled "A Substantivist Theory of Truth."

C: So far as Platonism is concerned, Frege's theory of thought or, more generally, "the third realm," is certainly Platonic: thoughts are mind-independent, non-spatial, non-temporal, causally inert, eternal entities. Frege wants to ground the objectivity of logic in the objectivity of thoughts. But I have a serious trouble with following his theory. I once wrote an unpublished article that systematically criticized it: no identity condition, no cognitive access, a bewildering relation between language and thoughts, confused relations among inhabitants of the third realm, and so on. I'd like to know your opinion about Frege's theory of thoughts, or about his doctrine of the third realm.

S: I am not a Frege scholar, but I studied Frege quite thoroughly and he influenced my thinking. I share Frege's attitude to natural language, which is the language largely used in professional philosophy. Frege says that language presents us with severe obstacles and sometimes forces us to speak metaphorically. I understand his talk of a "third realm" as largely metaphorical. There is a certain reality to thoughts, according to Frege, which is objective rather than subjective, yet

their reality is different in certain significant ways from that of physical objects. Is the third realm a Platonic realm? This depends on how one understands Platonism. If we understand it simply as affirming the reality of abstract features of objects in the world, then Frege's third realm is Platonic. But if we understand it as involving a commitment to two distinct and separate worlds or domains of objects, the one abstract, the other physical, then Fregean thoughts, and with them his third realm, are non-Platonist.

2. Criticism Of Deflationism And Treatment Of The Liar

C: I think you use a clever argument to defeat Kant's deflationist argument. Kant could have used essentially the same argument to support deflationism in the theory of knowledge, but he didn't. And rightly so. For the same reason that this argument does not undermine the viability of a substantive theory of knowledge it does not undermine the viability of a substantive theory of truth. Could you present your own objections to quietism, disquotationalism, and deflationism in general? Frankly speaking, at most of time, I do not understand what deflationism says and why.

S: I have already explained my objection to deflationism, and my objection to quietism and disquotationalism are quite similar. They rest on the general principle of epistemic friction, and in particular on that part of it which says that theoretical knowledge in general should be substantive, in the everyday sense of being rich, deep, informative, explanatory, systematic, rigorous, etc. Why should all knowledge be substantive? In my view, this follows from a central trait of human beings: our desire to have substantive knowledge of important (significant) aspects of the world, including aspects such as knowledge itself, ontology, truth, mind, morality, logical inference, rationality, and so on, which are studied by philosophy. Deflationism, quietism, and disquotationalism have a very narrow outlook on both the theory of truth and on its

subject-matter. Disquotationalists, for example, say that it follows from the truth of disquotational sentences – sentences like "'Snow is white' is true if and only if snow is white" – that the truth predicate is redundant. But this does not follow. And it certainly does not follow from the truth of this sentence that the concept or norm of truth in general is trivial or redundant. It is only if we assume that disquotational sentences capture *the* (one and only) "essence" of truth, that we can draw any significant conclusion about truth from such sentences. But in my view, disquotational sentences have very little to do with either the essence of truth or with its significance for humans. And no one, as far as I know, has established that the essence of truth is captured by such sentences. Nor has anyone shown that we can always eliminate the word "true" or "truth" based on disquotation. For example, in statements like "truth is a norm of correctness," "the concept of truth is an immanent, transcendent, and normative concept," "A statement is logically true if and only if it is true in all models," and so on, truth words cannot be eliminated based on disquotation; nor are these statements as a whole made trivial or redundant based on disquotation. Just because some other sentences (e.g., "'Snow is white' is true") are trivialized or made redundant by disquotation in some contexts it does not follow that the concept and norm of truth are trivial or redundant. Deflationism and disquotationalism are based on false assumptions, or at least on assumptions that have never been established - assumptions of the form "there is nothing more to truth than ...." And quietism is based on equally false or unestablished assumptions, for example the assumption that *the only (or most important) purpose of philosophy is therapeutic*.

C: How can we use your theory of truth to deal with paradoxes, especially the Liar?

S: The answer to this question is given in my paper “Truth & Transcendence: Turning the Tables on the Liar Paradox” (2017). Normally, when we develop theories of a given subject-matter, say a theory of gravity, we focus on the content or target of the theory and its correctness, interest, explanatory power, etc. Only when we have arrived at what we take to be an adequate formulation of the theory do we worry about its logical correctness. If it turns out that the theory contains a contradiction or leads to paradox, we are of course shaken, and we take appropriate steps to overcome the problem, revising the theory or, in extreme cases, discarding it. But our main concern is getting the subject-matter right. In the field of truth this is often not the case. Here many philosophers first worry about paradox or contradictions, and only after they have taken adequate steps for avoiding these do they turn to the task of developing a correct, interesting, and explanatory theory of truth itself. But this presents a potential problem: ad hocness. If our solution to a looming truth paradox is given prior to understanding the nature of truth, then it is likely to be *ad hoc* rather than integral to its subject-matter. This has been a major source of dissatisfaction with Tarski’s solution to the liar paradox, the paradox involved in a person saying “I am lying” or in a sentence saying of itself that it is false (or not true). If such a sentence is true, then it is false, and if it is false, it is true. Tarski’s solution to the problem is to build a hierarchy of languages: object-language, meta-language, meta-meta-language, and so on. The definition of truth for the object language is given in the meta-language, the definition of truth for the meta-language is given in the meta-meta-language, and so on. No language contains its own truth predicate or other semantic predicates, and self-reference is *not* allowed. This is made possible by restricting the theory to “formal languages of the deductive sciences,” essentially, languages formulated within a well-defined framework of mathematical logic. It is generally agreed that Tarski’s solution to the liar paradox is effective, but many philosophers

regard this solution as ad hoc. Many other solutions were offered – an especially well-known solution is due to Kripke (1975) – but most of these follow the pattern as treating the problem of paradoxes as an independent problem, one that has to be solved prior to the development of a contentwise adequate and correct theory of truth (or, sometimes, as a problem whose solution exhausts the task of a theory of truth).

My own approach to the paradox(es) of truth is different. I treat the theory of truth like any other theory: first I worry about the content of the theory and only then I check whether it leads to paradox. This is what I mean by "turning the tables on the liar paradox." The hope is that if our theory gets truth itself right, it would not lead to paradox in the first place. In practice, my theory justifies Tarski's solution to the liar paradox as based not on ad hoc considerations but on considerations pertaining to the nature of truth, and it views Kripke's and others' solution to the paradox as based on similar principles.

The heart of the matter is the Fundamental Principle of Truth that I talked about earlier, and in particular, its first two parts, immanence and transcendence. It is in the nature of truth that it applies to immanent thoughts, thought that speak directly about some subject-matter (something in the world, broadly understood). We may call the language, or that part of our language which is restricted to the expression of *merely* immanent, non-transcendent, thoughts "object language," or the "first layer" of our universal language, the layer in which no truth-predicate is used. For a truth predicate to arise, we need to *transcend* these immanent thoughts – transcend our object language or go beyond the first layer of our universal language – and engage in other thoughts, thoughts that have in view both our (object-language, first layer) immanent thought and those

facets of the world they have in view. It is only on the level of these "transcendent" thoughts that the truth predicate arises. The transcendent standpoint of these latter thoughts is just the kind of standpoint that is captured by a Tarskian meta-language, or by the second layer of a Kripkean universal language – the first stage of Kripke's definition of truth. There are technical differences between the Tarskian progression of languages and Kripkean progression of stages, but the basic principle of immanence and transcendence is common to both. In this way the liar paradox is avoided not on extraneous, ad hoc grounds, but based on the nature of truth itself.

3. COMPARING SUBSTANTIVE THEORY OF TRUTH WITH TARSKI'S THEORY OF TRUTH, *et al*

C: Obviously, you give a correspondence reading of Tarski's theory of truth. I myself also hold this reading. However, there are quite many controversies about the philosophical character of Tarski's theory. Some scholars argue that the definition is correspondence-theoretic, because there are reference, satisfaction, or correspondence relations between linguistic items and the objects in the model referred by them. Some scholars argue that the definition is not correspondence-theoretic, because correspondence presupposes the reality of the actual world, but the model(s) can be anything else beside the actual world. Some scholars, say Quine, argue that the definition is disquotation, or more generally, deflation: '*p*' is true if and only if *p*, or it is true that *p* if and only if *p*. Even Tarski himself says different things about this: sometimes he says his definition is intended to catch Aristotle's correspondence intuition about truth; sometimes he says his definition is neutral, that is, compatible with any philosophical position about reality. Could you clarify this question for me? It has puzzled me for quite a long time.

S: I am not a Tarski scholar, but the way I look at this issue is this: First, there are two perspectives on this issue, a historical perspective and an a-historical perspective. From the

former perspective, the question is how Tarski himself regarded his theory; from the latter perspective, the question is what kind of theory Tarski's theory is, independently of what Tarski himself thought it was or intended it to be. Second, there is the question whether we should focus on Tarski's 1933 theory, "The Concept of Truth in Formalized Languages," where he presents his theory as a correspondence theory, or on his 1944 theory, "The Semantic Conception of Truth and the Foundations of Semantics," where he says that his theory is philosophically neutral. Concerning the second question I tend to focus on the original, 1933 paper. I think this is Tarski's full-fledged development of his theory of truth while the 1944 paper is intended to bring his theory to philosophers' attention in a way that he thought was most likely to appeal to them. Concerning the historical vs. a-historical perspective: Historically, I agree with you that Tarski himself saw his theory as a correspondence theory in the spirit of Aristotle and that he understood his material condition on an adequate definition of truth (the T-schema) as capturing the correspondence principle. (See my response to your earlier question on the two faces of language). But when we ask what Tarski's theory really accomplished, regardless of what Tarski himself thought it accomplished, I think that what it accomplished is, as I indicated in discussing the logicality principle of truth, an account of the role *logical structure* plays in truth. Is this account a correspondence account? I myself think it is best interpreted as a correspondence account (for example, the logical constants are best viewed as denoting (or standing for) properties (relations, functions) in the world and satisfaction is best viewed as a correspondence relation. But this is not the majority view, and in any case very few philosophers of either logic or truth have offered a thorough and systematic discussion of this issue.

C: Compared with Tarski's semantic theory of truth and other theories of truth, what is new with your substantive theory of truth?

S: What is new with my substantivist theory of truth compared to Tarski's theory is primarily the questions I ask. This includes questions about the cognitive conditions under which truth arises in human thought, consideration of the role of truth in knowledge, substantial philosophical questions about the nature of correspondence and the plurality of its patterns, interest in truth conditions beyond those tracking the contribution of logical structure to truth, questions about skepticism with respect to truth, investigation of truth in mathematics, and so on. Compared to deflationists such as Paul Horwich, I am asking many questions that go beyond the equivalence and disquotation schemas they limit themselves to. In addition, my answer to the question of truth's role in human life goes far beyond the deflationist answer, which limits its role to certain technical, instrumental needs concerning generalization. In particular, I focus on the substantive role played by truth in knowledge. I do not relegate the discussion of various philosophical questions concerning truth to other philosophical disciplines; instead, I confront these questions within the theory of truth. I take on challenges that deflationists do not take, such as the challenge of explaining truth in mathematics and confronting the special difficulties arising in this field. And so on. Compared with traditional correspondence theorists, I develop a new, dynamic account of correspondence. Correspondence is not required to assume a naive and overly simplistic pattern, such as that of copy, mirror-image, or direct isomorphism. Instead, it is an open question, one that requires substantive investigation, what form correspondence takes in different fields, whether it takes the same form in all fields, how simple or complex the forms it takes are, etc. Finally, compared with alethic pluralists (such as Crispin Wright and Michael Lynch) my pluralism is both more limited and more substantial than theirs. On the one hand,

other pluralists allow a broader array of types of truth, such as coherence, correspondence, and pragmatic truth, that have little in common. I restrict the plurality of truth to a plurality of forms of correspondence, and this renders my pluralism tighter and more unified. On the other hand, other pluralists limit the general principles of truth to largely trivial principles, relegating the substantive part of the theory of truth to the specific principles (those that vary from field to field). My own theory demands that both the general and the specific principles be substantial, subject to substantive investigations rather than taking the form of mere platitudes.

Ⅳ A New Philosophy Of Logic

1. Foundational Account For Logic

C: Mainly influenced by Quine (and also by Marxist philosophy), I'm sort of enemy of the apriorist justification of logical laws, and more sympathetic with empiricist justification of them: logic is in some way related to the world and our cognition of the world. But in what way? Many details are not clear and hidden in darkness. When I read your long article "The Foundational Problem of Logic" (2013), I think I get what I want. Could you briefly answer the following questions about your foundational account for logic: Why do we absolutely need such an account? Why have we lacked such an account for such a long time? How do you develop your own account? What are the main claims of your account? What open questions are still waiting to be answered? What further work is there still waiting to be done? And so on.

S: A foundational account of logic is especially important due to logic's crucial role in all knowledge and discourse. Due to our cognitive limitations, we are incapable of obtaining knowledge of the world by discovering everything about it directly. We need a method of

inference that will enable us to arrive at new knowledge based on existent knowledge, and the requisite method must *in fact* transmit, and guarantee the transmission, of truth from sentences to sentences. This requires a factual foundation for logic. Furthermore, due to logic's universality, an error in logic can, in principle, undermine our system of knowledge in its entirety. A serious error in biology is unlikely to undermine physics and a serious error in physics is unlikely to undermine mathematics or logic, but a serious error in logic is likely to undermine all disciplines. Moreover, an error in logic, being a contradiction, is likely to inflict especially severe damage on our system of knowledge, cancelling the difference between true and false knowledge – veritable knowledge and fiction. Finally, logical structure, and the logical constants central to it, are so prevalent in human discourse, in all areas and on all levels, that if we don't get their contribution to the truth-value and truth-conditions of sentences right, we don't get the truth value, and truth conditions, of most sentences of our language, in all areas, right. All these mean that we cannot take logic for granted, that logic is not a mere game or a set of conventions, and that it is not sufficient to justify our logical theory based on a mere "feeling" that it's right or its appearing to us to be obvious or somehow self-evident. We need a veridical foundation for logic, and this is not a trivial matter.

Why have we lacked a foundational account of logic for such a long time? First, let me say that throughout history, many logicians and philosophers did hold philosophical views on the nature and foundation of logic, but what was missing was a thorough, systematic, theoretical working out of such a foundation. This was noted not just by me, but also by Pen Maddy in her 2012 paper "The Philosophy of Logic." Pen herself, as well as Bob Hanna, have recently attempted such a foundation. In my view, the main reason we have lacked a thorough foundation for logic

until recently is the fact, which we talked about earlier, that traditionally philosophers identified the foundation*al* project with the foundation*alist* project, and this led them to conclude that a foundation for logic (as a "basic" discipline) was impossible. Furthermore, philosophers who reject the foundationalist methodology have for a long time viewed this rejection as committing them to the rejection of the foundation*al* project itself. The specific reason they cite against attempts to provide a systematic foundation for logic are circularity and infinite regress. This can be traced to Wittgenstein's *Tractatus*, where he says that to provide a foundation for logic we have to "stand somewhere outside logic" but it is impossible to think outside logic. Following Scheffer (1926), this problem is sometimes called the "logocentric" problem: "In order to give an account of logic, we must presuppose and employ logic." It is interesting to note that the identification of the foundation*al* project with the foundation*alist* project is so deeply ingrained in philosophers, that even contemporary philosophers who reject foundationalism cite the fact that a foundation for logic inevitably involves *some* form of circularity (regress) as a ground for denying the very possibility of such a foundation.

To develop a foundational account of logic, I use the foundational holistic methodology. And within this methodology I often use the functional method (in the everyday sense "functional"). For example, identifying a central role (function) of logic, I ask what characteristics logic needs to have in order to fulfill this role. Then, having these characteristics in mind, I ask: What kind of grounding will endow logic with these characteristics? And so on.

My main claims are:

1. Logic is both a field and an instrument of knowledge. As an instrument of knowledge, logic's role is to develop an especially powerful universal method of inference and provide tools for the detection of especially pernicious errors (contradictions). As a field of knowledge, logic studies inferences and contradictions of this kind.

2. Focusing on inference, logic has to specify the conditions under which a given inference transmits truth from sentences to sentences with an especially strong modal force. An inference of this kind is called "logically valid." Logic has to enable us to identify logically valid inferences as well, to tell us how to build such inferences, and so on.

3. Both as a field and as an instrument of knowledge, logic requires a grounding both in the world and in the mind.

4. In addition to reasons common to all disciplines (e.g., epistemic friction), there are special reasons logic requires a grounding in the world, or a *factual* grounding: (a) Logic has to *work in the world.* (b) *L*ogic is factual in the sense that there is a fact of the matter as to whether a given inference transmits truth from sentences to sentences with an especially strong modal force. (iii) What logic has to transmit from sentences to sentences is *truth* (and not beauty, or simplicity, or ...). Since truth is a matter of the way things are in the world, broadly understood (rather than a matter of things related only to the mind), the world plays a crucial role in logical inference. In particular, logical inference is constrained by, and can be based on, some facts concerning the relation between the conditions under which the premises are, or would be, true of the world and those under which the conclusion is (would be) true of the world.

5. Logic requires a grounding in the human mind as well because its task is to create a powerful system of inference (/ detection of pernicious error) for use by humans. This means that certain aspects of mind (language, concepts, etc.) are also crucial to the building of a logical system.

6. To be universal and have an especially strong modal force, logic cannot be grounded in just any facts concerning the world, but it must be grounded in appropriate *laws* governing the world – ones that have the requisite features of universality and an especially strong modal force.

7. One type of laws of this kind are *formal* laws, laws that govern the formal properties (relations, functions) of objects in general. A few examples of formal properties are identity, non-emptiness, universality (in a domain), complementarity, union, intersection, inclusion and so on, i.e., the properties correlated with the logical constants of standard mathematical properties. Standard mathematical logic, on my conception, is grounded in laws governing such properties.

8. A characteristic trait of formal properties is *invariance under all 1-1 replacements of individuals.* Identity, for example, is invariant under, or does not distinguish, 1-1 replacements of individuals b and c by individuals b' and c': b=c if and only if b'=c'. Similarly, the property of non-emptiness is invariant under any 1-1 replacements of individuals: if all the individuals in a (nonempty) domain A are replaced in a 1-1 manner by any individuals and the image of A under this replacement is A', then a property P of individuals is not empty in A if and only if its image in A' (under this 1-1 replacement) is not empty as well. I use this invariance condition as a general criterion of formality.

9. One systematic construal of invariance under all 1-1 replacements, using the language of contemporary mathematics, is invariance under all isomorphisms. (Identity is invariant under all isomorphisms of structures of the form <A,b,c>, where A is a non-empty set of individuals and

b, c are members of A; non-emptiness is invariant under all isomorphisms of structures of the form <A,B>, where B is a subset of A. Etc.)

10. To arrive at universality and modal force, we note that formal properties are invariant under all 1-1 replacements of individuals of any kind, both *actual* and *counterfactual*.

11. As a result, the laws governing formal properties – *formal laws* – are universal and have an especially strong modal force. They are universal because they hold in *all* actual structures or situations, and they have an especially strong modal force because they hold in all counterfactual situations, where the scope of "counterfactual" is especially broad. Physical properties, in contrast to formal properties, do not have such a high degree of invariance: they are not preserved under 1-1 replacements of physical individuals by non-physical individuals (say by mathematical individuals). Therefore, formal laws have a greater degree of generality and a greater modal force than physical laws. In short, formal laws are sufficiently strong to ground logic.

12. To create an adequate logical system we can use *formal properties* as the *denotations* of *logical constants*. The property of non-emptiness, for example, is the denotation of the existential quantifier, the operation of complementation is the denotation of negation, the identity relation is the denotation of the identity predicate, and so on. We then represent the totality of actual and counterfactual situations in which the formal laws hold by Tarskian models, and we define logical truth and consequence as truth or truth-preservation in all models.

13. The strong invariance of the logical constants together with the Tarskian apparatus of models guarantee that logical inference is highly general, highly necessary, topic-neutral, has an especially strong normative force (stronger than that of physics, for example), is quasi-apriori (largely unaffected by empirical discoveries), and so on. It is, however, not analytic (since it is

not grounded only in the mind). In addition to a semantics, "formal" logic has also a proof system. The rules of proofs of this system are based on laws governing the (denotations of the) logical constants of the system.

14. Any formal property can serve as the denotation of a logical constant in an adequate logical system. Therefore, logic is broader than standard 1st-order mathematical logic. It includes 2nd-order logic as well as all systems of so-called 1st-order generalized logics – logics with such logical constants as "most," "infinitely many," "is (a) symmetric (relation)", and so on.

What questions are left open and what further work needs to be done? First, there is more work to be done around the relation between logic and mathematics, which I will briefly discuss below. Second, there is more work to be done concerning laws of formal structure. Third, there is work to be done concerning the grounding of logic in the mind (your next question). And in addition to these, there are questions and criticisms to respond to. (I have already replied in print to most of the questions and criticisms that were published so far, but new questions/objections may still arise). Finally, I hope that my work on the foundation of logic will motivate others to investigate the philosophical foundations of other fields of knowledge in a thorough and systematic manner.

C: It is my impression that you make a great effort to argue that logic is grounded in the world, but do little to argue that logic is also grounded in the mind. Could you further explain in what sense, and in what way, logic is grounded in the mind? On this point, I think you may follow Quine: let Darwin's natural selection and evolution play a crucial role. It is by natural selection

and evolution that the structural features of the world are built into our mind, but more details are needed. What do you think of my suggestion?

S: First, let me explain why, in spite of the fact that logic requires a grounding both in the world and in the mind, I have so far focused on its grounding in the world. There are two related reasons. One is that most philosophers, past and present, think of logic as grounded only in the mind, so today it's more important to explain its grounding in the world than its grounding in the mind. The second is that if one starts with logic's grounding in the mind there is a danger of frictionless theorizing, so it's important to have a clear idea of the constraints right from the beginning. And one of the main constraints on logic, as on knowledge in general, is the world. So I prefer to begin my foundational studies with the world. (This is also one of the main reasons I decided to write *Epistemic Friction* before writing *Epistemic Freedom*.)

As for your suggestion that I give an evolutionary account of the grounding of logic in the mind, I agree with you that it's reasonable to presume that evolution plays a salient role in our ability to detect formal or structural features of the world. So this may very well be part of the account. But other things are involved in the grounding of logic in the mind as well. For example, our active participation in the process of knowledge, including the development of logical systems, may very well go beyond evolution. Although the evolutionary aspects I largely leave for evolution theories, I hope to work on the other factors in the planned volume on epistemic freedom.

2. Standard Of Logicality, Set Theory And Logic

C: As you define formality, an operator is formal if and only if it is invariant under all 1-1 replacements of individuals; an operator is an admissible logical operator if and only if it is formal. In my judgment, your definitions are not informative enough to clearly demarcate between formality and non-formality, and between logical constants and extra-logical constants, for you do not clearly define what an individual or object exactly is. If you just permit the states of affair and proper individuals to be objects, then, you will limit logic to mathematical first-order logic, that is, sentential logic and predicate logic. If you recognize *properties* and *propositions* as some kind of objects, then, the higher-order quantifiers like "∀F" and "∃G," "necessarily," "possibly" and "impossibly," "know" and "believe," "past" and "future," "ought," "permit" and "forbid," etc., are all logical constants, because all of them keep invariance under 1-1 replacement of *properties* or *propositions*, no matter what fields of knowledge they belong to. Thus, we will get the narrow or wide list of logical constants, and the narrow or wide scope of logic. All of these can explain quite well the characteristics of logic, such as topic neutrality, abstractness, basicness, especially strong modal or normative force, certainty, and (quasi-) priority in their own ways. What do you think about my comments?

S: Let me explain the invariance criterion of logicality in light of your comments, in particular, why it is formulated in terms of *individuals* and not in terms of objects in general (including properties and relations), how it relates to 2^{nd}- and higher-order mathematical logic, and how it relates to non-mathematical logics.

First, let me clarify 2 points:

1. The invariance criterion of formality/logicality applies both on the objectual level and on the linguistic level. On the level of objects, it tells us which objects (including properties, relations, and functions) are formal, and on the level of language, which linguistic expressions are logical. On the objectual level we assume a hierarchy of objects: individuals (level 0), properties of individuals (level 1), properties of properties of individuals (level 2), and so on. ("Property" here abbreviates "property, relation, or function.") And on the linguistic level we assumes a corresponding hierarchy of expressions: names of individuals (level 0), predicates of individuals (level 1), predicates of predicates of individuals (level 2), and so on.

2. On the objectual level, the things that are invariant under 1-1 replacements of individuals are properties of various levels. On the linguistic level – predicates of various levels. Properties that are invariant under 1-1 replacements of individuals are said to be *formal*; the corresponding predicates are said to be *logical (or admissible as logical predicates).* Logical predicates are said to *denote* formal properties. Examples of formal properties in this sense include identity (1^{st}-level), non-emptiness (2^{nd}- and higher-levels), complementation (2^{nd}- and higher-levels), intersection (2^{nd}- and higher-levels), all cardinality properties (2^{nd}- and higher-levels), reflexivity and symmetry (2^{nd}- and higher-levels), and so on. The corresponding predicates are identity, the existential-quantifier, negation, conjunction (of the form Ax & Bx), the cardinality-quantifiers, the reflexivity and symmetry quantifiers, and so on, which, aside from identity (and a few other predicates) can be of levels 2 and higher.

The second clarification provides an answer to one of your questions: The invariance criterion of 1-1 replacement of individuals yields a demarcation of logical and non-logical expressions of all

levels, and therefore is sufficient to account for 2nd- and higher-order mathematical logic(s) and not just for 1st-order logic(s).

Now to your question: Why invariance under 1-1 replacements of *individuals* and not invariance under 1-1 replacements of *properties*? Because it's very difficult to satisfy the latter condition, and the predicates that satisfy it are not suitable to serve as a basis for logic. None of the standard logical constants satisfy this invariance conditions, and neither do the other constants you mentioned, such as "necessarily," "possibly," "know," "believes," etc. The predicates that do satisfy invariance under all 1-1 replacements of properties are for the most part predicates that identify semantic types: "is an individual," "is an n-place property of individuals," "is an n-place property of m-place properties of individuals," and so on. A logic that limits itself to logical constants of this kind will not fulfill the designated task of logic.

Does the fact that 1-1 replacements of individuals is not satisfied by modal and other operators a reason to give up this criterion? No. There is a sense in which mathematical logic is stronger than other logics, for example, in having a stronger modal force. This does not mean that there is no room for weaker systems of inference, but the basis of these logics differs, in certain significant respects, from that of mathematical logic. It may be possible to establish them based on invariance of some kind, but it is neither invariance under all 1-1 replacements of individuals or invariance under all 1-1 replacements of properties. It is a challenge for philosophers of logic to understand the basis for these logics systematically and in a way that is both philosophically enlightening and provides tools for a critical evaluations of these logics.

C: You use set theory, more specifically, ZFC, as the background theory of formal structure, and you also regard logic as the theory of formal laws governing structures of objects. Your strategy seems to bring about a big issue: Is set theory prior to logic or logic prior to set theory? In other words, do we use logic as a tool to build set theory? Or do we use set theory as a tool to build logic? What do you think about these questions?

S: On my view, neither set theory nor logic are prior to each other. Logic and mathematics (including set theory) are developed in tandem, and their development is an example of *constructive circularity*, a process sanctioned by my foundational holistic methodology and dynamic model of knowledge. A foundationalist would have to see one as prior to the other (unless she regarded them as belonging to different branches of the hierarchical tree), but a holist does not. Logic and mathematics develop in tandem, each using resources provided by the other to further develop. I described this process in response to your question on constructive circularity. In the case of ZFC, we can use a pre-axiomatic logic to develop naive set theory, naive set theory to develop axiomatic logic (syntax and semantics), axiomatic logic to develop axiomatic set theory (syntax and semantics), and axiomatic set-theory to develop generalized logic (and in particular its semantics). I should also note that ZFC is just one example of a background theory of formal structure; in principle, other background theories are also possible.

C: Concerning your accounts of logical or mathematical truths, I have a worry that they are too *ad hoc* to be effective. You seem to first regard most parts of current logical and mathematical theories as true; then, in order to explain their truth, you find out those formal or mathematical features of objects. Metaphorically, this strategy looks like putting the cart before the horse.

Your theory *can explain* the truth of current logic and mathematics, but I doubt it also *can test* the truth of new logical or mathematical theories. Concerning cardinalities in mathematics, I doubt whether they could be used as the touchstone to test the correctness of *all* mathematical theories, especially *new* theories that will emerge in the future. What do you think about my worry and doubt?

S: I don't think my treatment of logical and mathematical truth is ad hoc. Using the foundational holistic methodology, I go back and forth between our current theories, critical philosophical questions about them, general investigations of truth and logic, use of various resources from the philosophical as well as the mathematical and logical literature, background psychological knowledge, common-sense reasoning, and so forth. All these enable us to develop a critical outlook on the actual theories I started with. In fact, in the case of logic I end up with a different logic from the one I started with: generalized 1^{st}-order logic is quite different from standard 1^{st}-order logic. As for mathematics, my account of mathematical laws as laws that govern formal properties in the world sets a standard for a critical examination of the currently accepted mathematical laws. It is not sufficient that these laws be justified on pragmatic or aesthetic grounds; they need to be justified on *veridical* grounds, namely, based on the standard of *truth.*

Concerning cardinalities in mathematics, I fully agree that they cannot be used as a touchstone to test the correctness of *all* mathematical theories, and I never said they did. I used them as examples for formal/mathematical features of the world alongside other features: identity and difference, reflexivity, symmetry, transitivity, well-ordering, complementation, intersection, union, Cartesian product, and so on. Furthermore, I leave it an open question what new

mathematical features and laws will be discovered in the future. I don't claim, or expect, or assume, or require that these will be, or will have anything to do with, cardinality.

3. PSYCHOLOGISM, HANNA'S AND MADDY'S CONCEPTIONS OF LOGIC

C: As is well known, mathematical logic originates from Frege's and Husserl's famous attack on psychologism. Recently, philosophers, mainly with a background in cognitive science and epistemic logic, started to reflect and re-evaluate anti-psychologism, contemplating even the revival of psychologism in logic. Does your foundational account of logic cohere with this sort of psychologism? Could you give some comments about psychologism, anti-psychologism, and new psychologism in logic? In this context, could you briefly review Robert Hanna's book *Rationality and Logic* (2006)? I surveyed this book and read several of its chapters.

S: Psychologism means different things to different people. I prefer to focus on Frege rather than on Husserl because Frege played a formative role in shaping my philosophical outlook, whereas Husserl didn't. Unlike Frege, however, I don't see the question of psychologism in black and white. I agree with Frege's claims that the job of a logical theory is not to describe humans' actual forms of reasoning and certainly not their habits of reasoning. Its job is to build a *correct* method of reasoning, correct in the sense that forms of reasoning sanctioned by this method in fact transmit truth from premises to conclusions with a strong modal force. The focal issue is not whether people believe, or behave as if they believed, that logical inferences are veridical, but whether they are in fact veridical. The truth of the logical laws, not their agreement with our psychological make-up, is the source of their prescriptive power. We are able to draw, and sometimes do draw, incorrect inferences, but logic's job is to build a system of principles for *correct* reasoning, regardless of whether our psychological make-up "forces" us to reason in this

way or not. Like Frege, I believe that logic is objective and is grounded in something that is itself objective.

But unlike Frege, I think that human psychology does play a significant role in logic. There is more than one way to build a correct logical system, but what we are interested in is a logical system that can be used by humans and the only logical systems we are capable of building are ones that can be built using cognitive resources available to us. In these ways, logic takes into account human biology, psychology, etc. So, I do think that some of the things that psychology and cognitive science study are relevant both for the understanding of logic and for the construction of logical systems. Whether this is what the new psychologism says about logic I prefer to leave an open question. Different practitioners say different things and one has to examine what they say individually.

As for Bob Hanna, I published a review of his 2006 book, *Rationality and Logic*, and the gist of what I said is this: Hanna develops a broadly Kantian "cognitivist" conception of logic according to which logic is an apriori normative discipline, constitutive of rationality, and constructively created by rational animals based on an innate template, called "protologic," which belongs to a special cognitive faculty, the logic faculty. The study of this faculty and the logic it generates is a common project of cognitive psychology and philosophy, but it is not a naturalistic project in the sense of reduction of logic to psychology. Hanna compares protologic to Universal Grammar. In the same way that Universal Grammar allows a multiplicity of natural languages, so protologic allows a multiplicity of logics. These logics must include protologic, but beyond that "anything goes," so to speak, including conflicting logics.

I agree with some aspects of Hanna's theory, for example, that the mind is one of the things that logic is grounded in, and that logic is not reducible to psychology. But I am critical of others. One focus of my criticisms of Hanna's account is that it completely neglects the veridicality of logic. Logic, according to his account, is grounded only in the mind and not at all in the world. Humans are treated as "captives" of the logic faculty, and this leaves them with no room for a critical outlook on logic, no way to distinguish between logical systems that in fact transmit truths from sentences to sentences with a strong modal force and those that fail to do so. The importance of veridicality for logic undermines the analogy between protologic and Universal Grammar. Natural languages are neither true nor false, but logical claims – both object-level claims ("Every individual is identical to itself") and meta-logical claims ("The sentence S is logically true," "S2 follows logically from S1") – are.

C: In 2002-2003, when I stayed at Miami, I read Penelope Maddy's paper "A Naturalist Look at Logic" (2002). It impressed me quite deeply. Later on, I asked one of my PhD students to translate it into Chinese and published the translation. In that paper, Maddy makes a great effort to ground logic both in the world and in the mind: "logic is true of the world," "the core of our logic reflects the structural features of the world;" "logic is grounded in the structure of human cognition," more specifically, "classical first-order logic rests on our most basic modes of conceptualization." Could you compare your foundational account of logic with Maddy's naturalistic conception of logic couched in that paper?

S: There are some significant similarities in our views: we hold that logic is grounded both in the world and in the mind, we identify the structural dimension of the world as the one that grounds logic, we deny that logic is analytic, we deny that it is purely apriori, we care about the veridicality of logic, and we believe in the possibility of change in logic. Methodologically, we regard the philosophy of logic, and philosophy more generally, as interconnected with other disciplines, including empirical disciplines. And as philosophers, both Kant and Quine are significant to us.

But there are also significant differences between us. First and foremost, Maddy is a naturalist whereas I am not. Although I am friendly to cooperation between philosophy and science, naturalism is not part of my philosophical identity in a way that it is a part of hers. Second, Maddy accepts from Kant exactly what I reject in his work: his treatment of logic. In my view, Kant's work is extremely important in fields like epistemology and ethics, but not in either logic or the philosophy of logic. Furthermore, I reject Kant's view that the logical forms of our thoughts are built into us once and for all and we have no control whatsoever over them. This renders the foundation of logic in the human mind static and passive, and it makes it very difficult to explain the veridicality of logic. This difference between Pen and me is partly reflected in a question she asked me following a talk I gave at UC Irvine in 2002. She asked whether it could not be the case that the biological structure of human cognition *happens* to fully coincide with the structure of the world. I answered that this is not the issue. The point is that it's the world that determines which conception of logical form yields *correct* logical truths and consequence, not what happens to be the cognitive structure of some mind. Not all possible structures of mind have built-in "logical forms" that yield *correct* inferences. Correctness is a

matter of how the *world* is. (Indeed, my theory can explain why the built-in cognitive resources used in logical reasoning reflect, at least to some degree, the structure of the world. It is likely that if they deviated from it too radically, humans would not have survived.) Furthermore, the history of logic shows that we do have some power on the logical forms we use in reasoning, so what the biological structure of human cognition *happens to be* is not the whole story, even on the level of mind. Moreover, I think my theory has stronger, more informative, and richer tools for explaining the grounding of logic in the world and the necessity of logical inferences, logical truths, logical laws, than Maddy's theory. Among other things, I offer a precise characterization of the worldly features in which logic is grounded – namely, *formal* features – and I do that in terms of a very fruitful notion – *invariance under isomorphism.* This enables me to do a few things that Maddy's account does not do: I can explain the *objective necessity* of logical truths and inferences on grounds other than happenstance or on subjective grounds – based on what appears to us to be necessary; I can identify what, in the world, is actually the source of logic's veridicality, rather than say that *it appears to us obvious* that logical truths are true and logical consequences are truth preserving; and so on. Finally, my foundational holism enables me both to overcome the objection of circularity in foundational studies of logic and to explain how humans are capable of acquiring knowledge of the objectual laws that ground the logical laws. Maddy rightly rejects Quine's one-unit holism, but she offers no alternative to that holism, hence has no means for explaining logical knowledge or diffusing the circularity objection that arises in all non-holistic studies of logic.

4. Quine's Theses About thE Revisability Of Logic

C: As far as the revisability of logic is concerned, Quine's position seems to be both very radical and very conservative. Radical side: he argues that logic shares empirical contents with science

based on the interconnectedness of our system of knowledge, so it is revisable even based on experiential evidence. Conservative side: he disregards any alternative logic, like intuitionist logic and quantum logic as a real revision of the first-order logic, because it allegedly changes the meanings of logical term, hence deals with a different subject matter. Could you comment on Quine's positions on the revisability of logic? Could you take as examples real revisions of classical logic? By the way, in recent years, logical pluralism has become quite fashionable. Could you clarify what logical pluralism exactly means? What is your attitude toward logical pluralism? Why?

S: In my view, Quine's positions on the revisability of logic are complex and there are deep tensions between them. On the one hand, Quine's rejection of analyticity and his view that all disciplines are partly factual, partly conventional, suggest that logic is partly, yet significantly, factual, i.e., grounded in the world, and as such open to revision on factual grounds. This seems to be reflected in a well known passage from "Two Dogmas of Empiricism" (1951) where Quine compares revision in logic to revisions in physics and biology. But here the tension creeps in. A closer look at this paragraph shows that the basis for this comparison is in fact the *pragmatic* element in all these revisions, not the *factual* element: "Revision even of the logical law of the excluded middle has been proposed *as a means of simplifying* quantum mechanics, *and what difference is there in principle between such a shift and the shift* whereby Kepler superseded Ptolemy, or Einstein Newton, or Darwin Aristotle" (my emphases). So his point here is not that logic is factual, but that the empirical sciences are largely pragmatic or conventional. The difficulty for Quine in viewing logic as factual is, in my view, rooted in his radical empiricism. As an empiricist, Quine cannot recognize abstract features of the world, or at least human

knowledge of such features, and therefore he cannot ground logic in the world in its own right, but only as a means of handling and, in particular, simplifying our handling, of problems arising in the experiential regions of empirical science.

In contrast, for me the question whether the world, or objects in the world, have abstract features is an open question. Furthermore, I believe that at least with respect to formal features there are good reasons to accept their reality. And it is just the laws that govern these features – formal laws - that ground logic. Therefore, for me, revision of logic can be motivated not just by pragmatic considerations concerning empirical science, but also, and indeed primarily, by considerations concerning the veridicality of logic itself.

Consider, for example, revisions of the law of excluded middle: "$S \vee \sim S$" or "$(\forall x)(Px \vee \sim Px)$." This law (in its second form) is grounded in a certain formal law governing the world. Using set-theoretic terminology, we can describe this law as saying that given a domain of individuals D and a property P, every individual in D lies either in the extension of P in D or in its complement in D. This law assumes that the basic formal structure of the world is such that every domain of individuals is divided into two parts by each property. But it is an open question whether this assumption is correct. If it turns out that each domain is in principle divided into 3 or more parts, then the law of excluded middle is false and classical logic ought to be revised. (The situation with the sentential version of the law of excluded middle is similar, as I explain in my book.)

Concerning logical pluralism, my view is that there are multiple perspectives on logic, and this naturally gives rise to multiple logics, for example, modal logic alongside mathematical logic.

My own account focuses on mathematical logic, and it explains why it is in a sense stronger and more basic than modal logic. The modal operators have a weaker degree of invariance than the operators of mathematical logic, and in this sense modal logic is a weaker logic. But this does not mean that it is not a "legitimate" logic, though it does mean that it is not a substitute for mathematical logic. So, as far as logical pluralism goes, I have no problem recognizing the viability of multiple logics. However, in thinking on pluralism in general, and on specific logics in particular, I reject the view, sometimes associated with logical pluralism, that *anything goes*. In particular, in the case of two conflicting logics of the same type – for example, two conflicting mathematical logics – we have to either reject one of these logics or explain why, in spite of their conflict, both are acceptable. And our explanation has to address the issue of veridicality, namely, the requirement that logical laws and claims of logical truth and logical consequence be true in the robust yet flexible sense I attribute to truth, that is, manifold correspondence. This is not a trivial requirement. Finally, there are logics, such as intuitionistic logics, that (at least on some construals) regard logic as grounded exclusively in the mind and not in any significant way in the world. These logics (or logics so construed) I reject based on the reasons that led me to conclude that logic must be grounded not just in the mind but also, and significantly so, in the world (or in certain specific facets of the world).

5. EPILOGUE

C: In *Epistemic Friction*, you promise us a follow up book, *Epistemic Freedom*. Could you tell us something about the contents of that book in advance? What main ideas and positions your new book will develop?

S: Epistemic freedom is a complementary principle to epistemic friction. In *Epistemic Friction* I focused on the overall structure of knowledge and the role of both friction and freedom in it, but I put more emphasis on epistemic friction. One of my main themes was the grounding of knowledge − all fields of knowledge, including logic and mathematics − in the world. In *Epistemic Freedom* I would like to explain the role of mind in knowledge. In thinking about the basic human epistemic situation, I characterized this situation as involving two elements: mind and world. The mind seeks to know the world but, due to its cognitive limitations, this is not a trivial or an easy goal for it to achieve. At the same time, due to the cognitive resources it does have plus its ability to actively search for, figure out, and implement new cognitive routes for reaching the world, this is not a hopeless pursuit either. It is this aspect of the role of mind in knowledge that I would like to investigate in *Epistemic Freedom.* And within this investigation I am particularly interested in two things:

First, I am interested in the role of intellect in knowledge. I am interested in understanding its role in everyday as well as scientific, mathematical, and logical knowledge, and in particular its role in discovery. And I aim at further developing – and revising, if needed – the new paradigm of intellect I proposed in *Epistemic Friction*: figuring out.

Second, I am interested in the classical question of how mind and world come together to generate knowledge of the world. In particular, I am interested in the way our active freedom enables us to maneuver the maze of mind-world interrelations. In short, I am interested in understanding the balance between epistemic friction and freedom, including our ability to break

away from some of the boundaries that either nature or we ourselves (through our cognitive passivity, misguided decisions, etc.) establish.

C: In my view, there are two different styles of doing philosophy in contemporary analytic philosophy. The first is closer to traditional philosophy, focusing on big and fundamental questions in metaphysics, epistemology, logic, ethics, etc., using analytical methods, paying close attention to the distinction between what's correct and what's wrong. I myself take Quine, Searle, and you as the representatives of the first style. The second is to focus on quite narrow and specific questions, using complicated techniques mainly from logic, mathematics, and linguistics, developing some novel, strange, stimulating, sometimes astonishing-sounding doctrines, bringing about quite fierce controversies and debates, and then □. Right now second style seems to be more fashionable than the first. Could you comment on this phenomenon: existent or non-existent? Positive or negative?

S: In a sense you are right. There are these two styles of philosophy today and the second is more popular. At the same time, I think that most philosophers are interested in the "big" questions and view the narrower questions as contributing to a more judicious answer to the big questions. A similar attitude exists among historians of philosophy. In order to address the classical philosophical questions today, many historians of philosophy believe that you need to understand their historical roots and the answers given to them by the great philosophers of the past. Is the current tendency of focusing on smaller questions good or bad? I think it's neither. There are many ways to contribute to philosophy, and each philosopher must find his or her own way to make such contributions.

C: In your opinion, what are the most salient characteristics of a great philosopher? Could you give some advice about doing philosophy to the young generation of philosophers, especially to the young generation of Chinese philosophers? As you know, Chinese philosophy has been outside of international philosophy for quite a long time. I think this situation has to be changed. At least, some Chinese philosophers should engage into international activities and organizations of philosophy, e.g. attend international conferences and workshops, publish in well-recognized international journals and presses, and so on. This way, we can have more communication and dialogue with international colleagues of philosophy than before.

S: Among the traits I admire in great philosophers are their independence, fearlessness, openmindedness, focus on big questions, doggedly seeking to get to the heart of the matter, imagination, and innovation.

My advice to young Chinese philosophers is to open themselves up to a variety of approaches to philosophy while being true to their own sense of what is important and worth doing. I think philosophy is universal, and I join you in urging Chinese philosophers to join international organizations, go to international conferences, publish in international journals and presses, visit philosophy departments in other countries, and invite philosophers from other countries to visit their departments and participate in their conferences. I myself find involvement with philosophy on an international level extremely fruitful and rewarding, and I believe philosophers from all nations will too.

C: I think, we did together very informative interview about your philosophy. Thank you very much for your cooperation, and hope your next book, *Epistemic Freedom*, will come out soon, and will also become a big success. I'm looking forward to reading it!

S: Thanks very much, Chen, for inviting me to this interview!

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ENDNOTES

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