Sonderbeitrag

Logic and Culture: Universally Valid Laws of Logical Form and Culturally Determined Differences of Logic

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Die Lektüre von Texten über Logik macht wohl nur Logikern Freude. Zwar ist in der Interkulturellen und Komparativen Philosophie ständig vom logozentrischen Westen die Rede, aber welcher „Westler" hat schon das *Organon* gelesen? Etiketten wie „östliche Logik", „buddhistische Logik" oder „chinesische Logik" sind ebenfalls im Umlauf, aber welcher deutsche Philosophieprofessor oder Advokat östlicher Spiritualität hätte auch nur bloße die Existenz der mehr als zweihundert Texte zur Kenntnis genommen, in denen sich chinesische und japanische Gelehrte seit dem 6. Jahrhundert der Frage widmen, wie logische Widersprüche zu vermeiden und logisch gültige Schlussfolgerungen zu erreichen seien? Unter allen Versuchen, grundsätzliche kulturelle Unterschiede festzustellen, ist das Bemühen, kulturell bedingte Unvereinbarkeiten logischen Denkens auszumachen, das wichtigste Unterfangen. Nun kann man freilich selbst zwischen zwei Hühnereiern unterscheiden – aber welcher Hahn krähte danach? Stets lassen sich Unterschiede finden. Die „Anderen" sind Knoblauchfresser, Bartträger (oder eben nicht), Nudelschlürfer – und dies mag denn auch immer wieder zu Mord und Todschlag führen. Aber ist so etwas akzeptabel? Gemeinsamkeiten und Differenzen festzustellen, reicht nicht. Es ist zu erklären, warum sie es verdienen, namhaft gemacht zu werden – warum sie wichtig sind. Und vor allem: inwiefern ihre Feststellung und Erklärung einem besseren Verstehen und einer besseren Zukunft dienen können. Nun wäre nichts fataler, als wenn das Denken von Menschen verschiedener Kulturen unvereinbaren, aber gleichermaßen gültigen Gesetzen der Logik folgte: selbst aus identischen mathematischen Prämissen gelangte man dann zu unterschiedlichen Konklusionen. Auch wenn wir in unserem Tun und Lassen gern auf jede Logik pfeifen und das logisch korrekte Argument so notorisch schwach ist, wie es Argumente nun einmal sind: wäre es nicht töricht, gänzlich auf die mit ihm verbundenen Chancen gewaltfreier Auseinandersetzung zu verzichten? Und sollte es nicht zu denken geben, dass man auch im „Osten" dankbar ist, wenn Häuser und Brücken nicht ein- und Flugzeuge nicht abstürzen? Ohne korrekte Logik wäre eine derartige Sicherheit so gut wie unmöglich. Und auch wenn man sich gegen die Einsicht sträubt: die Logik der so genannten Geisteswissenschaften folgt gerade in ihren Details denselben Gesetzen. Das Thema ist wieder einmal aktuell. Dabei werden Positionen, wie sie im Folgenden vertreten werden, mitunter fast feindselig abgelehnt. Bestenfalls liest man die entsprechenden Studien „an", um sie nach ein paar Seiten angewidert abzulegen. Das Gegenargument ist stets das Gleiche: Universalismus sei auch in Fragen der Logik Eurozentrismus und Kulturimperialismus. Man dürfe die eigene Auffassung nicht in die Interpretation fremder Kulturen hineinlesen. Man kenne die fremde Sprache nicht (gut genug), in deren eigentümlicher Welt auch jede Erklärung verbleiben müsse. Die Argumente gegen diese Sicht werden kaum zur Kenntnis genommen und sind deshalb in unserer Studie erneut angeführt. Vorweg sei nur auf drei Sachverhalte aufmerksam gemacht: auch chinesische Texte fordern logische Widerspruchsfreiheit – und mit keiner noch so „raffinierten" Übersetzen vermag man dieser Feststellung zu entkommen. Und hat man nicht fremde Sprachen entziffert, indem man Konzepte und Wörter der eigenen Sprache verwendete? Wäre dies anders möglich gewesen? Handelt es sich dabei nicht um Erfolgsgeschichten? Und wie will man etwas erklären, wenn die erklärende Sprache nicht signifikant von der Sprache dessen abweicht, das zu erklären ist? Die damit angesprochenen Probleme, die auch immer wieder in der Auseinandersetzung mit chinesischen Kulturen aufgeworfen werden, mögen die Veröffentlichung des akademischen Beitrags zu einer internationalen Philosophie-Konferenz rechtfertigen, die 2008 in Seoul stattfand – wohl wissend, dass die Lektüre nur Logiker vergnügen dürfte.

I Usages of the term 'logic'

People would talk about "the logic of a soccer game." Certain problems are regarded as just "a matter of logic". Scholars speak e.g. of "mathematical logic", "philosophical logic", "dialectical logic", "transcendental logic", two-valued and many-valued logics. Terms like "quantum logic", "para-consistent logics" and "fuzzy logic" have gained some popularity among scientists and logicians. Many scholars – and even some politicians – indeed equate Aristotelian logic with so-called "Western logic", and they believe that this logic would be fundamentally different from what they call "Eastern logic", e.g. Indian, Chinese, Japanese or Buddhist logic. Thus it seems appropriate to use terms like 'logic' and 'logical' in the following way.

By the term 'logic' we refer to a class of principles, laws, or rules of conceptual relations (relationships between concepts) or inference structures that are valid just because of or, rather, due to their form (with their validity thus being independent from their material contents), for example (1) the "rule of *identity*": $A \rightarrow A$, (2) the "rule of *transitivity*": if $A \rightarrow B$ and $B \rightarrow C$, then $A \rightarrow C$, (3) the "rule of non-contradiction": if A, then not non-A, and (4) the "*tertium non datur*" (TND) or "principle, or law, of the excluded middle": either A or non-A. In all instantiations of these formulae, A, B and C may refer to concepts or concept properties. The words 'if', 'then', 'not' etc. point to acceptable or inacceptable replacements, respectively. E.g., (2) permits for replacing "$A \rightarrow B$ and $B \rightarrow C$" by "$A \rightarrow C$", and (3) forbids replacing A by non-A. Readers who are familiar with Aristotelian logic may also think of the *Dictum de omni et nullo* that can be expressed as follows: If M is a property of the *genus* G (for instance, a property of the concept "animal"), then it is also a property of the *species* S (for instance, "horse" or "dog") of G; and if M is no property of G, then M is also no property of one of its *species* S. To note and emphasize, the validity of these principles does not depend on the meaning, or contents, of A, B, C, G, M, or S, no matter whether the respective concepts refer to hen eggs, stars, centaurs or something else. Furthermore, these principles must not be understood as laws that describe or determine structures of "reality", nor are they abstracted or deduced from the latter one. They are no ontological principles. Admittedly, the

Word 'is' is often taken in the sense of "exists", but this is just a specific feature of a specific language, e.g., English or some other Indo-European language. Above, 'is' is used to designate *relations* of identity and diversity between concepts and/or properties of concepts; in that regard, it does not have any ontological implications. By contrast, "quantum logic" is a theory that allegedly refers to some structures or relational interpretations of "reality" or, more precisely, to the structural interrelations exhibited by certain physical models of reality.

Coming back to our initial example, "the logic of a soccer game" may be characterized by something like the rule that stronger teams usually beat weaker teams. To be sure, this "logic" might consist of a set of specific inductive rules that need not apply to every game. As should become clearer below, the mentioned five principles are rules of form that are valid whenever we (want to) develop, e.g., a theory of many-valued logic, a physical theory (like quantum logic), or just a line of thought to be successfully communicated. Thus, they may be also characterized as unavoidable (and in this sense "transcendental") conditions of every identifiable line of thought. In this regard, the TND is no exception. Though according to any constructivist and/or intuitionist logic, it can be applied only to finite classes of "objects", it remains to be universally valid in the following important respect: if the TND can be applied, people at any times and in all places ought to accept it.

II What are and are there universal logical principles?

What does the question "Are there any universally valid logical principles?" mean precisely, and in what respect is it an important question?

If one decides to reflect on, or discuss, the question of whether there are universally valid logical laws, i.e. principles of logic valid (in the same way) for all human beings at any times and places, it would indeed not make much sense to use terms such as 'logic' and 'logical' in a way that would differ from the introduced usage, for only certain principles of logical *form* are "promising" candidates for universal validity. First of

all, individual theories of logic always differ from each other. Already in medieval scholasticism, scholars who worked at the same time at the same university, developed different theories of logic. *Mutatis mutandis,* this also applies to respective theories set forth by Chinese, Korean, and Japanese Buddhist scholars who interpreted Xuanzang's 玄奘 (600?-664) Chinese translations of two Sanskrit treatises relevant to logic, namely, Xuanzang's translations of Dignāga's (about 500, Chin. Chenna 陳那, Jap. Jinna) *Nyāyamukha* (Chin. *Yinming zhengli men lun* 因明正理門論, Jap. *Immyō-shōri-mon-ron*) and Śaṃkarasvāmin's (6th century, Chin. Shangjieluozhu 商羯羅主, Jap. Shōkarashu) *Nyāyapraveśa* (Chin. *Yinming ruzhengli lun* 因明入正理論, Jap. *Immyō-nisshōri-ron*). The most important differences between the Buddhist theories that were developed in India, China, and Japan were not due to culture – say, Chinese and Japanese culture –, but rather resulted from different views about certain logical principles. Thus they are rather characterized by inner-cultural disagreement. On a more general level, this is also true for theories of logic put forward in so-called "Western" and "Eastern" cultures: it is not cultural differences but culturally unaffected, or independent, differences that are logically relevant. Secondly, the often voiced question of whether or not (e.g.) Aristotelian logic turns out to be universally valid, is beside the point, for, because of its specific features, Aristotelian logic (actually a number of theories about logic put forward between the 4th century B.C. and today) cannot but be a particular theory or class of particular theories. *It is only certain laws expressed by Aristotelian logic* – like the *modus barbara* – that can be universally valid. The same applies to theories of logic developed in Asia. Thirdly, one would hope in vain that principles describing, or reflecting, culturally distinctive features of perception and cognition or characteristics of a specific grammar, would possess universal validity. If there are universally valid logical laws in the first place, these laws would have to be principles of form that are independent from (theories of) "material" structures (ontologies) and from the distinctive properties of the grammar and of the semantics of a specific language.

But why should one take the trouble of discussing the question "Are there universally valid logical laws?" We think that one should seriously confront this problem, because many scholars, people, and even politicians and journalists have answered it in the negative. Some even maintain that "Eastern logic" would deny the universal validity of all the five principles mentioned. More importantly, such – erroneous – denials have fatal implications. Imagine for instance that there would in fact exist two incompatible classes of logical laws that are equally valid. Consequently, the members of the two classes, say Europeans and Asians, would *regularly derive different conclusions from identical premises.* Any effort of reaching an understanding between the two groups of adherents would then be virtually impossible even in questions of mathematics – which would neither be compatible, nor in keeping, with general human experience overall, to say the least. To put it another way; if one can show that there are universally valid logical principles this might prove an efficient antidote against exotism, esotericism, phantastic ideas of "cultural otherness," and against the invention of unbridgeable cultural differences.

III Refutation of common arguments against the hypothesis of a universal logic

Certain arguments against the hypothesis of a universal logic – as, for the sake of brevity, we call our hypothesis – are still widespread and influential. It may be useful to refute them point by point.

(i) The simplest objection runs as follows: if the word is lacking, the respective thing or concept is lacking too. In Chinese and Japanese, the word for "logic" ((Chin. *luoji* 邏輯, Jap. *ronri[gaku]* 論理[学]) is a rather late calque (paronym or copy). Hence some scholars maintain that prior to its introduction in the 19th century there was no logic, or theory of logic, in Sino-Asia. Now, Aristotle never called his respective treatises "logic." It was not before Boethius (about 500 A.D.) that this designation became common. If the objection were true, then Aristotle was no logician and had never formulated a theory of logic. This conclusion would certainly be absurd. During the 4th century B.C., the Chinese Mohists put forward a "theory of disputation" (Chin. Mo bian 莫辯), and from the 4th through the 12th century A.D., Indian and Chinese Bud-

dhists formulated "theories of reason" – Skt. *hetuvidyā,* Chin. *yinming* 因明, Jap. *immyō* – that included, e.g., doctrines about non-contradiction und (valid) conclusion. Hence, these Mohist and Buddhist teachings are no less (and no more) logic, logics, or fragments of logic than the Aristotelian *Organon.* As most theories of logic do, they differ in many details, but such differences are insignificant if it comes to the question of whether a universally valid logic exists. Whereas Aristotle and the Aristototelians developed their syllogistics, Indian and Chinese theoreticians developed other formulas of logically valid conclusion. Such outwardly different patterns are unimported, for both groups tried to prove that – given certain presuppositions – their syllogisms and formulas were instruments and vehicles of logically valid conclusions. Aristotelians justified syllogistics by axiomatic theory. Buddhist scholars like the Indian Dignāga, the Chinese Xuanzang or the Japanese Gomyō 護命 (749?-834), and hundreds of other Buddhist scholars justified their formulas by deducing them from the "wheel of reasons" (Skt. *hetucakra,* Chin. *yinlun* 因輪, Jap. *inrin*) and the "three marks of the reason" (Skt. *trairūpya,* Chin. *yin sanxiang* 因三相, Jap. *in no sansò*). The only thing important here is that the classes or sets of principles (the axioms, and rules of deduction) that justify the Aristotelian syllogisms and the Buddhist figures of logical conclusion, are logically equivalent to each other, which is indeed the case: Aristotelian and Buddhist, but also Mohist theories of logical form are (meta-)logically equivalent in the following sense: Given the same premises, they lead to the same logical conclusions (see Paul, 1994), although Aristotle did not explicitly distinguish between logic and metalogic, rules and metarules, language and metalanguage, respectively (see Lenk, 2000a, 2000b, 2003).

Most significantly, Aristotelian, Mohist and Buddhist logicians sharply condemned logical contradictions alike, and as Western logicians and mathematicians (except some constructivist, paraconsistent approaches etc.) used the method of the *reductio ad absurdum* to refute inconsistent doctrines.

(ii) Another common objection against the hypothesis of a universal logic would state that, *in contrast to Western theories of logic,* "Asian logic" is pragmatic, or developed as a pragmatic enterprise; i.e., "Asian logic" in the first place would be merely a means of arguing in favour of certain practical, particularly soteriological, goals. Such an objection is untenable, too. It is even irrelevant, for whatever reasons, motives and objectives a theory of logic may have, this would have no bearing on the question of whether certain rules of logical form expressed in a theory are universally valid, for validity is independent from genesis. Moreover, the objection is also easily refuted. The reasons and motives conducive to the development and structure of the logics of Aristotle and the Aristotelians were very similar to those of the Mohist and Buddhist scholars. Like his Eastern counterparts, Aristotle wanted to provide a tool for efficient argumentation and for being successful or even victorious in matters of disputation. That is also indicated by the title *Organon.* Though several treatises on "theory of reason" include a homage to Buddha, works like Antoine Arnaud's *La Logique ou L'Art de penser* (1685), Wolff's so-called *Deutsche Logik (German Logic,* 1713), and Bochenski's (1902-1995) *Logik der Religion* ("Logic of Religion") include praises of the Christian god or serve theological purposes. In his *Logica Nova,* Raymundus Lullus (1235-1315?) even tried to explain and justify the three parts of the Aristotelian syllogism by interpreting the latter as a symbol of the Catholic Holy Trinity (Lullus, 2002: LI-LII. See also op. cit.: 225-271). The hypothesis that Xuanzang and his followers favoured a "religious logic" that would accept contradictions (Frankenhauser, 1996) is particularly unfortunate. Religious motivation does not preclude logical consistency. More importantly, Xuanzang and his followers disapproved of logical contradiction and uncompromisingly demanded adherence to the principle of non-contradiction. This is proved by numerous respective passages in their treatises, including explicit formulations of the TND, repudiations of inconsistent arguments, and refutations by means of a *reductio ad absurdum.* Xuanzang's almost desperate attempts to prove the logical compatibility of the two Buddhist teachings he admired most, namely of Mādhyamika (Chin. Zhongguan xuepai 中觀學派, Jap. Chūgan ha 中觀派), and Vijñaptimātratā (Chin. Weishi zong 唯識宗, Jap. Yuishiki-shū), i.e., the doctrines of the [right] middle [between ontological eternalism and annihilism] and of conscious only respectively, testify to an abhorrence of logical contradiction (Paul, 2008 [b]).

(iii) Again and again you might encounter the opinion that some Asian texts or teachings would deny the validity of at least one of the five fundamental rules listed above. As far as this is true, it is also true for some Western theories. But in (Western) constructivist logic the unrestricted validity, or applicability, of the TND has been questioned much more vehemently and systematically than in the East. Single or several *violations* of logical laws, however, cannot invalidate them, for, in contrast to natural laws, logical rules are valid in a *normative* sense, and actual transgressions would lead to inconsistencies. In this respect they may be compared to mathematical principles and traffic rules. Only by intentional *and* systematic violation allover the validity of a logical law may be questioned. However, if there existed such Asian texts, they would be completely obscure. We do not know of such texts. You can of course criticize the five listed laws. But in so doing, in one way or another, in one respect or another, you are forced to employ just these laws (if on a higher level or in the form of some functional or metatheoretical equivalents), unless you wanted to be satisfied with just voicing your indignation.

The most widespread and influential version of the hypothesis according to which Asian logic would prove that there are no universally valid logical rules is based on an interpretation of the treatises of the Buddhist scholar Nāgārjuna (about 100). Especially his *Mūlamadhyamakakārikā* and its commented Chinese translation (the *Zhonglun* 中論, Jap. *Chūron*) are regarded as texts that do not acknowledge the validity of the TND (irrespective of the question whether or not the TND is to be applied only to finite or infinite classes of objects). Thereby, it is the *tetralemma* (Skt. *catuṣkoṭi*, Chin. *siju fenbie*, Jap. *shiku fumbetsu* 四句分別) that is usually seen as the most important, if not decisive, means for invalidating the TND. As repeatedly shown, however, such an interpretation of Nāgārjuna is mistaken.[1] The formulations and applications of the TND which we quote below are intended to substantiate this again.

(iv) Many scholars maintain that logical rules would indeed depend on specific properties of the language in which they are expressed. But this is true only for some specific laws formulated in some theories, as for instance the Aristotelian rule of subalternation (if all S are P, then some S are P). In Mohist Chinese, however, 'some' means "at least one, *but not all.*" The respective definition says: "*huo* 或 (some) is *bu jin* 不盡 (not all)" (Graham, 1978: 470, no. 5). Thus, the Aristotelian rule of subalternation could not be applied by just automatically replacing "all" by "some". But this did not imply that the Mohists advocated a "different logic" that had to call into question the universal validity of the above-listed laws. To put it another way: although particular characteristics of a certain language may lead to formulating linguistic devices of logical reasoning that can be used only in that one language – be it Greek, German or Mohist Chinese –, such particular characteristics have no impact on the form of fundamental logical laws. Precisely speaking, they should not be called logical laws at all, for they are actually rules of consistent language use. According to a popular view, Greek syntax had determined Aristotelian logic. Scholars who hold this view, however, overlook one important point, namely, that Aristotle himself distinguished between grammatical and logical categories as, e.g., subject and predicate on the one hand, and *genus* and *species* on the other, and that, in his logic, he dealt with the latter. Similar to the distinction between *genus* and *species,* Buddhist logicians in India, China and Japan distinguished between property bearers and properties (Skt. *dharmin* and *dharma*, Chin. *fa* 法 and *youfa* 有法, Jap. *hō* and *uhō*). These classifiers, too, do not refer to grammatical, but to logical relations. From a logical point of view, it does not matter whether I say "Hens are animals", "A hen is an animal," "Whatever possesses the property 'hen',", also possesses the property 'animal," "The class of animals includes the class of hens," or "If something is a hen, then it is also an animal." In each – and generally in every – language the same logical relation can be expressed in different ways, and different lan-

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[1] See for instance Paul, 1993: 130ff, 1998, 2004a and b and 2005. By distinguishing between four propositions, or possibilities of predication (… is A, etc.), the tetralemma aims at combinatory completeness. It is often schematized in the following rather misleading way: (1) A, (2) non-A, (3) A and non-A, and (4) neither A nor non-A. The indicated studies try to refute the hypothesis that the tetralemma, and (some of) its appli-

cations, violate, or are even intended to invalidate, the TND.

guages have equivalent means of expression, or the potential to create such some. This applies even to (the expression of) the so-called Aristotelian copula. This copula need not be expressed explicitly. Respective phrasings must only be able to sufficiently clearly express the intended logical relations of identity and diversity, i.e., the respective judgement. Even a mere outcry may express an identifiable logical structure. If I cry "shit", competent speakers will immediately understand that, in my opinion, a certain fact (e.g., "this, "which is conceived of as *species)* is "shit" (which is conceived of as *genus*), i.e., something unwelcome. Perhaps I have just read the examination results posted on a university board. The question of how to adequately interpret the cry „shit," however, refers primarily to the epistemological problem of whether or not the contents of all the concepts (or words) that come into play are identified correctly. The solution of this problem – the interpretation of "shit" – precedes, so to say, the analysis of its logical structure.

Among others, Aristotle, al-Fārābī (about 870-950) and (the Chinese Buddhist logician) Wen Gui (7th century) more or less explicitly distinguished between logical and grammatical form and between theories of logic and theories of grammar (see Paul, 1993: 178, and 2008[a]: 70ff.).

(v) Another objection against our hypothesis says that, in marked contrast to "Western" logic, "Eastern logic" is no doctrine of "either – or", but one of "as well as" instead. In its most important version, this objection, too, would mean that "Eastern logic" shows that the TND cannot be universally valid. Since numerous Eastern texts formulate or apply the TND, this objection is mistaken. Often, the objection (also) implies that acknowledgement of the TND precludes an ethics of harmony and compromise. But this is again wrong. As is well known, Aristotle put forward a notion of "the right middle". As to "Asian" many-valued logic, if there is such in the first place, its existence would be irrelevant, since that would be independent from the question whether there are universally valid rules of logical forms. Probably, there indeed exist more, and more systematical, "Western" theories and applications of many-valued logic than in the "East." More importantly, the development of a many-valued

logic implies an application of two-valued logic, be it only on a meta-level. If the values can be clearly distinguished from each other, then multivalence even implies bivalence. For instance, the three values "acceptable", "undecidable", and "unacceptable" can be replaced by two values, e.g., "acceptable and/or unacceptable" and "undecidable". Further, one should again distinguish principles of logical form from ontological laws. Nāgārjuna and Kant used the TND. This notwithstanding, both came to the conclusion that the TND is inept to describe, and explain, the structures of a certain kind of "reality", namely "true reality" and "the thing in itself", respectively. Such kinds of "reality" (existence, being, entities) are simply beyond the potentials of human knowledge. This example may illustrate that rules of logical form do not *per se* describe, or reflect, ontological structures, but are rather *method(olog)ical* principles of knowledge. They are, so to speak, no copies or photographs of objects, entities, "being", and no structures that inhere to or in the objects of knowledge, etc., but they are necessary means of constructing, or gaining, knowledge.

(vi) According to another objection against our hypothesis of a universal logic, the logical rules formulated in some so-called theories of reason, are principles of induction. This can mean two things. If it means that these rules are the results of (an) induction, the objection is irrelevant, for propositions gained by induction can nevertheless be universally valid. This is but a special case of the fact that validity does not depend on genesis or origin. However, the objection can also mean that, in these theories of reasoning, the logical rules are conceived of as principles of induction. This view is based on the conviction that the specific kind of syllogism (the outer form) advocated in those theories of reason determine, or decide about, the logical validity of a conclusion. There are many studies favouring such interpretations, but they are mistaken. Among other treatises, the *Nyāyapraveśa* advances a notion of *deductive* reasoning (Paul, 1994: 83). It is not just the specific syllogistic figures, but the mentioned "wheel of reasons," and the "three marks of reason," that determine, or decide about, logical validity. However, understanding this argument presupposes comprehensive and detailed knowledge of these theories of reason.

An example may illustrate the thrust of the

argument. (a) You may apply Aristotelian syllogistics, concluding from the premises "All human beings are mortal", and "Socrates is a human being", that "Socrates is mortal". Or (b) one may apply the *modus ponens,* concluding from the premisses "If Socrates is a human being, he is mortal", and "Socrates is a human being", that "Socrates is mortal". Alternatively, (c) you may say "Socrates (S) is mortal (P)", *because* he is a human being" (thus naming the *reason* R, Skt. *hetu,* Chin. *yin,* Jap. *in*), "as for instance Alkibiades also is", *and* because "anything that is immortal is no human being". All this is of logical relevance only in so far as the way (the outer form) in which the conclusions are expressed fulfills the necessary conditions of a logically valid conclusion.

Evidently, there are several equally acceptable possibilities. According to Dignāga's theory of reason, a syllogism proving (by deduction) that Socrates (S) is mortal (P), is logically valid, if its reason R satisfies the following three conditions: (1) The reason, or property, of being a "human being" (R) is a property of the property-bearer "Socrates" (S) (S is R). (2) The reason, or property, (of being a) "human being" (R) belongs exclusively to property-bearers possessing the property "mortal" (P) (Only P are R). (3) There is no property-bearer "immortal" (non-P) that would possess the reason, or property, (of being a) "human being" (R) (No non-P is R). These "three marks of the reason" can of course be expressed more precisely (see Paul, 1994: 82f.).

These remarks, however, are not the end of the matter. These criteria of logically valid conclusions are derived form the "wheel of reasons". Generally put, this "wheel" is a complete list of (a) all combinatorily possible relations that can exist between a reason (i.e., the property being "the reason") and the reason's superordinate concepts, or property-bearers, which in this respect belong to the same kind (Skt. *sapakṣa,* Chin. *tongpin,* Jap. *dōhon* 同品, e.g., mortality), as well as of (b) all combinatorily possible relations between a reason and the contradictory opposites of its superordinate concepts (e.g., immortality) which are in this respect of a different kind (Skt. *vipakṣa,* Chin. *yipin,* Jap. *ihon* 異品). The completeness of the list permits for an equally complete list of the criteria that a relation between a reason and other concepts must fulfill to enable a logically valid conclusion. However, the selection of acceptable relations can be justified only pragmatically. Otherwise this selection had to be regarded as axiomatic or would amount to a vicious circle. We do not know of any Buddhist text that explicitly includes pragmatic justifications, whereas Aristotle and the Mohists expressly and positively resorted to pragmatism. For instance, they justified the law of non-contradiction by pointing out that without its acceptance it would not even be possible to develop a contiguous line of thought. If, e.g., "human" could be replaced by "non-human," there would then be no identifiable notion of "human," as Aristotle argued.

At this point, we conclude our discussion of common objections against our hypothesis and turn to the arguments that directly support it.

IV Direct arguments in favour of the hypothesis that there are universally valid rules of logical form

(i) The most important argument could be called a "transcendental" one, a pragmatically transcendental argument, or a fundamental methodological argument. This argument would suffice to justify our hypothesis. The argument states that humans cannot but acknowledge and apply – in one way or another, on the level of object language or meta-language – universally valid logical rules, if they want to reflect or communicate successfully. Aristotle and the Mohists explicated this insight in a transcendental and pragmatic way, arguing: that otherwise it would be impossible to conceive of something definite, or even to pursue a line of thought by replacing parts of it by other parts (Aristotle, *Metaphysics,* 1005b, 1006a, 1006b, 1007b, 1008a; Graham, 1978: 446f.; Paul, 2000 and 2008(a): 54). On the one hand, the argument is rather simple; on the other, it can be divided into several versions. For example, it can be phrased, or conceived of, as the hypothesis that without the capability of *homo sapiens sapiens* to think *logically* he would not survive, i.e., logical skills must be routed in human biological disposition. If humans were not able to understand causal relations in terms of logical consequences, they would not be able to explain why, e.g., they give way to a fast approaching car. In this respect, the argument is similar to Chomsky's hypothesis of a universal grammar. As recent scientific

research ascertained, even chimpanzees possess remarkable abilities to rudimentarily solve some basic logical and mathematical problems (see Savage-Rumbaugh et al. 1998, McGrew 2004, de Waal 2006). This is an important indication that human capability of logical thinking indeed would *inter alia* result from biological evolution, and is hence – in a sense – a biological property, of the species. Admittedly, the problem of how biological disposition and logical laws are related to each other, remains an open question, but that does not vitiate the (validity of the) argument.

(ii) Another argument refers to the logical foundations of mathematics. Valid mathematical reasoning is logically consistent, and it is implausible that universally valid mathematical principles (that, moreover, were developed in different cultures) would result from applications of mutually incompatible logical rules. Furthermore, the very transmittance of "Indian" "theories of reason" to China, Korea and Japan, and their acknowledgment there, as well as the appropriation of Aristotelian logic by Muslim scholars (often by way of translations from Greek into Syriac, and then from Syriac into Arabic) would be unconceivable.

(iii) Without application of at least some universally valid logical rules, translation would be impossible anyway. It is not only argumentative texts that cannot be understood without reflecting on questions of semantic consistency. Even in translating poetry one must often choose between consistent and inconsistent alternatives, and then usually opts for consistency, perhaps also by following the so-called *principle of charity.*

(iv) Actually, understanding of poetry rather often requires more logical reflection than understanding a passage of a treatise. To adequately understand Goethe's "All theory, my friend, is grey. / But green is life's glad golden tree," one must take into account a lot of things, as for instance premises about metaphorical language use and respective implications. In Sino-Asia, for more than 2000 years, poems were one of the most important means to criticize inhumane politics. Accordingly, authors and addressees had to know the respective contexts *and* to be skilled in logical thinking. Otherwise they would not have been able to arrive at the "hidden" conclusions. Besides, this also undermines the popular view that "Eastern thinkers" expressed themselves more often in poetic language than "Western philosophers," and that they, *because of this,* neglected or violated logicalness. More generally stated, poetry does not preclude logicality.

(v) There are also texts that, apart from logical consistency, lack systematic form. On the other hand, systematic form does not necessarily imply logicalness. For instance, Scholastic treatises on witchcraft are often very systematic though not very logical.

(vi) As already mentioned, many Asian texts include formulations and applications of logical laws that indicate belief in (the existence of) universally valid rules of logical form. In the following, we quote, and analyze, some respective passages. It should be noted that our interpretations of the applications do not imply a *petitio principii,* for the context of the quotes provides useful auxiliary information. Moreover, applications are often complemented by formulations of the relevant logical laws, and *vice versa.* Abstraction and generalization do not pose serious problems either, for we are dealing with forms, and formal relations. An example from the "theory of reason" may serve as illustration. One as yet unmentioned objection against our hypothesis says that the rules of "Asian logic" are materially determined laws, or laws of ontological structures. As our discussions of the "wheel of reasons" and the "three marks of the reason" reveal, this is wrong. Both prove that the theory of reason (as founded by Dignāga), deals with *relations* between concepts and concept properties and thus with *form* – which is similar to Aristotelian logic and its reflections about the identity and diversity of concepts, and about *genera* and *species,* and similar also to Mohist logic and its analysis of sameness and difference (*shi* 是 and *fei* 非 usw.). Formalization and the use of symbols are no necessary features of a theory of logical form. Also, objections that some of the passages quoted below are of a rather specific kind and are phrased as ontological statements, would be irrelevant, for this holds true also for some Aristotelian formulations of, e.g., the law of non-contradiction. Such formulations can be adequately interpreted as exemplary expressions or specific versions that imply respective general logical laws. For

instance, the sentence "Only [the/an] ox is [the/an] ox", that occurs in a relevant Buddhist text, can be understood as an exemplary example of "Only S is S. "Ox" is then interpreted as a symbol which could be replaced by other concepts, e.g., "man." In the following, we confine ourselves to a few quotations. Others could easily be added (see Paul, 1993: 167-173, 1994: 72ff., and 1998).

The *Zhonglun* includes the following exemplary formulations of the rule of non-contraction:

"If *dharmas* really exist, they cannot not exist" – which also expresses the rule of double negation. (T 1564: 1c f., trans. Walleser, 1912: 3.)

"Existence (Chin. *you*, Jap. *u*) and non-existence (Chin. *wu,* Jap. *mu*) are contradictions [to each other] (Chin. *xiangwei*, Jap. *sōi* 相違)." (T 1564: 3a, trans. Walleser, 1912: 8.)

Āryadeva's (2nd century A.D.) *Śataśāstra* (Jap. *Hyaku-ron*) includes paradigmatic expressions of the rules of non-contradiction and identity:

"The properties of existence and non-existence cannot be perceived (at the same time) in one and the same dharmas." (Trans. Tucci, 1929: 8.)

"If it exists, it exists. If it does not exist, it does not exist." (Trans. Tucci, 1929: 64.)

"Only the ox is the ox." (Trans. Tucci, 1929: 24; see also op. cit.: 22.)

The TND can be expressed as follows: A is either B or non-B (or not B). Prior to Kumārajīva (about 400 A.D.) who introduced the philosophy of Nāgārjuna to China, i.e., prior to Kumārajīva's Chinese translation of a commented version of the *Mūlamadhyamaka-kārikā* (Chin. *Zhonglun*), Chinese philosophers rarely used such formulations. This notwithstanding, they accepted and used the TND. The *Lunyu* (attributed to Confucius, 551-479 B.C.) includes the passage:

"When the way [right principles] exists (*you dao*) in the kingdom, he [a good man] will show himself; when the way does not exist (*wu dao*), he will keep concealed." (*Lunyu,* VIII.13, trans. Schwarz: 68, trans. Legge: 212.)

Even the Daoist *Daode jing* uses *you dao* and *wu dao* in a dichotomic sense and thus acknowledges the validity of the TND. (*Daode jing* XLVI, trans. Debon, 1979: 75.). Similarily it uses, e.g., "good" (*shan*) and "not good" (*bu shan*) in a dichotomic sense. (*Daode jing* XLIX, trans.

Debon: 78.)

The *Zhuangzi* (attributed to the philosopher Zhuangzi, 4th and 3rd century B.C.), too, uses *you* ("is", "exists", etc.), and *wu* ("is not", "does not exist", etc.) in a dichotomic sense (*Zhuangzi,* II, trans. Chan, 1969: 182; trans. Graham, 1981: 52), and also utilizes dichonomies like *ran* ("[is] so") and *bu ran* ("[is] not so"), and *ma* ("horse") and *fei ma* ("non-horse") (*Zhuangzi,* II, trans. Chan: 184 and 183, trans. Graham, 1981: 53). Further, the text contains sentences like:

"If the rulers respect [certain norms], there will be order. If they do not respect [them], there will be disaster." (*Zhuangzi,* XIV, trans. Chan: 204 and 193.)

The *Sunzi,* a treatise on the rules of warfare attributed to Sunzi (5th century B.C.), includes the passage:

"[He] who knows [the principles of warfare], will gain victory. [He] who does not know, will suffer defeat." (*Sunzi,* I and II, trans. Lin Cheng and Lionel Giles, 1978: 16ff. und 30ff.; see also op. cit.: 8ff., 60ff., 74ff. und 80ff.)

In the Canon of the Later Mohists one reads:

"Of a thing ... that it is this (*shi*) or not this *(fei)* is necessary *(bi)*" (*shi fei bi ye*). (Graham, 1978, A 51: 299ff.)

Fei ("not this") is contradictory to *shi* ("this"). Accordingly, the sentence can be interpreted as an expression of the TND, namely, "A or non-A." The use of the term "necessary" (*bi*) makes it clear that the sentence indeed expresses a law. Two other passages from Mohist texts relevant to our discussion can be translated as follows:

"To lack what distinguishes an ox (*niu*) is to be a non-ox (*fei niu*)." (Graham, 1978, A 73: 317ff., cf. also A 74.)

"To claim that all saying contradicts itself *(bei)* is self-contradictory *(bei)*." (Graham, 1978, B 71: 445.) (That, by the way, is a rare and telling example of a meta-language formulation!)

Among many other texts, the *Zhanguo ce* 戰國策, „Anecdotes from the [Era of the] Warring States [475-221 B.C.]," provides further evidence for our hypothesis. In an impressive way, this anthology documents that, in pre-Qin times (prior to 221 B.C.) logical reasoning, particularly sophisticated logical reasoning, was regarded as very important. One does not need to study or develop *theories* of logic to be able to reflect logically. One passage of the *Zhangguo ce* reports of an attempt to discredit a defector. The way

this is done clearly displays the intention to definitely realize the goal. A letter is written which insinuates that the defector is actually a spy for his own country. It is addressed to the defector, but not sent to him. Instead, it is made sure that the foreign power gets hold of it. The letter includes the ingenious formulations:

"This is to remind Ch'ang T'o [i.e., Chang Tuo, the defector and nominal addressee of the letter] that if the thing can be done it must be done at any cost; if it cannot be done you must return immediately. The longer the delay the more will leak out and it will mean your life." (Trans. Crump, 1996: 75.)

Evidently, this wording makes conscious use of the TND to reach the intended goal. The phrasing ("… can be done … cannot be done") is chosen to definit(iv)ely exclude a third possibility, *thus* providing a safe basis for the (insinuated) respective conclusions. In the world of the Warring States which was characterized by mistrust, intrigues, and treason, the letter must have been psychologically convincing too. The letter succeeded, and the defector was sentenced to death.

All other Chinese philosophical texts of similar length we know of do include phrases similar to the quoted ones. Since all these formulations aim at covering all possible cases of a problem, they as a matter of fact (and methodology!) presuppose the validity of the TND. They are applications of the TND that imply acknowledgement of the law. That the distinction between A and non-A (or not A) – e.g., *you* and *wu*, *shi* and *bu shi*, *shi* and *fei, (ma)* and *fei (ma)*[1]*, ran* and *bu ran* – is of argumentative relevance in many respects, further supports such an interpretation.

Returning to Indo-Sinitic and Buddhist teachings, we first quote from the *Brahmanas* (perhaps completed about 600 B.C.):

"Twofold is the universe; there is nothing third: [there is only] the true and the untrue." (Trans. Ruben, 1955: 28; see also Paul, 1994: 82.)

Buddhist treatises like (a) the *Zhonglun,* (b) Xuanzang's translations of the *Nyāyamukha* and the *Nyāyapraveśa,* i.e., the (Chin.) *Yinming zhengli men lun* and the *Yinming ruzhengli lun,* (c) the probably more than 200 commentaries and

studies that Chinese and Japanese scholars wrote about these translations (see Paul's overview, 1993: 349-365), and (d) Xuanzang's version of the "Treatise on the realization of mere consciousness," the *Cheng weishi lun,* include numerous applications of the TND, and they also contain many explicit propositions of the kind that some A must either be a B or a non-B.

Exemplary versions of the TND are expressed in the following passages:

"It is impossible that there should be anything that is neither permanent nor impermanent." (T XXXII, no. 1630: 11c; trans. Tachikawa Musashi 1971: 124.)

The term 'impossible' makes it clear that the proposition is meant to indicate a law.

"Effects either result from conditions, or they result from non-conditions." (T 1564: 3a, trans. Walleser, 1912: 7.)

One of the basic goals of the *Zhonglun* is to show that our common notions of existence are inadequate to characterize true reality, i.e., the text is to prove that things do not exist in the way in which we usually express or describe their existence. In particular it tries to prove that nothing exists eternally and that nothing is "annihilated," i.e. perishes without traces. In most cases, the proof runs as follows:

Proposition:

A does not exist.

Proof:

(i) Suppose A exists.

(ii) Then A exists/must exist as B or non-B.[2]

(iii) This is impossible because of at least one of the following reasons: (α) There is no empirical evidence for the existence of B or non-B. (β) The proposition that B or non-B exists implies a contradiction (Chin. *xiangwei*, Jap. *sōi* 相違), or a *regressus ad infinitum* (Skt. *anavasthā*, Chin. *wuqiong,* Jap. *mugū* 無窮), or an assumption which is as questionable and unproved as the proposition itself (Skt. *sādhyasama,* Chin.: *suozheng leisi yin*, Jap.: *shoshō ruiji in* 所証類似因). (Cf. Walleser: 26 and 38; see also Paul, 1993: 131.)

Conclusion:

A does not exist. (See Walleser, 1912: 7-12, 14-18.)

In some cases, (ii) is formulated as tetra-

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[1] Ma, "horse," could of course be replaced by any other noun.

[2] In most if not all cases, B refers to a concept and not to a sentence or statement. Hence "non-B" and not "not B." Further, "A is not B" can be reconstructed as "A is non-B." For example, "A is no chair," is equivalent to "A is a non-chair."

lemma:

(ii*) Then A exists/must exist as (1) B, or (2) non-B, or (3) B *and* non-B, or (4) *neither* B *nor* non-B. (See Walleser: 5, 47, 115, and 146.)

To give an example:

"(ii*) The dharmas do not originate from (1) themselves 諸法不自生

nor from (2) others 不從他生

nor from (3) both 不共

nor (4) without reasons 不無因.

(iii) Thus one knows that they do not originate at all 是故知無生". (*Zhonglun* I:1; T 30, 2b6f.; Walleser: 5.)

These examples should suffice to show that the *tetralemma* by no means negates the TND. For, in the first place, the *tetralemma* simply aims at combinatorial perfection. It is used as a device to cover every imaginable case, nonsensical cases included. Secondly, it actually contains an application of, and thus presupposes, the TND. Thirdly, the abstract formula of (ii*) that is frequently used to prove the existence of a distinctively Eastern logic, presents the *tetralemma* in a generalized form rarely realized in the Buddhist texts. This applies in particular to the logical form suggested by the formula. In many cases, instances of "B *and* non-B" and "*neither* B *nor* non-B" are completely lacking. Furthermore, if a phrase like "B *and* non-B" actually occurs, it usually refers to a logical contrast such as "eternal" and "absolutely non-existent," or to different perspectives, but does not designate contradictories. If it does, however, then "B *and* non-B" often means a logical adjunction ("B *and/or* non-B"), i.e., a combination of B and non-B. The second example is a case in point: *dharmas* that do not originate from themselves, nor from others, may originate from both, that is, by one half from themselves and by the other half from others. Cases, in which "B *and* non-B" expresses a (self-)contradiction, are rare, and usually without much ado dismissed as untenable. Furthermore, "*neither* B *nor* non-B" must not be confused with "*neither* B *exists nor* non-B *exists*." The latter can be true. For example, *neither* blue dragons *nor* dragons which are not blue do exist. As far as the *Zhonglun* accepts "*neither* B *nor* Non-B," the text refers to what it regards as untenable notions of existence. As mentioned, one goal of the *Zhonglun* is to criticize such notions. None of all these cases implies the notion that "B *and* non-B" can be logically valid.

Many learned Sino-Asian Buddhists, especially adherents to the School of Mere Consciousness, used the methods of argument employed by the *Zhonglun*. One outstanding example is Xuanzang's refutation of the proposition that the *dharmas* exist [as substances, or eternally] (T XXXI, Nr. 1585, S. 3c-4a; trans. Wei Tat 1973: 42-47; trans. Chan: 377-379). It culminates in an explicit formulation of the TND: "… that existent dharmas are neither identical nor different … contradicts the common knowledge of the world that things are either identical with or different from other things." *you fei yi yi wei shi gong zhi you yi yi wu* 又非一異 違世共知 有一異物. (T XXXI, no. 1585: 3c-4a; trans. Wei Tat: 44-45; trans. Chan: 379)

To avoid any misunderstanding: the almost inflationary use learned Sino-Asian Buddhist made of the TND, and the way they did it, testifies to the fact that they regarded the TND as valid. However, they rarely tried *to justify* the validity of the TND. This not withstanding, the respective quotes can adequately be understood as indications of this validity.

V The concept of universally or "generally admissible rules": a class of formalized universally valid rules of logical form

Modern logicians may find our above discussion somewhat vague or old-fashioned. They may ask for a (clearer) formalization of some of the logical rules which we regard as universally valid, and for more precise and more technical explanations. In the following, we describe one respective approach, namely the idea of "generally admissible rules," or a "positive logic of consequences." For the sake of better understanding, we will thereby not shrink from repeating some of our above arguments.

Though it is true that extant attempts to develop a deductive foundation of the so-called logical constants, i.e. the forms of judgements, in descriptive and common formal logics have been proved to be thwarted (Lenk, 1968), indeed leaving any philosophical foundation of the respective logical forms incomplete or not purely logically or formally determined in the first place, there should be still some good arguments for the universal validity of the known logical connectives (propositional logics or logic of junctors, "*Junktorenlogik*") and predicate logics (logic of quantification or quantors, "*Quan-*

torenlogik") – even if there were not a really engendering foundation, i.e. no exact characterisation of the logical particles as **the** *logical ones* by an a priori principle, but only by an *ex post* interpretation of use and functions. That means one should already know what the logical particles are – in order, only after the fact so to speak, to characterise them as those by a certain kind of criterion. Even if Kant had wondered to have such an engendering a priori foundation and deduction of the system of logical form of statements (i.e., for him the Aristotelian forms of judgement) it is true beyond any doubt that this attempt does not hold water or stand the tests, but is incomplete itself (Lenk 1968, chap.II).

In a way we have to look for the independence of logical rules from language forms and linguistic basic structures in order to more exactly comprehend the logical character of logical connectives and forms as well as quantifiers (or quantors). Therefore it might be helpful to look for some kind of operative attempts to found or rather interpret via a reliable procedure the characterisation of logical forms as, e.g., the traditions of constructivism. After Brouwer, Heyting and others more lately Paul Lorenzen (1955, 1968) would try to distinguish the respective operative uniqueness by interpreting the forms, structures and procedures of logical arguments independently of language structures.

In his earliest "operative" foundation of logics and mathematics, of the respective rules and constants, Paul Lorenzen (1995) would claim to have developed a language-independent generative foundation of logical rules, laws and particles by not just retreating to evidences (ibd.: 62).

The intuitive basic idea is the following one: calculi are prescriptions for producing figures – e.g. the figures in knitting – with which one can step by step engender additional figures according to a rather schematic or formal application of some given basic rules of operating with these figures starting from the given initial figures and only by successively using these figures and rules and nothing else – the basic idea thus is that there are some rules which are "valid" (admissible) for any calculus or set of subfigures whatsoever in so far as their application just engenders only the same subfigures as the *ad libitum* application of the basic rules of the calculus would render anyhow. By using such rules admissible to any calculus whatsoever

Lorenzen introduced or even invented the idea of universally or „*generally admissible rules*" (*"allgemein zulässige Regeln"*) which are so to speak superfluous: They do not deliver anything new which would not have been possible to have been generated by repeatedly applying the basic rules.

The most interesting examples of such generally admissible rules are the often so called "rule of *identity*": A → A, and the "rule of *transitivity*" of figure production: A → B and B → C would allow to replace these both steps: by A → C. The rule of transitivity A → B, B → C ==> A → C would be later on interpreted as the logical implication meaning that for any calculus (system of operation for engendering figures) in which we have both the formulae as a basic meta-notation available, as mentioned in the premise, you would also have the right to directly go over to A → C or abbreviate these two steps to (now being) only one. Thus, the generally admissible rules are interpreted as *logical rules*. (The same is the case with the traditionally so-called "law of identity" A → A: If you have engendered the figure A you are certainly allowed to repeat it, e.g., to engender A since you have already done it; also here is nothing new to gain which was not already available in the basic figures of the calculus.)

Therefore, one might interpret these rules as the generally admissible rules of what is called "positive logic of consequences" (*positive Konsequenzenlogik*) consisting only of pure "if so"-connections for and within the production of figures or the connection of prepositions as by the so-called subjunction ("if… so…"). This is enough to already get pure consequential logic without quantification and negation which, thus, can be already characterised by such procedural operative presuppositions in the forms of the generally admissible rules of figure production.

You might also include one other rule, the so-called *transportation rule*(*s*): A → (B → C) and B → (A → C) can be replaced by A & B → C, respectively. This is a measure of simplifying the formulae just in syntactical form. Thus '&' would first of all mean that you have both figures A and B available. They could be separated by a comma: If you include (or 'project') this sign & used for the meta-description of the respective calculus rule by introducing it as a sign in the basic level of the formal set of calculus rules (plus variables) you might also think of it, as Lorenzen says, as a "*relatively* admissible"

symbol. The whole formula would then represent the respective rule(s) of transportation (importation or exportation, repectively), i.e., it is interpreted now as a set of relatively admissible rules which do not engender anything new beside only the new specific figures containing this new sign (&). You might certainly interpret and rewrite this as the connective ∧ symbolising the "and" in propositional logics. A similar procedure can be applied for introducing let's say the disjunction, or adjunction, ∨, i.e. the "or" of propositional or "junctor" logics: A → C and B → C may be replaced by (A or B) → C, i.e., on the basic level, A ∨ B → C. Then, we would already have positive consequence logics with conjunction and disjunction.

If you also tried to introduce a meta-statement describing or depicting (by a sign) that a figure would allow to produce an underivable figure (not being able to be produced within the calculus), then you would have introduced a sort of (constructivist) negation: A → Ø.[1] This can be interpreted as having introduced a certain kind of constructive (or according to Lorenzen "effective" negation); with that you would have already the general logic of consequences dealing only with connectives or propositions.

You can also as is easily understandable introduce relatively admissible signs and symbols for quantifiers, if you insert general "open" signs (predicate or function signs, "functors") to be applied to singular instances – like predicates to individual constants or variables. The "all-quantification" would then mean that the quantifier, or quantor, is producing a respective formula for all respective individual variables over a given domain and the respective constants within that field of "validity" or application. Then, you would have arrived at the constructivist logic of quantification including negation. From a constructive point of view according to the approaches which had first been developed by Brouwer and Heyting all that amounts to a foundation of intuitionist logics.

It is certainly true that we can also understand this kind of calculus then as a *logic* calculus

regarding operative or constructive quantificational logics, since apart from the combinations with the newly introduced figures like the junctors and quantifiers we have general insights about the producibility of figures or the reusability of statements (whether they are propositions or quantificational formulae) about admissibility and the "superfluousness" of attempts of engendering respective figures or statements by extra repetitions etc. All this certainly is only got by using this set of figures under the purview of interpretations (to note, operative interpretations) by interpreting the general reachability of figures as the *operative interpretation of logical implication*.

Indeed, by contradistinction to Lorenzen's first interpretation, we cannot understand this system of rules as the system of logical rules (constructive logics) without interpreting the switch from the going over from one figure to another as an implication (of logical forms or statements) without using so to speak *procedural and operative interpretations*. However, it is a matter of well-founded or well-grounded interpretations, and not just at will, though it certainly is no *a priori* necessary procedure for the engendering of logical rules in an absolutely deductive sense. That means that also here, *interpretations* of a rather operative, or if you wish, figurative provenance are used. That, however, does not restrict the general validity or universality of this kind of operative interpretations. Indeed, any operative subjunction (→) whatsoever is necessarily to be presupposed by any calculus whatsoever, otherwise we could not have a calculus, i.e. the (set of) prescriptions for stepwise producing figures, at all.

The logical "if-so" connection in this figurative sense, the subjunction (→), is so to speak "absolutely founded" in an operative sense, in so far as it is the essential form of any structure of schematic operations – as for instance by going from figure to figure or engendering figures within a calculus whatsoever. This would also hold true for any system of schematic operations dealing with the transgression from one figure to another in a formal system of any kind. Thus, we have a meta-theoretic interpretation of the operative subjunction as an "if-so" connective and the operative implication being, so to speak, absolutely characterised by a basic structure of getting strict consequences (though still in a purely formal manner). Thus, the operative subjunction is in a sense founded in a quasi

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[1] 'Ø' would designate either a figure underivable or unproducible within the calculus in question or in any calculus whatsoever, or it could signify any impossible figure or mean an or the overall contradiction. 'A → Ø' would thus stand for the constructionist operative negation: ¬A (¬ again being a relatively admissible figure).

"absolute" manner. It is certainly easy to interpret it as the (operative) logical implication, if it is generalised to any rule of going over from any figures whatsoever and calculi to any other figures by just consequently and strictly applying the rules of the respective basic calculi. In such a way, the generally admissible rules would be transposed towards being interpreted as or becoming an universal "logic calculus" ("*Logik-kalkül*").

To be sure, understanding the generally admissible and relatively admissible rules as *logical* connectives and operative though formally characterised procedures as logical inferences is by way of an *interpretation*. By this we interpret the general form of going over from figures within certain calculi as the general characteristics of logical rules. But this does not deprive them of their operative special position beyond purely linguistic convention: The logical particles and in particular the absolutely founded operative subjunction being interpreted as logical connectives turn out to be in so far independent of specific language forms. This holds first of all for the connectives which are in a sense operatively "defined" by the rules (including the relatively admissible ones) and the basic calculi and the more general forms of any calculi whatsoever. But this is also the case for the general so-called predicate forms which should rather be interpreted as being "functors" or "functions"[1] which are applied to singular instances or sort of single figures or basic "objects" etc.

Thus we have an operative interpretation of the so-called positive logic of consequences including functors and quantors without being dependent on any specific language structure whatsoever. That means that logic understood in this way cannot be just dependent on specific structures of the respective diverse languages, but has to be seen as universally valid or applicable by being founded on the idea of generally or relatively admissible rules of all calculi of any kind whatever.

By the way, the later, so-called dialogical, foundation of logics and "the" logical rules as proposed by Lorenzen and Lorenz by basing them on the rules and systems of the moves

[1] Functors or functions in this sense are open place signs for variables to be replaced by object signs, or figures, i.e. by constants, or to be bound by the quantifiers "for all" or "at least for one" (instance or object).

which can always be defended from the attacks and defensive reactions as structurally "allowed" (for the respective logical constants) in dialogues between a formal proponent and opponent do not only render a theoretical foundation of logics but also – as is all the more as easily understandable – an *interpretation* of different argumentative rules which are, to be sure, in a way not really dependent on specific languages but on the form of language and argumentation as well as dialogues in general. Therefore, they are not as clearly an example in point for our thesis of the universal validity of logics rules in general.

Interestingly enough, this positive logic of consequences is contained in any logic system whatsoever, e.g. in the classical, the strict, as well as the constructive ones (except to a certain degree for some parts of "para-consistent logics"!). Therefore, we have apparently characterised a certain kind of founding kernel or basis of logics, namely dealing with "subjunctions" and implications and some kinds of extensions towards other relatively admissible connectors (connectives) and to quantifications. Thus, it seems plausible to interpret this kind of universal functor logics according to the understanding of the procedures of engendering figures and the generalisation of the operative subjunction towards an operative *implication* and towards the meta-form of logical implication (in the form of the generally or relatively admissible rules) as *a* or even *the* universal foundation of logics. However, we have to be sure again that this is certainly a *post hoc interpretation* and not just a mechanical production or derivation or deduction of logics from an a priori principle without using logics per se at all. But this seems to be as close as you can possibly come towards a certain kind of universality and independence from specific languages or language structures at all. (Even the description of these rules and the procedures, or functional equivalents, to characterise them would certainly mean to use language and logical arguments on the meta-level or in the metalanguage. But this is not of any avail for the respective operative characterisation as such.)

A little note has to be added regarding the *principle of the excluded middle*, the above-mentioned *tertium non datur* (TND) in classical logics.

This logical inference structure is not constructively available in operative and construc-

tive logics, but, nevertheless, it is easy to see that nothing in terms of inadmissible consequences or contradictions would occur if we still use this principle and the respective equivalent principle of double negation: $\neg\neg A \rightarrow A$, and the respective procedure of indirect proofs. (This is certainly true in applying logics to finite systems; but only in infinite systems we cannot constructively replace indirect proofs by direct constructive ones or use the *tertium non datur* in general for would-be distinctions of individual solutions. But even from a constructivist point of view, it remains true that the TND, as far as it can be applied, is valid for all human beings.)

Therefore, practically using the TND does not end up in any serious problem whatsoever regarding logical arguments in everyday language and any (finite) systems (with the exception of mathematical operations on infinite sets or systems and the respective inadmissibility of indirect proofs in intuitionist and constructive mathematics and logics). In addition, the critical role of the principle of the TND applied to infinitive sets is of no real avail regarding the results of everyday logical argumentation. Moreover, the same holds for the apparent logical differences of the problems regarding allegedly different "logic cultures" in the East and West and the respective discussions, e.g., whether or not there were Western or Eastern brands of special, or even "specious", "logics". Thus, in the given context, we can dispense with further discussing the TND.

VI Some hypothetical conclusions

As the bulk of our quotes above would undeniably document, classical Chinese pre-Qin texts (texts prior to 221 B.C.), Brahmanist and Buddhist Sanskrit texts, and Sino-Asian Buddhist texts all include numerous expressions of the laws of identity, non-contradiction, and of the transitivity of logical implication as well as the TND, and also numerous applications of these laws. The quotes thus strongly indicate that some universally valid principles of logical form exist. Indeed, a view such as that there could be something like a distinctively "Chinese logic," which would differ from a "European logic," is a strange idea. For how could a notion of such a allegedly distinctive Chinese logic cover 2500 years of Chinese culture(s), without over the same time being a notion of human rules and ways of thinking in general? Let alone that there

could be a viable notion of a distinctively "Eastern" or "Western" logic. The differences that exist between the (theories of) logic developed in the "West" and in the "East" are insignificant if it comes to the question of whether or not there are universally valid rules of logical form. These differences should be attributed to

(a) characteristics particular to (specific) theories of logic as for instance the degree of explicit formalization, or the choice of an intensional or extensional or semantical approach,

(b) features particular to a specific language as for instance the functional meaning of quantifiers and the way the logical copula is expressed,

(c) the formulation, "outer", or external form and recommendation of specific figures of logical conclusion,

(d) different contexts of origin and respective different goals as for instance the justification of Buddhist and Catholic teachings,

(e) different degrees of interest in theory or "theories" of logic, and respective differences in the number, scope and detailedness of logical theories,

(f) differences regarding levels and metalevels of the formulations of logical rules (including alternative formulations of functional equivalents and/or of operational procedures or descriptions).

As to the ability to think logically, and the application of laws of logical form, there are no significant logical differences between people of different cultures.

There are also no differences regarding the scope and metalevels of metalogical and philosophical interpretations.

References

Arnould, A. (1972): *Die Logik oder die Kunst des Denkens [La Logique ou L'Art de penser].* Darmstadt 1972.

Bochenski, J. M. (1981): *Logik der Religion.* 2nd edition. Paderborn 1981.

Chan Wing-tsit (1969): *A Source Book in Chinese Philosophy.* Princeton 1969.

Cheney, D. L. – Seyfarth, R. M. (1990): *How Monkeys See the World. Inside the mind of another species.* Chicago 1990.

Crump, J. I. (trans.) (1996): *Chan-kuo Ts'e [Zhanguo ce].* Rev. edition. Ann Arbor 1996.

Dawkins, M. St. (1993): *Through Our Eyes Only? In search for animal consciousness.* New York a.o. 1993.

Debon, G. (trans.) (1979): *Lao-tse [Laozi]: Tao-Te-King [Daode jing].* Stuttgart 1979.

Frankenhauser, U. (1996): *Die Einführung der buddhistischen Logik in China.* Wiesbaden 1996.

Graham, A. C. (1978): *Later Mohist Logic, Ethics and Science,* Chin. and English. Hong Kong 1978.

Graham, A. C. (1981): *Chuang Tzu [Zhuangzi]: The Inner Chapters and other Writings from the Book Chuang-tzu.* London 1981.

Gould, J. L. – Gould, C. G. (1994): *Animal Mind.* New York 1994.

Griffith, D. R. (1984): *Animal Thinking.* Cambridge, MA 1984.

Harbsmeier, Ch. (1998): *Language and Logic in Traditional China.* Vol. VII in Needham, J. (Ed.): *Science and Civilisation in China.* Cambridge 1998.

Kant, I. (1944): *Kritik der reinen Vernunft.* Leipzig 1944 (1. Aufl. v. 1791: A, 2. Aufl. 1787: B.) Kants gesammelte Schriften. Kants Werke. Königlich-Preußische Akademie der Wissenschaften (Ed.). Berlin 1910-1955. XXIII Bde. (zit.: AA)

Legge, J. (1983): *The Chinese Classics.* Vol. 1 [Lunyu and Mengzi], Chin. and English. Taipei 1983.

Lenk, H. (1968): *Kritik der logischen Konstanten. Philosophische Begründungen der Urteilsformen vom Idealismus bis zur Gegenwart.* Berlin 1968.

Lenk, H. (1973): "Philosophische Logikbegründung und rationaler Kritizismus". In: *Z. f. philosophische Forschung* 24 (pp. 183–205, 1970) (reprinted in id., pp. 88–109, 1973).

Lenk, H. (1973): *Metalogik und Sprachanalyse. Studien zur analytischen Philosophie.* Freiburg 1973.

Lenk, H. (2000a): "Warum fehlte Aristoteles die Metastufen-Methode. In die Objektsprache gerichtete (Hinunter-)Projektionen und das Fehlen von Metasprache sowie Metaregeln in der Aristotelischen bzw. traditionellen 'westlichen' Logik". In: Öffenberger, N. – Skarica, M. (Eds.): *Beiträge zum Satz vom Widerspruch und zur Aristotelischen Prädikationstheorie.* Hildesheim. Pp. 71–87, 2000, (in Spanish "Por qué a Aristoteles le faltó el método de los metaniveles?". In: Lenk, H. et al. Pp. 9-24, 2003).

Lenk, H. (2000b): "O hätte Aristoteles Panini gelesen… Über Metasprachen und Metaregeln in der Sprachlogik". In: *Existentia* 10 (pp. 1–4, 141–147, 2000).

Lenk, H. (2003): "Zur geschichtlichen Entwicklung der Begründung von logischen Urteilsformen". In: Lenk, H. et al. (Eds.): *Urteil, Erkenntnis,* Kultur. Münster pp. 197-219, 2003.

Lenk, H. – Hegselmann, R. (1989): „Partikeln, logische". In: Ritter, J. – Gründer, K. (Eds.): *Historisches Wörterbuch der Philosophie,* vol. 7. Basel – Stuttgart pp. 147-154, 1989.

Lin Cheng – Lionel Giles, *Sun Tzu: The Art of War.* Chin. and English. Taipei 1978.

Lorenz, K. (1961): *Arithmetik und Logik als Spiele.* Diss., Kiel University, 1961 (mimeographed).

Lorenzen, P. (1955): *Einführung in die operative Logik und Mathematik.* Heidelberg: 1955.

Lorenzen, P. (1966): "Logische Strukturen in der Sprache". In. *Studium generale* 19 (pp. 398–401, 1966). Lorenzen, P. (1958): *Formale Logik.* Berlin 1958.

Lorenzen, P. – Lorenz, K. (1978): *Dialogische Logik.* Darmstadt 1978.

Lullus, R. (2002): *Die neue Logik: Logica Nova* (Lateinisch-Deutsch). Hösle, V. (Ed. and trans.) Darmstadt 2002.

Lunyu. See Legge and Schwarz.

McGrew, W. (2004): *The Cultured Chimpanzee. Reflections on cultural primatology.* Cambridge, UK – New York 2004.

Nyāyamukha. See Tucci 1930.

Nyāyapraveśa. See Tachikawa.

Paul, G. (1993): *Philosophie in Japan.* 1993.

Paul, G. (1994): "Argumente für die Universalität der Logik. Mit einer Darstellung äquivalenter Axiome aristotelischer Syllogistik, spätmohistischer Logik und buddhistischer Begründungstheorie". In: *Horin* 1. München pp. 57–86, 1994.

Paul, G. (1998): "Einheit der Logik und Einheit des Menschenbildes. Reflexionen über das Tertium non datur". In: *Ethos des Interkulturellen.* Baruzzi, A. (Ed.) – Takeichi, A. Würzburg pp. 15–29, 1998.

Paul, G.(1999): "Neuere Literatur zur (buddhistischen) Begründungstheorie". In: *Hōrin* 6, pp. 249–259, 1999.

Paul, G. (2000): "Der Kulturstreit um die Universalität Aristotelischer Logik". In: Öffenberger, N. – Skarica, M. (Eds.): *Beiträge zum Satz vom Widerspruch und zur Aristotelischen Prädikationstheorie.* Hildesheim pp. 117–136, 2000.

Paul, G. (2001): "Logic in Japanese philosophy, post-Meiji". In: *Routledge Encylopedia of Asian Philosophy.* Leaman, O. (Ed.). London – New York pp. 326–328, 2001.

Paul, G. (2003): "Sprachliche und logische Form". In: *Urteil, Erkenntnis, Kultur.* Lenk, H. – Skarica, M. et al. (Eds.). Münster pp. 35–46, 2003.

Paul, G. (2004a): "Logic and Culture". In: *Three Mountains and Seven Rivers.* Hino, Shoun – Wada, Toshihiro (Eds.). Delhi pp. 463–485, 2004.

Paul, G. (2004b): "Zur Rolle der Logik in buddhistischen Texten. Unter besonderer Berücksichtigung des Zhonglun". In: *Sünden des Worts: Festschrift für Roland Schneider zum 65. Geburtstag.* Arokay, J. – Vollmer, K. (Eds.). Hamburg pp. 425–448, 2004.

Paul, G. (2005): "Logic in Buddhist texts. With particular reference to the Zhonglun". In: *Hōrin* 11/2005, pp. 39–56, 2005.

Paul, G. (2008a): *Einführung in die Interkulturelle Philosophie.* Darmstadt 2008.

Paul, G. (2008b): "Xuanzang (600?-664) – Gläubiger und Logiker". In: *Mitteilungsblatt [der Deutschen China-Gesellschaft]* 1/2008. Bochum pp. 84–94, 2008.

Ruben, W. (1955): *Beginn der Philosophie in Indien.* Berlin (DDR) 1955.

Savage-Rumbaugh, S. (1986): *Ape Language.* New York 1986.

Savage-Rumbaugh, S. – Lewontin, R. (1994): *Kanzi.* New York 1994.

Savage-Rumbaugh, S. – Shanker, St. G. – Taylor, T. (1998): *Apes, Language and the Human Mind.* Oxford – New York 1998.

Schwarz, E. (1985): *Konfuzius: Gespräche des Meisters Kung [Lunyu].* München 1985.

T = *Taishō-shinshū-daizōkyō,* "Taishō-Tripitaka", ed. Takakusu Junjirō et al., Taishō-issai-kyō-kankō-kai, 100 vols. [Tōkyō] 1924-34 (new edition by Taishō-shinshū-daizōkyō-kankō-kai (ed.), Daizō-shuppan, [Tōkyō] 1960-79).

Tachikawa Musashi (1971): "A Sixth-Century Manual of Indian Logic (A Translation of the Nyāyapraveśa)". Sanskrit and English. In: *Journal of Indian Philosophy,* vol. 1, 1971.

Tucci, G. (1929): *Pre-Dignāga Buddhist Texts on Logic from Chinese Sources* (trans. and comm.). Baroda 1929.

Tucci, G. (1929): "The Nyāyamukha" (trans. and comm.). In: *Jahrbuch des Instituts für Buddhismuskunde,* Bd. I. Heidelberg pp. 1 – 72, 1930.

Waal, F. de (2006): *Primates and Philosophers.* Princeton NJ 2006.

Walleser, M. (trans.) (1912): *Die Mittlere Lehre des Nāgārjuna. Nach der chinesischen Version [Zhonglun] (des Kumārajīva) übertragen.* Heidelberg 1912.

Wei Tat, [Xuan Zang's] *Ch'eng Wei-Shih Lun [Cheng wei shi lun]: The Doctrine of Mere-Consciousness.* Chin. and English. Hong Kong 1973.

Wolff, Ch. (1978): *[Deutsche Logik:] Vernünftige Gedanken von den Kräften des menschlichen Verstandes und ihrem richtigen Gebrauche in Erkenntnis der Wahrheit.* Arndt, H. W. (Ed.) Hildesheim – New York 1978.

Zhonglun. See Walleser.