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In Response to: Mary M. Garrett's *Language and Logic in China: A Guide for Argumentation Scholars*

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I begin with a personal note. Last October I was a member of a delegation of philosophers that visited philosophy departments in nine universities in China. Since I was writing a book on logic, my main interest was the status of logic in Chinese philosophy. Prior to going, I had read a book by Chinese professor Ming-Jer Chen at the University of Pennsylvania's Wharton School entitled "Inside Chinese Business". In that book I was surprised to find the following statement:

"Chinese does not have grammatical structures equivalent to the English conditional mode: that is, statements that encourage the listener to put aside direct reality and enter into an imaginary realm of hypothetical ("If you had arrived in time for the meeting, we would have made a deal"). This grammatical difference between Chinese and English has important cognitive and communicative implications; namely the Chinese show a remarkable resistance to hypothetical thinking."

Since the conditional, in my opinion, is *the* connective that is most indispensable in logic, I was intrigued. So at the first university I visited, East China Normal University in Shanghai, I asked whether the Chinese language had a conditional sign. Their professor of logic, Dr. Jui Rong Dong, assured me that it did and produced two Chinese characters, one for 'if' and one for 'then'. However, he also recommended the book by Christoph Harbsmeier, entitled *Logic and Language on Ancient China*, Volume 7 of a Cambridge University Series on Technology and Civilization of China which Ms. Garrett just spoke about. I had never heard of this book before, so I duly noted it down in my notebook. When I got back to this country, Hans Hansen asked me, out of the blue, if I would like to comment on Ms. Carrett's paper on a book by Harbsmeier. I checked on the book with Barnes and Noble, who informed me it was 476,000th on the Bestseller List and it costs \$130. Nevertheless I ordered it and after looking at it, accepted Hans' invitation.

Garrett's paper mentions a two-part proposition that is of great interest to philosophers and historians of science, and hovers ever in the background of this book. I will focus on this. The two claims, offered to explain why modern science did not develop in China as it did the West, are that

- 1) "a certain kind of reasoning is necessary for the evolution of science, and
- 2) that something about the Chinese language mitigates against this kind of reasoning."

As Garrett says, Harbsmeier agrees with first part of this proposition—that a certain kind of reasoning is necessary for the development of science, and in particular that logic is crucial for the evolution of scientific thought. As she also says, Harbsmeier never really clarifies what that exact relationship is. Unfortunately this is true; in fact Harbsmeier does not display much competence in either logic or the philosophy of science. Nevertheless, I strongly agree with Harbsmeier; there is such a relation.

Garrett goes on to say that Harbsmeier "disagrees with the notion that the Chinese did not or could not think logically." That is true and again I agree with Harbsmeier, but I begin to part company with the second part of the next sentence, which reads,

“Building on the accumulated research of Chinese scholars, which he augments through his analyses and examples, Harbsmeier explores and *definitively disproves the misconceptions that these claims are based on.*”

This seems to suggest that Harbsmeier has *definitively disproved* the second proposition, namely that “something about the Chinese language mitigates against” the kind of reasoning necessary for the evolution of science—or at least that he has disproved the propositions that have been offered to support this conclusion. These propositions are fairly widely held and Garrett lists them as,

- 1) that the writing system is pictographic, thus discouraging abstract thought
- 2) that the language has no grammar, thus inhibiting analytic thinking;
- 3) that the language lacks counterfactuals, thereby hindering speculative thought;
- 4) that the Chinese have no conception of Truth, the sentence, or class relations, making logical reasoning impossible
- 5) that the Chinese reason analogically, rather than deductively or hypothetic-deductively,
- 6) the Chinese think poetically, holistically, and organically rather than analytically and logically.

Although Harbsmeier shows that the statements above require considerable alteration and refinement, I think he is a very long way from *definitively disproving* these statements or the conclusion they purport to support.

Now I am a logician rather than a linguist, and I have had no training in the Chinese language so I have to rely on Harbsmeier and other experts for analyses of Chinese texts. But I believe, as do some of the other experts, that the second part of the proposition above is true—there are features of the Chinese language which mitigate against the development of the kind of logic that was developed in the Greek language by Aristotle and the Stoics and has evolved into modern logic, and that this fact goes a considerable way to explaining why modern science did not develop in China as it did in the West. Further, I believe that Harbsmeier’s examples and many of his conclusions support this.

The first 17 books in the seven volumes to which this book belongs, were guided by a sort of friendly bias. Its editor, Joseph Needham wanted to “admit Asia to equality on our thoughts, not only politically but culturally” (a quote from B. Russell placed on the Frontespiece of Volume II). In Volume I, page 18, Needham wrote “It is my conviction that the Chinese proved themselves able to speculate about nature at least as well as the Greeks in their earlier period. If China produced no Aristotle, it was, I would suggest, because the inhibitory factors which prevented the rise of modern science and technology there began to operate already before the time at which Aristotle could have been produced.”

Harbsmeier seems to share this attitude. He seems to be want to avoid invidious comparisons. Having asked the question, “Why did the practice of of *yin ming* [Chinese Buddhist logic] decline whereas Aristotelian logic was revived and developed into a central discipline within the European educational system?” he says “These are questions that belong properly to the anthropology of logic” (p. 414). I don’t believe these questions belong to anthropology; I believe they can be answered by examining and comparing logic in the West, with writings in

China. Harbsmeier concludes “...the structure and nature of the Chinese language—for all the constraints these impose on Chinese rhetoric—*can not be the decisive factor*, since the extant logical *yin ming* texts [of Chinese Buddhist logic] are about as clear or as unclear as their contemporary and comparable European counterparts within the field of Aristotelian logic” (p. 414). Whether or not Aristotle and Buddhist logic are equally clear I don’t know, since I do not know Chinese. But their clarity is not the issue. The relevant question for the issue before us is whether the logic of Chinese Buddhism, could help foster the development of modern theoretical science as well as the logical principles of Aristotle, the Stoics and subsequent logicians could, and whether the Chinese language contains the same features needed for the development of logic as the Greek, Latin, and Indo-European languages do.

Western logic is based on two things: the use of variables for propositions, predicates, and individual entities, and a unique set of distinct ‘syncategorematic’ or “logical” words, namely, ‘and’, ‘or’, ‘if...then’ ‘not’, ‘all’ and ‘some’. These are the components of which *valid* schemata are built.

Aristotle (384-322 B.C.) developed a system of logic with ‘all’, ‘some’ and ‘no’ as his logical constants. Using them with Greek letters as variables for noun phrases he presented schemata that would be *valid*, no matter what nouns or noun phrases were substituted for the variables. By these means he conveyed universal principles of *logical validity*. He presented these schemata in conditional statements using the Greek word, ‘εἰ’ or ‘εἰάν’ for ‘if’, as in “if A is predicated of none of B and B of all C, it follows that A will apply to no C” (Aristotle, *Prior Analytics*, 26 (*celarent*)). In the following century (300-206 B.C.) the Stoics and Megarians developed a system of logic using variable terms for *sentences* and the Greek words ‘If ...then’, ‘both...and’, ‘either... or’ and ‘not’ as sentence connectives. Euclid, who had studied in Athens, wrote his *Elements of Geometry* while a university teacher in Alexandria around 300 BC. Archimedes applied and extended Euclid’s work to physics. Their treatises in Greek used the same language, with copious occurrences of “if... then...” and other logical constants. Many, if not all, of their proofs were *logically valid* by criteria formulated in the schools of Aristotle and the Stoics. Today modern logic is built up using similar variables and the same logical constants translated into English or other Indo-European languages. The great scientists of the modern era were schooled in these logics, and their disciplines were governed in part by these concepts of *logical validity*.

As Harbsmeier and other scholars have noted, classical Chinese lacks several features which were indispensable in formulating this logic.

1) Harbsmeier tells us that Buddhist logic in China, ‘Yin Ming’, has no **variables**. He says “Aristotle’s formulations absolutely and quite invariably involve *variables*. Chinese Buddhist formulations, as far as I have been able to ascertain, never involve any variables...” (p. 406). Further, he says, “Buddhist logic in China suffers from this sort of limitation. It cannot systematically and freely abstract from the concrete terms in its proposition and formulate the formal laws governing valid inference. It invariably discusses concrete examples, and moreover always examples that are of Buddhist logical significance” (p. 406). (Harbsmeier says the later Mohists “used a term which came close to a ‘variable’” to formulate the distinction between names which involve properties of things, and names that do not (p. 333). Also after asking, “was Aristotle’s invention of variables repeated anywhere else?” he calls the Chinese *mou* for “such-and-such” a “pseudo-variable”; different occurrences refer to different people or entities (p 287).)

Ancient Greeks and modern Europeans alike could use letters of their alphabet as variables since letters have no meaning. Chinese has no alphabet; it has fixed characters replete with meanings. Perhaps the lack of meaningless letters deprived China of simple devices to serve as variables that can help convey schemata of sentences with the very abstract property of being *logically valid*.

2) Harbsmeier discounts the view that all Chinese *characters* are pictographic. He agrees that many Chinese characters began as pictures, but holds the currently prevailing view that in most cases “Chinese characters stand for pronunciations of ... words in the spoken language, and mean what they mean because the morphemes have the meanings that they have in the spoken language” (p34). If spoken words can have abstract meanings so can some characters; and he shows that some Chinese characters do stand for abstract entities. But in various places Harbsmeier makes clear that they did not have certain kinds of abstract concepts that could be conveyed by Greek suffixes or schemata.

3) It is not true that the Chinese language has no *grammar*. True, its characters cannot be categorized as verbs, nouns, adjectives, adverbs etc., since the same character may serve as noun, verb or adjective depending on its position in a sentence. The characters do not change by person, mood, voice or gender, or have past, present and future forms. But there *is* a Chinese grammar; according to Hu Shih (1970) it is so easy it did not need saying (cf. p. 86). However, Harbsmeier concludes that the more complex “Classical Greek and Latin show a much greater systematic ability unambiguously and transparently to articulate logical and grammatical complexity than the comparable Classical or Literary Chinese.”, that this aids in developing scientific theories, and that “...the traditional Chinese scientists would also appear to be at a clear linguistic disadvantage.”

The first book on Chinese grammar was written in 1904. At the end of Chapter c) *Logical Features of the Classical Chinese Language* (pp. 171-3), Harbsmeier “confidently concludes”, “despite the possibility that he may be reflecting his cultural prejudices,” that

“Classical Chinese writers show a very considerably lesser tendency to use rhetorical and semantic complexity (in the technical senses we have indicated above) than Classical Greek and Latin writers...

“To the extent that the habit of reliably decoding highly complex articulated meanings constitutes a mental exercise that may be healthy for the conduct of science insofar as science involves very complex interrelationships between statements that need to be made explicit, aspiring scientists who are learning Classical Chinese were at a certain disadvantage when compared with speakers of Classical Greek or Latin.

“I conclude, secondly, that Classical Greek and Latin show a much greater systematic ability unambiguously and transparently to articulate logical and grammatical complexity than the comparable Classical or Literary Chinese.

“To the extent that the rhetorically or semantically very complex sentences which cannot be reproduced in Classical or Literary Chinese should prove to be a significant aid in explicating, questioning and developing an overall constellation of scientific theories, the traditional Chinese scientist would also appear to be at a clear linguistic disadvantage.”

Garrett says Harbsmeier “asks whether Classical Chinese had the terms and structures which would allow expression of the operations of symbolic logic, such as various kinds of negation, implication, counterfactuals, inference, disjunction, conjunction, and quantifiers and he answers with a resounding affirmative.” I don’t read Harbsmeier that way; he says Chinese lacks some of these.

4) With respect to **negation** Harbsmeier says, “Aristotle developed an abstract notion of negation, *apophasis*” (p. 107) but “In Classical Chinese literature we find no abstract notion of negation as such” (p. 108), although he lists eleven different Chinese characters which each convey what we in English might call specialized negations, e.g., a ‘not’ for times, a ‘not’ for terms denoting objects, a ‘not’ for sentences.

5) He also says, “Classical Chinese has no current equivalent for the declarative *vel* ‘or’.” “The standard way to ask whether something is fish or fowl in Classical Chinese is to ask two questions “Is it fish?” “Is it fowl?” (pp. 119-20). Again, “It is often noticed that Classical Chinese does not have one word for ‘or’ that was used in declarative sentences like “Sages are either arrogant or stupid...”. He adds, “It is a curiously easy task to construct logical/syntactic constellations [involving several ‘if...then...’s and ‘or’s] that are easy to articulate in a language like Classical Latin, but apparently impossible to articulate in Classical Chinese” (p. 158).

6) Harbsmeier’s discussion of the **conditional** in Chinese leaves us somewhat confused.

Under the heading *Inference*, he informs us that “The conditional particle *tse*, ‘then’, which can mark the relation between an antecedent and a consequent in conditionals, is among the most frequent words of the Classical Chinese language” (p. 118). But it is not clear that ‘tse’ has the same meaning as the Western conditional. The Harvard University Press’s Chinese-English dictionary translates the character *tse* as both “and so” and “then”; if it is followed by some characters it means ‘then, in consequence’, and by other characters it means, ‘that is the end of it, so be it’, and it has many other meanings in other linguistics contexts. Sequences of passages with just ‘tse’ in them, like ‘p *tse* q, q *tse* r, p *tse* r which are translated as “If p then q, if q then r and if p then r’ may also be translated as ‘p and so q, q and so r, p and so r’ without conditionals.

On counterfactual conditionals, experts differ. Alfred Bloom (a linguist and psychologist, now President of Swarthmore College) wrote in 1981, “... the Chinese language has no distinct lexical, grammatical or intonational device to signal entry into the counterfactual realm, to indicate explicitly that the events referred to have definitely not occurred and are being discussed for the purpose of exploring the might-have-been or the might-be” (p. 118). Bloom’s book on this subject cites interesting empirical evidence of contemporary difficulties that Chinese natives have in understanding hypothetical reasoning. Ms. Garrett reviewed this book in 1985 and Harbsmeier seems to agree with her counter-view, asserting that “explicit counterfactual reasoning was frequent in ancient China. The lack of verb forms like the subjunctive in Chinese did **not** lead to a lack of explicit counterfactuals.” On the other hand we have the statement of Jer-Ming Chen about hypothetical thinking in China.

7) Harbsmeier’s attempts to show that ancient Chinese presented arguments with some of the standard logical forms are appallingly unconvincing.

With respect to **Modus Ponens**, on pages 284-5 Harbsmeier give ‘p implies q, p, Ergo: q’ as *modus ponens*, [confusing ‘implies’ with ‘if...then...’], then he gives an example which is not a

clear case of *Modus Ponens*, summarises it in a form which is clearly not *Modus Ponens*, and then says, “As our analysis shows, this is far from being a neat case of argument by *modus ponens*, but the connection with *modus ponens* is clear enough.” The passage (translated by D.C.Lau) is: “Pi Hsi summoned the Master, and the Master wanted to go. Tzu Lu said, ‘Sometime ago I heard it from you, Master, that the gentleman does not enter the domain of one who in his person does what is not good. Now Pi Hsi is using Chung Mou as a stronghold to stage a revolt. How can you justify going there?’” Harbsmeier’s summarizes the argument as: “1. The gentleman should not enter the domain of a person who does what is not good. 2. Pi Hsi is a person who does what is not good. 3. You, Confucius are a gentleman. 4. Ergo: you, Confucius, should not enter Pi Hsi’s domain.”

On page 390 he cites other passages which “seem to come close to using the *modus ponens*,” but they have no clear relation to *Modus Ponens* either.

With respect to *Modus Tollens*, on pages 282-3 Harbsmeier says *Modus Tollens* “turns out to be much more popular in ancient China than its seemingly more straightforward counterpart, the *modus ponens*”. He gives what he calls a typical Chinese of example of *Modus Tollens*. But his example is not a clear example of *Modus Tollens*, and Harbsmeier’s attempt to formulate it turns out to be, in his words, “in imperfect form of *modus ponens*”. He then ends up saying “However, the argument is clearly a formally valid one. Given the premises the conclusion follows logically.” There are no doubt better examples of his point. (Harbsmeier’s “typical Chinese argument” (translated by Lau) reads “Jan Chhui said: ‘It is not that I am not pleased with your way, but rather that my strength gives out.’ The Master replied: ‘A man whose strength gives out, gives up mid-way. Now in your case you set the limits beforehand.’ ”

Under the heading ‘*Sorites*’, Harbsmeier gives several examples of what might better be called chains of correlations. For example, Han Fei (3rd Cent BC) wrote a sequence beginning,

When a man has good fortune, wealth and honour come to him
 When wealth and honour come to him he eats well and dresses well
 When he eats and dresses well, arrogance will arise...

This sort of chain apparently occurs quite frequently in ancient Chinese philosophy. But the interpretation as a sorites is questionable. Apparently Han Fei used ‘Tse’ for the assumed conditional, for Harbsmeier wrote about this passage, that “There is no doubt that Han Fei here focuses on the transitivity of the relation he denotes by the Chinese word *tse*. ... However, Han Fei is not, in fact setting up a sequence of logical implications by using the particle *tse*. By using $p \text{ tse } q$, Han Fei only claims a regular concomitance between p and q in this world. He is not concerned with the logical connection between p and q in any possible world” (p. 281).

The full sequence, as translated by C. D. Lau, 1984—with possible schematizations added on the right—was (see page 281):

When a man has good fortune, wealth and honour come to him If P then Q P&Q,
 When wealth and honour come to him he eats well and dresses well If Q then R Q&R
 When he eats and dresses well, arrogance will arise If R then S R&S

When arrogance arises, his behavior will be wicked and his actions will be contrary to principle If S then (T&U) S&(T&U)

When his behavior is wicked he will die an untimely death If T then W T&W

When his actions are contrary to principle he will be unsuccessful If U then V U&V

On the one hand he will have the misfortune of an untimely death If W then M W&M

On the other hand he will be known as unsuccessful. That is misfortune. If V then M V&M

Therefore, it is said Misfortune lurks in good fortune. \square If P then M \square P&M

The schematization as a sorites with conditionals may be reading a Western interpretation into the Chinese text. It could be schematized as ‘P&Q, Q&R, R& (T&U), T&W, U&V, W&M, V&M, \square P&M’.

8) In his *Concluding Reflections* Harbsmeier says “There is much to be learnt from the Chinese about human language, but one thing I have not found in classical Chinese is any kind of special Chinese logic” (p.410). Though the Chinese may sometimes have made what the West could identify as a logically valid argument, they apparently never formulated the concept of a **logically valid** argument as the Greeks did. In concluding his discussion of the best Chinese logic *Yin Ming* (Chinese Buddhist logic of the 7th and 8th centuries), Harbsmeier compares it with Aristotelian and later formal logics. He says, “Western logical theory is in principle indifferent to the question of what concretely the premisses of an argument are, or whether the premisses of an argument as a matter of fact are true or not. Aristotelian and later more general formal theories of logic in the West are interested in premisses only in a conditional way: *if* the premisses were true, would this logically imply that the conclusion also was true?” In contrast, “‘Yin Ming’ does not systematically distinguish between factual truth and logical validity” (pp. 404-5). Indeed, he reports, “to the Chinese Buddhist an argument which justifies a thesis which goes against the teachings of one’s own school or against one’s own known views is logically unacceptable” (p. 376); the so-called “logical acceptability” here is not logical validity, and indeed is not logical at all in the Western sense of logical.

Like the words ‘hydrogen’, ‘oxygen’, ‘atom’, ‘molecule’, ‘electron’ and ‘photon’, the term ‘logically valid’ was developed in the West. Without the concepts they stand for the modern science would not have been possible. China did not have these concepts. I believe this even more true for the concept of *logical validity* than for those of ‘hydrogen’ and ‘electron’.

In short, far from *definitively disproving* the thesis that classical Chinese lacked the features necessary to develop a system of logic and the kind of thinking that was needed to for the development of modern science, Harbsmeier’s book provides much support for this thesis.

By the 13th Century China did indeed accomplish great feats of engineering and had many marvelous mechanical inventions, a civil service, and a rich philosophical heritage. It had concepts of truth and falsehood and words identifying premisses and conclusions in arguments; but its emphasis was on practice and social harmony. It is one thing to give evidence that the Chinese could and did think logically. It is another to say their language could express the logical concepts that have been crucial for the kind of scientific development that took place in the West. They had no such logic, and it is not clear that they could have provided the universal criteria of logically valid inferences that were capable of being expressed in the Indo-European languages.