None of the Above: the Catuṣkoṭi in Indian Buddhist Logic

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Abstract: The catuṣkoṭi (*Greek*: tetralemma; *English*: four corners) is a venerable principle of Indian logic, which has been central to important aspects of reasoning in the Buddhist tradition. What, exactly, it is, and how it is applied, are, however, moot—though one thing that does seem clear is that it has been applied in different ways at different times and by different people. Of course, Indian logicians did not incorporate the various interpretations of the principle in anything like a theory of validity in the modern Western sense; but the tools of modern non-classical logic show exactly how to do this. The tools are those of the paraconsistent logic of First Degree Entailment and some of its modifications.

Key Words: catuṣkoṭi, Buddhism, Nāgārjuna, ineffability First Degree Entailment, plurivalent logic

1 Introduction

The catuṣkoṭi (*Greek*: tetralemma; *English*: four corners) is a venerable principle of Indian logic, which has been central to important aspects of reasoning in the Buddhist tradition. What, exactly, it is, and how it is applied, are, however, moot—though one thing that does seem clear is that it has

been applied in different ways at different times and by different people. Of course, Indian logicians did not incorporate the various interpretations of the principle in anything like a theory of validity in the modern Western sense; but the tools of modern non-classical logic show exactly how to do this. The tools are those of the paraconsistent logic of First Degree Entailment (FDE), and some of its modifications.[1] We will approach the matter chronologically, interlacing philosophical and technical material, as appropriate.[2] The point of the exercise is to show how the history of philosophy and the techniques of contemporary non-classical logic can profitably inform each other. Positions which one might have taken to be unintelligible can be shown to be perfectly coherent with the aid of these techniques; conversely, the positions may themselves suggest the development of interesting new logical techniques.

2 Back to the Beginning

So let us go back to the earliest applications of the catuṣkoṭi.

The four koṭis (corners) of the catuṣkoṭi are four options that one might take on a question. Given any question, there are four possibilities, *yes*, *no*, *both*, and *neither*. Who first formulated this thought would appear to be lost in the mists of time, but it seems to be fairly orthodox in the intellectual circles of Siddhārtha Gautama (*Pali*: Gotama), the historical Buddha (c. 6c BCE). Thus, canonical Buddhist texts often set up issues in terms of these four possibilities. For example, in the *Mijjhima Nikāya,* when the Buddha is asked about one of the profound metaphysical issues, the text reads as follows:[3]

> 'How is it, Gotama? Does Gotama believe that the saint exists after death, and that this view alone is true, and every other false?'
>
> 'Nay, Vacca. I do not hold that the saint exists after death, and that this view alone is true, and every other false.'
>
> 'How is it, Gotama? Does Gotama believe that the saint does

[1]For FDE, see Priest (2008a), ch. 8.

[2]I note right at the start there are some Buddhist logicians in whose thinking the catuṣkoṭi played no role. This is true, in particular, of the school of Dignāga and Dharmakīrti. Like the Nyāyā, this school of logic endorsed both the Principles of Non-Contradiction and Excluded Middle. See Scherbatsky (1993), pt. 4, ch. 2.

[3]Radhakrishnan and Moore (1957), p. 289 f. The word 'saint' is a rather poor translation. It refers to someone who has attained enlightenment, a Buddha (Tathāgata).

> not exist after death, and that this view alone is true, and every other false?'
>
> 'Nay, Vacca. I do not hold that the saint does not exist after death, and that this view alone is true, and every other false.'
>
> 'How is it, Gotama? Does Gotama believe that the saint both exists and does not exist after death, and that this view alone is true, and every other false?'
>
> 'Nay, Vacca. I do not hold that the saint both exists and does not exist after death, and that this view alone is true, and every other false.'
>
> 'How is it, Gotama? Does Gotama believe that the saint neither exists nor does not exist after death, and that this view alone is true, and every other false?'
>
> 'Nay, Vacca. I do not hold that the saint neither exists nor does not exist after death, and that this view alone is true, and every other false.'

It seems clear from the dialogue that the Buddha's interlocutor thinks of himself as offering an exclusive and exhaustive disjunction from which the Buddha is to choose. That there are four such possibilities, was the standard view.[4]

Later Buddhists echoed the thought. Thus, in the *Mūlamadhyamakakārikā* (hereafter, MMK) Nāgārjuna frequently addresses an issue by considering these four cases. Thus, in ch. XXV, he considers nirvāṇa. First, he considers the possibility that it exists (vv. 4-6); then that it does not exist (vv. 7-8); then that it both exists and does not exist (vv. 11-14); and finally, that it neither exists nor does not (vv. 14-15). As Āryadeva, Nāgārjuna's disciple, was to put it:[5]

> Being, non-being, [both] being and non-being, neither being [nor] non-being: such is the method that the wise should always use with regard to identity and all other [theses].

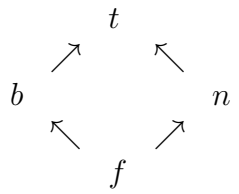
Thus, it would seem, originally, the catuṣkoṭi functioned as something like a Principle of the Excluded Fifth. Aristotle held a principle of the Excluded Third: any statement must be either true or false; there is no third possibility; moreover, these two are exclusive. In a similar but more generous way, the catuṣkoṭi gives us an exhaustive and mutually exclusive set of four possibilities.

[4]See Ruegg (1977), p. 1.

[5]Tillemans (1999), p. 189.

3 First Degree Entailment

How to formulate such a simple idea has bemused many commentators, and resulted in many dud ideas.[6] However, to anyone familiar with the rudiments of contemporary non-classical logic, there is an obvious way. First Degree Entailment (FDE) is a system of logic that can be set up in many ways, but one of these is as a four-valued logic whose values are t (true only), f (false only), b (both), and n (neither). The values are standardly depicted by the following Hasse diagram:



Negation maps t to f, vice versa, n to itself, and b to itself. Conjunction is greatest lower bound, and disjunction is least upper bound. The set of designated values, D, is $\{t, b\}$.[7] The four corners of truth and the Hasse diagram seem like a marriage made for each other in a Buddhist heaven.[8]

FDE can be characterised by the following sound and complete rule system. (A double line indicates a two-way rule, and overlining indicates discharging an assumption.)[9]

$$\frac{A, B}{A \wedge B} \qquad \frac{A \wedge B}{A \ (B)}$$

$$\frac{A \ (B)}{A \vee B} \qquad \frac{A \vee B \qquad \begin{array}{c}\overline{A}\\ \vdots \\ C\end{array} \qquad \begin{array}{c}\overline{B}\\ \vdots \\ C\end{array}}{C}$$

$$\frac{\neg(A \wedge B)}{\neg A \vee \neg B} \qquad \frac{\neg(A \vee B)}{\neg A \vee \neg B} \qquad \frac{\neg\neg A}{A}$$

4 Denying All the Koṭis

So far so good. Returning to the question of the Tathāgata after death, the Buddha, as we observed, refused to endorse any of the koṭis on this

[6] For a survey, see Ruegg (1977), p. 39ff. And for a critique, see Priest (2010), 2.2.

[7] See Priest (2008a), ch. 8.

[8] As observed in Garfield and Priest (2009).

[9] See Priest (2002a), 4.6.

matter—and on a number of similar "unanswerable" metaphysical questions. In some sūtras it appears that this is because speculation over the matter is simply a waste of time.[10] Thus, in the *Cula-Malunkyovada Sutta*, we read:[11]

> It's just as if a man were wounded with an arrow thickly smeared with poison. His friends and companions, kinsmen and relatives would provide him with a surgeon, and the man would say, 'I won't have this arrow removed until I know whether the man who wounded me was a noble warrior, a priest, a merchant, or a worker.' He would say, 'I won't have this arrow removed until I know the given name and clan name of the man who wounded me... until I know whether he was tall, medium, or short... until I know whether he was dark, ruddy-brown, or golden-colored... until I know his home village, town, or city... .' The man would die and those things would still remain unknown to him.
>
> In the same way, if anyone were to say, 'I won't live the holy life under the Blessed One as long as he does not declare to me that 'The cosmos is eternal,'... or that 'After death a Tathagata neither exists nor does not exist,' the man would die and those things would still remain undeclared by the Tathagata....
>
> So, Malunkyaputta, remember what is undeclared by me as undeclared, and what is declared by me as declared. And what is undeclared by me? 'The cosmos is eternal,' is undeclared by me. 'The cosmos is not eternal,' is undeclared by me. ... 'After death a Tathagata exists'... 'After death a Tathagata does not exist'... 'After death a Tathagata both exists and does not exist'... 'After death a Tathagata neither exists nor does not exist,' is undeclared by me.
>
> And why are they undeclared by me? Because they are not connected with the goal, are not fundamental to the holy life. They do not lead to disenchantment, dispassion, cessation, calming, direct knowledge, self-awakening, unbinding. That's why they are undeclared by me.

However, in some of the sūtras there is a hint of something else going on. The Buddha seems to explicitly *reject* all the options, the suggestion being that all the answers have a common and false presupposition. Thus, in the

[10] See Ruegg (1977), pp. 1, 2.

[11] Thanissaro (1998).

Mijjhima Nikāya, the Buddha says that none of the four kotis 'fits the case' in such issues. When questioned how this is possible, he says:[12]

> But Vacca, if the fire in front of you were to become extinct, would you be aware that the fire in front of you had become extinct?
>
> Gotama, if the fire in front of me were to become extinct, I would be aware that the fire in front of me had become extinct.
>
> But, Vacca, if someone were to ask you, 'In which direction has the fire gone,—east, or west, or north, or south?' what would you say O Vacca?
>
> The question would not fit the case, Gotama. For the fire which depended on fuel of grass and wood, when all that fuel has gone, and it can get no other, being thus without nutriment, is said to be extinct.

The thought seems to be that if fires or Tathāgatas have gone out of existence, one can say nothing about them.

We find Nāgārjuna and some of his Madhyamaka successors appearing to deny all the koṭi sometimes too. For example, as part of an argument that the Tathāgata has no self-being (svabhāva), MMK XXII: 11, 12 says:[13]

> 'Empty' should not be asserted.
>
> 'Non-empty; should not be asserted.
>
> Neither both nor neither should be asserted.
>
> These are used only nominally.
>
> How can the tetralemma of permanent and impermanent, etc.
>
> Be true of the peaceful?
>
> How can the tetralemma of finite, infinite, etc.
>
> Be true of the peaceful?

and in the course of an argument for the same conclusion about nirvāṇa, MMK XXV: 17 says:

> Having passed into nirvāṇa, the Victorious Conqueror
>
> Is neither said to be existent
>
> Nor said to be nonexistent.
>
> Neither both nor neither are said.

[12] Radhakrishnan and Moore (1957), p. 290.

[13] All translations from the MMK are from Garfield (1995).

Rejecting all four koṭis in this way is sometimes, and for obvious reasons, called the 'four-cornered negation'. And just to confuse matters, the word 'catuṣkoṭi' is sometimes taken to refer to this.

5 A 5-Valued Logic

How can one understand the rejection of all four koṭis in terns of modern logic? The fact that none of the four koṭis sometimes holds would seem to imply that there is a fifth possibility: (e) none of the above. Technically, the obvious thought is to add a new value, e, to our existing four (t, f, b, and n), expressing this new status.

Since e is the status of claims such that neither they nor their negations should be accepted, it should obviously not be designated. Thus, we still have that $D = \{t, b\}$. How are the connectives to behave with respect to e? Both e and n are the values of things that are, in some sense, neither true nor false, but they had better behave differently if the two are to represent distinct alternatives. The simplest suggestion is to take e to be such that whenever any input has the value e, so does the output: e-in/e-out.

The logic that results by modifying FDE in this way is obviously a sub-logic of it. It is a proper sub-logic. It is not difficult to check that all the rules of FDE are designation-preserving except the rule for disjunction-introduction, which is not, as an obvious counter-model shows. However, replace this with the rules:

$$\frac{\varphi(A) \quad C}{A \vee C} \qquad \frac{\varphi(A) \quad C}{\neg A \vee C} \qquad \frac{\varphi(A) \quad \psi(B) \quad C}{(A \wedge B) \vee C}$$

where $\varphi(A)$ and $\psi(B)$ are any sentences containing A and B.[14] Call these the φ *Rules*, and call this system FDE_φ. FDE_φ is sound and complete with respect to the semantics.[15]

6 e and Ineffability

Whether or not Nāgārjuna himself is best interpreted as really denying all the koṭis is a question of interpretation that I won't go into here. There is no doubt that later philosophers did.[16] This is particularly the case when the

[14] Instead of $\varphi(A)$ (etc.), one could have any sentence that contained all the propositional parameters in A.

[15] For the proof, see the technical appendix of Priest (2010).

[16] The Buddhists tadition was not alone in appearing to reject all four of the koṭis sometimes. See Raju (1953).

Yogacārā influence came to be felt in subsequent developments. According to this, there is an ultimate reality. Our conventional (lived) reality is produced by the imposition of a conceptual/linguistic structure onto this. What is this ultimate reality like? One cannot say. To do so would require the employment of linguistic and conceptual categories; and the ultimate reality is what remains after all such categories have been "peeled off". It is a simple *thatness* (tathāta), often referred to as *emptiness*. One may have a direct perception of it under appropriate circumstances, but describe it one cannot. It is ineffable. In some Buddhist philosophers, the fifth status given by denying the four standard values of the catuṣkoṭi is the value of the ineffable.

The interpretation of the catuṣkoṭi and four-fold negation which takes ineffability on board is spelled out perhaps most clearly and explicitly by the Tibetan philosopher Gorampa. He says in his *Synopsis of Madhyamaka*, 75:[17]

> The scriptures which negate proliferations of the four extremes refer to ultimate truth but not to the conventional, because the ultimate is devoid of conceptual proliferations, and the conventional is endowed with them.

The fifth value, e, then, is the value of the ineffable.

Care is needed here over the word 'truth' in this quotation. It is a translation of the Tibetan *bden-pa* (*Sanskrit*: satya). This can mean either *truth* or *reality*. In the quote from Gorampa, it clearly means 'reality'. Now, it is states of affairs which are effable or ineffable, not sentences. This requires us to rethink our formal language and its interpretation.

We must now think of the bearers of the truth values as states of affairs. Connectives generate complex states of affairs. Thus, if A and B are states of affairs, then $A \wedge B$, $A \vee B$ and $\neg A$ are the related conjunctive, disjunctive and negative state of affairs. As for the truth values themselves: a state of affairs that receives the value t exists and its negation does not. A state of affairs that receives the value b is such that both it and its negation exists. Similarly for f and n. And a state of affairs that receives the value e is ineffable.

7 Talking of the Ineffable

Matters are still more complex, though. Ultimate reality is, on this understanding, ineffable. Yet Gorampa himself talks about it. Thus, as I just

[17]The translation is taken from Kassor (2013).

quoted him as saying, 'the ultimate is devoid of conceptual proliferations'. This explains why, indeed, it is ineffable; but it is also says something about it. Some things about the ineffable *can* be expressed.[18]

One might react to this in various ways. One is to write off the whole project as misconceived. Obviously, this was not Gorampa's reaction. Indeed, nor is this obviously required in a context where the possibility of contradictions is clearly allowed for in the shape of one of the koṭis.

Gorampa's own response to the situation is to draw a distinction. Kassor (2103) describes matters thus (her italics):

> In the *Synopsis*, Gorampa divides ultimate truth into two: the nominal ultimate (*don dam rnam grags pa*) and the ultimate truth (*don dam bden pa*). While the ultimate truth ... is free from conceptual proliferations, existing beyond the limits of thought, the nominal ultimate is simply a conceptual description of what the ultimate is *like*. Whenever ordinary persons talk about of conceptualize the ultimate, Gorampa argues that they are actually referring to the nominal ultimate. We cannot think or talk about the *actual* ultimate truth because it is beyond thoughts and language; any statement or thought about the ultimate is necessarily conceptual, and is, therefore, the nominal ultimate.

It does not take long to see that this hardly avoids contradiction. If all talk of the ultimate is about the nominal ultimate, then Gorampa's own talk of the ultimate is this. And the nominal ultimate is clearly effable. Hence Gorampa's own claim that the ultimate is devoid of conceptual proliferations is just false.

A similar situation was to arise about 500 years later and a few miles to the West. In the *Critique of Pure Reason* Kant explains that there are noumenal objects about which one cannot talk/think. For talk/thought constitutes *phenomenal* objects. Realising the bind he is in here, Kant drew a distinction between an illegitimate positive notion of a noumenon and a legitimate negative, or limiting, notion. This does not help: according to Kant, the negative notion is there to place a limit on the area in which we can apply thought/language. But to say that there is an area to which we cannot apply thought/language is clearly to say something about this area, and so apply thought/language to it.[19]

[18]It is not just Gorampa who finds himself in this position. Any theory according to which there is something ineffable and which explains why it *is* ineffable is going to be in the same situation. There are many such theories, East and West. See Priest (2005).

[19]See Priest (2002b), 5.5.

Indeed, the Gorampa/Kant predicament is inevitable. If one wishes to explain why something is ineffable, one *must* refer to it and say something about it. To refer to something *else*, which one can talk about, is just to change the subject.

8 Accepting More than One Koṭi

The honest thing to do, then, is to admit that the situation is a contradictory one. We have here a contradiction at the limits of thought, of a kind to which certain Buddhist views are committed. Nor is this irrational. Given those views, and the fact that the contradictions can be controlled, this is exactly the rational position to hold.[20]

Given this, we must allow for things to be (truly) sayable and ineffable as well—that is, to take more than one semantic value. In fact, there is some precedent for this in Nāgārjuna as well. Thus, MMK XVIII: 8 says:

> Everything is real and is not real.
>
> Both real and not real,
>
> Neither real nor not real.
>
> This is Lord Buddha's teaching.

Exactly how to interpret this passage from Nāgārjuna is moot. But whatever the truth of that matter, in Gorampa, at least, we seem to be stuck with the idea that something can be true and ineffable, and so inhabit more than one of our five values.

9 Relational Semantics

But how to make sense of this technically? There is, in fact, an easy way to do so.

In classical logic, evaluations are functions which map sentences to one of the values 1 and 0. In one semantics for FDE, evaluations are thought of, not as functions, but as relations, which relate sentences to some number of these values. This gives the four possibilities represented by the four values of our many-valued semantics.[21]

[20] See Garfield and Priest (2003), and Deguchi, Garfield, and Priest (2008). The contradiction we are dealing with here is closely related to Nāgārjuna's paradox that the ultimate truth is that there is no ultimate truth. (See Priest and Garfield (2003), sec. 5.) One can say nothing true about ultimate reality—either because there is no such thing, or because it is ineffable. But either way, that is itself an ultimate truth.

[21] See Priest (2008), 8.2.

We may do the same with the values t, b, n, f, and e themselves. So if P is the set of propositional parameters (or atomic states of affairs), and $V = \{t, b, n, f, e\}$, an evaluation is a relation, $\rhd$, between P and V. We insist that every formula has at least one of these values. That is, the values are exhaustive:

Exh: for all $p \in P$, there is some $v \in V$, such that $p \rhd v$.

However, there is no reason why $\rhd$ cannot relate a sentence/state of affairs to *more* than one value. Thus, p may relate to both *true* (t) and *ineffable* (e).

How might the connectives behave in this context? If we denote the many-valued truth functions corresponding to the connectives $\neg$, $\vee$, and $\wedge$ in FDE_φ, by $f_\neg$, $f_\vee$, and $f_\wedge$, then the most obvious extension of $\rhd$ to all formulas is given by the point-wise clauses:

- $\neg A \rhd v$ iff for some x such that $A \rhd x$, $v = f_\neg(x)$
- $A \vee B \rhd v$ iff for some x, y, such that $A \rhd x$ and $B \rhd y$, $v = f_\vee(x, y)$
- $A \wedge B \rhd v$ iff for some x, y, such that $A \rhd x$ and $B \rhd y$, $v = f_\wedge(x, y)$

One can show, by a simple induction, that for every A there is some $v \in V$ such that $A \rhd v$. I leave the details as an exercise.

Where, as before, $D = \{t, b\}$, we may simply define validity as follows: $\Sigma \vDash A$ iff for all evaluations, $\rhd$:

- if for every $B \in \Sigma$, there is a $v \in D$ such that $B \rhd v$, then there is a $v \in D$ such that $A \rhd v$

That is, an inference is valid if it preserves the property of relating to *some* designated value.

A moment's reflection will show that if we insist that every parameter takes *exactly* one of the five values, the same is true for *all* formulas. These semantics are, then, just a variation of the functional semantics for FDE_φ which we have already employed. Let us call them the *single-valued relational semantics*.

But what is this logic which allows multiple values? In fact, it is FDE_φ. Let is write the single-valued consequence relation as $\models_s$ and the many-valued consequence relation as $\models_m$. Any single-valued interpretation is a many-valued interpretation. Hence if $\Sigma \not\models_s A$ then $\Sigma \not\models_m A$; so if $\Sigma \models_m A$ then $\Sigma \models_s A$. Conversely, suppose that $\Sigma \models_s A$. Then by the completeness result mentioned in Section 5, the inference is delivered by the rules for FDE_φ.

But it is easy to check that each of these rules is sound with respect to the many-valued semantics. Hence, $\Sigma \models_m A$.

A final technical comment. One can turn a relational semantics into an equivalent functional semantics by taking the functional values to be *sets* of the many values ($\{t, e\}$, etc.). In this way, it is possible to iterate the construction to higher orders, taking sets of values, sets of sets of values, etc. For the case where we start with the simple classical truth values, 1 and 0, this is done in Priest (1984). Again, there, applying the construction (after the first iteration) does not destabilise the consequence relation.[22]

10 Coda: Jaina Logic

In conclusion, it is worth nothing the similarity of the view we have just been looking at with that which is to be found in another Indian logical tradition: Jainism.[23] In this, there are three basic "truth values", *true*, *false*, and a third truth value. The precise meaning of this third value is somewhat moot, since different writers gloss it in different ways: *both true and false*, *neither true nor false*, *ineffable*, *non-assertable*.[24] Sentences can take any number of these values, as long as this is at least one, giving seven possibilities in all $(2^3 - 1)$—rather than the 31 $(2^5 - 1)$ we have in the Buddhist case. One can turn this trilogy into a relational logic in exactly the way we have done in the Buddhist case.[25]

The Jains endorsed a metaphysical view about the nature of reality, according to which is it "multi-faceted". One can then think of each of the values, v, as one of the basic values of the sentence if it has that value at some facet. Perhaps the most natural way to develop this picture in terms of modern logic is to take each facet to be something like a possible world. Each world is many-valued, but the resulting logic is not a many-valued one, but a modal one. One can do exactly the same with our four or five Buddhist values instead of the three Jaina ones. I leave the details as a relatively straightforward exercise. The fact that the Buddhists do not subscribe to a similar metaphysical doctrine concerning the many-faceted nature of reality makes this sort of logical development much less natural.

[22]For a fuller discussion of the construction described in this section, see Prest (2014).

[23]For details of what follows, see Priest (2008b).

[24]See Priest (2008b), sec. 5.

[25]In Priest (2008), this is formulated not as a relational semantics but equivalently as a functional semantics, where the functional values are sets of truth values. The possibility of applying this construction to the Buddhist four (or five) values, as we hae done here, is noted there in fn. 15.

References

[1] Deguchi, Y., Garfield, J., and Priest, G. (2008), 'The Way of the Dialetheist: Contradictions in Buddhism', *Philosophy East and West* 58: 395-402.

[2] Garfield, J. (1995), *The Fundamental Principles of the Middle Way: Nāgārjuna's Mūlamadhyamikakārikā* (New York, NY: Oxford University Press).

[3] Garfield, J., and Priest, G. (2003), 'Nāgārjuna and the Limits of Thought', *Philosophy East and West* 53:1-21. Reprinted as ch. 5 of Garfield's, *Empty Words* (New York, NY: Oxford University Press, 2002) and as ch. 16 Priest (2002b).

[4] Garfield, J., and Priest, G. (2009), 'Mountains are Just Mountains', ch. 7 of M. D'Amato, J. Garfield, and T. Tillemans (eds), *Pointing at the Moon: Buddhism, Logic, Analytic Philosophy* (New York, NY: Oxford University Press).

[5] Kassor, C. (2013), 'Is Gorampa's "Freedom from Conceptual Proliferations" Dialetheist? A Response to Garfield, Priest, and Tillemans', *Philosophy East and West* 63: 399-410.

[6] Priest, G. (1984), 'Hypercontradictions', *Logique et Analyse* 107: 237-43.

[7] Priest, G. (2002a), 'Paraconsistent Logic', pp. 287-393, Vol. 6, of D. Gabbay and D. Guenther (eds), *Handbook of Philosophical Logic*, second edition (Dordrecht; Kluwer Academic Publishers).

[8] Priest, G. (2002b), *Beyond the Limits of Thought*, second edition (Oxford: Oxford Unversity Press).

[9] Priest, G. (2005), 'The Limits of Language', pp. 156-9, Vol. 7, of K. Brown (ed.), *Encyclopedia of Language and Linguistics*, second edition (Amsterdam: Elsevier).

[10] Priest, G. (2008a), *Introduction to Non-Classical Logic: From If to Is* (Cambridge: Cambridge University Press).

[11] Priest, G. (2008b), 'Jaina Logic: a Contemporary Perspective', *History and Philosophy of Logic* 29: 263-278.

[12] Priest, G. (2010), 'The Logic of the Catuṣkoṭi', *Comparative Philosophy* 1: 32-54.

[13] Priest, G. (2014), 'Plurivalent Logic', *Australasian Journal of Logic* 11, article 1; http://ojs.victoria.ac.nz/ajl/article/view/1830.

[14] Radhakrishnan, S., and Moore, C. (eds.) (1957), *A Source Book in Indian Philosophy* (Princeton, NJ: Princeton University Press).

[15] Raju, P. (1953), 'The Principle of Four-Cornered Negation in Indian Philosophy', *Review of Metaphysics* 7: 694-713.

[16] Robinson, R. (1956), 'Some Logical Aspects of Nāgārjuna's System' *Philosophy East and West*, 6: 291-308.

[17] Ruegg, D. (1977), 'The Uses of the Four Positions of the Catuṣkoṭi and the Problem of the Description of Reality in Mahāyāna Buddhism', *Journal of Indian Philosophy* 5: 1-71.

[18] Scherbatsky, Th. (1993), *Buddhist Logic*, Vol. 1 (Delhi: Matilal Banarsidass).

[19] Thanissaro (1998), 'Cula-Malunkyovada Sutta: The Shorter Instructions to Malunkya', http://www.accesstoinsight.org/tipitaka/mn/mn.063.than.html (accessed March 2010).

[20] Tillemans, T. (1999), 'Is Buddhist Logic Non-classical or Deviant?', ch. 9 of *Scripture, Logic, Language: Essays on Dharmakīrti and his Tibetan Successors* (Boston, MA: Wisdom Publications).