



Logic in The 21st Century: Advice For Young Logicians

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ABSTRACT

By *logic* I mean the subject Aristotle started in *Prior Analytics*. Logic studies demonstration and everything necessary for demonstration, and also many things that come to mind in the course of such studies—including axiomatic method as described in my short "Axiomatic method". By *young* I mean less than about 40 years old. By *logicians* I mean people who have dedicated their lives to advancing and criticizing logic: to discovering and establishing new additions and also to clarifying and correcting what has or had been accepted. More specifically, my advice is for people who have already embarked on their careers: from fresh PhDs, instructors, and assistant professors to young professors looking forward to reaping the fruits of their long years of study and research. My advice is for people who have mastered logic and who want to improve their mastery. I would write something very different for students, something along the lines of my "Logic teaching in the 21st century".

Some of the things I recommend you have already done. Please do not think that my recommending something suggests that I think you have not already done it. Moreover, I am fully aware that other retired logicians are as qualified as I to give advice that will help you make the most of your remaining years as an active logician. I hope you seek their advice. I can tell you with certainty that some of their advice will conflict with mine and that some of their advice will serve you better. Temperaments vary; this advice will not be suitable for all temperaments. Be careful whose advice you accept. The lessons of my paper "Critical thinking and pedagogical license" apply here. I recommend that you consider its implications for career decisions.

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Decide What Logic is About

My first advice is to articulate to yourself what you take to be the reality that logic is about. Logic is a science and, like all other sciences, its subject matter preceded its origin. Logic's subject matter grows and evolves, always exceeding what the science knows of it. I take the subject matter of logic to include prominently what for years I have been calling argumentations, e.g., in "Argumentations and logic". The argumentations, whether demonstrations or not, created by pre-Socratic thinkers—geometers, arithmeticians, astronomers, historians, etc.—preceded Aristotle's theorizing. Although, as he said in the first sentence of *Prior Analytics*, Aristotle's focus was on demonstrations and the knowledge obtained using them, he also theorized about argumentations

in general including non-demonstrative deductions and also argumentations that are not even deductions. My “Aristotle’s demonstrative logic” can help you with this although you might do better just unfolding your own ideas without any reading.

The reality that logic is about, e.g., argumentations, does not come catalogued and labeled. Along with demonstrations there are argumentations wrongly taken for demonstrations. One of the perennial problems of logic is to perfect our criteria of demonstration, i.e. our methods for determining of a given argumentation whether it is a demonstration for a given person at a given time—for example, for you now. My “Teaching paradoxes and orthodoxes” touches on this.

In this endeavor be sure to be engaged, to have traction, to be autonomous: avoid intimidation, imitation, and alienation. Take charge of your intellect. For example, instead of asking *what is meant* by saying that a given conclusion follows from given premises, ask yourself *what you mean* when you say that a given conclusion follows from given premises. Again, instead of asking *how it is determined* that a given conclusion follows from given premises, ask yourself *how you determine* that a given conclusion follows from given premises. And again, instead of asking *how it is determined* that a given conclusion does not follow from given premises, ask yourself *how you determine* that a given conclusion does not follow from given premises.

Impersonal questions beginning ‘what is meant’, ‘how is it determined’, and the like tend to reinforce alienating, intimidating, false absolutist presuppositions. My “Meanings of implication” should help in cataloguing the range of answers others have given. Two alternative but complimentary sorts of answers that I have given at different times are briefly mentioned in “Argumentations and logic”. They are more fully discussed in “Information-theoretic logic” and “Information-theoretic logic and transformation-theoretic logic”. The first focuses on issues in philosophy and history of logic; the second was written for a gathering of physicists, mathematicians, and other senior academics not versed in logic.

But also avoid the opposite mistake that has been the nemesis of brilliant persons who might otherwise make even more useful contributions. Don’t be isolated: after asking such questions of yourself, do not assume that others answer the same way or even that others asked themselves the same questions. Be sure to ask these questions, not as impersonal questions addressed to no one, but as questions concerning individual persons. You might be surprised at what you uncover. Susan Wood and I were astounded when we asked such questions of George Boole. See our “Boole’s criteria of validity and invalidity”. “Absence of argument-deduction-proof distinctions in Church 1956” shows that even classic texts yield surprises when approached this way.

Be a master among masters. Leverage your mastery by consulting other masters. Write drafts of your papers and seek objective criticism by circulating them to other masters. Be an active member of the community of logicians. One way to do this is by regularly writing reviews. When you find a publication you want to master, write a review and send it to a journal that publishes reviews. Also, I recommend becoming a reviewer for *Mathematical Reviews* [MR]. MR assigns items to review. This enables you to become acquainted with developments that may have

escaped your notice and it alerts you to the tastes and accomplishments of other masters. I have published on average two or more reviews per year. Since 1970, the year of my first review for MR, I have published over 100 reviews there. In almost all cases, I learned useful things: often about logic, sometimes about English, sometimes about publishing standards, and sometimes about the temperaments and opinions of my colleagues. Some especially rewarding reviews are those of Evert Beth's *Mathematical Thought*, Alfred Tarski's collected papers, Constance Reid's biography of Hilbert, Willard Quine's *Philosophy of Logic*, and Hilary Putnam's *Philosophy of Logic*. Incidentally, not all logicians do reviews. Alfred Tarski never did one. But Kurt Gödel did several and Alonzo Church did dozens if not scores or even hundreds.

Another practice I recommend is to write entries for encyclopedias and dictionaries. This will lead to clarifying your own conceptual framework and terminology for yourself and learning what you thought you understood but did not. How many times have you heard someone else or yourself say something like "I understood that perfectly until I tried to write about it"? Church wrote dozens of such entries as did John Myhill, Stewart Shapiro, and other accomplished masters. The *Cambridge Dictionary of Philosophy* has scores of logic entries about 30 of which are by me. It is important to realize that no such entry is definitive: even aside from mistakes, they all involve compromises and trade-offs, e.g. between accessibility and rigor. Whenever you read one, ask yourself how you would have written it. Passive reading can numb the understanding.

Logic, like all sciences, is a social, communal enterprise. Join logic societies and take part in their activities. If there is no local logic group for you to join, get to know the local people interested in logic and invite them to assist you in creating one. I have participated over the years in the Berkeley Logic Colloquium, the Philadelphia Logic Colloquium, and the Buffalo Logic Colloquium, the last two of which I helped to found. Notice that all three are named for cities, not universities. Their meetings were attended by logicians from area institutions and the groups were interdisciplinary, not limited to mathematics, philosophy, information science, or any other single discipline.

Decide How You Think and Write About Logic

My second advice is to decide on what conceptual framework and terminology you are going to use in your future work. This will save you time and exasperation while helping you to catalogue your own beliefs and hypotheses. I am glad I started this early in my career, as shown by my 1972 "Conceptual structure of classical logic", which I do not recommend except as an example of how to get started. The framework and terminology of my 1989 "Argumentations and logic" is far superior although I recommend it only as a useful stage in a process. My "Sentence, proposition, judgment, statement, and fact" will show some of what needs to be done on the philosophical side. "Existential-import mathematics" will help you see what you will need on the mathematical side.

My terminology has evolved. My 1989 "Argumentations and logic" is a watershed. What I wrote before then is basically right but it would be more useful rewritten in my current terminology. If I had time, I would rewrite everything I wrote before 1989.

Besides the basics that flow from modern rendering of the traditional distinctions such as ontic/epistemic, syntactic/semantic/pragmatic, type/token/occurrence, string/referent/sense/ etc., you will need to find the distinctions you need for your own special exploration.

The same methods for discerning conceptual structure and devising suitable terminology that logicians apply to themselves can be applied to other logicians' work. One example is "Notating Tarski's truth-definition paper".

Learn What You Think Teaching Logic Is

My third area of advice is about teaching. As said in "First days of a logic course" and elsewhere, I recommend teaching the basics and avoiding fads. Ordinary standard first-order logic with a smooth and user-friendly natural deduction system needs to be mastered by students before they get exposed to what Quine impolitely calls deviant logic: many-valued logic, free logic, paraconsistent logic, relevance logic, intuitionistic logic, fuzzy logic, etc. Of course, even beginning students need to know what second-order logic is for pedagogical, historical, and philosophical reasons—and to take the mystery out of schemata. My "Second-order logic" gives the basics. My "Schemata" is inaccessible to undergraduates and even to many graduate students: it was written for the seasoned expert.

Encourage students to develop their native common sense, their taste for clarity, their intellectual integrity, and their autonomy as thinkers. If everything is paradoxical and surprising, nothing is paradoxical or surprising: there is nowhere firm to rest and no way to steady oneself. Common sense is necessary for challenging what sometimes disguises itself as common sense. Appreciation of logic requires the ability to discern surprises, as William Frank and I point out in our "Surprises in logic". In studying and researching logic expect the unexpected. Sometimes finding what you were not looking for is as rewarding as finding what you were looking for. And be ready to find that what you were looking for doesn't exist. My "Logical methodology chart" supplements what I say about surprises and goal changing in "Argumentations and logic".

The teacher must be on the alert for students who find intellectual autonomy burdensome or threatening or even agonizing. There are also students that are drawn to mysterious-sounding paradoxical hocus-pocus and mumbo-jumbo. And of course, teachers need to be aware of students who think logic is ritualistic manipulation of meaningless formulas using rules arbitrarily adopted in the past.

Let the students know that they are participants in the creation and development of their own logical expertise and that they are not being initiated into mysterious lore or being indoctrinated into eternally fixed and universally accepted "laws". This approach is worked out in my paper "Critical thinking and pedagogical license" mentioned above. I recommend that you read it aloud to your students and discuss its implications for their college experience.

The received logical terminology can be an impediment to connecting logic to rational thought. When poorly-crafted but entrenched terminology is introduced, don't pretend that it is sacred liturgy. At the right moment be ready with instructive quips such as "Material implication is to implication as wooden animals are to animals". My "Truth-values" scratches the surface.

Tarski's masterpiece *Introduction to Logic* starts the beginners out with identity logic and not with one of the artificial, confusing, and contrived artifacts misleadingly called "propositional logics", which are not logics in any normal or useful sense. I recommend giving some thought to which "logic" usefully comes first. The issues need more discussion but "Identity logics" and "Logic teaching in the 21st century" will get you started.

Think about what learning logic is. Learning logic is not the internalizing of the opinions of great logicians. And it isn't just memorizing sentences and propositions, although certain passages are useful to memorize. The positive role of memorizing in logic learning has been overlooked perhaps in overreaction to the sterile and oppressive practice of requiring students to learn "the names of the syllogisms"—something that masked from them a brilliant chapter in the history of logic as explained in "Deduction and reduction: decoding medieval mnemonics" that I wrote with the medievalist Daniel Novotný and the classicist Kevin Tracy.

What is useful for first-year logic students to memorize? For one thing, I get all of my students to memorize the three Gödel axioms of arithmetic, essentially the last three "Peano Postulates" as expressed in English by Bertrand Russell. These are found in section 7 of my "Editor's Introduction" to the Cohen-Nagel masterpiece *Introduction to Logic*. One of the sentences to be memorized expresses mathematical induction. Getting the students to memorize this, and testing them to be sure they get it right, will save you and them a lot of trouble. It took me two decades to learn this. With patient and clear instruction first-year students can handle this.

Memorizing well-crafted English sentences that express logically, historically, mathematically and philosophically important truths helps students master several areas including English composition. Such sentences get stored as paradigms of composition. And they help students learn how to read carefully and grasp propositions.

Memorable, well-crafted native-language sentences are especially important for laws of logic, or what serve as laws of logic in your courses, and for anything you prove to your students. Before you start proving anything in class, make sure all of the students understand what you propose to prove. It is a colossal waste of time to agonize over the arduous chains of inferences if the audience doesn't care whether the conclusion is true or false. And they cannot care about something they do not know of. It helps to have a clear, memorable native-language sentence so the students can memorize it, discuss it, mull it over, and understand why a rational animal would care whether it is true. Here is an example from "Existential import today": "A given universalized conditional implies the corresponding existentialized conjunction if and only if the existentialization of the antecedent predicate is tautological". Of course, before a proof will be graspable, it is necessary to see the formal details because those details are what the proof deals with.

It is essential to give regular exercises, quizzes, tests, and examinations if only to let the students know that they are learning something and that you care about whether they are making progress. One of my revered teachers, Leon Henkin, would say toward examination time in each course that the best reason for giving a final examination is to prove to your students that they learned something in your course. After a pause he would add that the best reason for not giving a final examination is to prevent your students from dwelling on the fact that they learned nothing in your course. The worst teacher I ever had never gave tests or exams. When teachers test their students they learn valuable lessons about the effectiveness of their own teaching. Examinations examine the examiner as well as the takers.

It takes some thought to devise effective testing methods. We need more published research on logic-testing. The exercises added to the second edition of Cohen-Nagel might help. My “Alternative constituent format” and “Numerically-indexed alternative constituent format” describe some methods that I found to be effective not only in testing but also in research.

A logician needs certain tools and skills. What are they and how are they acquired? What “operational knowledge” does a logician need? A logician needs certain concepts, structures, and objects. What are they and how are they grasped? What “objectual knowledge” does a logician need? A logician needs knowledge of certain propositions. What are they, how are they grasped as propositions, how are they framed as hypotheses, and how are hypotheses settled as true or as false? What “propositional knowledge” does a logician need? Does the expert logician need knowledge beyond the operational, the objectual, and the propositional? Some understanding of what logic students lack at the beginning of a course and what they will acquire during the course should be a help to the teacher. Idris Samawi Hamid and I tried to map this territory in our “Investigating knowledge and opinion”.

Decide What Research In Logic Is

Research in logic is not imitating previous research. It is true that detailed study of previous research can suggest questions that will lead in fruitful directions. But too much reading can lead to mind-numbing information overload. Make notes on what you read. For each item I read, I make a selective alphabetized index on a WORD document to learn the author’s conceptual framework, whether the terminology is consistently deployed, etc. An hour of writing saves an hour of reading from being wasted. Deciding what to read is critical. Deciding how to read is more critical. My strategy is to skim and then jump around. Reading aloud is amazingly informative. Reading one passage several times is often more productive than reading several passages. Sometimes a passage that initially seems clear and simple loses its clarity and simplicity and becomes problematic and disturbing after being re-read several times. Sometimes the opposite happens. My notes of a lecture my teacher Albert Hammond gave say ‘Naming precedes defining’. I don’t know how many times I read that before his insightful meaning came through.

Research is not just, and not even mainly, answering questions and settling hypotheses raised by “important” logicians. There is something debilitating and alienating about spending your

limited resources answering a question whose importance never gripped you. If you don't see and feel the importance of a question and see the possibility that trying to answer it will satisfy needs you feel, you might be cutting yourself off from access to what will raise your spirits and give you lasting pride and inner satisfaction. Be your own authority. Be your own appreciative audience.

Do not ask what is regarded as the most important research of the past. Instead ask what you take to be the most important research of the past. And get clear about why it is important to you. See if this path leads to important research questions. Such general questions might be overwhelming. Try specializing them to research in a specific area or to research involving a certain concept or to research involving variants of a given concept. My "Three logical theories" started with an attempt to understand what was important about the most important properties of logics. My "Categoricity" started with an attempt to understand what was important about the most important attempts to characterize the content of important mathematical sciences.

As important as answering questions and settling hypotheses may be, the activities of asking questions and framing hypotheses is at least as important. Questions often embody deep insights, sometimes they reveal gaps in a body of knowledge or, worse, mistakes that have been kept out of sight. Young logicians are understandably reluctant to ask questions, especially in print. They know full well, contrary to popular cliché, that there *are* stupid questions, or at least questions that look stupid to experts. When a stupid question makes its way into print, especially if it is presented as embodying a deep insight, it is the duty of the attentive expert to expose its deficiencies in a clear, objective, and constructive way so that young researchers are not sent on fruitless journeys, on "wild-goose chases". Even experts ask stupid questions in print—often when they stray beyond their field of expertise and fail to consult knowledgeable colleagues. "Mazur's semantic problem" gives an example: in that paper Michael Prentice and I took mathematician Barry Mazur to task for unwittingly trying to impersonate a logician.

That said, I recommend keeping a list of questions. From time to time revisit the list and, without deleting prior formulations you find naïve or poorly framed, rewrite them, carefully preserving your initial puzzlement and also articulating new puzzlements and new insights that have come to you. Before going public with a question, share it with colleagues who will be understanding and non-judgmental. Anyway, do not censor yourself, and of course, do not censure yourself. Researchers need to give their creativity full reign, or free rein, if you prefer. The progress of a person's thought is often reflected better by the sequence of their questions than by the sequence of their conclusions.

Descriptive, Constructive, and Definitional Research

Besides answering questions and settling hypotheses, there are other research goals. Before the 1930s, logics were all formulated with axiom-based deduction systems following the agonizingly awkward obsolete paradigm established by Frege and mindlessly imitated by unimaginative logicians—until Jaskowski and Gentzen came along. Independently, they set for themselves the research goal of formalizing the rule-based natural-deduction that mirrored reasoning that had been performed smoothly and unself-consciously by creative thinkers going back to Euclid,

Pythagoras, and to the mythical first demonstration attributed speculatively by Kant to Thales. Jaskowski and Gentzen were not answering questions or settling hypotheses, or at least not primarily doing so; they were constructing something or describing something.

It took years for the natural-deduction paradigm to become established. Even today there are pockets of holdouts that continued to deprive themselves of its benefits. Sad to say, among the holdouts are proponents of what they call natural deduction, but who show no awareness of the structure of pre-formalized deductive reasoning. E. J. Lemmon, Benson Mates, and Patrick Suppes are examples named in the last section of “Discourse grammars and the structure of mathematical reasoning III: two theories of proof”.

As late as the 1960s modal logic, roughly the logic of necessity, possibility, and impossibility, was conducted exclusively from the axiom-based perspective. When some of my students at the University of Pennsylvania wanted to work on modal logic, I realized that they would have an advantage if natural-deduction versions of the standard modal logics were created. This is the origin of the two papers “Logical consequence in modal logic: natural deduction in S5” and “Logical consequence in modal logic II: semantic systems for S4”, co-authored with George Weaver who was one of my PhD students when the first was written.

Besides constructing natural-deduction versions of modal logics we wanted to give rigorous demonstrations of soundness and completeness. The syntactical sides of such proofs had previously been based on string theory, which studies one-dimensional linear strings of characters as described in “String theory”. But since natural deductions contain nested sub-deductions and were thus two-dimensional, string theory did not apply directly. To formulate natural deduction so that string theory could be supplied we created a one-dimensional notation for nesting sub-deductions. This new notation has the added benefit of clarifying and high-lighting the differences between genuinely natural deduction and the Lemmon-Mates-Suppes method.

Tarski’s truth definition, his consequence definition, and his logical-notion definition are paradigms of the importance of research aimed at critical evaluation and reconstruction of traditional terminology. At the same time, as several of my papers show, they invite the same kind of skepticism that motivated them. Succinctly put, however creative, careful, and rich Tarski’s three papers are, none of them are definitive. The truth-definition paper does not define truth; the consequence-definition paper does not define consequence; and the logical-notions-definition paper does not define logical notion, logical concept, logical constant, or any other concept widely employed in logic previously.

Of course, disputes over terminology can become squabbles if not conducted with patience, respect, and objectivity. Sometimes the recognition of ambiguity can lead to a lasting peace without either side giving up territory. Nevertheless, although we are all free to attach whatever meanings we want without regard to previous usage, as hinted above, some terminology is an impediment to learning. That said, Tarski’s three papers advanced the field partly by shedding needed light on gaps in our field thus pointing to research opportunities.

Research Logistics

Before you embark on a research project, try to determine its knowledge and skill requirements and make sure you meet them. In most cases where you do not meet the requirement, you should abandon the project, acquire what you lack, or find people that have what is needed to help you. For example, when I conjectured the completeness of the logic of variable-binding term operators that I had discovered in the course of trying to correct errors in previous work, I realized that the required mathematical skills and knowledge were beyond me. I enlisted two mathematically superior friends to join me in proving the main theorem in the paper “Variable-binding term operators”.

Again, when I conjectured the faithfulness of my interpretation of Aristotle’s logic, also discovered in the course of trying to correct errors in previous work, I realized that the required skills and knowledge in ancient Greek were beyond me. I enlisted two linguistically superior friends, both classicists, to join me in documenting the main theses in the paper “Aristotle’s natural deduction system”.

Another aspect of research logistics is the preparation of indexes, documents, reference lists, and the like that you will need as you progress in your research. Do whatever you need to avoid interruptions that will cause you to lose momentum. Be alert to interruptions: when they do occur, take notes to help find your way back where you were.

Of course, no amount of planning and preparation will be effective if you are in a bad state of mind or if you are absorbed with other things. It is in these two areas that most of my mistakes were made. To be in a good state of mind, be on good terms with everyone you interact with, don’t carry grudges, overlook offenses and forgive offenses you can’t overlook, avoid self-righteous indignation, however warranted, look for the virtues and achievements of your colleagues and students, and above all be compromising and kind-hearted. I almost forgot to advise avoidance of extra-marital relations and other betrayals.

To avoid being absorbed with other things, keep to a healthy lifestyle, live within your means, stay away from investment opportunities, don’t manage properties or be involved in business, and minimize involvement in religious, civic, neighborhood, and other obligations that your community burdens you with. To this add avoiding addictive pastimes such as marathon running and choir singing. I feel bad when writing this: it reminds me of my failures and makes me regret not getting this advice from one of my several wise teachers.

Deciding How To Publish In Logic

As soon as you get a result—whether mathematical, philosophical, historical, or other—take a day to write a 300-word abstract. After getting your friends to vet it, get it into print one way or another. I usually send my abstracts to be presented “by title” at the next meeting of the Association for Symbolic Logic for publication in the *Bulletin of Symbolic Logic*. There are other journals that publish abstracts.

So far I have published over 200 abstracts, six in the latest issue of the *Bulletin of Symbolic Logic*. A published abstract establishes priority. Besides, you will need an abstract when you write the paper. Moreover, if by some fluke your result had already been achieved by someone else or, heavens forbid, it was wrong, you will find out sooner this way and save yourself the trouble of writing the paper. After all, it is easier and less embarrassing to retract an abstract than a paper. There are many other benefits to writing abstracts.

As far as your own inner development is concerned, you are probably better off writing and publishing in your native language. As one of my teachers taught me, whenever you write in your native language you bring to your work solutions of thousands of little problems that you dealt with since you began to monitor your own speech and writing. Moreover, each language embodies wisdom that it acquired in its evolution—sometimes helped by nameless innovators, sometimes by brilliant native writers such as Shakespeare, sometimes by creative native translators such as Barnes importing wisdom of foreign authors. In using your native language you employ its wisdom, wisdom you acquired speaking, listening, and reading.

If, for whatever reason, you need to publish in English, be sure to find a colleague with native fluency in both languages and with expertise in the relevant area of logic. Actually, here is where you can have it both ways. Publish in your native language—getting the benefit of native vetting. And then write another article in English reporting your previously published results restructured, updated, and corrected in light of your rethinking and in light of criticism. Anyway, do not fail to serve the part of your native logic community that has not mastered English.

Your inner intuitive ability to detect implications is tied somewhat to your linguistic intuitions. The same holds for your inner intuitive ability to detect non-sequiturs and your ability to make good guesses about whether a given conclusion follows. Until you have achieved a very deep grasp of a foreign language, you are more skilled in logic when using your native language. I hasten to add that Tarski was the most logically skilled person I ever conversed with—even though we always spoke English—and his native language was Polish.

Sometimes you will want to decide where you want to publish an article even before the article has been written. In this case it will save trouble if you use the journal's style when writing. Also in this case, look at the articles in that journal concerning the area and issues you will deal with. Be sure to take those articles into account in your thinking and list them in your bibliography. After all, editors like to see their own journals referenced and, more importantly, the referees that get assigned to vet your article will probably be among the authors that have published related ideas in that journal.

Sometimes you will wonder whether to submit to a high-prestige journal with a large circulation but a high rejection rate and a slow response time. The alternative is to submit to a less prestigious journal with a smaller circulation but with a smaller rejection rate and quicker response time. Contrary to what one might guess, it is often easier to get a well-written and useful article accepted in a high-prestige journal because its editors are more likely to identify merit.

When I was a young logician trying to establish a publication record in order to be eligible for promotions, salary increases, research leaves, and the like, I got rejections accompanied by deeply flawed explanations written by biased and unqualified editors.

If you want to publish a certain article in a certain high-prestige, high-demand journal, make sure the article is the kind of thing it usually publishes. When I write “maverick” articles, I send them to “maverick” journals or submit them to anthologists to appear as book chapters. Among my “maverick” articles are some of my best and most creative contributions. Examples include “Gaps between logical theory and mathematical practice”, “Meanings of implication”, “Remarks on Stoic deduction”, and “Harris on the structures of language”.

Today, the internet makes it possible to get a large number of readers without publishing in large-circulation journals.

Wherever you submit, make sure that what you submit is of high quality and that it has no flaws that you can find. Before submitting something, take as long as you need to read it carefully beginning to end while imagining that it was written by your worst enemy. Frango Nabrasa says to write unto others as you would have them write unto you. I advise taking his words literally.

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