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Some Reflections on R. S. Y. Chi's *Buddhist Formal Logic*

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It has been almost twenty years since Richard Chi published his *Buddhist Formal Logic*,[1] a work which attempted virtually everything at once: it was filled with various interpretations of the history of Buddhist thought, particularly that of Dignāga as found in the short synopsis of valid and fallacious reasons known as the *Hetucakra*; at the same time it sought to present a philosophical analysis and evaluation of Dignāga's thought by abundantly using the techniques of Anglo-American analytic philosophy and formal logic. The book, in spite of its forbidding appearance, is certainly worth the necessary effort on the part of an open-minded reader; no doubt it has its share of questionable interpretations, as we shall see below, but Chi's approach and his portrayal of Dignāga's thought are still of relevance for the growing number of philosophers who recognize the importance and interest of understanding non-western systems of logic and epistemology.

Two recent events make it fitting to once again examine Chi's contribution: one is the sad news of Prof. Chi's death, and the other is the fortunate fact that his book has been reprinted in India by Motilal Banarsidass. Given that the book was written many years ago, it is, of course, inevitable that the perspective of a present-day writer on these issues will exhibit important differences from that of Chi. Nevertheless, I think that it is of interest to take stock of some of the positive and negative sides of Chi's book and, in so doing, address some aspects of the problem as to how one might approach the subject of "Buddhist formal logic."

It should be clear by now that formal logic *can* be profitably

used in elucidating the thought of early logicians, be they Western or Asian; we have a number of examples of this now and Chi has the merit of being one of the pioneers in using this approach in Buddhist logic. The obvious pitfall, however, is basing enormous formal superstructures on very incomplete or shaky understandings of the Buddhist texts: if one does not have a really clear picture of the philosphical notions which one is seeking to translate, or if those notions themselves are fuzzy, the result of using formal techniques will be, to say the least, unilluminating.

I. The Trairūpya

A good example of a rather fruitless, premature use of logic is Chi's treatment of Dignāga's theory of the triply characterized reason (*trairūpya*). (Here, let me refer to two articles published by S. Katsura: "On *Trairūpya* Formulae" and "Dignāga on *Trairūpya*."[2]) On pp. 40 et seqq. we find Chi's section 126, "Interpretation of the *Trairūpya*," where the author bases his opinion on what Dignāga's theory was all about on a passage from Hsüan-tsang's Chinese translation of the *Nyāyapraveśa* (NP), a work which was itself most likely written by Śaṅkarasvāmin. Aside from the obvious incongruity of grounding an interpretation of the fine details of Dignāga's thought on a text which is not actually by him, and is at any rate far and away less important than the *Pramāṇasamuccaya*, Chi bases his whole understanding on the Chinese translation of NP, when in fact we have the Sanskrit original and the Tibetan. Here is what Chi says on p. 41:

> The above way of interpretation is not merely my personal speculation. The Chinese translation, although usually very poor, is accurate enough in the rendering of the *Trairūpya*. The word *pien*[a] which means "pervade" or "pervasive" is used in the first and the third clauses; while the word *ting*[b] which means "necessary" is used in the second clause. According to the Chinese rendering, the *Trairūpya* [as found in Hsüan-tsang's trans. of NP] should be translated as follows:
>
> The pervasive presence of the *hetu* in the subject;
> The necessary presence of the *hetu* in some similar instances;
> The pervasive absence of the *hetu* from dissimilar instances.

Now let me reproduce the Chinese, Sanskrit and Tibetan texts of the NP passage in question and confront Chi's rendition with some of Katsura's results concerning "only" (*eva*) in the NP:

Chinese: 因 有 三 相. 何 等 為 三. 謂 遍 是 宗
法 性, 同 品 定 有 性, 異 品 遍 無. 性

Sanskrit: *hetus trirūpaḥ / kiṃ punas trairūpyam / pakṣadharmatvaṃ sapakṣe sattvaṃ vipakṣe cāsattvam iti/*[3]

Tibetan: *gtan tshigs ni tshul gsum mo // tshul gsum po de yang gang zhe na / phyogs kyi chos nyid dang / mthun pa'i phyogs* nyid *la yod par nges pa dang / mi thun pa'i phyogs la med pa* nyid *du nges pa yang ngo //* (Peking *bstan 'gyur* ce 180b5-6).

The first thing to be noticed, following Katsura, is that the Sanskrit does not have "only" (*eva*), whereas the Tibetan, in the second and third clauses, has *nyid*, which here has the sense of *eva* rather than the abstract *tva* or *tā*. As for the Chinese, *pien*[c] and *ting*[d] do not correspond to anything in the Sanskrit, but are rather Hsüan-tsang's additions, just as *nyid* was added by the Tibetan translator. Now, Chi understood *ting* in a rather normal Chinese way[4] as meaning "necessary." He explains on p. 42 that *ting you hsing*[e] means:

> "assured presence," "not failing to be present" or "bare presence" and includes two possible cases, namely: the pervasive presence and the partial presence (*sapakṣavyāpaka* and *sapakṣaikadeśavṛtti*).

There is, however, every reason to believe that *here* the character *ting* is being used, perhaps infelicitously, to convey the sense of "only" (*eva = nyid*): in other words Hsüan-tsang also made the same "addition" which the Tibetan translator made. The point then is not (as Chi would have it) that the second clause simply asserts that *some*, but not all, instances of the reason are in the set of similar instances. Rather, the clause asserts that *all* instances of the reason are in that set.[5] This equivalence, *ting = eva*, while fairly rare, is attested in A. Hirakawa's *Index to the Abhidharmakośabhāṣya*, but more significantly, we find that both *pien* and *ting* are used to render *eva* in other *trairūpya* formulae in Hsüan-tsang's translation of NP, formulae where *eva* actually does occur in the Sanskrit.[6]

No doubt, if we want to translate the NP passages strictly on the basis of what the Chinese says, the result will be ambigu-

ous. But if we bear in mind that *ting* and *pien* are being used to render *eva*, then the meaning of the passage will be that the *hetu* is only present in the subject, it is present in only the similar instances and it is only absent (i.e., entirely absent) in the dissimilar instances. If this does not look different from Dharmakīrti's formulation in the *Nyāyabindu*, so be it: it seems that both Hsüan-tsang and the Tibetan translator of NP may very well have had a Dharmakīrti-style formulation of the *trairūpya* with *eva* in mind when they made their "additions." Anyway, leaving aside NP, we now have fairly good evidence that Dignāga in the *Pramāṇasamuccayavṛtti* did use *eva* in the second characteristic, viz., the *anvayavyāpti*, when commenting on *tattulye sadbhāvo*, and moreover, that he may have accepted the equivalence of the second and third (i.e., the *vyatirekavyāpti*) characteristics.[7]

Chi seems to have based his stance largely on an article of K. Potter, "Dignāga and the development of Indian logic", which he reproduced in his book and which distinguished three phases of the development of the *trairūpya*. Given the results which we have now, I doubt that these phases can be accepted as Potter described them. So, in sum, I will not present the superstructure of formulae (see pp. 42–43) which Chi based on his or Potter's interpretation, for I think it is sufficient to say that the Buddhological problem of what Dignāga, or even Hsüan-tsang, held with regard to *eva* was a much more thorny one than Chi or Potter made it out to be, and until that problem is clearer in our minds, much of Chi's formal treatment of the *trairūpya* and his philosophical comparisons with John Stuart Mill are really beside the point.

II. Is the Hetucakra extensional?

On p. xix Chi writes:

> The *Hetucakra* was intended to be an extensional study of various kinds of major premises about whether they can yield valid syllogisms.

By "extensionality of logical formulae" we mean that any two equivalent formulae may, in contexts in a given theory, be

replaced by one another. Thus, for example, if the sentences P and Q are equivalent, then it can be shown that, in formulae composed only of sentential connectives and quantifiers, Q can be substituted for P in any given sentence and the truth-value of that sentence will remain unchanged. If, however, we have a theory which uses epistemic statements such as "X knows that . . ." or modal statements such as "Necessarily. . . ," then there will be many statements which are not extensional, but rather, "intensional." The sentence

$$(P \equiv Q) \longrightarrow (X \text{ knows that } P \equiv X \text{ knows that } Q)[8]$$

is false, and thus sentences containing "X know that. . ." are said to be "intensional" rather than "extensional."[9]

Now, one of the key problems in deciding to what degree the *Hetucakra* is extensional is how to interpret the *asādhāraṇānaikāntikahetu*, viz., "the reason which is uncertain because it is [too] exclusive," where, according to Dignāga, the reason is supposed to be absent from both the similar instances (*sapakṣa*) and the dissimilar instances (*vipakṣa*).[10] The usual interpretation, which Chi also presents and which I have elsewhere termed "the orthodox scenario," is that a reason such as "audibility" (*śrāvaṇatva*), which is co-extensive with the *dharmin*, "sound," is *literally* excluded from both the *sapakṣa* and the *vipakṣa*. The *sapakṣa* here would be all things which are impermanent, *except for the dharmin, sound*. So, audibility cannot occur in the set of *sapakṣa* for proving sound's impermanence, for such a *sapakṣa* simply does not exist: it would have had to be something which was audible and was *not* a sound.[11] And *a fortiori*, "audibility" does not occur in the dissimilar instances (*vipakṣa*) either, for there is nothing which is audible and which is also permanent.[12]

This version of the *asādhāraṇahetu* is not silly or wrong, but it is worth our while to see that it is not the only version: far from it. Indeed, I have argued that there was a controversy in Tibetan Buddhism over this question, with the Sa skya pas maintaining something like the orthodox scenario, while the dGe lugs pa maintained a different position, basing themselves on definitions of *sapakṣa* and *vipakṣa* such as those found in Ratnā-karaśānti's *Antarvyāptisamarthana*. But it is, of course, not particu-

larly persuasive to just cite later logicians in order to answer the question as to what Dignāga thought; what is much more convincing is that Dharmakīrti, in *Pramāṇavārttika* IV's long discussion of the *asādhāraṇahetu*, does *not* support the orthodox scenario, but rather comes up with a version (similar to the dGe lugs) which would interpret this fallacy as being essentially a problem of an epistemic and intensional logic in that it involves contexts such as "X knows that. . .". I leave it up to the reader to judge whether Dharmakīrti was an accurate exponent of Dignāga's thought on this matter.[13]

Kārikās 207–259 of the *parārthānumāna* chapter of *Pramāṇavārttika* form part of a larger section loosely treating of Dignāga's *Hetucakra*, and specifically concern the refutation of the Naiyāyika's argument that living bodies have selves (*ātman*) because they have breath and other animal functions (*prāṇādi*).[14] Although Dharmakīrti does not discuss the sound-(im)permanent-audibility example very much, he does explicitly state in *kārikā* 218 that the *asādhāraṇānaikāntikahetu*, "breath, etc.," is completely similar logically to the example found in the *Hetucakra*.[15] Here are some of the key verses along with extracts from commentaries.

Context: In k. 205 and 206, Dharmakīrti has been putting forth the recurrent theme that the certainty of the reason's being excluded from the dissimilar instances depends upon there being a necessary connection (*avinābhāva*) between it and the property to be proven. Such a connection will guarantee the pervasion (*vyāpti*), i.e., the concomitances in similarity (*anvaya*) and in difference (*vyatireka*). Thus, given such a connection, the reason would be excluded from the dissimilar instances, but in the case of the *asādhāraṇahetu*, such a connection cannot be established; hence there is no such exclusion.

> Devendrabuddhi's introduction to k. 207: [Objection:] If in this way the Master [Dignāga] did not exclude (*ldog pa ma yin na*) the special case [i.e., the *asādhāraṇahetu*] [from the dissimilar instances], then why is it said that it is excluded from the similar and dissimilar instances?[16]
>
> k. 207: [Reply:] It is just from the point of view of merely not observing [the reason among the dissimilar instances] that he spoke of it being excluded. Therefore [i.e., since the *vyatireka* is uncertain when it is due to merely not observing the reason],

[the Master said that the reason] is uncertain. Otherwise [if there were the certainty that it is excluded from the dissimilar intances], [the reason] would be demonstrative (*gamaka*).[17]

k. 220: By saying that [the *sādhana*] is excluded just from the contrary of what is to be proven [viz., the dissimilar instances], it is asserted [by implication] that it is present in what is to be proven [viz., in the similar instances]. Therefore, it was said that by means of one [viz., the *vyatireka* or the *anvaya*], both will be demonstrated by implication.[18]

The point of k. 207, then, is that Dharmakīrti wants to interpret "absence in the *vipakṣa*" metaphorically: it does not mean that breath, etc., are in fact completely absent from what does not have a self, but rather that the debaters do not observe that breath, etc., occurs in things which have no self. But, although the debater might not see something, that does not necessarily mean that it is not there. In that sense, the debater does not ascertain absence, for indeed, as k. 220 makes clear, if breath, etc., were really absent in the dissimilar instances, then the *vyatirekavyāpti* would hold; hence, the *anvaya* would hold too, and the reason would be valid!

So in brief, "exclusion" or "absence" is to be interpreted metaphorically as meaning "non-observation." And precisely because non-observation is not probative, the essential point of the *asādhāraṇahetu*, according to Dharmakīrti's interpretation of Dignāga, is that the debaters do not know or ascertain *vyāpti*, be it the reason's absence in *vipakṣa* or its presence in *sapakṣa*.

Finally, consider the following important passage from Dharmakīrti's *Svavṛtti* to *Pramāṇavārttika* I (*Svārthānumāna*) k. 28, along with Karṇakagomin's *Ṭīkā*.[19] (I have underlined the *Svavṛtti* passages):

kathaṃ tarhy asādhāraṇatvāc chrāvaṇatvaṃ nityānityayor nāstīty ucyata ity āha / kevalaṃ tu ityādi / nityānityeṣu śrāvaṇatvasya bhāvaniścayābhāvāt / śrāvaṇatvaṃ nityānityayor nāstīty ucyate /. Now then, how is it that audibility is said to be absent in both permanent and impermanent [things] because it is an exclusive [attribute]? [Dharmakīrti] answers: But it is just. . . etc. [It is just] because audibility is not ascertained as being in either permanent or impermanent [things] that audibility is said to be absent from what is permanent or impermanent.

Our conclusion must be that, at least following Dharmakīrti, the *Hetucakra* cannot be treated extensionally, but will involve epistemic, intensional statements.[20] •

III. Quantification and semantics

A number of years ago the Dutch logician, E.W. Beth, sketched out a set of questions which a study of a non-Western logic should approach if it is to be of use to a modern philosopher of logic.[21] Some of his more general questions (e.g., "Does the language of the culture in question give suitable means of expression for formal logical reasoning?") have, I think, been more or less satisfactorily answered by now with regard to Buddhist logic, but others, in particular those which concern the basic structures of Buddhist logic, such as quantification, negation, implication, intensionality/extensionality and semantic theory, are still to a surprising degree unresolved. Whenever one attempts to explain such structures, one would do well to bear in mind Beth's caution that "one should be prepared for the possibility that the treatment of formal logical problems is combined or mingled with considerations of another, for example, epistemological, psychological or grammatical nature."[22]

Now let us, by way of an example, look at quantification in Buddhist logic. It seems to me that one of the recurring problems in using formal logic to handle pervasion (*vyāpti*) and such notions is that we often disregard the peculiar semantic theories of the Buddhists, and then we simply go ahead and use first order predicate calculus (with some modifications here and there) plus a semantics which is more or less as we might find it in an elementary logic textbook. Of course, there can be a certain utility in deliberately over-simplifying things. But I would argue that a satisfactory theory of basic formal structures in Buddhist logic must take into account Buddhist metaphysics and especially the semantic theory of *anyāpoha* ("exclusion of what is other").

Let us first look at what Chi did with quantification. We find an account of Dignāga's three "operators," pervasive presence (*vyāpaka*), absence (*avṛtti*) and partial presence (*ekadeśavṛtti*), where Chi uses standard first order predicate cal-

culus quantifiers (Ex) Fx (Read: "There is an x, such that x has F) and (x) Fx (Read: "For all x, x has F). He then argues (cf. pp. xxiv and xxv) that Dignāga's version of pervasion between F and G was:$\neg$(Ex) (Fx &$\neg$Gx) plus the additional premiss (Ex) (Fx & Gx). I presume that what Chi means by saying that pervasion is "a conjunction of two distinct premisses," is that the example constitutes a premiss, viz., that there are instances of F and G. At any rate, if these quantifiers are taken normally (as in an elementary logic textbook), they should range over a domain composed only of actually existent things. And that leads to difficulties in the case of Buddhist logic: (a) pervasion (and hence quantification) is not restricted to existent things, but also concerns inexistent but possible items, such as the rabbit's horn,[23] and even inconsistent, impossible items, such as the barren woman's son; (b) even in the *Hetucakra* itself, we find examples, such as space (*ākāśa*), which from the point of view of Buddhist metaphysics do not really exist.[24]

A fairly good solution to the conundrum is that of A. Mac-Dermott, who uses R. Routley's R*.[25] We can introduce a universal quantifier, (πx) P, ranging over all possible items, be they existent or inexistent. We can then define another quantifier as follows:

$$(\Sigma x)\ P\ =\neg(\pi x)\neg P\ Df.$$

Thus "(πx) Fx" should be read as "For all possible items, x, x has F". Read "(Σx)" as "for some x," i.e., as a quantifier which does not imply that the value of the variable exists. Pervasion then would become:

$$(\pi x)\ (Fx \longrightarrow Gx)\ \&\ (\Sigma x)\ (Fx\ \&\ Gx),\ \text{i.e.,}$$
$$\neg(\Sigma x)\ (Fx\ \&\ \neg Gx)\ \&\ (\Sigma x)\ (Fx\ \&\ Gx).$$

(The second conjunct would show the premiss that F and G must not be uninstantiated.)

This approach does, however, have the distinct disadvantage that it cannot easily handle inconsistent items, a point which seems to have given MacDermott herself some qualms.[26] The problem is symptomatic of the fact that the semantics which she used bears little resemblance to the Buddhists' own semantics

as developed in the theory of *apoha*. (In fact, even Routley himself had some misgivings about the domain of an interpretation of R* being composed in part of inexistent items, and he showed a preference for a substitutional interpretation, where the domain would consist of names.) I would suggest another approach to quantification in Buddhist logic, an approach which, in spite of its prima facie strangeness, has the merit of staying close to the Buddhist's own semantic theories.

We know that for Dignāga and Dharmakīrti words do not directly refer to particulars (*svalakṣaṇa*); instead, what is spoken about is always a mentally created fiction, a *sāmānyalakṣaṇa* or universal characteristic, which consists in the exclusion of all that is other than the intended object. This fiction has a type of mind-dependent existence (we could say "subsistence"), or in Buddhist terminology, it is said to be "conventionally existent" (*saṃvṛtisat*); it is, however, only indirectly connected with what is ultimately real, i.e., *svalakṣaṇa*; in sum, it is a type of proxy over which our thoughts and words range. The details of this connection between proxies and *svalakṣaṇa* is beyond the scope of this paper, but suffice to say that the proxy, largely because one confuses it with the *svalakṣaṇa* leads us to understand and act on various *svalakṣaṇa* in the world. (Dharmakīrti, in *Pramāṇavārttika* III, k. 57, illustrates the process by an example of a person who mistakes the light emitted by a jewel through a keyhole for the jewel itself; such a person will nonetheless know where the jewel is, and will eventually obtain it.) Equally, there can be "proxies," such as that of the rabbit's horn or that of the barren woman's son, which have no corresponding *svalakṣaṇa*. The upshot is that the Buddhist adopts what B.K. Matilal has termed a "pan-fictional" approach:

> The Buddhist, in fact, would like to put all the objects over which our thoughts and other psychological activities may range at the same level; and this will include not only (a) things which do exist now (i.e., which are assumed to be existent by the common people or by the realist) but also (b) things which do not exist now (i.e., past and future things), (c) things which cannot exist (viz., the rabbit's horn) and also (d) things of which it would be a logical contradiction to say that they exist (viz., the son of a barren woman).[27]

To return to the problem of quantifiers and their interpretation, the essential idea is to let them range over a domain composed entirely of proxies, i.e., *sāmānyalakṣaṇa*. We could use the quantifiers (πx) and (Σx) and let them range over domains of proxies, which all exist at least conventionally. While the barren woman's son is contradictory, his *sāmānyalakṣaṇa* proxy is not, and gives us no special problems. We also introduce a function which assigns *svalakṣaṇa* to some of these proxies. This function will often assign the same *svalakṣaṇa* to several different *sāmānyalakṣaṇa* proxies; the *sāmānyalakṣaṇa* denoted by the words "impermanence" and "producthood" (*kṛtakatva*), for example, are connected with the same *svalakṣaṇa*.

An interpretation *I* will consist of the ordered quadruple [*D*, *D'*, *f*, *g*], where *D* is a non-empty set of *sāmānyalakṣaṇa*, *D'* is a possibly empty set of *svalakṣaṇa*, *f* is a function assigning elements of *D* to individual variables and constants, and sets of *n*-tuples in *D* to *n*-ary predicates. *g* is a function assigning *svalakṣaṇa* in *D'* to proxies in *D*. Truth and satisfaction could proceed more or less normally, except that in the case of an atomic formula such as *Fa* (interpreted as "*a* is impermanent"), the formula would be true when the proxy, *a*, which is not itself impermanent, is conventionally or commonly *thought* to be impermanent. (In the case of the barren woman's son we should probably have to say that his proxy is not even conventionally thought to be a son.) I do not wish to pretend that this is philosophically wholly satisfying as a theory of truth—at any rate it would need an accompanying account of what conventional truth is for Buddhist logicians.[28] Suffice to say that this line of approach to quantification and its semantics in Buddhist logic is also faithful with regard to the philosophical stance of Dignāga and Dharmakīrti's thought.

IV. Final Remarks

It seems to me obvious that we cannot reasonably attempt a philosophical analysis of Buddhist logic as extensive and technical as that of Chi's study on the *Hetucakra* until we are much more familiar with the main Indian and Tibetan texts and have a clearer idea of the doctrines about which we wish to

philosophize. Now, Chi acknowledged that his work was just a beginning—that should be stressed. However, the next time someone tackles the *Hetucakra* we especially need to have a clearer understanding of the *Pramāṇaviniścaya* and the *Pramāṇavārttika*, both of which have important sections on this subject. The indigenous Tibetan *rtags rigs* texts, which often have a section on the *Hetucakra* and provide useful definitions of the various sorts of valid and fallacious reasons, are also of value here. Finally, there are many other Tibetan works, such as dGe 'dun grub pa's *Tshad ma rigs pa'i rgyan* and rGyal tshab's *rNam 'grel thar lam gsal byed* and Ngag dbang bstan dar's commentary on the *Hetucakra*, which have long and valuable sections on the problems at stake and merit serious study.

NOTES

1. R.S.Y. Chi, *Buddhist Formal Logic, Part I, A study of Dignāga's Hetucakra and K'uei-chi's Great Commentary on the Nyāyapraveśa*. Dr. B.C. Law Trust Fund, Volume I, first published by the Royal Asiatic Society of Great Britian, 1969. Reprinted by Motilal Banarsidass, Delhi, 1984. There are no differences between the two printings, except that the errata indicated in the first edition have been corrected in the reprint. Let me specify that in what follows, I have, for typographical reasons, changed Chi's symbolic notation in certain places. Specifically, conjunction will be represented by "&" (read:. . .and. . .), disjunction by "v" (read:. . .or. . .), material implication by " ——➤ " (read: if. . .then), negation by "¬" (read:. . .not. . .) and equivalence by "≡" (read:. . .if and only if. . .).

2. "On *Trairūpya* Formulae," in *Buddhism and Its Relation to Other Religions: Essays in Honour of Dr. Shozen Kumoi on His Seventieth Birthday*, Kyoto, 1986, pp. 161–172. "Dignāga on *Trairūpya*," *Journal of Indian and Buddhist Studies (Indogaku Bukkyōgaku Kenkyū)*, XXXII, 1, December, 1983, pp. 544–538.

3. See p. 1 of *The Nyāyapraveśa, Sanskrit Text with Commentaries*, ed. A.B. Dhruva, Gaekwad's Oriental Series 38, Baroda, 1968.

4. Cf. modern Chinese *yi ting*[f].

5. For the use of *eva* / "only" at stake in the *trairūpya* see Y. Kajiyama, "Three kinds of affirmation and two kinds of negation in Buddhist philosophy," *Wiener Zeitschrift für die Kunde Südasiens* 17, 1973, pp. 161–175. See also the corrections of B.S. Gillon and R.P. Hayes, "The role of the particle *eva* in (logical) quantification in Sanskrit," WZKS 26, 1982, pp. 195–203.

6. See Katsura (1986) op. cit. p. 162. To take one of Katsura's examples, NP, p. 1, 13–14: *tatra kṛtakatvaṃ prayatnāntarīyakatvaṃ vā pakṣadharmaḥ sapakṣa*

evāsti *vipakṣe nāsty* eva /. Taishō p. 11b:

此 中 所 作 性 或 勤 勇 無 間 所 發
性 遍 是 宗 法 性，同 品 定 有 性，異
品 遍 無 性.

7. See Katsura (1983) op. cit.

8. For an explanation of the symbols used, see n. 1.

9. See A. Grzegorczyk, *An Outline of Mathematical Logic.* (Dordrecht: D. Reidel Publishing Co., 1974) pp. 222–224. I have discussed the role of these intensional epistemic statements in Indian and Tibetan Buddhist logic in my "Identity and referential opacity in Tibetan Buddhist *apoha* theory," in B.K. Matilal and R.D. Evans (eds.) *Buddhist Logic and Epistemology.* (Dordrecht: D. Reidel, 1986), pp. 207–277.

10. In another article I have argued against taking Buddhist inferences-for-oneself (*svārthānumāna*) and inferences-for-others (*parāthānumāna*) as being some sort of syllogism; I will not go into the details here. See my article "Sur le *parārthānumāna* en logique bouddhique," *Asiatische Studien / Études Asiatiques* 38, 2, 1984, pp. 73–99.

11. See my paper, "On *sapakṣa*," forthcoming in *Acta Orientalia Hungarica*, Proceedings of the Csoma de Körös Symposium held in Visegrád in Sept. 1984. On p. 363 of his article, "On the theory of intrinsic determination of universal concomitance in Buddhist Logic," *Journal of Indian and Buddhist Studies*, 7, 1, pp. 364–360, Y. Kajiyama gives the "orthodox scenario":

> If the reason belongs exclusively to the minor term, as in the case of audibility which is supposed to prove momentariness of sound (minor term), no homologous cases [i.e. *sapakṣa*] which are audible and momentary are available.

12. In fact, the *Hetucakra* discusses the reason "audibility" in the context of proving that sound is permanent. We frequently find both sorts of proof, viz., of sound's impermanence or sound's permanence. See Kajiyama op. cit. p. 363, and T. Stcherbatsky, *Buddhist Logic.* Leningrad 1930, vol 2, p. 208, n. 1. Indeed, logically the problem is the same. If we are proving that sound is permanent, then there will be no *vipakṣa*, i.e., impermanent things other than sound, which will also be audible. Note that Chi (p. 17) defines *vipakṣa* as ẑ (hz), i.e., the set of all things which do not have the property to be proven. If he wants to make his account of the *asādhāraṇahetu* work, he would have to specify *vipakṣa* as ẑ (fz & hz), i.e., the set of things which are not the *pakṣa*, and which do not have the property to be proven. Cf. n. 33 on p. 135 of M. Tachikawa, "A Sixth-century manual of Indian logic," *Journal of Indian Philosophy* 1, 1971, pp. 111–145: "Both the *sapakṣa* and the *vipakṣa* must be different from the *pakṣa*. Therefore the mark is present neither in the *sapakṣa* nor in the *vipakṣa*." If we kept Chi's definition, ẑ (¬hz), then we would be forced to say that "audibility" *does* occur amongst the things, like sound, which are not permanent, and hence that it does occur in the *vipakṣa* when one is proving that sound is permanent!

13. The question turns largely, I would think, on Dharmakīrti's "addition" of the word *nges pa* = *niścita* ("ascertained") in his rendition (cf. *Pramāṇaviniścaya* II) of Dignāga's formulation of the *trairūpya* in *Pramāṇasamuccaya*'s *Svārthānumāna* chapter. This is taken up in E. Steinkellner's "Remarks on *niścitagrahaṇa*," forthcoming in *Festschrift for G. Tucci*. This term is not explicitly present in Dignāga's formulation but the sense, judging from other passages of *Pramāṇasamuccaya*, seems to warrant its addition. Surprisingly enough, when Chi (cf. p. 30) cites the *Nyāyabindu*'s version of the *trairūpya*, he omits this word, which makes for a big change: I think it is fair to say that *niścita* / *niścaya* makes an extensional treatment of the *trairūpya* incomplete and distorting.

14. Cf. *Vaiśeṣikasūtra* 3.2.4 Uddyotakara maintained that the reasoning was one where only the contraposition held (*kevalavyatirekin*).

15. *śrāvaṇatvena tat tulyaṃ prāṇādi vyabhicārataḥ.*

16. *Pramāṇavārttikapañjikā*, (sDe dge edition, reproduced in *sDe dge Tibetan Tripiṭaka, bsTan 'gyur Tshad ma*, Tokyo, 1981ff.), 310a3: *gal te 'di ltar slob dpon gyis khyad par ldog pa ma yin na / ji ltar mthun pa'i phyogs dang mi mthun pa'i phyogs las de ldog pa yin no zhes bshad ce na /.*

17. *adṛṣṭimātram ādāya kevalaṃ vyatirekitā /*
    uktā 'naikāntikas tasmād anyathā gamako bhavet //.

My additions in *pāda* c and d have been made on the basis of Manorathanandin's *Pramāṇavārttikavṛtti* (ed. R. Sāṅkṛtyāyana, Patna 1938–40): *tasyādarśanamātreṇa vyatirekāniścayād anaikāntika ācāryeṇoktaḥ / anyathā vipakṣād vyatirekāniścaye gamako hetur bhavet /.* Note, however, that with regard to *pāda* a and b, this latter commentator strangely glosses *sapakṣād vyatirekitoktā*, whereas following Devendrabuddhi's line of thought, as well as the general thread of the argumentation, *vipakṣād vyatirekitoktā* would seem more logical. I have essentially followed Devendrabuddhi here. Cf. *Pañjikā* 310a4: *gang gi phyir mi mthun pa'i phyogs la de mthong ba med pa tsam gyis ldog pa yin la / de'i phyir na ma nges pa yin no //.*

18. *asādhyād eva viccheda iti sādhye 'stitocyate /*
    arthāpattyā 'tā evoktam ekena dvayadarśanam /

For additions, see Manorathanandin ad. k. 220.

19. P. 84 in ed. R. Sāṅkṛtyāyana, reprinted in Kyoto: Rinsen Books, 1982.

20. A few remarks on the subject of *sapakṣa*. Chi, and indeed most other modern writers on Buddhist logic, have defined *sapakṣa* as those items, *with the exception of the dharmin*, which have the property to be proved. It is important to stress that this view on *sapakṣa* would involve serious problems of a formal nature: in particular, the equivalence between *anvaya* and *vyatireka* does not hold. Chi seems to have recognized this fact (cf. p. xxxvii). Specifically, he argued that a formula such as (x) (fx ⟶ gx) & (x) ((¬fx & gx) ⟶ hx) ⟶ (x) (fx ⟶ hx) is "completely wrong", but he then used this as an argument to scrap any equivalence between the *anvaya* and *vyatireka* and to try to show that Dignāga perhaps had some sort of way out of John Stuart Mill's charge that the syllogism committed a *petitio principii*. This last bit is, to say the least, rather far-fetched.

Now, given our previous discussion concerning Dignāga's *trairūpya*, we

may have to recognize that *anvaya* and *vyatireka* were taken to be equivalent already at the time of Dignāga. However, whether that is so or not, it is definitely clear that Dharmakīrti held them to be equivalent. But then an absurdity arises: if we must exclude the *dharmin* from *sapakṣa*, Dharmakīrti would have been making a gross logical blunder in claiming this equivalence. Note that J.F. Staal, in an article, "Contraposition in Indian Logic" (in E. Nagel, P. Suppes and A. Tarski ed., *Logic, Methodology and Philosophy of Science*. Stanford, 1962), obscured things by claiming that in Dharmakīrti's version of the *trairūpya* in the *Nyāyabindu*, the *anvayavyāpti* and the *vyatirekavyāpti* are in fact equivalent, i.e., the latter is the contraposition of the former. Staal used T. Hailperin's restricted variables (see "A Theory of Restricted Quantification I & II," *Journal of Symbolic Logic*, 22, 1. 1957: pp. 19–35 and 22, 2, 1957: pp. 113–129) where the expression $\alpha x\ F(x)$ denotes any of the values of x such that x has F. He also introduced a relation $A(y,x)$ meaning that y occurs in a locus x, h means the *hetu*, p means the *pakṣa* and s means the *sādhya*. He then defined *sapakṣa* and *vipakṣa* as:

(1) $\alpha x\ (\neg(x = p)\ \&\ A(s,x))$ and

(2) $\alpha x \neg A(s,x)$

respectively. The result is that the *anvaya* condition becomes:

(3) $(x)\ (A(h,x) \longrightarrow (x = sapakṣa))'$ i.e.,

(4) $(y)\ (A(h,y) \longrightarrow (y = \alpha x\ (\neg(x = p)\ \&\ A(s'x))))$, i.e.,

(5) $(y)\ (A(h,y) \longrightarrow (\neg(y = p)\ \&\ A(s,y)))$.

Vyatireka becomes:

(6) $(\alpha x \neg A(s,x)) \neg A(h, \alpha x \neg A(s,x))$, i.e.,

(7) $(x)\ (\neg A(s,x) \longrightarrow \neg A(h,x))$

However, contrary to what Staal maintains, (6) is not the contraposition of (4): (4) and (6) are *not* equivalent. The formula,

(8) $(y)\ (A(h,y) \longrightarrow (y = \alpha x\ (\neg(x = p)\ \&\ A(s,x)))) \equiv (\alpha x \neg A(s,x)) \neg A(h, \alpha x \neg A(s,x))$ is false. This becomes clear when we eliminate the restricted variables as in (5) and (7).

(9) $(y)\ (A(h,y) \longrightarrow (\neg(y = p)\ \&\ A(s,y))) \equiv (x)\ (\neg A(s,x) \longrightarrow \neg A(h,x))$ is clearly false. The problem arises precisely because of the presence of the formula "$\neg(y = p)$."

What is perhaps worse, following this interpretation of *sapakṣa* in Dharmakīrti's *trairūpya*, the *anvayavyāpti* would in most cases be a false statement. Intuitively speaking, the *anvaya* would state that everything which has the *hetu*-property is a member of the set of things which have the *sādhya* and are not the *dharmin*. That's usually false: the *dharmin* can certainly have the *hetu*-property. So leaving aside Dignāga, we would have to say that the logicians who followed him continually made howlers of the most abysmal sort—and surely here we are violating the fundamental hermeneutical principle that one should always seek an interpretation which presupposes that the author was intelligent and had a consistent position in mind. Now, I would readily grant that the term *sapakṣa* is vague, but it seems that to "recuperate" Dharmakīrti's (and probably Dignāga's) statements, the *sapakṣa* at stake in the *trairūpya* theory cannot exclude the *dharmin*. This is more or less the conclusion that the Tibetan dGe lugs pa scholastics reached when they formulated two sorts of *sapakṣa*: *sapakṣa* proper (*mthun phyogs*) and *sapakṣa* taken *etymologically*

(sgra bshad du 'jug pa'i mthun phyogs). It is only in the latter type that the *dharmin* is excluded. See my article, "On *sapakṣa.*" Note that following the Tibetans' idea of *sapakṣa* (proper), it would come down to everything which has the property to be proved *(sādhya),* and *vipakṣa* (proper) would be those things which do not have this property *(asādhya).* Not only would this avoid all the logical problems which plague us, but it is noteworthy that Dharmakīrti in k. 220, for example, (see above) uses these very terms *sādhya* and *asādhya* and Manorathanandin and Devendrabuddhi (cf. *Pañjikā* 312b6-7) gloss them as *sapakṣa* and *vipakṣa* respectively.

21. See pp. 131–133 of his *Aspects of Modern Logic.* Dordrecht: D. Reidel Publishing, 1970.

22. op. cit. p. 132.

23. For example, Buddhists from Dharmakīrti (cf. his *Vādanyāya*) to Ratnakīrti argue in the following way: "All things which do not produce their effects successively or simultaneously are incapable of casual efficacity, like a rabbit's horn. What is not momentary does not produce its effect successively or simultaneously. Therefore what is not momentary is incapable of casual efficacity and hence does not exist." See p. 60 in K. Mimaki, *La Réfutation bouddhique de la permanence des choses (sthirasiddhidūṣaṇa) et la preuve de la momentanéité des choses (kṣaṇabhaṅgasiddhi),* Paris, 1976. The pervasion here between "not producing effects successively or simultaneously" (F) and "being incapable of casual efficacity" (G) cannot follow Chi's model, for the point is that there does not exist anything whatsoever which has F or G.

24. It could very well be argued that not all cases of pervasion for Dignāgean logicians must be accompanied by examples. In particular, Dignāga and his followers also used consequences *(prasaṅga),* which behave quite differently from the valid and fallacious reasons which are the concern of the *Hetucakra:* they do have pervasions between their terms, but it is not usual to give any examples at all. To take an illustrative case, Dharmakīrti in *Pramāṇavārttika* IV, k. 12 (cf. also *Pramāṇaviniścaya* III) explains Dignāga's use of consequences by taking the *prasaṅga* that a Naiyāyika universal *(sāmānya)* would have to be many different things because it is present in a multitude of particulars. There is not discussion of an example at all in the commentaries, nor in the *Pramāṇaviniścaya.* Note however that Manorathanandin in commenting on k. 12's *parakalpitaiḥ prasaṅgo dvayasaṃbandhād ekābhāve 'nyahānaye* glosses *dvayasaṃbandha* as *vyāpyavyāpakabhāva,* which is essentially the term Chi is seeking to explain in Dignāga. See my article, *"Pramāṇavārttika* IV (1)" in the *Weiner Zeitschrift für die Kunde Südasiens* 30, 1986, pp.143–162. Manorathanandin and the other commentators make it clear that the pervasion of the consequence is logically equivalent to the pervasion in the consequence's contraposition *(prasaṅgaviparyaya),* which yields a valid reason. But it is only with regard to this contraposed form that one would need to present an example.

25. See A. MacDermott, *An Eleventh-Century Buddhist Logic of 'Exists'.* Dordrecht: D. Reidel, 1969. R. Routley, "Some things do not exist," *Notre Dame Journal of Formal Logic* 7, 3, 1966, pp. 251–276.

26. See notes 24 and 29 in MacDermott op. cit. Routley himself had

some suggestions as to how to handle a thoroughly Meinongian logic with inconsistent items, but I doubt that it is worth our while to enter into the details. For an attempt at a Meinongian semantics, see T. Parsons, "A Prolegomenon to Meinongian semantics," *Journal of Philosophy*, 61, 1, 1974, pp. 561–579.

27. p. 103 in B. K. Matilal, "Reference and existence in Nyāya and Buddhist logic," *Journal of Indian Philosophy* 1, 1970, pp. 83–110.

28. See S. Katsura, "Dharmakīrti's theory of truth," *Journal of Indian Philosophy* 12, 1984, pp. 215–235.

Chinese terms

a. 遍
b. 定
c. 遍
d. 定
e. 定 有 性
f. 以 定