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# FOUNDATIONAL HOLISM, SUBSTANTIVE THEORY OF TRUTH, AND A NEW PHILOSOPHY OF LOGIC: INTERVIEW WITH GILA SHER BY CHEN BO*

**GILA SHER AND CHEN BO**

## I. ACADEMIC BACKGROUND AND EARLIER RESEARCH

CHEN Bo (hereafter, "**C**" for short): Professor Gila Sher, I'm very glad to interview you at UCSD. I first "met" you, so to speak, by coincidence. In 2014, I spent a year at Nihon University, Japan, as an academic visitor to do my research. When writing a paper on Quine's conception of truth, I searched for relevant literature on google. Your name and papers jumped out. I downloaded some of your papers, read them, and loved them. In my view, we work in a similar direction in philosophy and have similar positions about some basic philosophical issues. I like your topics, positions, arguments, and even your academic style. I myself think that your research is very important and of high quality, and that your new book *Epistemic Friction: An Essay on Knowledge, Truth and Logic* (Oxford, 2016) is an essential contribution to epistemology, the theory of truth, and the philosophy of logic. That's the reason I decided to invite you to visit Peking University and give five lectures over there in 2016.

Gila SHER (hereafter, "**S**" for short): It was very nice to find a kindred spirit in China. I enjoyed my visit to Peking University very much.

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### *A. Sher's Early Years*

**C**: Right now, my Chinese colleagues know almost nothing about you. Could you say something about, for example, your background, education, and academic career, some general information about yourself. Then, Chinese readers, perhaps also Western readers, can know you and understand your philosophy better than before.

**S**: I grew up in Israel. Israel was a young idealistic country then and there was an ethos of independent thinking and intellectual engagement in the population at large. Although I grew up in a tiny country, I always thought of myself as a citizen of the world. Books written all over the world were translated into Hebrew and I identified with Russian humanists and suffering American slaves as much as with people from my own country. I learned semi-theoretical thinking both at school and at my youth-movement (where we regularly discussed issues in applied ethics). But fully theoretical, abstract thinking I learned at home, from my father, who was an intellectual-cum-builder. Abstract thinking felt like an adventure, no less exciting than the adventures I read about in Mark Twain's and Jules Verne's novels. When I finished high school I served in the Israeli army for two years (in a unit attached to the kibbutz movement), and as soon as I finished my service I started my BA studies at the Hebrew University of Jerusalem, where I majored in philosophy and sociology. Studying philosophy was an intense experience for me. In my first year I was full of questions, for which I could find no satisfying answers. But when, in my second year, I studied Kant's *Critique of Pure Reason*, suddenly everything became clear. I felt as if I discovered something that I was looking for my entire life without knowing it. Kant remains my model of a true philosopher. But Kant was history and I wanted to do philosophy on my own. This was something that analytic philosophy, which I also encountered in my second year at the Hebrew University, offered. I was critical of analytic philosophy for being inordinately narrow and for neglecting the "big" philosophical questions, but I loved its spirit of actively posing problems and then actively trying to solve them. These two attractions, and the tension between them, were characteristic of the philosophy department at the Hebrew University during that period. The philosophy department was deeply divided, and the object of contention was philosophical methodology. How should we do philosophy? Should we ask the questions and use the methods epitomized by Kant and other traditional philosophers, or should we use the methods exercised by contemporary analytic philosophers with their emphasis on language? Two of my professors, Eddy Zemach and Yosef Ben Shlomo, had a public debate on this issue, and we, the students, were both the jury and the judges. It was up to us to decide which way to go, and to make the "right" decision we invited each professor to discuss his position with us, sitting with Yosef Ben Shlomo in a coffee house in Jerusalem and with Eddy Zemach

at his home. This lively atmosphere and the encouragement to decide how to do philosophy on my own had a deep influence on me. My own personal choice was to keep the big, classical questions alive, but use new tools to answer them. At the Hebrew University I also discovered logic. I came to logic from philosophy, rather than from mathematics, and I needed to learn how to read advanced texts in logic, which were written, for the most part, by and for mathematicians. The person who taught me how to do that was Azriel Levy, the renowned set-theorist. Levy gave a one trimester course on logic in the mathematics department, focusing entirely on sentential (propositional) logic. But his explanations were so deep and general that after taking this one course with him I could read any textbook in mathematical logic and related fields (e.g., model theory). Another significant influence was Dale Gottlieb. Gottlieb was an American philosopher of logic who visited the Hebrew University for one trimester. It was in his class on substitutional quantification that I first experienced the joy of logical creativity. Other professors who influenced me at the Hebrew University were Yermiyahu Yovel, Avishai Margalit, Haim Gaiffman, and Mark Steiner.

A few years after finishing my B.A. I moved to the United States and went to graduate school at Columbia University, New York City, where I worked with Charles Parsons. I wanted to work with someone who shared my interests in Kant and logic, whose philosophical integrity and acumen I respected, and who would not interfere with my independence. Parsons had all these qualities, and more. The other members of my dissertation committee were Isaac Levi, Robert May, Wilfried Sieg, and, replacing Sieg who moved to Carnegie Mellon, Shaughan Lavine. During my graduate studies I was a visiting scholar at MIT for one year. There I talked regularly with George Boolos, Richard Cartwright, and Jim Higginbotham. After finishing my dissertation I joined the philosophy department at the University of California, San Diego as an Assistant Professor. I am still there today, now a professor.

### *B. Intellectual Influence: Kant, Quine, and Tarski*

**C**: I'd like to know which academic figures, including logicians and philosophers, have had strong intellectual influence on you and, in some sense, have molded you intellectually. I find that you often mention some big names, for example, Kant, Wittgenstein, Tarski, Quine, among others. Right now, I want to know when you found Kant, what aspects of his work impressed you deeply, what drawbacks you think his philosophy has, so you can make your own contribution to logic and philosophy?

**S**: You are right. The philosophers who influenced me most were Kant, Quine, and Tarski. Wittgenstein was also an influence, as was Putnam. Among contemporary philosophers, I feel affinity to Williamson's substantivist approach to

philosophy as well as to other substantivists. But Kant was special. He was my first love in philosophy, the first philosopher I felt completely at home with, and if I were asked to choose two philosophical works for inclusion in a capsule capturing the essence of humanity for extra-terrestrials, they would be Kant's *Critique of Pure Reason* and *Groundwork for the Metaphysic of Morals*.

But my views on the content of Kant's philosophy are mixed. Let me focus on the *Critique*. I think that Kant's question "Is human knowledge of the world possible, and if it is, how is it possible?" is still the central question of epistemology. I think Kant is right in thinking that this question is in principle answerable, that the key to answering it is methodological, and that the main issue is how the human mind is capable of cognitively reaching the world and how it can turn such cognition into genuine knowledge. I agree with Kant that one of the crucial issues is the role of human *reason*, or *intellect*, in knowledge, and that knowledge requires both what I call "epistemic friction" and "epistemic freedom" (which I will explain later on). Furthermore, I think that Kant's question and answer are a paradigm of *substantive* philosophy. I also share Kant's view that the central question of epistemology requires a certain kind of transcendence and that such transcendence is possible for humans.

Yet, there is much about Kant's approach to knowledge that I am critical of. First, I think that both his conception of the world and his conception of the mind, as target and agent of human knowledge, respectively, are inadequate. Kant's bifurcation of the world into thing-in-itself and appearance has been widely criticized, and for good reasons. In particular, I think that his claim that the world as it is in itself is utterly inaccessible to human cognition is too strong and his claim that cognition is limited to the world of appearance is too weak. I am also critical of Kant's rigid and static conception of the structure of human cognition. Moreover, although Kant emphasizes the element of freedom in human cognition, his conception of epistemic freedom is exceedingly weak. The role of freedom is largely passive, and active freedom seems to play no role in his conception of knowledge. This is especially clear in his account of the highest level of cognitive synthesis, the categories. There is no room in Kant's theory for the possibility that humans might intentionally change the categories they use to synthesize their representations. The categories are fixed once and for all, as are our forms of intuition, the basis for our mathematical knowledge. I also disagree with his view that both mathematical laws and highly general physical laws are grounded almost exclusively in our mind. Furthermore, I find Kant's rigid dichotomies—the analytic and the synthetic, the apriori and the aposteriori—extremely unfruitful (for reasons I will explain later on). Finally, I am critical of Kant's treatment of logic. Although Kant recognizes the crucial role logic plays in human knowledge, his attitude towards logic is largely uncritical, and he offers nothing like a Copernican revolution for logic. The problem is not that Kant did not anticipate

Frege's revolution; the problem is that he did not ask penetrating questions about the foundation and in particular the veridicality of logic, as he did for other branches of knowledge.

### *C. Origin and Main Ideas of* The Bounds of Logic

**C**: Now, we come to your first book: *The Bounds of Logic: A Generalized Viewpoint* (1991), based on your PhD dissertation. Could you outline the contents of this book: for instance, what central questions you are trying to answer, what new ideas you are putting forth, what important arguments you are developing for your position, and so on.

**S**: *The Bounds of Logic* develops a broad conception of the scope and limits of logic, based on a generalization of the traditional conception of logicality, and in particular, logical constants (logical properties, logical operators). As you mentioned, this book is based on my dissertation ("Generalized Logic: A Philosophical Perspective with Linguistic Applications", 1989), so to explain how I came to write this book I have to start with my dissertation and graduate studies. I had always been interested in the question "What is the (philosophical) foundation of logic?," but I didn't know how to approach this question as a topic of a serious theoretical investigation. You cannot just ask "What is the foundation of logic?" and hope to come up with an answer. Or at least I couldn't. I needed to find an entry point to this question, one that is (1) definite, (2) manageable, and (3) goes to the heart of the matter. But how does one find such an entry point? The clue to such an entry point was given to me by my dissertation advisor, Charles Parsons. One day Charles mentioned to me a 1957 paper by Andrej Mostowski, "On a Generalization of Quantifiers," and said I might find it interesting. I don't know what, exactly, he had in mind, but for me, this paper was a revelation. This was in the mid-1980's. At this time many philosophers took it as given that core logic is standard 1st-order mathematical logic and that the logical constants of core logic—the "wheels of logic," so to speak—are the truth-functional sentential connectives (the most useful of which are "not," "and," "or," "if … then …," and "if and only if"), two quantifiers: the universal quantifier ("every," "for all") and the existential quantifier ("there exists," "some," "for at least one"), and the identity relation. The question why these and not others was rarely asked. For the sentential connectives, at least, there was a general criterion of logicality—truth-functionality. Nobody I knew of asked why this was the right criterion, but at least there was a general criterion about which the question could be asked. For the logical quantifiers and predicates there was not even a general criterion. All there was is a list. A list of two quantifiers and one predicate, possibly closed under definability (so a quantifier like "There are at least n things such that …" could also be considered a logical constant). The accepted view was that you cannot give a substantive

answer to the question "What is logic?." Following Wittgenstein, philosophers thought that we can "see" what logic is, but we cannot "say" or "explain" what it is. And following Quine, the accepted view was that logic is simply "obvious." There is no need to engage in a critical investigation of the nature of logic.

But Mostowski showed that we can generalize the traditional notion of logical quantifier by identifying a certain general principle underlying the recognized quantifiers, construct a criterion of logicality based on this principle, and argue that all quantifiers satisfying this criterion are genuinely logical. His criterion was *invariance under permutations (of the universe of discourse)*, and this criterion was later further generalized (most influentially, at the time, by Per Lindström) to *invariance under isomorphisms*. The question I raised in *The Bounds of Logic* was: Is *invariance under isomorphisms* the right criterion of logicality? Are the bounds of logic broader than those of standard 1st-order mathematical logic? Do they include all logics satisfying the invariance criterion of logicality? Why? The question "why?" was the main innovation of the *Bounds of Logic*. The question meant: Are there philosophically compelling reasons to accept or reject the invariance criterion of logicality? Does this criterion capture the deep philosophical principles underlying logic? What are these principles and why are they the right (or wrong) principles? I wasn't looking for a "mark" of logicality—for example, apriority. I was suspicious of the traditional philosophical dichotomies, and in any case I didn't see how apriority could go to the heart of logicality. Having formulated my question by reference to the Mostwoski-Lindström criterion, the challenge was to find a way to answer this question. At the time, there were only few influential articles on the notion of logical constant, for example, Christopher Peacocke's "What is a Logical Constant" (1976) and Timothy McCarthy's "The Idea of Logical Constants" (1981). Both of these rejected invariance-under-isomorphisms as an adequate criterion of logicality, but their considerations were tangential to what I was looking for.

The catalyst for my own investigations was John Etchemendy's dissertation, "Tarski, Model Theory, and Logical Truth" (1982), which was later developed into a book, *The Concept of Logical Consequence* (1990). Etchemendy made a provocative claim: Tarski's definition of logical consequence failed because Tarski made an elementary mistake in his use of modal operators when arguing for its adequacy. And the same was true for contemporary logic. The semantic definition of logical consequence in principle fails, and where it works, this is just a happenstance. This provocative claim showed me how to proceed in my investigations. My first step was to re-read Tarski's classical paper, "On the Concept of Logical Consequence" (1936). Having re-read the paper, critically examined its claims, and connected it to the question I was asking in my dissertation, I saw where Etchemendy's analysis went astray. Tarski identified *two* pretheoretical features of logical consequence: *necessity (strong modal force)* and *formality*. For

a given sentence to be a logical consequence of (or follow logically from) a given set of sentences, the *truth* of the latter sentences (premises) must *guarantee* the truth of the former sentence (conclusion) with an especially strong *modal force* and based on *formal features* of the sentences involved. Tarski defined logical consequence as a consequence that preserves truth in all models and claimed that this definition satisfies the necessity and formality conditions provided we have an adequate division of terms (constants) into logical and non-logical.

Tarski himself did not know whether it was possible to provide a systematic characterization of logical constants, and he ended his paper on a skeptical note. But I saw how the idea of invariance under isomorphisms enables us to tie up all the elements required to justify Tarski's definition of logical consequence: Invariance under isomorphisms captures the idea of formality. Logical constants need to satisfy this invariance criterion in order to be formal. Given the formality of logical constants, logical consequences can and should be formal as well. To achieve this goal we use a Tarskian apparatus of models. Tarskian models have the job of representing the totality of formally possible situations. Consequences that hold in all Tarskian models therefore hold in all formally possible situations. This, in turn, guarantees that Tarskian consequences have an especially strong degree of necessity. And for that reason, consequences satisfying the Tarskian definition are genuinely logical. (Etchemendy, in contrast, completely neglected the formality condition, and therefore could not see how necessity is satisfied.)

Acceptance of invariance under isomorphisms as a criterion of logicality has non-trivial results. It considerably extends the scope of mathematical logic, in particular, that of 1st-order mathematical logic. 1st-order logic is a family of 1st-order logical systems, each having a set of logical constants satisfying the invariance-under-isomorphisms criterion. This criterion can be extended to sentential logic, where it coincides with the existent criterion of truth-functionality. This provides a philosophical justification for the latter criterion as well. Among the non-standard logical constants are quantifiers such as "most," "few," "infinitely many," "is well-ordered," and many others. The book goes beyond the existent Mostowski-Lindström criterion in defining not just logical operators but also logical constants, offering additional conditions designed to explain how logical constants are incorporated in an adequate logical system. My conception of logical operators partially coincides with one proposed by Tarski himself in a 1966 lecture, "What are Logical Notions?." Tarski's lecture did not influence my thinking because it was first published only in 1986, and by the time I found out about it (about a year later) my ideas on logicality were already fully developed. As it happened, Tarski himself did not connect this lecture with the problem of logical consequence, saying that his lecture had nothing to say about the question "What is Logic?" and that the latter question is left for philosophers to answer. For me, in contrast, the two were inherently connected.

### *D. Branching Quantifiers and IF Logic*

**C**: In *The Bounds of Logic* you talked about branching quantifiers. This reminds me something about Hintikka. In 1997–98 I spent a year with Georg Henrik von Wright as a visiting scholar at the University of Helsinki. There I met Hintikka and we talked many times. I know that based on branching quantifiers, Hintikka and Sandu invented IF logic (independent-friendly 1st-order logic) and game-theoretical semantics, and drew a series of astonishing-sounding conclusions. Hintikka himself wrote that IF logic would produce a revelation in logic and the foundation of mathematics. More than twenty years have gone. Could you comment on Hintikka's IF logic and game-theoretical semantics?

**S**: The idea of branching, or partially-ordered, quantification is based on another generalization of standard 1st-order mathematical logic—a generalization of the structure of a quantifier-prefix. In standard logic, quantifier-prefixes are linear—$(\forall x)(\exists y)Rxy$, or $(\forall x)(\exists y)(\forall z)(\exists w)Sxyzw$ (read as "For every x there is a y such that x stands in the relation R to y" and "For every x there is a y such that for every z there is a w such that x, y, z, and w stand in the relation S"). Here y is dependent on x, z is dependent on y and x, and w is dependent on z, y, and x. In 1959 the logician and mathematician Leon Henkin asked: Why should quantifier-prefixes be always linearly-ordered? He proposed a generalization of the standard, linear, quantifier-prefixes to partially-ordered prefixes, treating linearly-ordered quantifiers as a special case. Henkin's work was purely mathematical, but in 1973 Jaakko Hintikka argued that it has applications in natural language. From here on the study of branching or partially-ordered quantifiers developed in two ways. One of the developments, due to Jon Barwise, Dag Westerståhl and others, involved the combination of the two generalizations—the generalization of quantifiers begun by Mostowski and the generalization of quantifier-prefixes due to Henkin. This led to the creation of a theory of *branching generalized quantifiers*. An example, due to Barwise, of a branching generalized quantification in English, using the generalized-quantifier "most," is "Most of the boys in your class and most of the girls in my class have all dated each other." The linear version of this sentence says: "Most of the boys in your class are such that each of them dated most of the girls in my class." The branching version says that there are two groups of people: one containing most of the boys in your class and one containing most of the girls in my class and all the boys in the one group dated, and were dated by, all the girls in the other group. The branching reading requires that each of the boys dated *all* the girls in the group of girls—that is, the same girls—whereas the linear reading does not require that.

But Barwise found it (technically) difficult to give the same interpretation to all branching quantifications. Barwise's interpretation worked for monotone-increasing generalized quantifiers (such as "most" and "at least two"), but not for other

quantifiers (e.g., monotone-decreasing quantifiers such as "few," non-monotone quantifiers such as "an even number of" and "exactly two," and mixed quantifiers with respect to monotonicity). Barwise concluded that the meaning of branching-quantifier sentences depends on the monotonicity of the quantifiers involved, and some combinations of branching quantifiers yield meaningless sentences. This did not make good sense to me, and in my dissertation (and *The Bounds of Logic*) I showed how, by adding a certain *maximality* condition, we can give a unified interpretation to all branching quantifications, regardless of monotonicity. In a later paper (1994) I proposed a completely general definition of branching quantifiers based on this idea. The main challenge in formulating a completely general semantic definition of branching quantifiers is the lack of compositionality, which means that recursion is not readily available. But there are ways to overcome this problem.

The second direction that the study of branching quantifiers took was Hintikka's. Limiting himself to standard quantifiers, Hintikka, in cooperation with Gabriel Sandu, developed a game-theoretic semantics for branching quantifications, which they called "IF logic" or "independence-friendly logic," that is, a logic in which some occurrences of quantifiers in a given quantifier-prefix may be independent of each other (or not in the scope of each other). Hintikka believed that the new logic was extremely powerful. For one thing, it could be used to provide a new foundation for mathematics—something that he pursued in his 1998 book, *The Principles of Mathematics Revisited.* He also thought that branching quantification could be used in fields like quantum mechanics, where there are non-standard relations of dependence and independence between objects. I can see why Hintikka thought this could be a fruitful application of IF logic, but I don't know how, exactly, this was supposed to work. It is unfortunate that Hintikka passed away before he further developed these ideas. I hope Sandu will continue this project.

### *E. Preparation for the Next Leap*

**C**: From your first book, *The Bounds of Logic* (1991), to your second book, *Epistemic Friction* (2016), 25 years have passed. In the middle of this period, you co-edited a book, *Between Logic and Intuition: Essays in Honor of Charles Parsons* (2000). I know that you never stopped your investigation and research. Could you outline your academic work in this duration of time?

**S**: After finishing my first book, I started to develop my ideas on philosophical methodology, epistemology, and truth, as well as work out in more detail the philosophical aspects of my conception of logic. My style of work is cumulative. My interest in epistemology preceded my interest in logic, and already at the Hebrew University I started working on Quine. As a graduate student at Columbia University I continued to develop my ideas on Quine, and this eventually

culminated in a paper, "Is There Place for Philosophy in Quine's Theory?," which was published in the *Journal of Philosophy* in 1999. At UCSD I gave a few graduate seminars on Carnap and Quine and these led to further development of my ideas. My attitude towards Quine's philosophy was always mixed. On the one hand, I admired Quine for his philosophical courage, independence, and combination of original and common-sensical thought. In particular, I admired his rejection of the traditional philosophical dichotomies, which I saw as opening new possibilities for addressing the classical questions of epistemology. At the same time, I thought that in certain ways Quine had a very narrow view of philosophy, partly reflected in his deep empiricism and naturalistic methodology. This led me to develop a revised model of knowledge—a "neo" or "post" Quinean model—that would later be included in my second book.

Truth was not a topic I was planning to write about. I was led to it by two circumstances. First, it was a natural continuation of my interest in logic and in particular in Tarski's approach to logic. Tarski's approach to logic is largely semantic. In particular, he treats logical consequence as a semantic notion. But what is a semantic notion? Tarski has a clear and definite answer to this question: A notion is *semantic* if and only if it has to do with the *relation between linguistic expressions and objects in the world*. Semantic notions are, therefore, essentially *correspondence* notions, and this is supported by Tarski's account of his notion of truth (in his 1933 paper) as a correspondence notion in the Aristotelian sense. But if semantic notions in general are correspondence notions, then the semantic notion of logical consequence is also a correspondence notion, that is, a notion grounded not just in language but also, and significantly so, in the world. Tarski himself never indicated that he regarded logical consequence (and the associated notion of logical truth) as a correspondence notion. But then, Tarski was a minimalist in his attitude to philosophical discussions. He thought of himself as a philosopher-logician, but he preferred to limit his detailed discussion to technical and mathematical issues. This, however, is not true of me, and I set out to investigate the topic of truth and its relation to logical consequence.

Another impetus for studying truth came from the increasing dominance of deflationism, and in particular that brand of deflationism that says truth is a trivial notion and there is no room for a substantive theory of truth. The popularity of deflationism surprised me. Why would anyone be interested in being a philosopher if all a philosopher could do is develop trivial, non-substantive theories? And the idea that deflationism is appropriate for certain philosophical theories, specifically the theory of truth, made no sense to me. My reaction to the increasing popularity of truth-deflationism, as advanced by Horwich's 1990 book *Truth*, for example, was to try to understand what led contemporary philosophers to espouse this view. I found their explanation unconvincing, but I thought there might be something below the surface, something about the subject-matter of truth that

made substantive theorizing about it especially difficult and explained why philosophers despaired of the possibility of a substantive theory of truth. So I decided to investigate whether there was such a difficulty. My investigations led to the conjecture that it is the enormous breadth and complexity of truth that raises severe difficulties. This, in turn, led me to look for a strategy for dealing with such difficulties. My approach has some affinity with contemporary pluralist approaches to truth, such as those of Crispin Wright and Michael Lynch, but it differs from these on two significant points: (1) the appropriateness of viewing the general principles of truth as *platitudes*, and (2) the scope of the plurality of truth. (See Part III below.) I started to develop a new, non-traditional, correspondence theory of truth, one that rejects the naive features of the traditional theory and allows a plurality of *forms* (patterns, "routes") *of correspondence*. The task of the theorist of truth is to investigate how truth (= correspondence) can, does, and should work, both generally and in particular fields, and develop a substantive account of truth based on these investigations. I published 14 papers on truth, including "On the Possibility of a Substantive Theory of Truth" (1999), "In search of a Substantive Theory of Truth" (2004), "Forms of Correspondence: The Intricate Route from Thought to Reality" (2013), and others.

During the interval between my two books I also continued to develop my theory of logic. My goal was to develop a full-fledged philosophical foundation of logic, a theoretical foundation guided by logic's role in acquiring knowledge. This led to the publication of 16 papers on logic, from "Did Tarski Commit 'Tarski's Fallacy'?" (1996) to "The Formal-Structural View of Logical Consequence" (2001), "Tarski's Thesis" (2008) and "The Foundational Problem of Logic" (2013, recently translated into Chinese by Liu Xinwen and published in three parts in *World Philosophy*). It was in this paper that I began to develop a new methodology of grounding or foundation, "Foundational Holism," that makes a substantive grounding of logic possible.

All these publications paved the way to my second book. In 2001 I taught a graduate seminar on John McDowell's book, *Mind and World* (1994), and this book gave me the idea of focusing my new book on "friction" in the epistemic sense. In 2010 I published a paper that foreshadowed my book, "Epistemic Friction: Reflections on Knowledge, Truth, and Logic." Other topics I explored during that time include branching quantification, indeterminacy and ontological relativity, and free will.

## II. FOUNDATIONAL HOLISM AND A POST-QUINEAN MODEL OF KNOWLEDGE

**C**: Now, we come to your second book, *Epistemic Friction* (2016). I love this book and evaluate it very highly. I appreciate your intellectual courage. Today, it

has become fashionable in philosophy to dislike big questions, to reject the foundational project, to reject the correspondence theory of truth, and to regard logic as being irrelevant to reality, being analytical, being fixed forever. You bravely stand out and speak loudly: No, I have another story to tell. In my view, your new book develops three systematic theories: foundational holism, a substantive theory of truth, and a new philosophy of logic. This is why I chose the title of this interview. I'd like to discuss with you the three theories carefully. First, could you outline your foundational holism? Your motivation? Main claims? Basic Principles? What open questions are still waiting to be answered? What further work is still waiting to be done?

**S**: Thanks. *Epistemic Friction* is indeed an attempt to construct an integrated account of knowledge, truth, and logic. The general principles that tie these topics together are the principles of *epistemic friction* and *epistemic freedom*. The underlying idea is that knowledge requires both freedom and friction (constraint). Two central principles of friction are: (1) Knowledge, qua knowledge, is knowledge of the world (or some aspect of the world), and therefore, *all* knowledge, including logical and mathematical knowledge, must be constrained by the world, in the sense of being veridical, that is, true to the world. (2) To be theoretically worthwhile, our body of knowledge, and each discipline and theory within it, must be substantive (explanatory, informative, rigorous, interesting, deep, important) throughout. But friction alone is not sufficient for knowledge. Knowledge requires epistemic freedom as well, the freedom to be actively involved in setting our epistemic goals, deciding how to pursue them, and actually pursuing them: designing research programs, conducting experiments, making calculations, figuring out how to solve problems, etc. Friction and freedom are not disjoint. Epistemic norms, in particular, lie in the intersection of freedom and friction, they are freely generated and imposed on us by ourselves; yet they are instruments of constraint. The norms of truth, evidence, explanation, and justification, are especially important for knowledge.

### *A. General Characterization of Foundational Holism*

**S**: The first topic of *Epistemic Friction* is, as you noted, *foundational holism*. This is a proposal for a new epistemic methodology, which is both part of my account of knowledge and used in my pursuit of a foundation for knowledge, truth, and logic within the book. The motivation for developing a new epistemic methodology is partly due to the failure of the traditional methodologies, foundationalism and coherentism. This naturally leads to a search for an alternative methodology, one that will be both universal (i.e., applicable both to empirical and highly abstract disciplines) and focus on a robust and substantive grounding of knowledge in reality. The coherentist methodology fails to satisfy my first

friction requirement: a robust grounding of all knowledge in the world. Even when it conceives of knowledge as knowledge of the world, coherentism's focus is on the agreement *between our theories* rather than on the agreement of *our theories with their target, the world*. Foundationalism does insist on the grounding of knowledge in the world, but it insists that this grounding be rigidly ordered: the grounding relation must be a strict partial-ordering (anti-reflexive, anti-symmetric, transitive) and have minimal elements. This requirement is one of the main reasons for the downfall of foundationalism. Given its central principles—(1) the grounding of our system of knowledge is reduced to the grounding of the basic units, (2) to ground X we can only use resources which are more basic than those generated by X, (3) no unit of knowledge (or combination of such units) can generate more basic resources than those generated by the basic units—it follows that no unit of knowledge, or combination of units, can produce resources for grounding the basic units. I call this "the basic-knowledge predicament". Foundationalism's success in grounding our system of knowledge depends on its success in grounding the basic units; but due to the strict ordering it imposes on the grounding relation, it has no resources for grounding those units. And the few attempts to overcome this problem (e.g., by allowing the basic units to be self-grounding) have come upon great difficulties.

The failure of the foundation*alist* methodology has led many philosopher to give up on the foundation*al* project altogether. One of the main claims of foundational holism is that this reaction is unjustified. This reaction is based on an identification of the foundation*al* and foundation*alist* projects, but the two are not identical. The foundational project is a general philosophical project, designed to provide an explanatory justification of humans' ability to provide genuine theoretical knowledge of the world. But the foundationalist method is just one method for carrying out the foundational project. What we need is a different method, a method of "foundation without foundationalism" (to use the title of a book on 2nd-order logic by Stewart Shapiro). *Foundational holism* is such a method. It says that we can achieve the foundational goal by using holistic rather than foundationalist tools, where holism is *not* identified with (nor implies) coherentism, but stands on its own. Foundational holism puts holistic tools in the service of a *robust foundational project*, one which is informed by both friction and freedom.

It is important to distinguish foundational holism from another type of holism as well: total holism or one-unit holism, namely the view that our system of knowledge is one huge atom, devoid of inner structure, and we can grasp it only as a whole. Foundational holism, in contrast, is a structured holism, one that emphasizes the inner structure of our system of knowledge as well as its structured connection to the world. Among the basic principles of foundational holism are:

1. In pursuing a foundation (grounding) for knowledge, we can, and indeed ought to, make full use of our cognitive resources, initiative, and ingenuity, in whichever order is fruitful at the time.
2. There are multiple cognitive routes of discovery as well as justification from mind (including theories) to the world, some strictly-ordered, others not. The foundational/grounding project sanctions the use of multiple routes of this kind.
3. The grounding process is a dynamic process, modeled after the dynamic metaphor of Neurath boat. To ground a given theory in the world we use whatever tools are available to us at the time. We then use the grounding we thus obtain, together with new resources (obtained by employing this grounding) to construct better tools. In the next step we use these tools to improve the grounding of the given theory (or find flaws in it and revise or replace it), extend the grounding to new theories, and so on.
4. In grounding a given theory we may use resources produced by other theories. What matters most, however, is not coherence with these theories, but rather using their (partial) success in reaching the world to ground the given theory.
5. In grounding a theory there is neither a possibility of nor a need for an Archimedean standpoint.
6. Although a certain degree of circularity/regress is inevitable, it need not undermine the grounding. We are responsible for avoiding vicious circularity, but non-vicious circularity is acceptable. Indeed, some forms of circularity are constructive, and these make a positive contribution to the grounding project. (I will say more about this in response to your next question.)

While foundational holism is more flexible than other methodologies, it is also more demanding. By allowing greater flexibility in grounding knowledge in the world it enables us to extend the grounding-in-the-world requirement to all fields of knowledge, including logic, something that more rigid methodologies cannot do. The more rigid the method of grounding, the more limited it is, in the sense of forcing us to limit the grounding-in-reality requirement to certain disciplines, leaving others (e.g., logic) outside this requirement.

There is much to say about these principles, but I will leave it at that. In the book I use the foundational-holistic method to construct a model of knowledge, develop a theory of truth, provide a detailed foundation for logic, and a skeleton of a joint foundation for mathematics and logic. This, however, does not exhaust the uses of the foundational holistic method, and there is much work to be done

in exploring its use in various branches of philosophy as well as other fields of knowledge. In the course of this work, some open questions are likely to arise, as well as opportunities to spell out in more detail, critically examine, and further improve the method.

### *B. Circularity, Infinite Regress, and Philosophical Arguments*

**C**: For a long time, circularity and infinite regress have had a very bad reputation in all disciplines. By appealing to your foundational holism and the Neurath-boat metaphor, you argue that circularity is not so bad, sometimes even inevitable. You distinguish between destructive and constructive circularity. Could you explain more about the role of constructive circularity in philosophical arguments?

**S**: I suspect that the reason circularity and infinite regress were considered fatal flaws in traditional philosophy had to do with its foundationalist conception of justification and argumentation. In accordance with this conception, all types of circularity and regress were banned. But with the rejection of foundationalism in the 20th-century, the situation had changed. The advent of holism, in particular, contributed to the legitimization of some forms of circularity and infinite regress (see, for example, Keith Lehrer [1990]). But many holists are coherentists, and as such don't emphasize the grounding-in-reality requirement. Foundational holism, in contrast, rejects coherentism. It is as intent on a genuine grounding of knowledge in the world as foundationalism is. From the point of view of foundational holism, we can distinguish four types of circularity: (1) Destructive circularity, (2) Trivializing circularity, (3) Neutral Circularity, and (4) Constructive circularity. Destructive circularity introduces errors into our theory. Examples of such circularity include cases of self-reference that lead to paradox, as in the Liar Paradox (a sentence that says of itself that it is not true). Trivializing circularity includes cases of circularity which are valid yet trivializing (for example, "P; therefore P"). An argument that rests on this type of circularity is worthless. Neutral circularity is the circularity involved in, say, writing a book on English grammar in English. It makes no difference to the adequacy of the book whether it is written in English or, say, in Chinese. Finally, we have constructive circularity. This is the most interesting case of circularity. The main idea is the Neurath boat idea: we use what we already have to make new discoveries, or create new tools, which we then use to make still newer discoveries and newer tools, and so on. In the Neurath boat metaphor, the sailors patch a hole in the boat temporarily using resources they have on the boat. Then, standing on the temporarily patched hole, they find new resources—not just resources found on the boat, but resources found in the sea and its environs—and use them to create better tools that enable them to re-patch the hole in a better and more lasting manner. The key is that we don't just repeat what we did before, but we do new things using new resources we obtain

by utilizing what we did. Two examples of constructive circularity are Cantor's diagonal method and Gödel's use of arithmetic syntax to define arithmetic syntax.

Constructive circularity is constantly used in *Epistemic Friction*. For example, logic is used in constructing a foundation for logic, but it is used critically and with added elements: philosophical reflections, new discoveries, knowledge borrowed from other disciplines, and so on. These provide us with tools for critically evaluating the logic we started with. Say, if at some point the theory of formal structure we used in constructing our logic demonstrates that the basic structure of reality is trivalent rather than bivalent, this might lead us to replace our initial bivalent logic by a trivalent logic. The dynamics of constructive circularity is also demonstrated in my (schematic) account of the emergence of logic and mathematics: Starting with a very basic logic-mathematics (say, a theory of Boolean structure), we build a very simple logic. Using this logic as a framework (as well as other resources), we build a simple mathematics (say, naive set theory). Using this mathematics (plus other resources), we build a more sophisticated logic (say, standard mathematical 1st-order logic). Using this logic (and other resources), we build a more advanced mathematics (say, axiomatic set theory). Using this (and other resources), we can construct a more powerful logic (say, 1st-order logic with generalized quantifiers), and so on.

### *C. Comparing Foundational Holism with Foundherentism*

**C**: In 2002–03, I spent a year with Susan Haack as a visiting scholar at the University of Miami. Haack developed foundherentism in her *Evidence and Inquiry* (1993). She argued that foundationalism and coherentism—the traditionally rival theories of justified belief—don't exhaust the options, and that an intermediate theory, that is, foundherentism, is more plausible than either. Foundherentism has two crucial claims: (1) A subject's experience is relevant to the justification of his empirical beliefs, but there need be no privileged class of empirical beliefs justified exclusively by the support of experience, independently of the support of other beliefs; (2) Justification is not exclusively one-directional, but involves pervasive relations of mutual support among beliefs. She appeals to the crossword puzzle analogy to show that we have to go back and forth all the way down the justification process. She also tried to show that the foundherentist criteria are truth indicative. Could you compare your foundational holism with Haack's foundherentism?

**S**: Haack's foundherentism makes a significant step in the right direction. Foundational holism shares some themes with foundherentism, but diverges on others. Among the shared themes are the two features you mentioned: (1) experience is relevant for empirical justification, but justification involves connections with, and support from, other theories; (2) justification is not a linear relation, but

rather a relation that can take multiple forms, including forms that involve back and forth, bi-directional connections between theories, and there is an important element of figuring out, including figuring out of the kind involved in a crossword puzzle. But there are also significant differences between foundational holism and foundherentism. Two of these concern the *scope* of the methodology, and the significance of coherence.

1. *Scope*. The foundherentist methodology is limited to empirical knowledge; it does not apply to, say, logical knowledge. Foundational holism has a far broader scope. It applies to all branches of knowledge, from the most mundane and experimental to the most abstract and theoretical. Moreover, its treatment of the different disciplines is highly unified. It applies the same general principles to all disciplines, from experimental physics to mathematics and logic. At the same time, it also accounts for their differences, by recognizing a rich and diverse array of cognitive resources, sufficiently rich and diverse to accommodate, and explain, the differences between different disciplines. I will return to this in a moment.

2. *Attitude to coherence*. Although foundational holism incorporates some of the elements characteristic of coherentism—non-linear justification, interconnections between theories, denial of both the need for and the possibility of an Archimedean standpoint, tolerant attitude toward circularity and infinite regress—it denies the central place foundherentism assigns to coherence in justification. The view that coherence can be viewed as a mark of veridical justification is an old view, found, for example, in Kant's *Critique of Pure Reason* (B848), but this does not turn Kant into a coherentist (as I explained in my recent paper, "Lessons on Truth from Kant" [2017]). Nor does the use of coherence as a "mark" play a central role in Kant's theory of justification. The problem with putting coherence at the center of justification is the fact that false theories can cohere as much as true theories, that is, coherence is not correlated with veridicality. Clearly, foundherentism is superior to both coherentism and foundationalism, but the role of coherence is still too central. By approaching the problem from a third, independent perspective, coherence can be given its due limited role. Foundational holism offers such an independent perspective. It affirms the existence, in principle, of multiple, and interconnected, cognitive routes from mind to world, both routes of discovery and routes of justification. But the key question, according to foundational holism, is whether these routes lead to the *worldly targets* of our theories, not whether they cohere with *each other*.

Furthermore, although foundherentism, like foundational holism, sanctions other cognitive resources besides sensory perception as central to knowledge, for example resources analogous to those used in solving a crossword puzzle, foundational holism goes farther than foundherentism in viewing *intellectual* resources as central to knowledge. It offers a new paradigm of intellectual activity central to all knowledge—*figuring out*, which is far broader than that of a crossword puzzle.

And it emphasizes intellect's ability to provide *cognitive access to the world*. For example, it explains Gödel's discovery and proof of the incompleteness of arithmetic as both *factual* and *intellectual*, focusing primarily on their *veridicality* (in the correspondence rather than coherence sense).

I would like to reiterate, however, that Haack made an extremely important step forward in the development of a workable philosophical methodology. As it happens, I arrived at my own methodology not through Haack, but through my investigations, in the 80's and early 90's, of the foundations of logic and Quinean epistemology. These led me to a view that has some significant similarities with Haack's views, thought also significant differences.

### *D. A Post-Quinean Model of Knowledge*

**C**: By adopting your foundational holistic methodology, you delineate a dynamic and structural model of knowledge. Sometimes you call it a post-Quinean model of knowledge. Could you spell out the main points of the model and its significance in epistemology?

**S**: Having developed a methodology that balances the principles of epistemic friction and freedom while avoiding the pitfalls of both foundationalism and coherentism, I set out to construct a model of knowledge using this method. All disciplines, in this model, would be subject both to high standards of truth, objectivity, and veridical justification, and to high standards of conceptualization, unity, and substantiveness. This model would differ from existent models by setting the same high standards of truth, explanation, veridical justification, and grounding-in-reality for all disciplines, including highly abstract disciplines such as logic and mathematics. One of the distinctive characteristics of the model would be rejection of the traditional bifurcation of knowledge into factual and non-factual, where the latter—being analytic and/or apriori—is grounded exclusively in language, concepts, or more generally the mind.

A natural starting point is Quine's model of knowledge in "Two Dogmas of Empiricism" (1951). This model, with its holistic structure and its rejection of the traditional bifurcation of knowledge into factual and conventional, is highly promising. But Quine's model is as problematic as it is promising. In particular, there is a serious tension, first noted by Dummett (1973), between Quine's rejection of the traditional bifurcation of knowledge into factual knowledge and non-factual (conventional, linguistic, conceptual) knowledge and his Center-Periphery model, which brings back this bifurcation. It is true that the boundary between center and periphery is gradual rather than sharp. But having sharp differences between the factual and the non-factual is one thing, and having deep differences between them is another. Logic, in Quine's model, never lies in the periphery, and this creates a significant gap between the degrees of factuality of logic and empirical

science. To the extent that the periphery represents the *interface* between our system of knowledge and *reality*, logic is devoid of such interface. Logic may be changed indirectly in response to difficulties faced by empirical science in the periphery, but such changes are based on pragmatic or instrumental considerations rather than on factual or veridical considerations pertaining to logic itself. There is no sense in which logic is true-to-the-world or false-to-the-world in Quine's model, no possibility that logic is changed due to a conflict between what it itself says and what is *in fact* the case (concerning its subject matter, logical truth and consequence). This, I argue, is a result of Quine's radical empiricism. As a radical empiricist, Quine recognizes only an *experiential* interface between theory and world; hence, it is impossible for logic to interface with the world as deeply as physics does in his model. There is nothing in the world, on Quine's empiricist picture, for logic to interface with (to be true about or be substantially grounded in), and in any case, it is impossible for humans to have any cognitive access to abstract features of the world according to radical empiricism.

My solution to the inner tension in Quine's epistemology is to render the Center-Periphery model thoroughly dynamic. Center and Periphery are job descriptions rather than locations. One of their jobs is to represent the interface of all fields of knowledge with both world and mind (through the periphery and center, respectively). Each discipline lies in the periphery as far as its truth and grounding in the world are concerned; in the center, as far as its conceptual resources and grounding in the mind are concerned. Accordingly, disciplines move freely between center and periphery along two dimensions: context and time. Factual development takes place in the periphery; conceptual development in the center. This results in a model of knowledge that is flexible and dynamic yet highly demanding: Each discipline is subject to robust veridicality requirements as well as to conceptual and pragmatic requirements. Each discipline requires a substantial grounding both in the world and in the mind. Our system of knowledge reaches the world through a rich, holistic network of cognitive routes, both perceptual and intellectual, both direct and circuitous, targeting both experiential and abstract features of the world. There is a significant role for active freedom in all branches and stages of knowledge. And so on.

**C**: I'm also interested in the two faces of language you mentioned, that is, semantic ascent and objectual descent. Could you further clarify them and their uses in philosophy?

**S**: This is one aspect of the dynamic structure of the model. The basic idea goes back to medieval philosophy, but I arrived at it through Tarski and Quine. There are many ways of talking about a given subject-matter, two of which are (1) objectual and (2) linguistic. The first way is more direct: to say that snow is white we attribute to the object (stuff) snow the property of being white. The second way is less direct: Instead of saying that the object snow has the property of being

white ("Snow is white") we say that the sentence "Snow is white" has the semantic property of being true ("'Snow is white' is true"). Quine calls the move from the objectual mode of speech to the linguistic mode "semantic ascent." I call the opposite move "semantic descent." What enables us to switch from one mode to the other is the systematic connection between the truth of a sentence and its object having the property the sentence attributes to it. This correlation is reflected in Tarski's T-schema (one instance of which is "'Snow is white' is true if and only if snow is white"). You may ask: What determines which mode of speech we use? My answer is: context, interest, etc. The same content can be expressed in different ways in different contexts. This is one aspect of the dynamic structure of our system of knowledge.

### *E. Intellect and Figuring Out*

**C**: When talking about the dynamic model of knowledge, you use two special words, "intellect" and "figuring out," but you don't clearly say what they mean and how they are relevant to apriorism and empiricism. Could you further clarify these notions? By the way, you blame Quine for neglecting the role of intellect or reason in theory-building, but I think this is not fair. Quine holds the thesis of underdetermination of theory by experience: "we can investigate the world, and man as a part of it, and thus find out what cues he could have of what goes on around him. Subtracting his cues from his world view, we get man's net contribution as the difference. This difference marks the extent of man's conceptual sovereignty—the domain within which he can revise theory while saving the data."[1] Man's conceptual sovereignty is just where man's intellect or reason, imagination, creative power, etc., play significant role! Hence, Quine does give a big enough space for man's intellect or reason to play its role. What do you think about this point?

**S**: The question of intellect's or reason's role in knowledge is an important question that, in my view, has been sidelined in analytic philosophy, where it has been largely limited to a small number of traditional issues, such as apriority, pragmatic conventions, and rational or mathematical intuition. I think it is time to go beyond the traditional paradigms and rethink the role of intellect in knowledge. In *Epistemic Friction* I make a few steps in this direction. One of these steps is a consideration of a new paradigm of intellectual knowledge, far broader than the earlier paradigms. I call this paradigm "*figuring out*."

By "intellect" I mean the totality of human cognitive capacities playing a significant role in knowledge other than sensory perception. This role, I believe, is far from being exhausted by conceptual analysis, pragmatic conventions, and/or

[1] W. V. Quine, *Word and Object* (Cambridge: MIT Press, 1960), 5.

mathematical (or rational) intuition—the roles commonly associated with intellect in the existent literature. Nor is intellect's role limited to mathematical, philosophical, and logical (or more generally inferential) knowledge. I especially emphasize the crucial role played by intellect in discovery—discovery in all fields, both theoretical and experimental. Consider experimental science. Sensory perception clearly plays a role in experimental physics, but this role is largely passive, and by itself cannot generate the kind of knowledge that experimental science provides. Nor do pragmatic considerations, mathematical intuition, and inferential capacities suffice. How do you get from passive perception to hypotheses about nature? How do you decide what particular activity counts as an experiment for a particular hypothesis, what activity, among the unbounded number of possible activities, tests the correctness of a particular empirical hypothesis? You have to *figure out* these things. But this figuring out is neither primarily perceptual nor purely pragmatic (since there is a question of correctness here). Nor is it primarily a matter of conceptualization (for the same reason). And the operation of figuring out need not be fast (immediate), as mathematical/rational intuition is supposed to be. Nor is figuring out apriori—isolated from sensory perception. In figuring out what hypotheses to make given the empirical data and how to test these hypotheses we use everything we have, including all the knowledge we have already obtained. We don't isolate intellect from empirical knowledge or data. And to the extent that the world has features that cannot be detected by our sensory capacities, figuring out using our intellect is an available means of getting to know, or at least making progress toward getting to know, some of these features.

What do I mean by "figuring out?" At this initial stage in developing a theory of figuring out I use the expression "figuring out" largely in its everyday sense: configuring, working out, putting two and two together. Figuring out is not mysterious. It is something we do in all stages and areas of our life, both practical and theoretical. Babies figure out things all the time. Farmers constantly engage in figuring out how to solve problems arising in their farms, how to improve their crops, and so on. Computer technicians figure out what went wrong with our computers and how to fix them. Copernicus figured out that the earth revolves around the sun rather than the other way around. Darwin figured out the (or some of the) principles of evolution. Einstein figured out many things about the physical structure of the world using thought experiments. Crick and Watson figured out the structure of the DNA. Gödel figured out *whether* mathematics is complete and *how* to prove that it is not. Wiles figured out whether Fermat's last theorem is true and how to incorporate various mathematical theories in order to prove this. Kant figured one way to meet Hume's challenge, namely by changing our epistemic gestalt. And so on.

A few distinctive characteristics of figuring out we have already seen: it has to do not just with justification but also with discovery, it is different from sensory

perception although it can be combined with it, it is not primarily pragmatic although it is used in pragmatic considerations, it is not constrained in the way that rational intuition is (it does not have to be immediate, quick, perceptual-like, or apriori), and it has an enormously broad scope.

But this is just the beginning. There is much more to be done to develop a systematic theory of intellect's role(s) in knowledge. This includes critically examining the activity of figuring out itself. These are things that I hope to work on in the near future, and I especially hope other researchers—philosophers, psychologists, cognitive scientists—will participate in these investigations.

Now, to the second part of your question. You make a good point. In *Word & Object* Quine does acknowledge that sensory cues from the world don't suffice for theorizing about the world: the rest is due to "man's net contribution." Furthermore, in "Epistemology Naturalized" (1969) he talks about the gap between our "meager" sensory "input" and "torrential" theoretical "output", implying that much more than mere sensory perception is involved in knowledge. But Quine says virtually nothing about what "man's net contribution" is, how the gap between sensory input and theoretical output is filled. He has a placeholder for a constituent of knowledge that goes beyond sensory perception but this place holder remains empty: a black box. In particular, Quine never considers the possibility that our net contribution includes anything beyond pragmatic-conceptual organization of the sensory data. Even in the passage you cite from *Word & Object* all Quine has to say about "man's net contribution" is that it is "conceptual." In some places—for example, "On Empirically Equivalent Systems of the World" (1975)—he characterizes everything that goes beyond observation as "foreign matter," "trumped-up matter, or stuffing, whose only service is to round out the formulation"[2] of observation statements (my emphasis). The heart of the matter is that Quine never considers the possibility that not just our sensory organs, but also our intellect, is tuned to the world. Quine's own contribution to our understanding of intellect's role in knowledge, and especially in discovery, is thus quite meagre.

### *F. Comparing Foundational Holism with Quine's Holism*

**C**: Could you systematically explain what similarities and differences there are between your foundational holism and dynamic model of knowledge and Quine's holistic conception of knowledge? In his early writings, Quine presented his holism quite radically (1951): "The unit of empirical significance is the whole of science".[3] Later on (1975), he moderated his holism: "Science is neither discontin-

[2] W. V. Quine, "On Empirically Equivalent Systems of the World," *Erkenntnis* 9 (1975): 313–28, 324.

[3] W. V. Quine, "Two Dogmas of Empiricism," *From a Logical Point of View*, ed. Quine (Cambridge: Harvard University Press, 1980) 20–46, 42.

uous nor monolithic. It is variously jointed, and loose in the joints in varying degrees. Little is gained by saying that the unit is in principle the whole of science, however defensible this claim may be in a legalistic way."[4] Thus, for Quine, our body of knowledge is a whole with different levels and internal structure.

**S**: In "Two Dogmas of Empiricism" (1951) Quine presents two distinct types of holism (which I mentioned earlier). The first type I call "one-unit holism" (and Dummett calls "total holism"); the second type I call "relational," "structured," or "network" holism. One-unit holism is the kind of holism you talk about in the first part of your question. The idea is that the smallest unit of knowledge is our system of knowledge as a whole, and that means that our system of knowledge is treated as a huge atom, having no inner structure. Relational holism, in contrast, views our system of knowledge as an open-ended network of distinct units, intricately interconnected. One-unit holism was criticized by many philosophers, including Grünbaum (1960, 1971), Dummett (1973), and Glymour (1980), on various grounds. In response to Grünbaum's criticisms, Quine significantly qualified his one-unit holism in his later writings, as you indicated.

I myself reject Quine's one-unit conception of holism on the ground that inner structure is essential both for the acquisition of knowledge and for its understanding. (This was Dummett's main ground for rejecting Quinean holism). But I do accept Quine's relational conception of holism, with its emphasis on a rich network of connections between disciplines. This is a point of central similarity between my holism and Quine's. The similarities extend to rejection of foundationalism, rejection of both the possibility of and the need for an Archimedean standpoint, recognition that not all cases of circularity and infinite regress should be rejected, etc. But, within the common framework of relational holism there are some significant differences between my holism and Quine's: (1) For Quine, as for most relational holists, holism is exhausted by interconnections between theories and disciplines, that is, interconnections within our system of knowledge. For me, it is not. There is an additional dimension of interconnections: a rich and highly intricate network of connections between our theories and the world. There are multiple cognitive routes from mind (theories) to the world, and these are often interconnected, exhibiting highly complex patterns and using the resources of diverse theories. (2) My holism is more dynamic than Quine's. Since this is your next question, I will discuss it in my response to that question. Other differences concern the role of intellect in the holistic system of knowledge, and more. I should also mention Michael Friedman's (2001) criticism of Quinean holism. Friedman attributes to Quine's (relational) holism another feature, namely treating all units of knowledge in the same way (any two theories are interconnected in the

[4] W. V. Quine, "On Empirically Equivalent Systems of the World," *Erkenntnis* 9 (1975): 313–28, 314.

same way and to the same degree as any other two theories), so it is epistemically impossible to differentiate either the role or the behavior of one unit of knowledge from that of another. If, and to the extent that this is true of Quinean holism, foundational holism differs from Quinean holism in this respect too. Foundational holism is not simply a relational holism, but it is a highly structured holism, differentiating between different units of knowledge both with respect to their roles in our system of knowledge and with respect to their behavior and interconnections with other units.

**C**: I think your dynamic model of knowledge is right, but your comments about Quine's model are not so fair and well grounded: "Elements in the center are manipulated using pragmatic standards, elements in the periphery—using evidential standards. Elements located in the periphery stand in a privileged relation to reality that elements located in the center are excluded from."[5] Quine clearly asserts that empirical content is shared by all the elements in our body of knowledge, no matter whether they are located in the center or in the periphery; there is no difference of "all or nothing" for empirical contents of statements but only difference of degree: more or less, close or distant, direct or indirect. In our system of knowledge, any statement, including a logical law, is revisable in response to "recalcitrant experiences," and any statement, including an observational report, can be saved based on methodological consideration. Since the center and the periphery are interchangeable, I don't think that Quine believes there is a fixed, rigid, and sharp cleavage between the center and the periphery. As you point out, Quine dislikes any bifurcation in philosophy, and holds sort of gradualism. What do you think about my comments?

**S**: I agree with you that compared with earlier empiricist models of knowledge Quine's model is more dynamic. Elements in the center may be affected by recalcitrant experiences in the periphery and elements in the periphery may be saved based on methodological considerations. The difference between center and periphery is a matter of degree. But I don't think that this significantly affects the depth of the differences between disciplines lying in the center and disciplines lying in the periphery in Quine's model. Disciplines lying in (or around) the center, such as logic and mathematics, are significantly farther away from the periphery than observational/experimental disciplines, and their connection to reality is far weaker than that of the latter. Logic's tenets are not experiential, and therefore they themselves cannot conflict with experience. Conflicts with experience can substantially involve only experiential units of knowledge. Experiential units of knowledge can be revised because of a conflict between their own content and experience. But logical units can be revised only in response to conflicts between

[5] G. Sher, *Epistemic Friction: An Essay on Knowledge, Truth, and Logic* (Oxford: Oxford Press, 2016), 42.

*other units* with experience (or else based on purely pragmatic considerations). Now, my claim is that these differences are very significant. Most importantly, disciplines lying in and around the center of Quine's model are subject to significantly weaker veridicality standards than disciplines lying in and around the periphery. You are right that the boundary between center and periphery is not sharp, but big differences don't need sharp boundaries. (For example, there is no sharp boundary between being a child and being an adult, but aside from borderline areas there is a very big difference between them.) Finally, the fact that Quine's model is only modestly dynamic is reflected in the fact that in his model logic and mathematics never lie in the periphery (cannot reach the periphery) and experimental science never lies in the center.

In my model, none of this is the case. The periphery is not limited to sensory experience but extends to non-sensory interface between our system of knowledge and the world. And logic, therefore, can be, and is, bound by periphery norms—essentially veridicality—just as much as experimental physics. All disciplines move between center and periphery, each being required to forge robust contacts with reality (through the periphery) as well as with the mind (through the center). In Quine's model, mathematics is grounded in reality only through its connections to physics (indispensability considerations), but in my model it is grounded in reality independently of these connections as well. This is made possible by the fact that my conception of reality, as well as of humans' cognitive interface with reality, is far broader than Quine's. Reality (world) has abstract as well as concrete features, and human's cognitive interface with reality involves not just sensory organs but also intellect (figuring out). Compared with my model, though not with more traditional models, Quine's model of knowledge is quite static.

### *G. Evaluation of Quine's Philosophy*

**C**: I am still a fan of Quine's philosophy: it has had great influence on my philosophical outlook. Could you give a general characterization and evaluation of Quine's philosophy? What are its most valuable contributions? What are its obvious drawbacks? Right now, how do we evaluate the place of Quine's philosophy in 20th century philosophy?

**S**: I have also been greatly influenced by Quine and am still a fan. But I am a critical fan. I cannot offer a definitive characterization or evaluation of Quine's philosophy and its place in the 20th century, but let me tell you how I see it from my perspective.

I think of Quine as one of the most important, influential, and revolutionary analytic philosophers of the second half of the 20th-century. He revolutionized analytic philosophy at least twice. His first revolution is centered on "Two Dogmas of Empiricism" (1951) and related papers, and its two most important

contributions are, in my view: (1) Rejection of the traditional philosophical dichotomies, in particular, the analytic-synthetic dichotomy and the related conventional-factual dichotomy. (2) Rejection of epistemic foundationalism and its replacement by a (relational) holistic methodology. Quine's second revolution is Naturalism, or the naturalization of philosophy. Its most succinct expression is found in "Epistemology Naturalized" (1969), and it was a central theme in Quine's philosophy until his death in 2000.

In my view, Quine's first revolution is more valuable than his second. But his first revolution is often misunderstood. This is not surprising, in light of the fact that Quine devoted very little space to a presentation and discussion of the central issues involved in this revolution, devoting most of "Two Dogmas of Empiricism" to reasons for rejecting the analytic-synthetic distinction that have very little to do with the valuable aspects of his revolution. Quine's arguments against analyticity largely revolved around issues of unclarity and circularity, but his circularity objections are incompatible with his own holism. The most important problem with analyticity, in the context of Quine's first revolution, is, in my opinion, epistemic. Not in the sense that his real focus is, or should have been, on apriority (as suggested by Putnam), but in a different sense. Although the analytic-synthetic dichotomy is a linguistic or semantic dichotomy, it has important epistemic ramifications. Specifically, it induces a bifurcation of statements, theories, and fields of knowledge into factual and non-factual, and this, in turn, implies that, epistemically, some fields are subject to challenges from the world, while others are not. This leads to what I believe is a false sense of security with respect to fields like logic and mathematics: here we don't have to worry about veridicality, we don't have to take any measures against the possibility of factual error. (In my book, I liken this approach to an epistemic "Maginot line of defense.")

By rejecting the analytic-synthetic dichotomy, Quine opens the way to a new approach to knowledge: all fields of knowledge are subject to robust veridicality requirements, including substantial requirements of *factual* justification. No field of knowledge is exempt. This, I believe, is a veritable revolution in philosophers' attitude to non-empirical knowledge, and in particular to logical knowledge. It is important to note that this does not render logical knowledge empirical. It renders it *factual*, but *not* necessarily empirical. We need to establish the veridicality of logic, as well as of mathematics, philosophy, etc., in its own right, and not just based on their indispensability for, connections with, or applications in empirical science. I would say that Quine's first revolution opened the door to a new approach to philosophy. On the one hand, we may go back to the classical philosophical questions of Kant and others. On the other hand, we are free to put aside the traditional dogmas that guided past philosophers' approach to these questions. We are free to develop new tools and methods for answering these questions. This

openness has not been fully realized by the philosophical community. But it is there, ready to be discovered and made use of.

Quine's second revolution is his naturalistic revolution. This revolution has two faces: an open-minded face and a closed-minded face. Its open-minded face says that there is no good reason or need to draw a sharp line between philosophy and other sciences, including the empirical sciences. All disciplines are in principle interconnected, and the dogmatic boundaries between them—the idea of "philosophy first," of philosophy as a privileged field of knowledge, isolated from all other fields—should be toppled or rejected. This face of Quine's naturalist philosophy is in line with his first revolution, and it is best seen as continuing and further strengthening that revolution. But Quine's naturalistic revolution has another face as well. This is a rigid and narrow face, whose main message is that there is no place for philosophy as an independent discipline, but all philosophical questions should either be thrown away or be reformulated as empirical scientific questions. This face of Quine's revolution is sometimes summed up in the slogan "Philosophy should be reduced to, or replaced by, empirical psychology." This aspect of Quine's second revolution expresses his radical empiricist tendencies, tendencies that created an inner tension in his first revolution, and are discussed at some length in my book. In "Epistemology Naturalized" the dogmatic character of this face of Quine's second revolution is expressed in his unquestioning adherence to Humean empiricism. Quine takes Humean empiricism for granted. He never questions or tries to justify this extreme form of empiricism. He completely disregards criticisms of this radical empiricism (by Kant or others), treating Hume's empiricism as written in stone. The only alternative to Humean empiricism that Quine considers is Carnap's positivism. And finding faults with this alternative, he concludes that the Humean direction is the only way left for philosophers to go. Quine's lip service to the mutual inclusion of philosophy in psychology and vice versa makes no difference to his call to reduce philosophy to empirical psychology (or to replace it by the latter), and the result is an exceedingly narrow and one dimensional conception of philosophy. The openness of the first face of Quine's naturalism is overshadowed by its narrow and radical face. As far as the actual impact of Quine's naturalist revolution on philosophy in the late 20th and early 21st century analytic philosophy goes, I think there is a continuum of positions from an open-minded, enlightened naturalism to a close-minded, overly restricting one.

## III. SUBSTANTIVE THEORY OF TRUTH AND RELEVANT ISSUES

### *A. Outline of Substantive Theory of Truth*

**C**: 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?

**S**: 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: (1) the "Fundamental Principle of Truth," (2) the principle of "Manifold Correspondence" (and a new theory of Mathematical Truth based on, and exemplifying, this principle), and (3) 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, 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 to arrive at. 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 explains 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: (1) 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. (2) 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 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 concept 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 immanent thoughts. (We can ask, for example, whether a given immanent sentence offers a macroscopic or a microscopic description of its target in the world.) One characteristic of the question of truth is that it is a *normative* question: Are our immanent thoughts *correct* about the world? Do they get the world

right? Do they satisfy high standards of accuracy? And to arrive at truth we need, therefore, a "normative" mode of thought. Our notion of truth thus arises in the juncture of three modes of thought: the immanent, transcendent, and normative modes of thought. And the fundamental principle of truth says that truth is, therefore, *immanent, transcendent,* and *normative*. One might object to the claim that truth is a *norm* of thoughts, saying it is a *property* of thoughts. My answer to this objection is that from the point of view of our semi-Kantian question about truth, truth is primarily a norm of thought and only secondarily a property of thoughts. A thought has the property of truth if it satisfies the norm of truth. If you wish, 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 consequences. 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 created by and for humans and as such it has to take into account the complexity of the world relative to our cognitive capacities. It is quite possible that some facets of the world we can reach quite easily and directly, while others we can reach only indirectly and in relatively complicated ways. This will affect 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 that goes to the heart of truth and is very basic and general about it, 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, and it applies only to logically complex candidates for truth, not to logically simple (atomic) ones. Furthermore, logical structure is just one of many things that affect the truth value of logically complex thoughts, and for that reason the logicality principle is not a core principle of truth. It is still a universal principle of truth, but this is due to the peculiar character of logical structure. Due to certain special features of logical structure, its influence on the truth value of immanent thoughts does not vary from field to field and it is in this sense that it 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).

III. *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, that is, 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 tool for constructing theories, language is also an obstacle, as Frege emphasized. And this is true of standard semantics as well. 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, 1st-level predicates—only 1st-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 depiction 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 of the world, and if these features are, say, properties rather than individuals, then the singular terms of mathematics denote properties rather than individuals, albeit in an indirect manner. Numerals, for example, might refer to 2nd-level cardinality properties rather than to numerical individuals, and arithmetic statements might be true or false of finite cardinalities rather than of numbers (numerical individuals). If so, the pattern of correspondence in arithmetic and set theory is "composite" in a way that I spell out in my book.

This approach enables us to endorse mathematical realism without endorsing Platonism (a Platonic reality parallel to physical reality). There is just one reality, with objects and properties having both physical and formal features (properties). And this frees us from the problems raised by mathematical Platonism (e.g., those spelled out by Benacerraf). This account can be expanded beyond arithmetic, but once again, I cannot go into this here.

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" (2016), "Lessons on Truth from Kant" (2017), "Truth and Scientific Change" (2017), "Truth & Transcendence: Turning the Tables on the Liar Paradox" (2017), "Is There Truth in Ethics? (2017)," and "Pluralism and Normativity in Truth and Logic" (Forthcoming). They will serve as a basis for a new book on truth, tentatively titled "A Substantivist Theory of Truth" or "Truth as a Human Value".

**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 some 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.

### *B. 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 don't 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 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 arising from 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 of 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, thoughts 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 thoughts and those facets of the world these immanent thoughts 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.

### *C. Comparing Substantive Theory of Truth with Tarski's Theory of Truth*

**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 something other than 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 versus 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 don't 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 don't 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 AND COMPARISON WITH OTHER THEORIES

### *A. Foundational Account of 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 still waiting to be done? And so on.

**S**: A foundational account of logic is especially important due to logic's crucial role in knowledge and discourse. Given 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" or sense of "obviousness". 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 often view 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*."[6] 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:

[6] H. M. Sheffer, "Review of *Principia Mathematica*," *Isis* 8 (1926): 226–31, 228.

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 dual grounding—in the world and in the mind.
4. In addition to general reasons that apply to all disciplines (e.g., epistemic friction), there are reasons specific to logic that explain why it requires a *factual* grounding, or a grounding in the world: (1) Logic has to *work in the world*. (2) Logic 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. (3) 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, the world plays a crucial role in logical inference. In particular, logical inference is constrained by, and might even be based on, some facts concerning the world: specifically, certain facts concerning the relation between the conditions under which the premises are (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 in addition to a grounding in the world because its task is to create a system of inference (/ detection of error) for use by humans. This means that certain aspects of mind (language, concepts, etc.) are 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, that is, the properties correlated with the logical constants of standard mathematical logic. Standard mathematical logic, on my conception, is grounded in laws governing formal properties.

8. A characteristic trait of formal properties is *invariance under all 1-1 replacements of individuals.* Identity, for example, is invariant under all (does not distinguish any) 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 (using the language of contemporary mathematics) of invariance under all 1-1 replacements of individuals, as explained above, is *invariance under isomorphisms*. Here we think of a 1-1 replacement as a function from a given domain to a given domain (same or different) which is 1-1 and *onto*. Identity, for example, 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. From here on I will use this construal of 1-1 replacement of individuals, talking about *1-1 and onto replacements of individuals* instead of *1-1 replacements.*
10. Formal properties are invariant under all 1-1 and onto replacements of individuals of any kind, both *actual* and *counterfactual*. 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, don't have such a high degree of invariance: they are not preserved under 1-1 and onto 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. Indeed, their modal force is, in a relevant sense, maximal. As such they are sufficiently strong to ground logic.

11. 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.
12. 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 physical laws and inferences, for example), is quasi-apriori (i.e., 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 semantics, formal logic has a proof system as well. The two are interconnected by the fact that the rules of proof are based on, or encode, laws governing the (denotations of the) logical constants.
13. 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 logical quantifiers such as "most," "infinitely many," "is a well-ordering 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 epistemic freedom enables us to make significant decisions concerning the construction of theories in all fields, including logic, and these are not (or at least may not be) fully determined by evolution. While I leave the evolutionary aspects for evolution theorists to investigate, I hope to investigate some of the other factors in the planned volume on epistemic freedom.

### *B. 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 (and onto) 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 don't 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 and onto 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**: It seems to me that you make three critical points in these comments: (1) For my definition of formality to be sufficiently informative to distinguish between formal and non-formal properties and logical and non-logical constants, I need to define what an individual or an object is. (2) By limiting objects to individuals (in the case of predicate logic) and state of affairs (in the case of sentential logic), I limit logic to sentential logic and 1st-order predicate logic. (3) If we allow invariance under 1-1 (and onto) replacements of properties, then not only higher-order logic but also various modal logics will pass the test of (formal) logicality. Concerning (1), my response is that to understand logic we don't need a full-fledged metaphysical account of objects. Logic takes into account only certain aspects of objects, for example, discreteness and numerical identity/difference, and for the purpose of demarcating formal properties / logical constants, only individuals (objects of level 0) need to be taken into account for reasons that I will explain in my answer to (3) below.

As for (2), my account classifies standard 2nd- and higher-order mathematical logic, though not modal logic, as a bona-fide formal logic. This does not mean that there is anything wrong with modal logic or that it is not a genuine logic, but only that it is different in certain significant ways from mathematical logic and for that reason the foundation I provide for mathematical logic does not apply to it. Concerning higher-order mathematical logic, my foundation does classify it as a *bona fide* formal logic. The properties that distinguish this logic from 1st-order logic are the 3rd- and higher-level properties of non-emptiness and universality (the existential and universal quantifier properties), and these *are* invariant under all 1-1 and onto replacements of individuals, as I will explain below.

Turning to (3), first let me clarify two 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 assume 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 and onto replacements of individuals are properties of various levels. On the linguistic level—predicates of various levels. Properties that are invariant under *all* 1-1 and onto replacements of individuals are said to be *formal*; the corresponding

predicates are said to be *logical (or admissible logical predicates).* Logical predicates are said to *denote* formal properties. Examples of formal properties in this sense include identity (1st-level), non-emptiness (2nd- and higher-levels), complementation (2nd- and higher-levels), intersection (2nd- and higher-levels), all cardinality properties (2nd- and higher-levels), reflexivity and symmetry (2nd- 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.

The second clarification explains why higher-order predicate logic is classified by my account as a *bona fide* formal logic.

Now to the question: Why do I limit myself to invariance under all 1-1 and onto replacements of *individuals* and don't consider invariance under all 1-1 and onto replacements of *properties*? The answer is that the latter is not suitable for a characterization of logic. In fact, very few properties satisfy it. None of the standard logical constants satisfy this invariance condition, 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 and onto 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 does not fulfill the designated task of logic.

Does the fact that the present invariance criterion is not satisfied by modal and other operators a reason to give it up? No. There is a sense in which mathematical logic is *stronger* than other logics, for example, from modal logic in which necessity is not limited to logical necessity ("Sentence S is necessarily true" is not synonymous with "Sentence S is logically true"). This does not mean that there is no room for modal systems of inference or that such systems should not be considered logics, but that the basis of these logics differs, in certain significant respects, from that of mathematical logic. It may be possible to establish these logics based on invariance of some kind, but it is neither invariance under all 1-1 and onto replacements of individuals or invariance under all 1-1 and onto replacements of properties. Our criterion of logicality poses a (positive) challenge for philosophers interested in modal and other non-mathematical logics, namely, seek a foundation for these logics that is both philosophically enlightening and provides tools for a critical evaluation of their scope.

**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 and 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. I started my investigation, in accordance with the foundational holistic methodology, with what I had at the time, which included the current mathematical and logical theories, philosophers' understanding of these theories, Mostowski's generalization of the standard notion of logical quantifier, and so on. Then I used these elements, together with others I found elsewhere or came up with by myself, to ask critical questions about logic and mathematics and build new tools for giving constructive answers to these questions. For example, one of the main questions I asked myself at the beginning of my investigation was: Why should logic be as in standard 1st-order mathematical logic? By applying a new tool to this question, one that is external to it, namely the invariance-under-isomorphism tool, by connecting this question to other challenges to mathematical logic, for example Etchemendy's challenge to Tarskian logic, by approaching these challenges in the spirit of problem-solving, and so on, I started formulating new questions, for example: What are the "real" principles underlying modern logic? Do they enable us to respond to Etchemendy's challenge? Does standard 1st-order logic fully exhaust these principles? and so on. Then, putting different things together

and figuring out how to "solve" the resulting "multi-variable equation", I arrived at my account of logic. Among the questions I asked were: Why do human beings need logic? How is this related to Tarski's philosophical requirements on an adequate definition of logical consequence? What is the philosophical significance of invariance under isomorphism? Can it be viewed as a criterion of formality? Can grounding logic in formal laws guarantee that it have an especially strong modal force, one that enables it to fulfill its designated role in human knowledge? Is the conception logic as grounded in formal laws fully realized by the standard system? And so on. This investigation involved rethinking the prevalent conceptions of logic as well as its scope and boundaries. The conclusions I arrived at were new and non-trivial. Among other things, I concluded that standard 1st-order logic is only a small part of logic, that generalized 1st-order logic as well as higher-order logic are integral parts of mathematical logic. I further concluded that logic must be grounded in certain features of the world and not just in the mind (language, concepts, conventions). I provided a theoretical account of the grounding of logic in the world—logical realism—incorporating formal laws governing the world, and I arrived at a new account of the relation between logic and mathematics and an outline of a unified philosophical foundation for these two disciplines, one that offers an alternative to logicism. Among other things, my account of mathematics shows how you can be a mathematical realist without being either a mathematical Platonist or a mathematical empiricist, and how this enables you to avoid both the problems of mathematical Platonism and the problem of mathematical empiricism. All this is neither ad hoc nor a mere affirmation of what I started with.

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* of 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 center on cardinality.

### *C. 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 2002–03, 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."[7] 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

[7] P. Maddy, "A Naturalistic Look at Logic," *Proceedings and Addresses of the APA* 76 (2002): 61–90, 67, 83, 69, 79.

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 in-built 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 over 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 isomorphisms*. 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 subjective grounds (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.

### *D. 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 terms, 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, that is, 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"[8] (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 V ~S" or "(∀x)(Px V ~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

[8] W. V. Quine, "Two Dogmas of Empiricism," *From a Logical Point of View*, ed. Quine (Cambridge: Harvard University Press, 1980): 43.

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).

## V. 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 will your new book 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, the 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 more judicious answers 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 in international activities and organizations, for example, 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 in philosophy than before.

**S**: Among the traits I admire in great philosophers are their independence, fearlessness, open-mindedness, 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 that together we did a 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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