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ANCIENT INDIAN LOGIC AS A THEORY OF NON-MONOTONIC REASONING

I

The principal aim of this paper is to establish the thesis that a significant relationship exists between Indian theories of proof and inference (*anumāna*), in particular the most ancient varieties of what is commonly called 'Indian Logic,' and a number of quite recent developments in the theory of "commonsense-inference" which are often subsumed under the term 'Non-monotonic Logic(s).' It is claimed that there is a connection both on the, so to speak, "object level" as well as on the "theoretical level", i.e., both regarding the subject matter the theories of inference are concerned with as well as the way in which essential features of the subject matter are reflected in the theoretical constructs. By advocating the existence of far-reaching connections between ancient Indian doctrines of *anumāna* and certain theoretical approaches developed in the framework of "Artificial Intelligence" (AI) it is implied that not only all attempts to equate (these varieties of) Indian theories of inference and proof with Western classical logic(s), and in particular with the Aristotelian doctrine of syllogism, are mistaken, but that also the way of correlating both (kinds of) theories must be revised in a more fundamental degree than it has been advocated even by those scholars who stressed the differences between Indian and Western theories and expressed reservations against equating them too readily. On the other hand this does not entail that *any* kind of correlating Indian and Non-Indian doctrines of inferring and proving must be inappropriate; rather it remains to explore 1. whether and to what extent the results obtainable for a number of more ancient versions of *anumāna*-theory can be extended to "Indian Logic" in general, 2. in which way Western logical theories and different varieties of Indian theories of inference and proof are related even if they cannot be equated in any straightforward manner and 3. which, if any, non-Indian counterpart yields a frame of reference for a fruitful analysis and understanding of Indian theories of *anumāna* or at least certain of their features.

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II

It is not difficult to establish *thematical* connections between commonsense-reasonings and Indian *anumāna*-theory. A number of sources show beyond any reasonable doubt that *anumāna* covered inferential processes which occur in everyday life.

Looking at particular sources one can establish an even more precise tenet: reasoning, in so far as it is subsumable under the concept of *anumāna*, is at least partially concerned with inferences made in everyday life, even if not exclusively. This view is clearly testified in a text which must be one of the most ancient sources of Indian *anumāna*-theory irrespective of whether or not one accepts the opinion of E. Frauwallner 1958, who assumed that a number of citations to be found in Buddhist Logical treatises belong to the *Ṣaṣṭitantra* of the Sāṃkhya teacher Vārṣagaṇya (Vṛṣagaṇa). After a definition of inference saying that inference (*anumāna*) is the "establishment of a rest" (*śeṣasiddhi*) from something perceptible on account of some connection (*saṃbandha*) the concept of connection occurring in the definition is specified by enumerating seven varieties. Each variety is exemplified by two examples: 1. the connection of master and (his) belongings (**svasvāmibhāva*) by king/master and servant or soul and primordial matter, 2. the connection of original substance and (its) transformation (**prakṛtivikārabhāva*) by milk and sour-milk or primordial matter and "the great" = the *buddhi*, 3. the connection of cause and effect (**kāryakāraṇabhāva*) by a chariot and its constituent parts or "goodness" (*sattva*) etc., 4. the connection of producer and produced (**nimittanimittikabhāva*) by potter and pot or soul and activity of primordial matter, 5. the connection of whole and part (**mātrāmātrikabhāva*) by branch etc. and tree or sound etc. and the great elements, 6. the connection of common occurrence (**sahacāribhāva*) by Cakravāka-ducks or "goodness" etc., 7. the connection of annihilated/obstructed and annihilator/obstructor by snake and mungoose or "goodness" etc. insofar as they are principal and secondary (*aṅgāṅgibhūta*). (Cf. E. Frauwallner 1958: 123; 126–127). It is obvious from this passage that a type of inference is envisaged which should pertain both to matters of everyday life as well as to reasonings trying to establish tenets of a particular philosophical school, viz the Sāṃkhya. This characterization of inference as applying both to worldly and to doctrinal matters is corroborated by other passages regarded by Frauwallner as constituting parts of the *Ṣaṣṭitantra*: on the one hand the inference of fire from smoke, the recognition of something as a cow or a horse by perceiving a special characteristic and the derivation of (prior) clouds from the swelling of water in a river are mentioned

whereas on the other hand the text presents later different proofs for the existence of primordial matter (*prakṛti*).

The NBh (*Nyāyabhāṣya*) on NS (*Nyāyasūtra*) 1.1.5 mentions the following inferences in the context of the first of two alternative explications of the technical terms *pūrvavat, śeṣavat* and *sāmānyatodṛṣṭa* in the *sūtra*: a) the inference of the effect from its cause, e.g., if one infers from the gathering of clouds that there will be rain, b) the inference of the cause from the effect, e.g., if one infers from the increase of the amount of water and the swiftness of the current in a river that rain must have occurred, c) the inference that the sun must exhibit an imperceptible movement since things which are seen at different places at different times have undergone a previous movement and the case of the sun is like that. In his second alternative explanation of the terms Paksilasvāmin adduces: d) the inference of fire from smoke, e) the inference of the proposition that sound is a quality (*guṇa*) on the basis of the fact that it is existent (*sat*), impermanent etc. by excluding the possibility of its being a substance on account of its inhering in numerically one substance (*ekadravyavatva*) and the possibility of its being a movement/action (*karma*) on account of its being the cause of other sounds, f) the inference of the existence of a soul from desire etc. as the substratum in which they inhere. It is irrelevant for our present purposes which, if any, of the alternative elucidations of the technical terms *pūrvavat, śeṣavat, sāmānyatodṛṣṭa* in NS 1.1.5 conforms to the original intentions of the author(s) of the *sūtra*. What matters are, however, the following facts:

1. The examples show that the scope of inference (*anumāna*) is conceived as comprising besides inferences of everyday life and proofs of particular doctrinal tenets also the establishment of what might be called "scientific theorems". This is most clearly testified by the examples c) and f), which can also be viewed as inferences aiming at establishing explanatory hypotheses of well known facts, viz. the change of the position of the sun (relative to an observer) during the day (and the year) and the occurrence of psychic phenomena like desire, aversion etc.[1] Despite the circumstance that the texts do not make this unambiguously clear and that no absolute cogent proof can be constructed from these facts it appears nevertheless tempting to assume that the notion of inference as embodied in the term *anumāna* exhibited to a significant degree the quality of "topic neutrality" which is often regarded as a characteristic feature of (formal) logical concepts.

2. The inferences seem to lack absolute cogency in the sense that, given the facts which function as their base, the conclusions do not follow with necessity. This is in a particularly obvious manner suggested by example c), where our modern views contradict the conclusion drawn from the observed phenomenon, but also the other examples lack cogency: it is at least doubtful whether there is something like an immaterial soul in which psychic qualities inhere and not only the prediction of rain from the gathering of clouds but also the inference of previous rain on account of the increase of water and swiftness of the current are certainly insecure. The same must probably be said regarding the examples adduced in the *Ṣaṣṭitantra*.[2]

It is worth noting that even quite early the problem of fallibility seems to have been recognized as something which potentially endangers inference in general. This must be the case if we interpret NS 2.1.35 (according to the numbering in W. Ruben 1928; NS 2.1.37 according to other text-editions and B. K. Matilal 1985/1990: 34 ff), which runs: *rodhopaghātasādṛśyebhyo vyabhicārād anumānam apramāṇam*, as claiming that inference is no means of valid cognition on account of the fact that (generally accepted) logical reasons do not necessitate their *inferenda* for a) the inference that it must have rained because of the increase of water in a river is unsafe on account of the fact that water could equally well be obstructed by a dam, b) swift running of ants can also be caused by damage of the anthill and therefore does not necessarily indicate future rain and c) a cry resembling that of a peacock could equally well be an imitation and does not make the assumption of a real peacock unavoidable. Even if the crucial terms *rodha, upaghāta*, and *sādṛśya* should have been originally intended in a different way than it has been assumed by Pakṣilasvāmin in his NBh it seems pretty safe to assume that the objection intended to adduce the fact that certain phenomena taken as the bases of inferences can also be caused by different events and accordingly be explained in different ways than it has been hypostatized in the inference.[3] It is remarkable that the following *sūtra* 2.1.36, which runs *naikadeśatrāsasādṛśyebhyo 'rthāntarabhāvāt*, seems to reject the objection on account of the fact that the probative mark is distinguished in the case of valid inferences, viz. not the increase of water etc. alone, but also the circumstance that the augmentation of flood is not confined to a particular place, not the mere running of ants, but their running without fear, and not the mere occurrence of sound, but the existence of sound which does not only resemble the sound of a peacock are decisive. If this (or something close to this) is the correct interpretation of the rejection embodied in

NS 2.1.36 its compellingness must however be regarded as doubtful. It amounts to the claim that it is possible to specify the probative marks in such a way that they allow no other conclusion than the intended one. But not only regarding the particular specifications of the particular probative marks discussed in those *sūtras* does the question arise as to whether they successfully fulfill their intended role, but we are faced also with the problems 1. whether such specifications are possible in all cases which are canonically accepted as (valid) inferences, 2. whether it is required or desirable at all to restrict inferences to instances specified in this way and 3. what it is on account of which the specifications could legitimately impose further restrictions on the realm of valid or acceptable inferences.

It should at any rate be noted that the discussion of NS 2.1.35–36 suggests that at some earlier date inferences *were* accepted even if they did not fulfill the demands embodied in the specifications. Furthermore, it appears that the strategy of introducing specifications is insufficient to guarantee absolute infallibility unless they were such that they analytically entail the *inferendum*. Absolute infallibility by specification could for example be attained in the case of inferring rain from running movements of ants by hypostatizing as the basis of the inference a proposition that contains the occurrence of future rain "as its ingredient", e.g., the proposition that ants run because of future rain (or, if the Indian phraseology were adopted, by the property = *dharma* of being endowed with ants whose running is motivated by future rain as the logical reason). However, this device would not only produce an inference exhibiting circularity, but seems also clearly to contradict the intentions of the author of the reply embodied in NS 2.1.36. The specification that is mentioned in the text does not alter the fallibility-situation of the inference in one important aspect: The inference both with and without the specification is dependent on the hypostatization of the fulfillment of normality conditions.[4] Only if it is presupposed that things in the relevant case behave as they "normally" do can either the circumstance that ants run (towards their eggs) or that they run without signs of fear be taken as constituting a sufficiently firm basis for inferring the occurrence of rain. But the same holds good *mutatis mutandis* both regarding the other cases with which NS 2.1.35–36 are concerned and (at least the great majority of) all the examples which have been previously mentioned as well as other specimens of *anumāna* that are mentioned in the oldest texts. It seems therefore not inappropriate to consider fulfillment of normality conditions as an essential ingredient of inferences as conceived in the earlier stages of so-called "Indian Logic".

III

If this is true the relationship underlying the "input" and "output" of these inferences should differ from that of classical implication. More precisely, we should expect that certain properties which characterize the relationship of logical implication do not hold good for the connection that exists between the basis and the outcome of reasonings corresponding to *anumāna*. There are three conditions which have been regarded as essential for (classical logical) implication. In R. Cartwright 1990 they are denoted by the terms 'reflexivity', 'dilution' and 'cut'. Using the symbol '$\vdash$' for representing the relation of implication for a set S of sentences which takes subsets of S to members of S it is asserted that for all subsets X and Y of S and for any member p of S the following conditions are satisfied:

Reflexivity: $p \vdash p$
Dilution: If $X \vdash p$ then $X, Y \vdash p$
Cut: If $X \vdash q$, for every q in Y, and $Y \vdash p$ then $X \vdash p$.

The condition of 'reflexivity' means that the relationship of implication holds for every proposition and itself (every proposition implies itself). 'Dilution' amounts to the demand that if any set of sentences/propositions implies a proposition any set consisting of the propositions of the original set plus additional propositions (any superset of the original set) implies that proposition too. Formulated in terms of premises and conclusions one could also say that if any set of premises implies a conclusion the implicational relationship is preserved under any enlargement of the amount of premises. 'Cut' says that if any set of propositions implies all propositions of another set and this latter set implies some proposition then the relationship of implication holds equally good between that proposition and the former set. This ensures that the relationship of implication is transitive, i.e. if $p \vdash q$ and $q \vdash r$ then $p \vdash r$.

If we consider inferences which are made under the supposition that normality conditions are fulfilled – irrespective of what exactly we should understand under "normality conditions" – a little reflection reveals that there is no reason to assume that the property of dilution should characterize the relationship between the basis and the outcome of such reasonings. On the contrary, we should suppose that this requirement is inappropriate for at least two grounds:

1. If we infer some proposition on the basis of some proposition(s) because we assume that they exhibit a relation such that the latter proposition(s) should be true if the former is/are true and normality conditions are fulfilled and given that this latter fact (together

with everything which justifies the assumption of the truth of the basis of inference) constitutes the legitimization for our inference we are deprived of this legitimization as soon as we adopt the further assumption that the normality conditions are not fulfilled in the pertinent case. The reason is that if we enlarge the basis by the proposition that normality conditions are not fulfilled the content of the underlying normality assumption and the set of propositions that constitute the basis become incompatible. Either the assumption of normality or the assumption of the truth of the basis must be given up. Accordingly any relation which holds between (sets of) propositions and propositions precisely if the latter can be legitimately inferred form the former on account of the above-mentioned principle cannot exhibit the property of dilution because there is at least one enlargement, namely the enlargement by the proposition that normality conditions are not fulfilled in the pertinent case, which rules out the possibility that the same relation holding between a set of propositions and a proposition holds equally good between the superset resulting from this enlargement and that proposition. But since the property of dilution embodies nothing other than what is also referred to as the principle of monotonicity, namely the persistence of the original relationship no matter what is added to the initial premises, any reasoning relying on the hypostatization of normality-conditions in the above described way should exhibit lack of monotonicity and accordingly represent (some kind of) non-monotonic reasoning. One could also say that a relationship expressible by the term 'being legitimately inferable on the hypostatization of normality' lacks the quality of dilution and exhibits non-monotonicity.

2. Enlargement of the set of premisses endangers the persistence of this relation also on another ground: Inferring under the hypostatization of normality could lead to incompatible results. The reason is that things and situations exhibit various qualities and it is conceivable that some of these normally go hand in hand with a certain property or feature and some others with its opposite or some incompatible property. This means that in the context of reasoning under assumption of the fulfillment of normality conditions we have to reckon with the possibility of conflicting reasons. Now, if some property P is normally associated with some property S and some other property Q normally associated with the opposite of S or a property incompatible with S, it is at least questionable whether we are entitled to say that if an instantiation of S can be legitimately inferred from an instantiation of P it can also legitimately be inferred from an instantiation of P

together with an instantiation of Q as basis. It seems a defensible position to claim that inference should be blocked if the basis is enlarged in such a way that it contains ingredients which support a proposition on the same or similar grounds as the unenlarged basis supports a proposition incompatible with it. If this position is adopted we would be led to non-monotonicity also by the way of conflicting evidence.

Apart from dilution the property of "cut" might also be absent from a relation of being inferable on the supposition of normality. That the ascription of "cut" is at least problematic emerges as soon as one considers longer chains of reasoning.[5] Whether or not reflexivity holds depends on a decision regarding the essentiality of "normality conditions": If we adopt the view that the relationship essentially depends on the supposition of normality in the way that the relation holds only between propositions if it does not equally hold good between the propositions concerned without the normality assumption, reflexivity must be ruled out. For no plausible concept of inferability can be discerned which holds between propositions and themselves only under the supposition of normality. If on the other hand one takes normality conditions not as essential one is free to conceive the pertinent relation of inferability in such a way that it can be instantiated also between a proposition and itself or between propositions analytically entailing each other. We claim that all these considerations are potentially relevant for understanding and assessing a number of features of Indian theories of inference although we must postpone the presentation of evidence for the time being.

At the present stage it must be noted, however, that a great number of examples which are to be found in the (older) texts could be very well used for giving specimens of non-monotonic reasonings. This is especially obvious for those examples which seem to be presupposed by the critical discussion in NS 2.1.35–36 and which are "amended" by specification. The inference of rain from the fact that a river has risen exhibits non-monotonicity on account of the circumstance that it might become invalid after enlarging the basis by the proposition that the increase of flood is confined to some areas (or also by the knowledge that a dam has previously obstructed the water). The revised inference which relies on the non-occurrence of such unusual circumstances remains to be sensitive to possible enlargements of the basis even if a point of specification might be reached where it requires ingenuity in constructing abnormal situations, which might possibly never have occurred elsewhere, in order to invalidate the legitimacy of the original derivations. At any rate, also a number of other examples exhibit

the characteristic that if they are conceded as legitimate inferences their legitimacy becomes questionable in view of possible additional information. The inference that an individual who possesses certain characteristic marks must be (numerically) the same as some child some years ago that possessed the very same marks (which is mentioned as an example of *pūrvavat* in the *Upāyahṛdaya*; cf. G. Tucci 1929: xvii) would lose its validity if it were additionally known that the child in question has died in the meantime and the argument would at least loose much of its force if it turned out that the characteristic marks have been reproduced elsewhere. The derivation of the fact that all grains of rice in some pot are cooked because some tasted grains are cooked (mentioned in Chapter 18 of Qing-mu's commentary on the *Mūlamadhyamakakārikās* as well as in other sources; cf. G. Tucci 1929: xviii) crucially depends on the condition that the whole amount of grain has been put into the pot at the same time – which is otherwise only in "abnormal" cases – as well as other factors ensuring that all went normally. On the detection of further information, e.g. if it were observed that other grains of rice look different or if it would turn out by further probing that other portions are still uncooked, the original basis for the inference would break down. In all these cases the basis is not immune against refutation by contradicting evidence.

IV

It is, however, not only the case that ancient "Indian Logic" presents a number of examples which are well suited as specimens of "reasoning under incomplete information" such that augmentation of the information base could in principle endanger the plausibility of the inferences concerned, but the special characteristics of the subject matter are also reflected at various places in the theoretical discussions as well as in features of the theoretical doctrines.

The non-monotonic trait of *anumāna* is represented in an oblique way in a number of polemical discussions to be found in texts of authors who are regarded as the chief representatives of Indian Logic. At the beginning of the second chapter of Dignāgas *Pramāṇasamuccaya* (PS) a criticism of the Vaiśeṣika-proof for the existence of the substance "wind" (*vāyu*) is to be found which occurs in the context of an objection against Dignāgas claim that inference operates exclusively in the field of universals.[6] For our purposes the passage of *kārikā* 3d and the corresponding portions of the *Pramāṇasamuccayavṛtti* are of special interest.[7]

Dignāga rejects the claim that also the existence of particular substances can be the object of inferences and proofs on the ground that in the case of the alleged inference of wind from the quality of touch (*sparśa*) in reality it is a universal that is (indirectly) indicated. This means that wind etc. are not inferable because [merely] the universal [property] of inhering [in some substratum] is indicated for [the quality of touch] on account of the fact that [the universal property of] being a quality (*guṇatva*) inheres in it, or, alternatively, not the peculiarities of the own nature (*svabhāva*) of wind can be inferred, because only [the universal of] being a substance [which is] a substratum for touch etc. is indicated in respect of the mere universal of substanceness.[8] Thereupon an objection is brought forward to the effect that [the existence of wind] could be inferred by elimination, [i.e.] this inference regarding the own-nature of wind etc. succeeds [not by the mere quality of touch but by this quality in conjunction with] a proof by elimination to the effect that the quality of touch cannot inhere in any other of the [accepted] visible as well as invisible substances, [so that the existence of wind has to be accepted as its only possible substratum]. This objection is rejected by Dignāga on account of the facts that the existence [of wind as the substratum of touch-quality][9] is not given as established and the exclusion is the same [in this case]. [This means that,] if the existence [of wind/a connection between wind and some specific touch-quality in some instance] were given it could not be any more [generally] excluded as the substratum [of touch-quality] so that if one inferred the existence of a particular substance by some particular quality on account of the connection with some specific quality, leaving aside any [superordinate] universal of this quality, wind etc. could be established. But since this is not [already] established as existent, the exclusion would pertain [to this substance] in the same way as it pertains to the [substances] earth etc. because there is no specific quality[10] here.[11] If, on the other hand, it were asserted that the mere non-observation [of the characteristic properties of the other substances together with the crucial touch-quality][12] excludes all the visible substances, this is not appropriate. First of all, all incorporeal substances (like space and soul) cannot be affected by this argument. Moreover, the mind among the non-visible substances cannot be excluded because its characteristic qualities are only inferred [and since they are non-observable in principle their non-observance in a particular situation cannot rule out the mind as a possible candidate for the status of a substratum of the crucial touch-quality]. On the other hand touch-qualities (in general) are in fact observed together with visible substances and therefore belong to them and nothing else. But since the visible substances in their turn

are manifold, doubt arises as to which substance touch does belong to and the (general) existence of wind cannot be inferred by excluding all other candidates.[13]

Dignāga's rejection of the possibility of an "exclusion-proof" for the existence of wind is the most important part of the above cited passage. According to our analysis it exhibits the following steps:

(a) One cannot exclude other substances than wind as candidates of some specific touch-quality on account of the fact that the touch-quality in question is known from previous experiences to inhere in wind or to occur together with some other characteristic qualities of wind so that whenever one perceives the specific touch-quality in isolation there is more evidence in favour of the assumption that it inheres in wind than that it inheres in any other substance.

(b) One cannot exploit the very fact (adduced in the previous argumentative step, namely) that some specific touch-quality has *never* been perceived as inhering in any substance or as occurring together with specific qualities of other substances in order to derive that it should not pertain to any other substance than wind, because i), if the force of this argument should rely on the fact that this situation (of having never been perceived in a substance or as co-occurring with other specific qualities) should not have arisen if the touch-quality inhered in other substances, the argument is not suited to exclude substances like the soul or the mind which and whose qualities are never perceptible – because this situation *should* arise if one of them were the substratum of the touch-quality in question, and ii) the argument cannot even validly exclude visible substances as possible substrata because, even if it tried to exploit the circumstance that all other qualities of those substances are (at least sometimes) perceived as inhering in them or as co-occurring with their specific qualities, the argument would be counterbalanced by the fact that other touch-qualities have always been observed as inhering in other visible substances, so that in view of contradicting evidence the doubt arises as to whether or not the touch-quality in question might inhere in some specific variety of visible substance.[14]

First it should be noted that, irrespective of all interpretational difficulties in the details, it can be regarded as certain that Dignāga presupposed on the part of the Vaiśeṣika a proof which exhibits the characteristic features of non-monotonic reasoning under the hypostatization of normality. We are obviously dealing with an argument which tries to establish the existence of an entity on account of the fact that the occurrence of certain well-known phenomena could not be explained unless one assumed that the entity in question exists. As all arguments recurring to

the requirement of explaining facts typically do also this proof refers to the circumstance that without the acceptance of the proposed *explanans* we would be forced to assume facts which contradict previous experience or which are at least unfamiliar on the background of established knowledge. If we consider for example the claim that certain particular touch qualities which are observed without the perception of the characteristic qualities of the other substances earth etc. exclude those substances as their bearers, a number of "normality-assumptions" are surely involved. The argument relies e.g. essentially on the presupposition that touch-qualities never have so to speak "long-distance effects", that is to say, the argument takes for granted that the assumption can be ruled out that the occurrence of tactile sensations could ever be caused by tactile qualities inhering in substances which are located far away from the part of the body in which corresponding tactile sensations are located. We are certainly disposed to share this assumption mainly on account of the fact that experiences made in connection with material bodies like pots etc. as well as with substances like water etc. support this view. Nevertheless, if we gave up this view and if we regarded as realistic the possibility that sometimes tactile sensations, in particular tactile sensations of specific kinds, are caused by qualities of distant substances, the above mentioned Vaiśeṣika-argument would lose its force. Accordingly, we should assume that, *if* one attributes validity to the inference of the non-inherence of certain touch-qualities in visible substances on the basis of the fact that at the time of the occurrence of certain tactile sensations no substance is to be seen close to the part of one's body where the sensations are located, this attribution should be given up if the basis were enlarged by the proposition that the specific relevant tactile sensations are "abnormally" caused by distant sources. A further, even more fundamental normality-presupposition of the Vaiśeṣika-proof is that like other tactile sensations also the tactile sensations which allegedly prove the existence of wind correspond to qualities inhering in substances. Though it appears bizarre the possibility that all the tactile perceptions suggesting the existence of the substance wind are mere illusions and comparable to collective phantom limb pains common to all men cannot be ruled out on purely *a priori* grounds.

It is true that Dignāga rejects the Vaiśeṣika-argument, but it is less clear what his theoretical grounds are.[15] Certainly the dismissal of the proof of the existence of wind mainly rests on the ground that it (in Dignāga's view) lacks cogency. But is must be regarded as questionable whether the mere fact that the argument relies on normality-assumptions gave for him sufficient reasons for disclaiming its validity. It seems,

after all, that also Dignāga in principle accepted the validity of proofs requiring the hypostatization of the fulfillment of normality-conditions. This would find support even in the context of the discussion of the Vaiśeṣika-proof, if our interpretation of the above cited passage of the PS is mainly correct and if Dignāga conceded that inferences are valid in which after observation of the co-occurrence of special touch-qualities and one or a number of characteristic qualities of the wind-substance, the occurrence of wind-substance might be inferred on a later occasion in which touch-qualities of the same special kind are perceived. At any rate, the author of the PS *should* have accepted such an inference since it is homogeneous with the generally accepted example of inferring fire from smoke. As in the latter case, it is also here easily possible to convert the inference into a form according to which the instantiation of a universal at some place is inferred form the instantiation of another universal at the place in question on the background of (the observance of) the co-instantiation of both universals at other places. Normality-presuppositions come into play in the form of the assumption that what held good previously should equally hold good in the present case, namely the fact that if touch-qualities of a certain kind occur at some place the characteristic qualities of wind-substance and wind-substance itself occur too. If, on the other hand, the author of the PS rejected the argument for the exclusion of the relevant touch-qualities from visible substances not only because of the circumstance that its scope is too limited since it does not affect all-pervasive substance as well as not all-pervasive but invisible substances like the mind, but also because of the fact that it does not even successfully rule out visible substances because they are manifold, one might gather a certain kind of problematization regarding the assumption of normality as well as reasoning under this assumption. This would be the case if the reference to the diversity of the visible substances has to be understood as adducing the *possibility* that among the visible substances varieties exist which have to be viewed as abnormal in some relevant respects on the background of the visible substances known so far.

Such a view is clearly propounded by Dharmakīrti in the context of an argumentation which is to be found both within the *Svārthānumānapariccheda* of his *Pramāṇavārttika* (PV) and in the second chapter of the *Pramāṇaviniścaya* (PVin). Referring to Dignāga's assertion that it is not appropriate to exclude the relevant touch quality from the visible substances on account of mere non-perception, Dharmakīrti emphasizes the circumstance that the advocate of the Vaiśeṣika-proof has not confined himself to negate the occurrence of the touch-quality in those varieties of the substances earth etc. which

are visible but claims its non-occurrence in these substances in general. Now, there are many kinds of earth-substances like cotton, stones, leaves etc., says Dharmakīrti, and they differ considerably regarding their tactile qualities. Therefore the suspicion arises that there might be some specific kind of earth-substance (or water-substance or fire-substance) which exhibits the special tactile quality considered as proving the existence of wind.[16] Therefore, concludes Dharmakīrti, one cannot negate by mere non-perception the occurrence of the relevant touch-quality regarding the visible substances earth etc. in general.[17] Obviously an analogous argument could be construed in order to invalidate the fact that sometimes touch-quality is perceived without the characteristic qualities of earth and other substances as long as one regarded characteristic qualities like odour, taste, colour not as *defining* characteristica, but as something which *typically* inheres in those substances.[18]

In the case of Dharmakīrti it is even clear on what theoretical grounds the crucial step in the Vaiśeṣika inference of the existence of a wind-substance is dismissed. The citation of the *Pramāṇasamuccaya* occurs in the context of the discussion as to whether non-observance of the logical reason together with non-instantiation of the property to be proven is able to establish invariable concomitance between logical reason and property to be proven. Dharmakīrti's claim is that such kind of non-observance cannot conclusively show that it holds unexceptionally good that wherever the logical reason occurs the property to be proven must occur too and that it is only his condition of "essential connection", of *svabhāvapratibandha*, which is able to guarantee this. One could also say that in Dharmakīrti's view even "absolute" non-perception of abnormal cases – i.e., a deviation from the invariable concomitance of the proving property together with the property to be proven has not been perceived in any single case – is not sufficient in order to *guarantee* the non-occurrence of abnormal instances and that therefore his own doctrine of *svabhāvapratibandha* must be accepted since it is able to give this guarantee. This presupposes that inferences should only be accepted if there is a guarantee against "abnormality". Therefore the question poses itself not only as to whether Dharmakīrti's notion of *svabhāvapratibandha* in fact successfully performs the job he claims for it but also as to whether or not he was really justified in demanding those requirements for validity or acceptability of inferences – despite the fact that Dharmakīrti's thesis that mere non-perception cannot rule out the possibility of deviant cases is obviously correct.

That the author of the *Pramāṇavārttika* and the *Pramāṇaviniścaya* demanded not only exclusion of *actual* but also of *potential* abnormality is corroborated by the following paragraph in the PV as well as the

PVin. Dharmakīrti argues that the assumption that non-deviance could also be guaranteed by non-perception without "essential connection" proves to be faulty in view of the fact that things which have been perceived as being such and such within a particular region or under certain circumstances might be otherwise in other regions or under different circumstances. Certain herbs might possess a certain taste or a particular healing power provided that they grow in particular areas or on a specific ground, whereas those properties might be absent in the same kinds of herbs if they are located in different areas or grow on different kinds of soil.[19] This remark is significant because it appears to affect the appropriateness of reasonings under "frame-conditions". Dharmakīrti seems to advocate the view that any inference which relies on the circumstance that phenomena of a certain kind have been experienced as being connected with phenomena of some other kind cannot be valid as long as it relies merely on this fact because it leaves room for the possibility that the experiences which have been made were subject to (possibly unrecognized) "frame-conditions", i.e., the observed regularities hold only good under certain situational circumstances but can cease to hold if features of the situation are changed. Since these remarks occur in the context of a polemical discussion they deserve our attention because they are directed against a position which implies the acceptability of inferences relying on frame-conditions and because we have to reckon with the possibility that we deal with a position which possesses historical reality.

There is, however, strong evidence that views akin to the position Dharmakīrti criticizes in the textual passages cited above have been really held. In the sixth chapter of the *Hetubindu* (HB) Dharmakīrti attempts to refute a doctrine of six marks of a logical reason. Now, this is a position which in all probability has been actually advocated by certain theoreticians because Dharmakīrti explicitly asserts this.[20] According to this view a valid or acceptable logical reason must exhibit apart form the three conditions laid down in the traditional *trairūpya*-doctrine three further conditions, namely a) that its object has not been cancelled, b) that its uniqueness is intended to be conveyed and c) that it is known. Of these the first two additional marks deserve our interest because they amount to the requirement that lack of certain information constitutes a prerequisite for the validity and acceptability of logical reasons as well as for inferences. The condition that the object of a logical reason has not been "cancelled" refers to the fact that the thesis to be inferred must not be (*a priori*) ruled out by other sources of knowledge which prevail against the inference in question.[21] The mark of the "uniqueness of intention" is meant to exclude reasons and reasonings which are

counterbalanced by contradictory reasons and reasonings establishing together pairs of contradictory or incompatible propositions. More precisely, this condition probably means that the person who infers or proves himself does this with the intention and under the assumption that no counterbalancing inference or proof exists.[22] It is instructive to throw a glance at Dharmakīrti's criticism of this doctrine as far as these two additional marks are concerned.

First of all, the author of the HB asserts that both marks are redundant on the background of the first three conditions. The reason is that Dharmakīrti understands the doctrine of *trairūpya* in such a way that the conditions two and three amount to a universal proposition to the effect that it holds good without any exception that whatever exemplifies the logical reason exemplifies the property to be proven too. Surely, if a proposition of the form '(x)(Hx → Sx)' and a proposition of the form 'Hp' are taken as premises a corresponding proposition of the form 'Sp' follows with necessity and no further premises are required for the derivation. But Dharmakīrti reckons – rightly, as we will see later – with the possibility that his view does not correspond to the traditional conception of *trairūpya*. In particular he envisages the possibility that the "invariable concomitance" between some logical reason 'H' and some property to be proven 'S' holds unexceptionally only in the domain of the (potential) examples, i.e. in the domain of all entities apart from the one which is concerned in the inference in question as the bearer of those properties and which is technically called *pakṣa*.[23]

On the background of this assumption the skeleton of Dharmakīrti's argumentation against the fourth mark is as follows: 1) It is emphasized that the *trairūpya*-conditions in this alternative version cannot guarantee the *probandum*.[24] Accordingly further requirements would be necessary for such a guarantee; on the other hand this creates room for the possibility that the fourth mark is not redundant. 2) Dharmakīrti differentiates regarding the import of the fourth mark between two possibilities: a) the fourth mark requires that in reality no cancelling fact (*bādhā*) exists, b) the fourth mark requires that such a fact must not be known (at the time of making the inference). For the refutation of a) a further distinction is drawn between i) the assumption that the actual non-occurrence of the *probandum* depends on a cancelling means of knowledge (*bādhakapramāṇa*), ii) the assumption that such a dependence does not exist. In the case of i) the lack of a cancelling fact is itself sufficient for proving the *probandum* and accordingly the logical reason is deprived of all relevance;[25] a logical reason is equally irrelevant in case there were a cancelling fact because in such a circumstance it cannot possess probative force (since the *probandum* should not occur

whenever there is a cancelling fact).[26] In the case of ii), on the other hand, it could happen that both any cancelling means of knowledge does not exist and the *probandum* is lacking nevertheless[27] so that the non-existence of a cancelling fact does not possess probative force.[28] Regarding b) Dharmakīrti argues that there is no ground to believe that the logical reason should be affected not by actual occurrence of cancelling facts but by knowledge of cancelling facts and, given that the logical reason is used irrespective of whether a cancelling fact really exists or not whenever it is employed, if a cancelling fact is not known the question arises as to what its function is. If one says that it serves for proving the *probandum* the difficulty arises that the logical reason could be used for this purpose even if a cancelling fact does actually exist. Accordingly it should be equally legitimate to employ a reason after a cancelling fact has been known because there is no difference between both situations with respect to the concession of the possibility of the existence of a cancelling fact. In case it were assumed that a logical reason lacks probative force if a cancelling fact exists, it would result (under the premise that its acceptability depends on the non-knowledge of such facts) that a logical reason which has been employed could *lose* its probativeness. It is also not appropriate to assert (the other way round) that if a cancelling fact is not known then the logical reason is probative. If it were so that knowledge (of cancelling facts) "pervades" (the existence of) cancelling facts[29] it is true that the non-probativeness could not be caused in this way by the possibility of the actual existence of cancelling facts. But even if this were the case a logical reason would not perform any function because the non-existence of cancelling facts (and accordingly the *probandum*) would follow from the non-existence of such a knowledge itself (which would thus make a logical reason redundant). On the other hand, given (that such a pervasion does not exist and) that a cancelling fact might exist even if the knowledge (of cancelling facts) is not there, the incapability of the logical reason is not eliminated (by the lack of knowledge of cancelling facts).

With respect to the fifth mark Dharmakīrti's argumentation relies, apart from the consideration brought forward in connection with the previous mark that this condition is redundant on the background of the notion of invariable concomitance as the author of the *Hetubindu* understands it, on a distinction which is analogous to the one Dharmakīrti introduced when he discussed the fourth condition: The intended uniqueness could be taken to mean either a) that the logical reason does not possess a counterbalancing reason in reality or b) no counterbalancing reason has been shown. In the case of a), says Dharmakīrti, this requirement could not function as a workable mark (for judging validity or acceptability)

because its fulfillment could never be definitely known. It is, after all, also assumed regarding the other marks that they cannot perform this function whenever their nature is not known or whenever it is doubtful.[30] Accordingly one would never possess a (n applicable) logical reason. For any logical reason possessing the same characteristics as reasons of which counterbalancing reasons have been observed is subject to the suspicion that counter-reasons might in fact exist; if, however, there were a difference (between both kinds of reasons which could function as a criterion) this (and not the fact for which it is a criterion = the fifth mark in the sense of a)) would constitute a mark since on account of this difference a logical reason for which (the possibility of) a counter-thesis has been definitely ruled out allows the ascertainment of the *probandum*. Since, however, the nature of this difference has not been stated (by the proponent of the theory of the sixfold reason) there must be a doubt in all cases (i.e., even if a counterbalancing reason is not known), because even concerning reasons of which a counter-reason has been noticed nothing which distinguishes them was known before the recognition of this fact and correspondingly this difference is not always observed also for reasons for which counterbalancing reasons are possible, but some exceedingly clever mind might nevertheless find them out. Against alternative b) it has to be objected, according to Dharmakīrti, that 1. it is a very odd thing that some reason which has first occupied the dignified position of a conclusive reason should lose this status after some ingenious person has invented another counterbalancing reason and "betake itself into the grove of austerities like a king who has lost his kingship", 2. nothing is actually either probative or non-probative if probativeness relies on the inventions of arguing persons and 3. the "own nature" (*svabhāva*) of things never changes and therefore a reason which has this quality (of being connected with the *probandum*) by its own nature cannot be made something else and a reason which does not have this quality can never be probative on other occasions. – This is the train of thoughts of Dharmakīrti's argumentation against the fourth and fifth condition of the doctrine of six marks, which, although I tried to preserve all the main points are presented here in a condensed and abbreviated form. For the full version cf. E. Steinkellner 1967a: 85, 21–95, 1; E. Steinkellner 1967b: 70–75.

Without going into all the details of this textual passage the following characteristics of Dharmakīrti's discussion deserve to be noted:

1. Dharmakīrti seems to hypostatize that the doctrine of marks of a logical reason should yield conditions which *guarantee* the truth of the proposition to be inferred or to be proven. From the circumstance that a cancelling fact might exist even if the knowledge of cancelling

facts is not there, the author of the *Hetubindu* deduces that the incapability of the logical reason is not removed by the lack of knowledge of cancelling facts. Obviously Dharmakīrti is not ready to concede that the acceptability of inferences and proofs might rely on the condition that certain facts are *not* known. This attitude would be sufficiently motivated – though not necessarily also justified – if it were assumed that acceptability-conditions bestow the guarantee that the status of acceptability cannot be endangered by possible extensions of knowledge.

2. The author of our text appears to be reluctant to allow for the possibility that acceptability or validity might be "context-sensitive" in the sense that it depends on the comprehensive argumentative situation whether some particular argument counts as valid or not. Dharmakīrti depicts as odd the situation that some proof might lose probativeness in view of the fact that some counterargument has been presented. He presupposes a notion of probativeness according to which the maxim: "either always probative or never" holds good.

We do not want to investigate at this place on which theoretical grounds the author of the HB adopted this position. For our purposes it is at present more important to note that the *Hetubindu* depicts a theoretical doctrine as historically real of which it is claimed that it objectively possesses the above described features which Dharmakīrti is reluctant to accept.[31] But since this is so, the supposition that theories which involved these consequences actually existed in the history of ancient Indian philosophy cannot be dismissed as baseless and we are even to some degree justified to expect that there might have been persons who would have accepted the views embodied in those consequences.

V

There are indeed texts which corroborate the supposition that doctrines which exhibit the features delineated above have been adopted.

Within the above cited *Hetubindu*-passage a citation occurs which is taken to give *prima facie* evidence for the assumption that in the earlier tradition views have been held that require the acceptance of the fifth mark in the version that a counter-reason has not been shown. The citation runs as follows: *yathāha: yadā tarhi śabdatvaṃ nityam abhyupagacchati, tadāyam hetur eva syāt, yady atrānityatvahetuṃ kṛtakatvādi kaścin na darśayed iti*, = "As [he] has said: 'Thus, when one assumes sound-ness as eternally existing, this (i.e., audibility) would in fact be a reason, if not anybody points out producedness etc. as a reason for non-eternity here'. – Cf. E. Steinkellner 1967a:

93, 6–8; E. Steinkellner 1967b: 74–75. Now, it is quite probable that Dharmakīrti cites nobody else than Dignāga here. There are at least parallels in Dignāga's works.[32] The importance of this passage lies in the circumstance that it suggests that some logical reason like audibility, given the presupposition that "soundness" (*śabdatva*) exists as an example exemplifying both audibility and eternity, can be counted as probative as long as further information does not exist, in particular the information that sound also exhibits producedness which by the same standards proves the opposite of the original proof, i.e. non-eternity. It is true that Dharmakīrti emphatically rejects such a view of "provisional validity" and tries to present arguments for the absurdity of this position. He offers, however, at least insofar as the *Hetubindu* is concerned, no hint as to how the wording of the cited passage could be plausibly *interpreted* in an alternative way. At any rate, there is strong evidence that some part of the tradition after Dignāga understood this (or similar) remarks as attesting a "non-monotonic" notion of validity according to which acceptable inferences or proofs could lose this status in view of counterarguments.[33] It seems, however, quite possible that this tradition was right in assuming that it authentically represented Dignāga's views in this matter.

A similar opinion is suggested by some text which is commonly believed to stand close to Dignāga both regarding the time of its writing and the views represented therein, namely Śaṅkarasvāmin's *Nyāyapraveśa* (NP). This text clearly advocates the doctrine of a separate variety of fallacious reasons, named *viruddhāvyabhicārin*, within a subcategory, called 'indefinite' or 'unconclusive' (*anaikāntika*). The *viruddhāvyabhicārin* is explained in the NP with the following words:

> *viruddhāvyabhicārī yathā / anityaḥ śabdaḥ kṛtakatvād ghaṭavad / nityaḥ śabdaḥ śrāvaṇatvāt śabdatvavad iti / ubhayoḥ saṃśayahetutvād dvāv apy etāv eko 'naikāntikaḥ samuditāv eva //*
>
> (A. B. Dhruva 1968: 4, 21–52 = M. Tachikawa 1971: 142) = "A *viruddhāvyabhicārin* is as follows: 'Sound is non-eternal because it is produced like a pot; sound is eternal because it is audible like sound-ness.' Since both are reasons for doubt, these two, taken together, are one unconclusive [reason]."

It is true that the *Nyāyapraveśa* does not contain any explicit remark regarding the validity or acceptability of the two single constituent arguments. We only learn that "both reasons taken together" from a fallacious reason which is inconclusive. On the other hand, the very

fact that the inacceptability of the single reasons has not been explicitly stated together with the fact that the *viruddhāvyabhicārin* is recognized as a separate variety among the "inconclusive" reasons strongly suggests that in the view of the author of the NP both constituent arguments could be regarded as acceptable if they occurred in isolation.

After all, it would be a bit strange, if a separate variety of fallacious reasons would be presented on the basis of the opinion that its fallacious character rests solely on the inacceptability of one constituent-argument which would exhibit one of the other varieties of fallacious reasons.

Moreover, one of the constituents within the example given for a *viruddhāvyabhicārin*, namely: 'Sound is non-eternal because it is produced' is commonly considered as acceptable and it must be regarded as almost certain that this view was shared by the author of the NP too.[34] Now, if the other constituent-argument were taken as unacceptable or invalid in isolation, it becomes difficult to see on what grounds the view should rest that both constituents exemplify a separate category of fallacious reason because this would amount to the thesis that a valid argument can become invalid in combination with an invalid argument. In this way "non-monotonicity" would creep in, but in quite an odd form: Not the actual existence of counterbalancing evidence, but the claim of its existence would be sufficient to destroy acceptability or validity. Besides, the very term *viruddhāvyabhicārin*, if it is interpreted as a *dvandva* meaning 'contradictory and not going wrong,' indicates that in some respect this variety of fallacious arguments "does not go wrong" and thereby suggests that both its constituents, taken by themselves, are acceptable and valid according to the given standards.[35]

On the other hand, given that a *viruddhāvyabhicārin*, as conceived by the author of the NP, consists of two valid constituents, the conclusion that he must have regarded validity as sensitive to counter-evidence does not immediately follow. The way, the explanation of the *viruddhāvyabhicārin* is formulated, leaves room for the possibility that formulations of arguments which are valid, if occurring in isolation, do sometimes not represent valid arguments not because the arguments have lost their status of validity but because the formulations in question merely refer to, but do not contain valid arguments. Accordingly a *viruddhāvyabhicārin* would consist in an argument which *mentions* two arguments validly proving incompatible propositions[36] which however on account of this fact is fallacious and unconclusive.[37] But this interpretation can only claim plausibility as long as it is assumed that the author of the NP regarded as essential the circumstance that both sub-arguments are mentioned together by the same speaker at the same occasion. If we consider the phrase: 'Sound is non-eternal because it is

produced like a pot; sound is eternal because it is audible like soundness' it appears, however, difficult to understand, on what account this should be regarded as representing *one* argument and why we should see *one* logical reason involved. As regards the complex property of exhibiting both producedness and audibility we would have to subsume this in the context of the theory of the *Nyāyapraveśa* under the variety of "uncommon" (*asādhāraṇa*) reasons – like audibility itself if the Vaiśeṣika-premises are not hypostatized – so that there is no good basis for assigning the conjunctive property the function of the single logical reason of the *viruddhāvyabhicārin*-kind here. Besides, the assumption that such a chain of words should ever be uttered with the intention of formulating an argument seems quite eccentric. Therefore the hypothesis does not appear groundless that the author of the NP intended to convey in the above cited passage that *both* the argument to the effect that sound is non-eternal because of its producedness *and* the argument that sound is eternal because of its audibility (as well as the logical reasons involved), though valid in isolation (and given the pertinent Vaiśeṣika premise regarding the existence of soundness), are not valid whenever they occur in the context of their counterpart. – This would be corroborated by the formulation of the text itself, though only under the assumption that the dual of the noun-phrase *dvāv apy etāv ... samuditāv eva* is understood in the individual and not in the group-reading, i.e., as referring to the two arguments of the pair individually and not to the pair itself.[38] But even if this were not what the author of the NP intended to *convey* with this sentence, the hypothesis that he *believed* that acceptable arguments and reasons might lose this status in the context of counterevidence in not unfounded.

As long as we merely assume that the two arguments referred to in this passage are counted as valid in isolation, we would be confronted with a notion of acceptability or validity which is not "truth guaranteeing": Since the theses involved are incompatible at least one of them must be false and accordingly one of the reasons must be validly employed for proving a false thesis. But concerning such a weaker (i.e., less demanding) conception of validity or acceptability the position that validity (or acceptability) is sensitive to enlargement of information appears not unreasonable.

There is also other evidence for a kind of "defeasible" validity in the *Nyāyapraveśa*. Like other Buddhist texts of this period, to which the "classical" treatises of Vasubandhu and Dignāga belong, also the NP propagates on the one hand the doctrine of the "three marks" (*trairūpya*) of a logical reason and on the other hand theoretical notions which imply that the fulfillment of the criteria embodied in the three

marks represent at best necessary but not sufficient conditions for the acceptability of arguments. This has the consequence that validity and acceptability comes in at two stages: We must differentiate between 1) validity of logical reasons and 2) acceptability of inferences and proofs. Validity of a logical reason does not guarantee the validity or acceptability of a proof taken as a whole. Besides we must, strictly speaking, differentiate between two levels of validity also regarding logical reasons, namely a) validity in so far as the requirements laid down in the *trairūpya*-doctrine are fulfilled and b) validity in so far as all the conditions are met which filter out "proper reasons" from "fallacious reasons" (*hetvābhāsa*). This is so because certain varieties of fallacious reasons – apart from the *viruddhāvyabhicārin*-type mentioned above certain reasons which are apt to prove besides the desired thesis also unacceptable propositions, like the *dharmaviśeṣaviparītasādhana, dharmisvarūpaviparītasādhana* and *dharmiveśeṣaviparītasādhana*[39] – lie apparently beyond the scope of the *trairūpya*-conditions. However, at present only the first distinction between validity of reasons and acceptability of proofs and inferences deserves our attention. The *Nyāyapraveśa* possesses even corresponding technical terms since it differentiates between so-called "fallacious reasons" = *hetvābhāsa* and "fallacious proofs" = *sādhanābhāsa*. Whereas the former are defined by an explicit enumeration and subcategorization of kinds of *hetvābhāsas*, the latter is explained as utterances formulating the fallacious theses, logical reasons and examples that have been (previously) enumerated in the text itself.[40] It is the existence of the category of "fallacious theses" which is relevant in the present context.

The NP mentions nine varieties: 1. a thesis (*pakṣa*) that is contradicted by perception (*pratyakṣaviruddha*), exemplified by 'Sound is not audible', 2. a thesis that is contradicted by inference (*anumānaviruddha*), exemplified by 'A/The pot is eternal', 3. a thesis that is contradicted by tradition (*āgamaviruddha*), exemplified by the case that a Vaiśeṣika attempts to prove that sound is eternal, 4. a thesis that is contradicted by worldly/common knowledge (*lokaviruddha*), exemplified by 'The human skull is pure because it is a part of a living being like a conch or an oystershell', 5. a thesis that is contradicted by one's own words (*svavacanaviruddha*), exemplified by 'My mother is barren', 6. a thesis the qualifier of which is not recognized as existing (by the opponent) (*aprasiddhaviśeṣaṇa*), exemplified by the case that a Buddhist says to a Sāṃkhya that sound is perishable,[41] 7. a thesis in which the qualificand is not recognized as existing (by the opponent) *aprasiddhaviśeṣya*), exemplified by the case that a Sāṃkhya says to a Buddhist (who does not admit the existence of a soul) that the soul is sentient, 8. a thesis

in which both (the qualifier and the qualificand) are not admitted as existing (by the opponent) (*aprasiddhobhaya*), exemplified by the case that a Vaiśeṣika says to a Buddhist (who admits neither the soul nor inherent causes) that the soul is the inherent cause of pleasure etc., 9. a thesis in which the relation (between the substratum and the property to be proven) is (already) well-known (*prasiddhasaṃbandha*), exemplified by 'Sound is audible'.

It is true that some of the subcategories appear only applicable to public proofs and not to inferences in general. Nevertheless, it should be noted first that the categories 6-8 entail context-dependence of proof-acceptability in the way that acceptability can in principle depend on who the opponent is and what his views are. In a similar manner the case of the fallacious thesis of the *āgamaviruddha*-kind suggests that acceptability can depend upon the identity of the proving-subject. The ninth category contains a clear reference to epistemic facts. It is remarkable because it intimates that previously legitimate arguments might lose their status because of the circumstance that the knowledge basis has been extended in the way that the proposition to be proven has been accepted as true. As regards the varieties 1–2 and 4 it is true that we find in the NP no statement either saying or implying that the very same theses exemplifying those kinds of faults could also appear in acceptable arguments if the circumstances attesting the falsity of the theses were not given or not known. All that is explicitly said in connection with the *pakṣābhāsas* is compatible with the view that arguments containing a proposition of those categories are *always* invalid if the falsity of the thesis is *once* attested by perception, inference or commonsense-knowledge. On the other hand the hypostatization of the view that the very same arguments *would* be in order if their thesis were *never* contradicted by those factors appears quite well justified in respect of the author of the NP.[42] Should it not be equally legitimate to assume that the doctrine of this text involves a concept of acceptability according to which the pertinent arguments *are* acceptable *if* they are brought forward under circumstances in which the factors that bear evidence for the falsity of the thesis do not exist? One can at least say that this assumption would fit in well with the totality of the statements made concerning the fallacious theses in the NP as well as the NP as a whole. At any rate, the theory of fallacious theses introduces an element of reservation concerning the derivation of propositions. It bears the consequence that the NP exhibits a notion of acceptability of the form: (Argument) A is acceptable if P, provided that Q. But as the doctrine of fallacious theses contains a) elements where either the truth of the thesis is put into question by contradicting evidence

or its truth appears unacceptable to one of the parties involved in the argumentation-situation on principal grounds and b) the requirement that the thesis should not be already established as true, the form of the acceptability-condition could also be represented as follows:

An argument A for a thesis T is acceptable if and only if P, provided that neither the negation of T is supported by evidence[43] or required on account of doctrinal principles of the arguer or his addressee(s) nor T is (sufficiently) established as true without the argument A.

This entails that an argument A for T is acceptable only if P, provided that not-T is not supported by evidence (of a certain kind). But at least this latter structure could be equally well exhibited by an acceptability-criterion working for (private) inferences.

Such an acceptability-condition containing a reservation-clause harmonizes well with two features of the theory represented in the *Nyāyapraveśa* – and, one can add, in other works of the same "classical" period: 1. The three marks of a logical reason embodied in the *trairūpya*-doctrine represent only necessary, but not sufficient conditions for the acceptability of logical reasons as well as of inferences and proofs, 2. correctness of a logical reason is not sufficient for acceptability of proofs or arguments. The invariable concomitance between proving property and property to be proven which is implied in the *trairūpya*-doctrine of the *Nyāyapraveśa* and some contemporary texts relates exclusively to the realm of entities apart from the substratum of inference, the *pakṣa*, as I tried to show elsewhere.[44] Furthermore, we have to distinguish between, so to speak "ontic" and "epistemic" varieties regarding the conditions two and three of the *trairūpya*-theory. Whereas the former refer to the concomitance-relation between the relevant properties which holds good in reality the latter relate to what is known concerning this connection. Accordingly, the doctrine of *trairūpya* ensures that if the thesis to be proven were false, the substratum in question = the *pakṣa* would constitute the only real (according to the ontic version) or the only known (according to the epistemic version) "abnormal" case, in so far as the fact is concerned that the proving property regularly occurs only together with the property to be proven in (numerically) one and the same substratum. On the one hand, these versions of *trairūpya* do not provide sufficient conditions guaranteeing the truth of the thesis to be inferred or proven, on the other hand, they leave room for the possibility of introducing further relevant restrictions.[45] Therefore we could concretize the above mentioned acceptability-schema and formulate the following approximate characterization of the acceptability-conditions of arguments:

AC: An argument A to the effect that T is true is acceptable if and only if, given that the requirements concerning the acceptability of examples are met and the reason presented in A does not, by the same token, establish unacceptable results,[46] the supposition of the falsity of T entails that the substratum of inference = *pakṣa* would constitute a singular abnormal case regarding the concomitance between *probans* and *probandum*, provided that the truth or falsity of T is "an open issue".

This characterization is approximate because the requirements regarding acceptable examples as well as the precise import of the notion of "unacceptable result" have been left unspecified and since the formulations 'abnormal case regarding the concomitance between *probans* and *probandum*' and 'open issue' are not fully explicit. But given the context of our foregoing discussions it should be sufficiently clear as to what is meant here.

On this background the version of the theory of fallacious reasons which is presented in the *Nyāyapraveśa* becomes well understandable. It should perhaps be noted that this holds good in particular for two characteristic elements of this doctrine: the rejection of reasons of the *asādhāraṇa*-type as well as the rejection of "contradicted reasons" = *viruddhāvyabhicārin*.[47] In the first case the proving property is nowhere exemplified outside the *pakṣa*, which has the consequence that there is no positive basis for normality and abnormality regarding its concomitance relationship at all.[48] In the second case the supposition of the falsity of the thesis implies abnormality only under one aspect whereas under a different aspect it appears as preserving normality and its opposite, i.e., the truth of the thesis, implies abnormality. Accordingly, a rejection of the *viruddhāvyabhicārin* together with its acceptance as a separate variety of fallacious reasons would correspond to a particular specification of the notion of a singular abnormal case regarding the concomitance between *probans* and *probandum* to the effect that (lack of singular ab)normality is understood as (lack of ab)normality under all aspects.[49]

In view of these facts a circumstance should not appear mysterious which seems to have puzzled some scholars, namely that the doctrine of *trairūpya* does not confine itself to demand that a proper logical reason is a) (known to be) instantiated in the subject of inference (= *pakṣa*) and b) is nowhere (known to be) instantiated in any entity different from the *pakṣa* which does not exhibit the *probandum*, but that it requires moreover c) that *probans* and *probandum* must be (known to be) instantiated together in some entity different from the *pakṣa*. To be sure, given that '$(x)\ (x \neq p \rightarrow (-Sx \rightarrow -Hx))$' ("All x not identical

with the *pakṣa* are such that x does not exhibit the *probans* if x does not exhibit the *probandum*"), is equivalent to '(x) ($x \neq p \rightarrow (Hx \rightarrow Sx)$)' ("All x not identical with the *pakṣa* are such that if x exhibits the *probans* x exhibits the *probandum*"), this requirement ensures that the instance in question = the *pakṣa* would be abnormal in some respect if it exhibited the *probans* (as required by the first *trairūpya*-condition) but not the *probandum*. It is also true that by adding the requirement '($\exists$x) (($x \neq p$) & (Hx & Sx))' ("Some entity not identical with the *pakṣa* possesses both the *probans* and the *probandum*") the argument cannot be made "derivationally stronger"; in particular the fact that the conclusion does not necessarily follow is not eliminated in this way. The decisive point is, however, that in a situation in which only the other conditions (a and b above) but not this last requirement (c) were met it could never hold good that the assumption of the conclusion 'Sp' ("The *pakṣa* exhibits the *probandum*") allows for normality in all respects. It would necessarily follow that by the same token by which the assumption of the conclusion saves the supposition of (the lack of singular ab)normality in one respect, namely insofar as the *pakṣa* would not constitute an exceptional instance exhibiting the lack of the *probandum* together with the occurrence of the *probans*, the conclusion entails that the *pakṣa* exemplifies singular abnormality in another aspect, namely insofar it would be the only instance (in the world) that exemplifies the *probandum*.[50] The supposition that the idea of (maximal) preservation of normality-assumptions underlies the theory of inference in the NP and similar texts of that period enables us therefore to trace different theoretical elements such as certain characteristics of the doctrine of fallacious reasons, the canon of fallacious theses and a significant feature of the teaching of the "three marks of a logical reason" *trairūpya*) back to a uniform principle.

It is evident that all further restrictions mentioned in **AC** in so far as they are not implied in the *trairūpya*-doctrine are bound to appear redundant as soon as the *trairūpya*-conditions are taken to imply that the *probans* is "absolutely", i.e. including the realm of the *pakṣa*, concomitant with the *probandum*. Dharmakīrti advocated such a view of the doctrine and therefore it should not appear surprising that he rejected the notions of "fallacious thesis" and "contradicted reason" in the HB. The former does not impose any reasonable restrictions, because *if* the *trairūpya*-conditions in Dharmakīrti version are fulfilled the thesis to be inferred or proven follows with necessity and cannot be plausibly overridden under these circumstances. The case of conflicting reasons fulfilling the *trairūpya*-conditions can simply not arise on the basis of Dharmakīrti's strong requirements.

As regards the acceptability notion represented by **AC**, however, we obtain non-monotonicity as soon as we link it up with a corresponding notion of derivability or inferability. Such a connection would be established if we stipulate the following inferability-criterion:

IC: A proposition T is inferable from P if and only if 1) P entails that if T were false the subject mentioned in T (= the *pakṣa*) would constitute a singular abnormal case regarding the concomitance between *probans* and *probandum* – without exhibiting singular abnormality regarding some (other) aspect on account of the truth of T, 2) the hypostatization of the relevant normality and abnormality is based on (experience of) examples, 3) P does not by the same token make unacceptable propositions inferable; provided that 4) the truth or falsity of T is an "open issue".

It is in the first place the fact that the enlargement of a body of information or of hypostatized propositions can affect the status of something's being an "open issue" which makes the above stipulated inferability-concept non-monotonic. It seems, however, that what can be said regarding the *Nyāyapraveśa* holds to a large extent equally good for the theory/theories of inference which are represented by the works of Dignāga. Therefore we possess a base for claiming the existence of a non-monotonic derivability-notion for the "classical period" of "Indian Logic."

VI

This assumption is further supported by the fact that evidence for a non-monotonic inferability-notion can be found in a doctrine which is considerably older than the works of Śaṅkarasvāmin and Dignāga. It is the ancient theory of the so-called "five-membered syllogism" which suggests strong affinities to non-monotonic reasoning and theories thereof. In particular, a number of characteristic features of the doctrine of the five-membered syllogism appear much more plausible if we regard it as being concerned with "default-reasoning". It turns out to be highly instructive to consider it in connection with "default logics". In order to see the connections more clearly, it is necessary to throw a glance on modern theories of non-monotonic reasoning. Since there are many varieties of it,[51] we have to confine ourselves to examine one selected specimen. The "default logic" put forward by Raymond Reiter (R. Reiter 1980) appears especially suited in the present context as an object of comparison.

Reiter's "default logic" differs from a number of other approaches in that instead of extending the logical language and representing defaults *in* the language they are used as additional inference rules inducing so-called "extensions" of classical logical theories. The defaults specify how a knowledge base can be extended to a set containing propositions (or "formulae") which are not logically derivable (according to standards of classical logic) from that knowledge-base.

Following a convenient notation, the general form of defaults can be written:

$$A(x): B_1(x), \ldots, B_n(x)/C(x)$$ [52]

– 'A(x)', '$B_1(x), \ldots, B_n(x)$' and 'C(x)' are classical formula (whose free variables are contained in $x = x_1, \ldots, x_m$). The intended meaning of the default is as follows: If, for a specific x, A(x) can be shown and not-$B_1(x), \ldots,$ not-$B_n(x)$ cannot be shown, then derive C(x). One might also say that a default tells us that C(x) is derivable given A(x), provided that the negation(s) of $B_1(x)$ etc. is/are not established (or cannot be established). In Reiter's terminology 'A(x)' is called "prerequisite", 'C(x)' "consequent" and '$B_1(x), \ldots, B_n(x)$' the "justifications" of the default.[53]

A "default theory" is defined as a pair (D, W), where D is a set of defaults and W a set of (classical) formulae. W has the function to describe what is (already) known about the world. Now, in order to generate extensions a so-called "fixed point operator" Γ is introduced and for default theories where the prerequisite, consequent and the justifications of the defaults do not contain free variables (= closed default theories) Γ is defined as follows:

> Def Γ: Let S be a set of closed formulae, (D, W) a closed default theory. Γ(S) is the smallest set such that:
> D1 $W \subseteq \Gamma(S)$
> D2 $Th(\Gamma(S)) = \Gamma(S)$
> D3 If $A: B_1, \ldots, B_n/C \in D$, $A \in \Gamma(S)$ and $-Bi \notin S$ ($i \in \{1, \ldots, n\}$), then $C \in \Gamma(S)$.

– Cf. G. Brewka 1991: 31–33; R. Reiter 1980: 71–72.[54]

D1, saying that W is a subset of Γ(S), guarantees that all the formulae/propositions belonging to W, i.e. representing what is known about the world, are contained in Γ(S), i.e., the set of formulae/propositions yielded by the application of the Γ-operator on S. D2, which states that the set of all theorems of Γ(S) is identical with Γ(S), ensures that the set Γ(S) comprises all formulae/propositions which are classically derivable from

any set of formulae/propositions which is a subset of $\Gamma(S)$. This means that it cannot occur that something which is (classically) derivable from any proposition or number of propositions contained in $\Gamma(S)$ is itself not in $\Gamma(S)$. – $\Gamma(S)$ is deductively closed. – D3 expresses that if there is a default A: $B_1, \ldots, B_n/C$ within the set of defaults of the default theory (D, W) and the prerequisite A is in $\Gamma(S)$ and the negation of any B_i, such that i belongs to the set of numbers $1, \ldots, n$, does not belong to S, i.e. S does not contain any negated counterpart of any of the formulae B_1 ($B_2, \ldots, B_n$) as its element, then the consequent C is (also) a member of $\Gamma(S)$. In other words, D3 has the effect that as many defaults as possible are actually applied.

The so-called "fixed points" of this operator, i.e., any set of formulae/propositions such that if the Γ-operator is applied to the set it yields this very set itself,[55] are called "extensions" of (D, W). Since $\Gamma(S)$ is defined as the *smallest* set such that D1–D3 are fulfilled, it is guaranteed that no "ungrounded beliefs", i.e., propositions for which no argument based on W and D can be construed, are in an extension. It is, however, possible that several extensions exist. Take e.g., the following default theory:

T_{D1}: W1: Quaker (Nixon)
W2: Republican (Nixon)
D1: Quaker (x): Pacifist (x)/Pacifist (x)
D2: Republican (x): Not-Pacifist (x)/Not-Pacifist (x)

This "theory" – which corresponds to an example well known in AI-circles – contains as "informational basis" the propositions 1) that Nixon is a quaker and 2) that Nixon is a republican and as "inference rules" two defaults to the effect that (1) if it can be shown of anyone that he is a quaker and it cannot be shown that he is not a pacifist then one should derive that he is a pacifist and (2) if it can be shown of anyone that he is a republican and it cannot be shown that he is (not) a (not-)pacifist then one should derive that he is not a pacifist. There is one extension containing the proposition that Nixon is a pacifist and another extension containing the proposition that Nixon is not a pacifist. There is no extension containing both propositions because this militates against the minimality-condition: If a set of closed formulae/propositions S contains as its element that Nixon is a pacifist D2 cannot apply because the proviso that it is not established that Nixon is a pacifist is not met. (Otherwise an "ungrounded" proposition would be included). Analogously D1 cannot apply if S contains the proposition that Nixon is not a pacifist. The question arises which (if any) of the extensions can be adopted as an acceptable set of beliefs in

this situation. R. Reiter takes a "credulous view" and interprets each extension as an acceptable set of beliefs. But it is not difficult to see that this attitude is not necessitated by this approach. It is equally well compatible with the theoretical framework of Default Logic to define the theorems to be those formulae contained in *all* extensions (cf. also G. Brewka 1991: 33). This means that an acceptable set of beliefs consists only of propositions contained in the intersection of all extensions so that according to this "sceptical view" neither the proposition that Nixon is a pacifist nor its negative correlate would be acceptable in the above depicted case. The circumstance that something's being an element of *one* extension does not automatically entail its acceptability or theoremhood*[56] should be kept in mind because this is relevant for the assessment of the "five-membered syllogism".

We need not go into further details of Default Logic here. It has only to be added that defaults containing free variables are interpreted as schemata representing all "ground instances" of the default, i.e. as standing for the set of closed defaults obtainable by replacing its free variables by ground terms, i.e. terms containing no variables, in particular defaults resulting by replacing free occurrences of variables by names of objects.

As regards the doctrine of the five-membered proof or syllogism we must first mention that different varieties of this theory exist, and there is reason to assume that certain differences in the formulation of some of the members reflect significant theoretical changes. Since our claims refer in the first place to the ancient stages of "Indian Logic", we confine ourself to the earlier versions of the five-membered syllogism. There are a number of textual passages like NS 1.1.32–39 as well as *Carakasaṃhitā* 8 (*Vimānasthāna*), 30–35 – and some other sources – which suggest that the five membered syllogism at some of its early stages exhibited a form which was like or approximately like the following:

1. Assertion (*pratijñā*): p is S
2. Reason (*hetu*): because of H-ness = because p is H
3. Example (*udāharaṇa/dṛṣṭānta*): like D_1 (D_2 ... D_i) [and unlike D_j ...]
4. "Application" (*upanaya*): [and] this (i.e. p) is like that (i.e. like D_1 ...) [and unlike D_j ...]
5. Conclusion (*nigamana*): therefore it (i.e. p) is S.

Some of the members can be immediately related to elements of a default theory consisting of a pair (D, W), where D and W are both unique sets, namely

T_{D2}: W = p is H
and
D = x is H: x is S/x is S.[57]

There is an evident correlation between the reason (*hetu*) and the proposition belonging to W, which is moreover an instantiation of 'x is H', the prerequisite-schema of D. The conclusion (*nigamana*) corresponds, on the one hand, to the consequent of D, being an instantiation of the formula 'x is S' (i.e. a formula resulting from a substitution of the variable by 'p'), on the other hand, it is obviously an element of the extension of the above theory. That p is S is warranted by the default theory because 'p is H' fulfills the prerequisite condition and the negation of 'p is S' is not given as established. Now, the circumstance that the negation of the proposition representing the conclusion must not be given, if its derivation by default should be possible, is significant, because this shows that the proposition corresponding to the reason in the above-depicted five-membered proof-scheme alone cannot constitute a sufficient basis for a derivation of the proposition representing the conclusion in the framework of Default Logic, if the derivation of the conclusion should rely on the application of a default. But the five-membered syllogism not only exhibits more members than those which have been correlated with the prerequisite and the consequent of a default, but apart from the first member, the assertion (*pratijñā*), the other members do not coincide with any of those regarding their propositional content (or at least they do not obviously coincide).

It seems that no immediately evident correlation exists between the remaining two members of the five-membered syllogism, namely example (*udāharaṇa/dṛṣṭānta*) and "application" (*upanaya*) on the one hand and (sub)formulae of our default theory on the other. But now it is time to recall what has been claimed earlier with respect to the inferability-criterion that can be distilled out from the *Nyāyapraveśa* and other works of this period: According to the above given analysis, inferability essentially rests (among other things) on 1) the circumstance that if the proposition inferred were not true some entity regarding which one wants to infer something would constitute a solitary abnormal case and 2) the circumstance that the truth or falsity of the proposition to be inferred is an "open issue". This in its turn implies that inferability requires on the one hand that the proposition to be inferred should be necessitated by the hypostatization that some relevant entity is not abnormal in certain respects and on the other hand that the falsity of the *inferendum* is not given as established. The fulfillment of these two requirements is the task assigned to the *trairūpya*-doctrine and to (parts of) the doctrine of fallacious theses (*pakṣābhāsa*) respectively.

On this background a possible role of the third member, the example, becomes apparent: It possesses the function of giving an empirical foundation and justification of (relevant) normality-assumptions. The fourth member, on the other hand, can be understood as expressing the claim that the entity which is concerned in a particular case fulfills the relevant normality-conditions. In order to interpret the *upanaya* in this way, it is only required to discard certain versions according to which the fourth member expresses that the example and the substratum of inference (*pakṣa*) are similar with respect to the fact that both exhibit the proving property (i.e. the property mentioned in the second member).[58] But it is not improbable that these varieties represent later interpretations – and distortions. At any rate, there are versions which do not narrow down the respect in which subject of inference and example(s) are similar (or dissimilar) to the exemplification of the proving property.[59]

Moreover, the view that the *upanaya* states nothing else but the fact that example and substratum have in common that they both exemplify the proving property (or, in case of dissimilar examples, that they are dissimilar in that the one exemplifies and the other does not exemplify the proving property) possesses the consequence of attributing to the creator and the advocates of the five-membered syllogism rather bizarre intentions: The fact that example and substratum of inference are alike in *this* respect follows from the preceding statements so obviously that it becomes difficult to see on what grounds the explicit statement of this fact in the *upanaya* should have been regarded as necessary. Even as a "pedagogical device" this redundancy seems hardly defensible. The situation is, however, entirely different, if one takes the *upanaya* as expressing the fulfillment of normality conditions. None of the immediately preceding propositions nor the combination of them entails this.[60]

Now, we can discern a close congeniality between the above described doctrine of fallacious theses (*pakṣābhāsas*) and the proviso-formula, the "justification" of the corresponding default: part of the function of the *pakṣābhāsa*-theory is to ensure that the negation of the proposition to be inferred is not established as true and the "justification" expresses just this fact. Therefore we are entitled to claim that the *upanaya* stands to the proviso-clause of defaults in a relationship similar to the one that holds between the *upanaya* and those parts of the *pakṣābhāsa*-doctrine which rule out theses established as false. In the context of inferences relying on the fulfillment of normality conditions both the "justification" and the *pakṣābhāsa*-doctrine express necessary (though not sufficient) conditions for the fact that the pertinent case in question (in the Indian context = the substratum of inference) does not exhibit abnormality

in the relevant respect. Accordingly, the *upanaya* can be regarded as expressing a step – namely the assumption of the fulfillment of relevant normality conditions – such that the criterion of its admissibility lies in what both the doctrine of *pakṣābhāsas* and the proviso-clause in the defaults demand. One might also say that the *upanaya* represents the outcome of a previous argumentational step left implicit in the five-membered syllogism, namely (the ascertainment of) the non-existence of any evidence for abnormality regarding the pertinent case. Though it is true that the *upanaya* does not express the same as any of the (sub)formulae of a corresponding default an indirect, but significant relationship between the fourth member of the "syllogism" and the proviso-clause of defaults can be established in this way.

Since it appears hardly possible to brush away the fact that the fifth and the first member in the five membered proof coincide as regards the propositional content, it appears futile to attempt to make the occurrence of the *pratijñā* and the *nigamana* intelligible by correlating them with different elements of default-formulae. Nevertheless, default logic (and the same holds good also for other systems of non-monotonic logics) provides a possible key for explaining (and justifying) the apparent redundancy. We have mentioned above that being an element of an extension is not necessarily equivalent to being acceptable as a belief or as a theorem* in the framework of default logic. We can accordingly differentiate between a less demanding sense of derivability according to which being derivable is tantamount to belonging to an extension and a more demanding notion of acceptability as a belief or a theorem* according to which being an element of an extension constitutes merely a necessary, but not a sufficient condition for acceptability in that sense. One possible way of laying down sufficient conditions would be to prescribe that a proposition has to be an element of all extensions (= belong to the intersection of all extensions) in order to count as a theorem*. It is, however, not the only way, because in case of conflicting defaults it might be sometimes reasonable to take the precise nature and the relationships of the concerned defaults into account and give one default priority over the other(s). Nevertheless, the difference between derivability in the modest sense and derivability of the more demanding sort remains, and the possibility of correlating the conclusion (*nigamana*) with the first kind and the assertion (*pratijñā*) with acceptability as a belief or theorem* presents itself. This means that despite the fact that in the first and in the fifth member of the five-membered syllogism the same propositional content is expressed its mentioning has different *functions* in both cases: By saying that p is S in the conclusion it is conveyed that the proposition that p is S follows from certain established

facts according to certain derivability criteria, whereas by saying that p is S in the assertion one intends to convey that the proposition in question should be accepted. Or, if we put it into other words, the *nigamana* represents the claim that a proposition can be justified by reference to a default-inference rule, whereas the *pratijñā* represents the claim that the same proposition is true.

In spite of the fact that the ancient Indian theoreticians lacked our notion of a default and a default rule there is evidence that a distinction between derivability and acceptability lies behind the difference between the "assertion" and the "conclusion" in the five-membered syllogism. In the *Vimānasthāna* of the *Carakasaṃhitā* we find a remarkable passage which exhibits a doctrine that involves a bipartition between the first member, the *pratijñā*, and the remaining four members. *Carakasaṃhitā* VIII, 27 contains an enumeration of terms regarding which it is claimed that they should be studied for knowing the course of discussion among physicians. Here we encounter among others the expressions *pratijñā, hetu, dṛṣṭānta, upanaya* and *nigamana*, which are well known as technical terms denoting the five syllogism-members, but striking is the fact that between the words *pratijñā* and *hetu* etc. two other terms appear which are otherwise not commonly used in the context of the five-membered proof, namely *sthāpanā* and *pratiṣṭhāpanā*. The passage of *Carakasaṃhitā* VIII 30–32 gives an explanation of this sequence. First it is said that an assertion is the formulation of what is to be proved.[61] Then the so-called *sthāpanā* is defined as the establishment (*sthāpanā*) of this very assertion by reason, example, *upanaya* and conclusion.[62] The following paragraph defines the *pratiṣṭhāpanā* and we are informed that it is the establishing of the state-of-affairs which is contrary to that of the original assertion.[63] The existence of affinities with the phenomena connected with the above discussed *viruddhāvyabhicārin*-reason appears hardly deniable: We find two opposed theses 'p is S' and 'p is not S' which are supported by different arguments embodied in the second and third member. But significantly only one of the two members with coinciding propositional content, the *nigamana*, forms a part of the *sthāpanā*. Apparently there is, according to the doctrine of the *Carakasaṃhitā*, a distinction between a proof in the narrower sense, corresponding to *sthāpanā*, and a complete argumentation represented by all the five members. But the proof consisting of the members 2–5 is obviously not considered as yielding a guarantee of the truth of the *probandum* because this component can be common to argumentations aiming at establishing incompatible propositions. Moreover, notwithstanding the fact that it is not entirely clear whether the term *pratiṣṭhāpanā* is taken to refer to all the five or only to the

last four members of the counterargumentation, there is no reason to assume that the contrast between *sthāpanā* and *pratiṣṭhāpanā* involves any differences regarding the formal features or validity of proofs, i.e., both the *sthāpanā* and a *pratiṣṭhāpanā* can in principle be constituents of or identical with formally correct argumentations. Should not we therefore assume that the bipartition between the concepts of "assertion", *pratijñā*, and "establishment", *sthāpanā*, on the one hand, and between "establishment" and "counter-establishment", *pratiṣṭhāpanā*, on the other, is rooted in a formal notion of validity and consequence such that a proposition can be a valid consequence of other propositions even if it does not meet the full conditions of assertability? Accordingly, the *nigamana* expresses the fact that a proposition is validly derivable, whereas the *pratijñā* represents the claim that the same proposition is true.

But if the above mentioned normality assumption is inbuilt in the relevant concept of derivability, derivability is not truth-preserving, i.e., also a false proposition can be derived from a true basis. More particularly, if the basis were the proposition represented by the *hetu* and the validity criterion consisted in the truth of that proposition together with the facts a) that the falsity of the proposition to be proven is not established in advance and b) that there is a respect in which the negation of the conclusion entails abnormality, falsity of the consequence could cooccur with validity because of the possibility that abnormality of the relevant kind obtains. Thus there is a relevant difference between being a valid consequence and being assertible as true, which under these circumstances would be significantly related to the difference between being an element of an extension and being an acceptable belief or theorem* in Default Logic. Therefore the distinction between *pratijñā* and *nigamana* could be explained by the existence of a notion of deducibility of a not truth preserving kind, which, however, had not been explicated by the proponents of the five-membered syllogism themselves; but perhaps we are justified to claim that *if* it is explicated it should be explicated along the lines depicted above and say that the underlying inference-concept is one of default-inference. It deserves to be noted after all, that the cited passage of the *Carakasaṃhitā* appears to testify that the ancient Indian logicians were at least acquainted with the phenomenon which makes the difference between being a member of an extension and being an acceptable theorem significant, namely the existence of conflicting evidence of the kind that is represented by conflicting defaults in Default Logic.[64]

But how should we explain the example, the third member of the Indian syllogism, in view of Default Logic? The clue to an answer has

been already given when it was said before that the example fulfills the function of providing a basis for normality-assumptions. Let us consider the following default theory:

T_{D3}: W1: Quaker (Nixon)
W2: Republican (Nixon)
D1: Republican (x): Pacifist (x)/Pacifist (x)
D2: Quaker (x): Not-Pacifist (x)/Not-Pacifist (x)

T_{D3} is almost identical with T_{D1} except for the fact that 'republican' and 'quaker' have been exchanged for each other so that instead of the default that if, for a specific x, it can be shown that x is a quaker and it cannot be shown that x is not a pacifist one should derive that x is a pacifist we have the default that if, for a specific x, it can be shown that x is a republican and it cannot be shown that x is not a pacifist one should derive that x is a pacifist, and correspondingly the rule of deriving someone's being a not-pacifist from his being a republican is replaced by the rule of deriving someone's being a non-pacifist from his being a quaker. T_{D3} has the same extensions as T_{D1}. Despite this, we would be probably reluctant to consider T_{D3} "as good as" T_{D1} and would perhaps like to say that though T_{D3} gives us the same results as T_{D1} it gives us these results "on the wrong grounds". Indeed Default Logic, as depicted so far, furnishes us with no means allowing us to account for the "quality difference" between both default theories, let alone to rule out T_{D3} as unacceptable. Here we stumble on something where the doctrine of the five-membered proof goes beyond Default Logic. The pertinent question is: When are we allowed to consider a default theory as acceptable on other grounds than its internal formal features? Or: Are all default theories with analogous formal characteristics equally acceptable and if not, what is it that distinguishes acceptable from inacceptable or more from less acceptable ones? In particular, which defaults should be accepted and which not? To be sure, also Default Logic addresses the question which defaults are acceptable or needed in so far as their formal characteristics are concerned.[65] But here we are concerned with a difference that is not reflected in any of the syntactic characteristics of a theory or its components. It is, however, not difficult to discern that the difference between T_{D1} and T_{D3} is such that it embodies a "potential" relevance regarding the generation of extensions in view of possible modifications of the theories concerned. More precisely, if we retain those components of both theories in which they differ – the defaults D1 and D2 in our case – and let alter those parts in which they coincide in the same way for both theories – e.g., by replacing W1 + W2 by W1*: Republican (Bush)' both in T_{D1} and

T_{D3} or by extending the set of W by formulae/propositions representing information about being or not a republican or being or not a quaker regarding other persons than Nixon – we obtain variant pairs of theories whose members also differ with regard to their extensions and we have good reasons to expect that a "qualitative difference" would emerge in that more variations of T_{D1} than (corresponding) variations of T_{D3} would yield "acceptable extensions", i.e., extensions whose members can be regarded as true on independent grounds.

The deeper reason why the doctrine of the five-membered syllogism contains an ingredient which has no parallel in Default Logic itself lies in the following fact: Whereas Default Logic makes thematic a notion which could be described as "acceptability relative to a theory" Ancient Indian Logic aims at something that could be described as "absolute acceptability". This means that our above mentioned concept of an acceptable (set of) beliefs or theorems was relative in the sense that its intention lies in telling us which beliefs or theorems should be regarded as acceptable *given* a certain (default-)theory. But it was not meant to let us know whether a proposition should be accepted or not absolutely, without qualifications. If at all, questions of acceptability in any "absolute" sense seem only answerable if the problem of the acceptability or adequacy of default theories as a whole is taken into consideration. Accordingly, the circumstance that the ancient Indian theoreticians were interested in acceptability of a non-relative kind in the sense that more than acceptability relative to an *assumed* set of established propositions and defaults was at stake would both explain the fact that the doctrine of the five-membered syllogism contained elements going beyond the frame of Default Logic proper and the fact that Indian theories of inference and proof were always closely linked up with epistemological issues.[66] In this way there is a connection between the existence of the assertion – or of the pair of assertion + conclusion – and the existence of the third member, the example, in the five-membered syllogism. Precisely because "absolute" acceptability was at stake "relative acceptability" possessed *a fortiori* also importance and accordingly the distinction between mere derivability according to certain (not truth-guaranteeing) standards and warranted assertibility was significant. On the other hand, the aim of establishing criteria of absolute acceptability made it imperative to consider the question of the appropriateness of defaults. If the doctrine of the five-membered proof would have aimed merely at the explication of some formal concept of derivability, it might have been sufficient to say that a proposition 'Sp' is derivable (in the pertinent sense of derivability) if (and only if) the default 'H(p): S(p)/S(p)' exists – or follows as an

instantiation from an assumed open default 'H(x): S(x)/S(x)' – and 'Hp' is hypostatized as an assumption. Or, if we adopt a formulation which we might more realistically expect the Indian theoreticians to have used: That something (the *pakṣa*) possesses some property (*dharma*) is derivable if (and only if) it (= the *pakṣa*) possesses some other property such that (all) entities possessing the latter property normally/typically possess the former property – and if it is not already established that the *pakṣa* does not possess this property. But the scope of what we call "Indian Logic" was broader and therefore it is not surprising that the doctrine of the "syllogism" contains more members than *hetu*, (*upanaya*) and *nigamana* and that specifically with the third member, the *udāharaṇa/dṛṣṭānta* an aspect was introduced which could be described by the word 'methodological'. It is a different question whether the procedure of finding examples exhibiting both relevant properties – or the lack of both relevant properties – can be regarded as an adequate method of establishing normality conditions. One can indeed argue that the existence of instances exhibiting the relevant properties (or the lack of both properties) outside the realm under discussion is neither a necessary nor a sufficient condition for the truth of propositions of the form 'A's are normally/typically B'. Accordingly, the demonstration of the existence of such instances embodied in the *udāharaṇa/dṛṣṭānta* is both on the one hand too restrictive and on the other hand too liberal. But the principle lying behind the dṛṣṭānta-requirement seems to be sound: It amounts to the demand that normality assumptions must not be introduced arbitrarily but should be based on facts gained from experience – provided that proving should be more than a mere formal exercise. On a more abstract level it corresponds to the principle that not only derivability from a given default-theory but also derivability-relations relative to certain variations of given default-theories matter. If we consider this attenuated version, we are entitled to say that a prominent feature of ancient Indian theories of proof and inference, namely the fact that it contains a reference to examples, must not be considered as something contingent or even as resulting from an "incapability of getting a clear notion of universal concomitance" (expressible by formulae of the form '(x) (Hx $\rightarrow$ Sx)'), as it has been sometimes suggested by scholars, but it constitutes the essence of the pertinent proof-concept. A theory of proof relying on the supposition of normality conditions is in some important respect incomplete if it does not address the question as to how such suppositions can be justified. *If* we regard the doctrine of the five-membered syllogism as concerned with default reasoning we can at least give an account of why the reference to examples might have appeared imperative and what role

can be assigned to the element embodied in the third member of the five-membered syllogism in this framework.

Thus we are able to understand all the five members as performing relevant functions in the context of default-reasoning. There is no need to regard the doctrine of the five-membered syllogism as based on "pedagogical" considerations or as relying on circumstances which are specific to public debates or argumentations. Rather reference to default reasoning allows us to interpret the theory of the five-membered syllogism as a model both for public demonstrations and for private inferences.[67] One should not disregard the attractive aspects which this explanation offers.

VII

We can draw a number of conclusions which are directly or indirectly relevant for the three questions formulated in the first chapter, namely 1. whether and to what extent what holds good for certain ancient versions of *anumāna*-theory can be generalized, 2. how different varieties of Indian theories of inference are related to various Western logical doctrines and 3. whether there are counterparts outside the Indian tradition that provide useful tools for analyzing and understanding "Indian Logic" and which they are.

1

The preceding investigations have suggested that considerable and important differences are to be found even within the history of Older Nyāya, if we understand by this term the totality of doctrines preceding the period which is commonly regarded as beginning with the works of Gaṅgeśa and referred to by the term 'New Nyāya' (*navyanyāya*). That the differences are by no means insignificant follows from the fact that we possess evidence for the existence of various conceptions regarding the question as to what is required for the acceptability of proofs and inferences. We can differentiate between at least three types of acceptability standards that can be correlated with different varieties of the subject-matter the doctrines are concerned with. The following order probably roughly reflects the historical development.

Type 1

It is required that *probans* and *probandum* are related in such a way that the latter ensues from the former on condition that the pertinent case can be regarded as conforming to normality. More precisely, the state-of-affairs constituting the evidence and the state-of-affairs forming the conclusion exhibit types such that states-of-affairs of the first type

do not occur without the occurrence of state-of-affairs of the latter type under normal circumstances (or circumstances which are considered to be normal). In the special case in which the exemplification of a property is derived on the basis of the exemplification of another property in one and the same substratum – a case which has been made the standard from a certain time onwards and characterizes the view of the "classical period" represented among others by the Buddhist logicians Vasubandhu and Dignāga – the condition of acceptability amounts to the requirement that a proposition expressible by formulations like 'H's are normally S', 'Typical H's are S' or 'An H is S, if it is a normal H' etc. should be true, where 'H' stands for the property which is supposed to give evidence for the exemplification of the other property ('S') in some particular instance.

As far as known, no explicit formulation of the acceptability criteria and principles which characterize this type is to be found in the texts. Nevertheless, there is sufficiently strong evidence of an indirect kind. First of all, a great number of examples of proofs or inferences mentioned in the older sources – and obviously deemed as exemplifying good proofs or inferences – belong to this type. Or more precisely, the proofs or inferences concerned are such that they correspond to a theory which complies with the characterization given above. The examples of the *Ṣaṣṭitantra* and other older sources which had been mentioned previously testify to this. Moreover, the discussion of NS 2.1.35–37, which we referred to at the beginning of the investigation, suggests that such an acceptability standard had been current at certain times and in certain schools or traditions and that it was considered as insufficiently rigorous by a number of philosophers, among them the author of that passage of the *Nyāyasūtras*.

It is characteristic for this notion of acceptability that it allows for the existence of exceptional cases. Even in view of the fact that certain kinds of clouds do not invariably bring rain, but only typically do so, the inference of future rain from the observation of "rain-clouds" was obviously regarded as legitimate by some (early) theoreticians. Similarly it seems little probable that those who advocated the inference from certain characteristic marks to the identity of a person or from the qualities of certain portions of rice to similar qualities exhibited by other portions etc. simply overlooked the fact that reasonings of this kind are not absolutely cogent. Even if their views have not been fully explicated the attitude of these persons must have rather been that one its entitled to make these inferences as long as no evidence to the contrary exists. In this respect the pertinent acceptability notion corresponds to the one which underlies theories of non-monotonic reasoning. In

the same way as in the (famous) example of deriving the proposition that Tweety can fly on the basis of the proposition that Tweety is a bird we should also hypostatize for (many of) the cases with which Indian theory (theories) of inference is (are) concerned in the early stages of the historical development that they represent reasonings carried out in default of more conclusive evidence but legitimized by the circumstance that the assumption of the conclusion complies better with certain normality assumptions than the assumption of its negation *even if* exceptions to the hypostatized norm both exist and are known to exist. Therefore the theories of this type can be linked to the notions of *utsarga* (general rule) and *apavāda* (exception) playing a prominent role in the tradition of Indian Grammar, though, as far as known, this connection had not been expressly stated in any of the relevant texts and has obviously not been exploited for developing more sophisticated theories of reasoning accounting for higher order exceptions (exceptions to exceptions etc.). At any rate, it is well testified by the textual sources that this type of acceptability criterion did not prevail in later times and that a stricter acceptability requirement became current which entailed quite a radical change in the subject matter covered by the theories.

Type 2

One could characterize the difference between the first and the second type by expressions like 'ordinary normality' and 'extraordinary normality' or 'tolerant normality' (= normality with exceptions) and 'intolerant normality' (= normality without exceptions). What is meant is the following: Whereas the first type of acceptability requirement demands merely that the negation of the proposition to be inferred expresses some abnormal or exceptional state-of-affairs, the second type involves the stricter requirement that the negated counterpart of the *inferendum* expresses a "unitary exception", i.e., a state-of-affairs exemplifying a type which occurs in no other instance – or at least is not known to occur in any other instance. In the context of inferences in which the exemplification of properties is derived from exemplifications of other properties inhering in the same substratum this means that the pertinent substratum would be a totally unparalleled instance of a certain kind of exceptionality if the proposition to be inferred would not hold true. The exceptionality consists in the fact that some property does not cooccur with some other property in the same substratum.

Such a theoretical position can be connected with a number of texts of the "classical period", like the *Nyāyapraveśa* and the *Praśastapādabhāṣya* and more particularly with the doctrines of the "three marks of a logical reason" (*trairūpya*) expounded in these sources. It is true that we must reckon with the possibility of different varieties

of the *trairūpya*-conditions itself and possibly two aspects are intermingled in this doctrine which one could refer to by the expressions 'ontic' and 'epistemic'. The difference is roughly that ontic *trairūpya*-versions lay down certain conditions regarding the actual occurrence of the relevant properties (the proving property and the property to be proven) whereas epistemic *trairūpya*-versions relate to what is known about the occurrence of the properties. Nevertheless, the existence of this diversity (or the possibility of its existence) does not endanger the unity of the type of acceptability requirement. For it affects the acceptability standard only insofar as, whereas the ontic *trairūpya*-version entails that the substratum of inference (the *pakṣa*) would constitute the only *existing* exception regarding the cooccurrence of the relevant properties, the epistemic *trairūpya*-version implies that it would constitute the only *known* exception in case the proposition to be inferred would not hold true. It does, besides, not seem that ontic and epistemic *trairūpya*-accounts were considered as rivals in the period in which the above mentioned texts were written; rather some sources suggest that both issues have not been clearly distinguished.[68] Therefore, we should not rushly derive that these differences must reflect fundamental divergences with respect to acceptability standards. Rather we should say that epistemic and non-epistemic *trairūpya*-accounts tended to merge because the epistemic varieties represent criteria for what the ontic versions (literally) express: the lack of knowledge of any abnormality instances can support the assumption that abnormality outside the realm of the *pakṣa* does in fact not occur.

The hypothesis that a number of texts written around the time of Dignāga represent such an acceptability standard based on "intolerant normality" is also not refuted by the circumstance that even in texts preceding the *Nyāyapraveśa* and the works of Dignāga, like Vasubandhu's *Vādavidhi*, terms expressing "invariable concomitance" such as *avinābhāva* are documented. First of all, it is not absolutely certain that this term (or similar terms) for invariable concomitance means the same as '$(x)\ (Hx \rightarrow Sx)$', i.e., everything possessing the *hetu*-property (= the proving property) (also) possesses the *sādhya*-property (= the property to be proven), when it occurs in these texts. At least in a relevant number of cases the possibility cannot be ruled out that such words refer to a universal concomitance in the realm of all entities apart from the *pakṣa* – i.e., what would be expressed by '$(x)\ ((x \neq p\ \&\ Hx) \rightarrow Sx)$'. But there is not even the need to resort to this possibility. We can very well assume that these terms are intended to designate invariable concomitance of an absolute kind. The decisive point is that even under this assumption we are only committed to derive that the authors of

these texts had the *notion* of unrestricted invariable concomitance. It does not follow that absolute invariable concomitance has been treated as a necessary condition for the acceptability of proofs or inferences in the respective theories. In the context of a doctrine that postulates strict normality in the sense that apart from the instance under discussion (= the *pakṣa*) no exception must exist to the rule that wherever the *hetu*-property occurs the *sādhya*-property must be exhibited too the concept of an absolute invariable concomitance ensues in a natural way from the combination of the idea of the fulfillment of this requirement with the idea of the truth of the proposition to be proven. In fact, if both "strict normality" holds and the outcome of the inference/proof to the effect that the *pakṣa* possesses the *sādhya*-property on the basis of its possessing the *hetu*-property is true absolute invariable concomitance follows with necessity.[69] Therefore it would be illegitimate to derive from the mere existence of the concept of an invariable concomitance that the acceptability requirement was stronger than what we called "strict" or "intolerant normality". To be sure, it is *a priori* possible that the notion of unrestricted invariable concomitance has been also assigned the role of a necessary condition of acceptability. But as far as a number of pre-Dharmakīrti texts, like the *Nyāyapraveśa* and others, are concerned, there is more evidence for the view that only invariable concomitance in the realm outside the *pakṣa* was required for the acceptability of arguments (apart from other demands not concerning concomitance) and that accordingly any notion of unrestricted invariable concomitance would describe a situation in which both a reasoning or an argument fulfills all acceptability requirements and its outcome is true.[70] But this does not mean that absolute invariable concomitance was never taken as a necessary requirement in the history of Indian theory of inference. We must distinguish a further type.

Type 3

The defining characteristic of this type is that any inference to the effect that 'Sp' from the fact that 'Hp' is only acceptable if '(x) (Hx → Sx)' (= "All H's are S's") is true. This is a demand which has been adopted by Dharmakīrti and despite the fact that he claims that his views correspond to those of his predecessor Dignāga he might have been the first one who prescribed such a rigourous acceptability condition. As a matter of fact, his requirement is even stricter than this because his doctrine of "essential connection" (*svabhāvapratibandha*) has been probably designed to rule out cases in which a proposition of the form '(x) (Hx → Sx)' holds good "by chance". Not actual abnormality but the very possibility of its existence has been regarded by this Buddhist author as something which should be excluded for

legitimate inferences. But in this context we are not interested in giving an enumeration and description of all the subvarieties which have occurred in the course of historical development. Since it is our aim to distinguish main categories we assign Dharmakīrti's theory to this type because unrestricted invariable connection is *entailed* by the standard laid down by him.

2

If, as we claimed earlier, the order of these three types really corresponds to a historical progress we should not disregard the question as to the factors causing or at least favouring such a development.

A) *The transition from type 1 to type 2*

For understanding the transition from type 1 to type 2 we have to recall our initial observations on the scope and subject matter of ancient Indian theory of inference. The fact that *anumāna* subsumes both everyday reasonings and the establishment of doctrinal, in particular philosophical, tenets attains relevance at this point. If *anumāna*-theory had been only designed for handling commonsense issues it might have been confined itself to requiring "weak" or "tolerant" normality as a criterion. For in the context of everyday reasonings under incomplete information the idea appears plausible that inferring should serve to compensate for this deficiency by enabling one to deduce which state-of-affairs can be assumed as existing in order to be in a good position for acting successfully. For this purpose a means for identifying propositions possessing a sufficiently high degree of probability is needed and accordingly inquiries about what has to be expected under conditions of normality, even if exceptions (are known to) exist, are entirely appropriate in this connection. But the situation is different in doctrinal matters. Here it is not a question of provisional acception of propositions but of establishing tenets apt to be defended against rival claims and to serve as a foundation on which one can build further assumptions. The idea of normality tolerating exceptions does not constitute a proper basis for assuming that some consequence follows from certain facts with necessity. It is because in doctrinal matters one feels the need of grounding one's tenets on foundations from which they are derivable with some kind of necessity that the demand that the pertinent conclusion should follow from (the assumption of) certain facts on the hypostatization of normality conditions tolerating exceptions is bound to appear too weak. In the framework of proofs and inferences establishing propositions of the form 'Sp' on the basis of propositions of the form 'Hp' it holds good that *if* the pertinent relationship of consequence should be fit to be connected with any notion of necessity

the truth of a proposition of the form 'H's are normally/typically S' appears insufficient. We should therefore have no difficulty to understand the adoption of the view that if a necessity exists then it must also hold good that (at least) apart from p H's are unexceptionally S.

B) *The transition from type 2 to type 3*

The transgression from type 2 to type 3 can also be easily explained on the basis of what has been stated above. The distinguishing mark of type 2 is that something which is (apparently) included in the idea of the necessity of the *avinābhāva* between H and S (= the fact that whenever H is exemplified S is exemplified), namely the existence or knowledge of a strict regularity outside the domain of the subject of inference, is given the status of an acceptability requirement.[71] But is it not quite natural to assign this role to the necessity of the *avinābhāva* itself? It is probably the instability of the theoretical situation arising from the adoption of a type 2 requirement and the naturalness of substituting entailed theorems by the entailing principle which made Dharmakīrti honestly believe that he did nothing else than giving a fuller explication of the preceding tradition. But this does not at all mean that the Buddhist philosopher was right in his views on what he did and what is appropriate to do.

First of all, it must not be forgotten that the adoption of a type 3 requirement is natural only if one starts from type 2, whereas it is not a natural outcome of a situation characterized by a type 1 criterion. For this reason the transgression from type 1 to type 2 can be regarded as an essential intermediate step leading to the introduction of a type 3 standard. More precisely, the motivation lying behind the replacement of type 1 by type 2 was itself a decisive factor initiating a "dialectical movement" causing the overcoming or the "Aufhebung" of type 2 and its replacement by type 3. But in the absence of that motivation this particular urge for adopting a type 3 requirement vanishes.

Moreover, Dharmakīrti's reasons for his advocation of an unrestricted *avinābhāva* as a necessary acceptability condition are of different nature and value. At the end of the *Hetubindu*-passage discussed above an odd metaphysical consideration is put forward: The author says that the "own nature", the *svabhāva*, of things never changes and that accordingly a reason which has the quality of proving the *probandum* by its own nature cannot be made something else and similarly a reason which is not probative cannot become otherwise. On the one hand, this remark just expresses the opinion that probativeness or non-probativeness is a matter of "either-or": either a reason is probative at all or it is never probative. But the recourse to the *svabhāva*-concept is remarkable. We know from elsewhere that this term fuses the conception of an "intrinsic nature",

of a quality or set of qualities which something possesses irrespective of what holds true of other things of the world, with the notion of something which an entity has as an inalienable possession as long as it exists.[72] In view of this fact it seems that *one* factor for Dharmakīrti's position regarding the invariability of probativeness lay in his conception of marks of a proper logical reason as something peculiar to it and as qualities a logical reason possesses irrespective of the constitution of any other entity, in particular irrespective of the cognitive situation of persons who argue or infer. Having been transposed into the key of the *svabhāva*-concept this idea merged with the notion of something a logical reason must always possess, if it possesses that at all. The outcome was the well documented aversion to any theory which implies that probativeness or acceptability can be a matter of external circumstances and something that characterizes an entity only temporarily. As far as Dharmakīrti's rejection of context-sensitive probativeness essentially relies on the merging character of the *svabhāva*-concept his position has surely not got a sound foundation.

There are, however, more factors which have to be considered. It is well known that Dharmakīrti introduced into the theory of inference both the notion of "connection by/of self-essence" (short: "essential connection" = *svabhāvapratibandha*), subdivided into the *tādātmya*- and *tadutpatti*-relations, and the doctrine of three types of (logical) reasons, namely *svabhāva-*, *kārya-* and *anupalabdhihetu*. On the one hand, these innovations involved restrictions at least with regard to some of the older doctrines – and Dharmakīrti's theory has been criticized on the part of the Brahmanical schools on this account – but on the other hand Dharmakīrti extended the range of the inference-concept and the scope of *anumāna*-theory to a crucial degree. A standard example given at various places by Dharmakīrti in order to illustrate the concept of *svabhāvahetu* is the derivation of something's being a tree from its being a *śiṃśapā*(-tree). This is an inference of the same nature as if one deduces from the fact that something is an oak that it is a tree or from the proposition that someone is a boy that he is male or human etc. The crucial point is that regarding examples of this kind it appears entirely plausible to look at the matter in the way that a logical reason either is probative and remains probative irrespective of how much and what further information is added or it is not probative at all. Transformed into the key of derivability this amounts to the fact that a proposition (e.g., "The highest plant is Stockholms Kungsträdgården is a tree") is derivable from some (other) proposition (like: "The highest plant in S.K. is an oak") as an assumption in the same way as from any larger set of assumptions containing that proposition as an element.

In view of certain standard examples of *svabhāvahetus* a monotonic conception of derivability seems appropriate. But this highlights only the fatality of Dharmakīrti's undertaking to account for conclusions of that type in the same theoretical framework as the inferences which were in the focus of the foregone theories. Dharmakīrti attempted to bring together something which should not be brought together, at least not in the way he and other later Buddhist logicians did. Derivations of the *śiṃśapā* → tree type can be characterized as reasonings under surplus information whereas the older standard examples represent reasonings under deficient information. Accordingly the corresponding theories could be compared, in the first case, with instructions on how one might spend or invest one's capital without overdrawing one's budget; in the second case, however, we need a theory which works in the manner of guidelines telling us when and how we might afford something without possessing sufficient funds. In the same way as any good financial consultation should not cover up the difference between buying something with one's own money and buying on loan and must not neglect the circumstance that goods bought with loaned money may have to be given back, a good theory of reasoning under incomplete information must account for the possible consequences of further cognitive interactions with the world of reality – and accordingly also for the possible case that "reality" demands back suppositions which she had previously granted us to adopt.

It is true that Dharmakīrti undertakes attempts to show that both types of essential connection guarantee an invariable concomitance between reason and consequence. In the case of *tadutpatti* and *kāryahetus* this involves the claim that specific effects can have only one specific type of cause so that inferences from effects to their causes are safeguarded against growth of information. The arguments Dharmakīrti offers to this effect are questionable, however, not only because any claim excluding the possibility that different kinds of causes can have qualitatively identical effects appears *prima facie* little plausible but also because it seems that Dharmakīrti employs for his proofs a "modal scope fallacy" in form of a transgression from the proposition 'It is necessary that every cause has an effect' to 'Every cause has an effect necessarily' (= 'Every cause has necessarily an/the effect it has'). But for the sake of argument we can grant the hypothesis of a unequivocal relationship between *probans* and *probandum* even outside the realm of *tādātmya*-relationships and *svabhāvahetus*. After all, an advocate of Dharmakīrtian tenets could withdraw to the position that the concept of *tadutpatti* involves the notion of "originating from that and only that". He might say that the impossibility of originating from other

kinds of causal factors is a defining mark of this term and that it does not essentially harm his position if the corresponding notion deviated from the ordinary concept of causality. If in this way the notion of an unrestricted invariable concomitance were inbuilt in the pertinent concepts defining the varieties of *svabhāvpratibandha*, it would indeed follow that *if* a *probans* is connected with a *a probandum* by essential connection *then* it is guaranteed that any particular instance of the *probans* must also be an instance of the *probandum* and this conditional proposition would seem to be immune in view of any extension of information under these circumstances.

But even if we grant all this, Dharmakīrti's criticism of the doctrines which are the target of the polemics in the above discussed *Hetubindu*-passage is not vindicated. For even under the assumption that a relationship of monotonic derivability exists between a set consisting of the propositions 1) that H is related to S by (some type of) *svabhāvapratibandha* and 2) that p exhibits H, on the one hand, and the proposition that 3) p exhibits S, on the other, the need of a non-monotonic and "context-sensitive" notion of derivability is not refuted. In the doctrines of Dharmakīrti's opponents the issue is not of deriving 3) from a set containing 1) and 2) but of deriving 3) from 2) alone. The unique set consisting of 2) would under the given presuppositions at best allow for a monotonic derivation of the conditionalization of 1) and 3), i.e., the proposition that if H and S are connected by *svabhāvapratibandha* then p exhibits S. But this reveals that Dharmakīrti's position merely shifts the difficulty. We are now confronted with the problem of how one can establish the proposition that H and S are related by *svabhāvapratibandha*. And at this point also Dharmakīrti seems to be unable to avoid the admission of "jumping to conclusions" characteristic of non-monotonic reasoning. For we know that this Buddhist philosopher provided a procedure of the establishment of *tadutpatti*-relations which is based on observations of instances of concomitance and non-concomitance of *probans* and *probandum*. But it is difficult to see, how any amount of observations of e.g. the concomitance of smoke and fire together with the non-observation of any instance of smoke without fire should allow for a derivation of a *svabhāvapratibandha*-relationship between smoke and fire (or more precisely, between the properties of being provided with smoke and of being provided with fire) that is immune against any knowledge-extension, if the concept of *svabhāvapratibandha* included unrestricted invariable concomitance as its ingredient. Perhaps Dharmakīrti is entitled to claim that in the classical standard examples of inferences as well as in all admissible inferences also derivations of a monotonic kind must be involved. But the reason, why this would not

vindicate his position against his opponents lies in that Dharmakīrti is not content to add a new derivability notion to an older one or to show that and how both corroborate in certain instances, but attempts to discredit any concept of derivability which is sensitive to enlargement of information. Since at least in the case of *tadutpatti* a *svabhāvapratibandha*-assumption can only be taken on credit, the belief that the notion of "essential connection" could make such derivation-concepts superfluous is illusory. It is comparable to the illusion of a person who thinks that some borrowed money is equivalent to money he has earned himself merely because a loan has been transferred to his own personal bank account.

So far it seems that the tradition initiated by Dharmakīrti has introduced innovations and widened the theoretical scope, but no clue has been found to any shortcomings of the older approaches that have been overcome by the theoretical revisions. Rather it appeared that the rejection of former views was due to an imposition of principles appropriate to some field on another area requiring different norms. This diagnosis does not, however, do full justice to the facts.

We should consider that the theoretical situation immediately preceding Dharmakīrti's revisions exhibited a number of odd features. If its description given by us above is correct, it was characterized by an acceptability criterion which – leaving aside requirements not referring to cooccurrence conditions – demands the existence of an invariable concomitance between some property H and some property S in the realm of all entities apart from the substratum of inference or of all entities except the *pakṣa* with which the inferring person has become acquainted. The principle lying behind this standardization was in all probability that non-existence of exceptions to a rule in a domain should support conformity to the same rule in another domain. At any rate, it is difficult to see what else would constitute a rationale for this requirement. But Dharmakīrti appears to have perceived the brittleness of the involved principle. He considered examples like the inference that all the remaining not tasted fruits growing on a tree have the same taste or state of maturity like the tasted ones and probably was acquainted with cases like the proof (mentioned by certain Dharmakīrti-commentators) which claims that some boy who is the son of a particular mother must be dark-skinned because he is the son of that particular mother and all other sons of the same mother (known so far) are equally dark-skinned. The crucial point is not that a regularity existing or observed in a domain does not strictly entail that the same regularity holds also in another domain but that there are cases where the existence of a regularity in a number of instances does not appear to give support to its existence

in other relevant instances. The probability that further cases comply with a regularity is not always increased by the circumstance that it is unexceptionally exhibited in some domain even if the number of corroborating instances is high.

That this kind of scepticism concerning the probativeness of corroborated regularities is not unjustified can be gathered from the following "immortality proof": Suppose, someone has lived for about eighty years. He possesses an inductive basis of more of less thirty-thousand days of which he can truly say that they have not been his last day. Now, immediately after the thirty thousandth day of his life he might reason that he will not die on the thirty thousandth and first day on account of the fact that this is a day of his (present) life following the day of his birth like the thirty thousand days preceding the present day.[73] Possessing now an inductive basis of thirty thousand and one days he might with even more confidence derive that he should not die on the thirty thousandth and second day because the previous thirty thousand and one days following his birthday were not his last day etc. *ad infinitum*. Even if it were urged that days regarding which it has been only derived by inference that they are not days of one's death have to be excluded from any inductive basis and cannot be legitimately used as "examples", the reasoner could still live happily from one day to the next if he knew that at least the following day cannot be his last one.[74] If it were the case that any increase of "inductive basis" corresponds to an increase of "derivational security" our confidence in survival could be nicely enhanced by such reasonings conforming to the maxim: "The longer we live the better our prospects are of surviving the next day".

Although this example is, as far as we know, nowhere taken into consideration by Dharmakīrti or in the tradition which follows him, there is evidence that his logical reforms were (at least partly) motivated by a fact which the above devised "immortality argument" highlights: The circumstance that something would represent a unique exceptional case if some predicate would truly apply to it, is not *necessarily* a good argument for assuming the contrary, i.e., the truth of a proposition represented by an ascription of the corresponding negated predicate to the entity in question. Dharmakīrti seems to have been correct in rejecting the views of (certain of) his predecessors on account of the circumstance that they relied on purely statistical considerations. If it were otherwise, we should in fact feel urged to regard as valid the inference that some person will never experience his last day if one were given the assumption that, apart from some particular day, all days were not his last day, and analogous derivations could be made from similar assumptions not involving predicates which by force of

their meaning can only hold true of numerically one entity.[75] The fact of the matter appears to be that *sometimes* but by no means *always* the supposition of the occurrence of an exceptional case constitutes a basis for the rejection of certain assumptions and for the derivation of propositions from the fact that those assumptions are to be rejected. On this background Dharmakīrti's theory of "essential connection" can be viewed as an attempt to provide an answer to the question as to under what conditions considerations referring to suppositions of exceptionality or abnormality constitute valid arguments. The answer would be that only if a *svabhāvapratibandha* is given abnormality considerations are relevant.

If this is so, Dharmakīrti's doctrine of *svabhāvapratibandha* appears to be the outcome of a justified question. But this does not mean that the particular answer given in his theory must be accepted. First of all, it has to be noted that the admission that there are cases in which considerations of abnormality constitute arguments and cases in which they do not involves, strictly speaking, at best a need for amendment but not necessarily a need for substitution. After all, it could be argued that concomitance-relationships in a domain *are* criterially related to the existence of analogous conditions in other domains, but since they do not unexceptionally constitute valid grounds a meta-theory is required which on the one hand gives an account as to why concomitance-relationships are criteria whenever they are and on the other hand provides us with a clue when they (might) fulfill this function. It is tempting to say that concomitance relationships in a domain are suited as criteria relative to another domain iff the former relationships are due to a rule which equally holds good in the latter domain. Or, on a still higher level of abstraction: states-of-affairs suggesting a regularity in a domain are suitable criteria regrading other domains iff the circumstance that they suggest this regularity is due to something that is responsible both for the former regularity and for regularities in the other domains.[76] Now, as we suggested above, Dharmakīrti's doctrine of essential connection *can* be seen as a specification of possible bases of regularities justifying extensions from domains to other domains. In so far as it fulfills this purpose no absolute necessity exists, however, to *replace* regular concomitance in a domain by *svabhāvapratibandha*. Even though it does not correspond to the role assigned by Dharmakīrti himself to his notion of essential connection, we should perhaps best consider the theory of *svabhāvapratibandha* as destined to tell us what a person who takes the fact that a universal proposition – in particular a proposition of the form 'All H's are S' – is corroborated and not invalidated in a domain as a criterion for the assumption that this proposition is corroborated

and not invalidated also in another domain should be committed to. The intuitive idea is that the corroboration must not be due to mere coincidence or to factors which are not operative in the relevant domain. In other words, both the corroboration in the original domain and, if it exists, the corroboration in the extended domain must be due to some common ground.

But now we are able to see that this general idea of a common reason or factor responsible for regularities in different domains and thus also the idea lying behind the notion of essential connection is by no means inseparably tied to "strict", "intolerant" regularities. On the contrary, precisely the same considerations could also be connected with common regularities tolerating exceptions. *If* the circumstance that smoke has never occurred without fire in all instances apart from the Ainsley Mountain in Canberra on the 7th August 1992 is *by itself* no valid basis for assuming that smoke on the particular mountain at that particular date indicates fire, *then* the circumstance that in the realm of birds apart from Tweety and his friends it holds good that birds normally fly should *by itself* yield no sufficient basis for assuming that Tweety and his friends should fly since birds normally do.[77] It seems, however, that in the latter case we assume more than merely that birds apart from Tweety and his friends normally fly: We believe in fact that flying and being a bird is not a matter of coincidence and that, whatever the reason of its not being a coincidence in the realm of Tweety and his comrades might be, it applies also to Tweety etc. These considerations enable us to place the theory of *svabhāvapratibandha* in the context of default reasoning: Like the doctrine of examples in Indian theories of inference the requirements implied by this theory pertain to the sphere of "methodology" and concern the question as to which defaults should be adopted. The application of the above described idea to defaults amounts to the requirement that we cannot accept a default like:

Bird (x): Flies (x)/Flies (x)

merely because of the fact or the observation that this rule would work in *some* realm or that a realm exists which is compatible with the assumption that birds normally fly. To be sure, we can *adopt* this default *on the basis of* this fact or observation, but – if Dharmakīrti is right in this respect – by doing this we commit ourselves to more. The same would equally hold for a default like:

Car (x): Five-seated (x)/Five-seated (x)

although the root of the regularity would have to be traced in socio-cultural norms rather than in natural laws. This strengthens the suspicion

that Dharmakīrti's version of *svabhāvapratibandha*-doctrine, which contains merely the varieties of *tādātmya* and *tadutpatti*, might be too narrow.[78] But now it should be also clear that the tie between "essential connection" and absolute invariable concomitance which has been established by Dharmakīrti can be severed. The close concatenation between both notions is a result of the development from type 1 to type 2 acceptability criteria. The idea of unexcepted regularity in the realm apart from the *pakṣa* in combination with the idea that the regularity extends to the *pakṣa* yields absolute regularity without exception.[79] Tolerant regularity outside the *pakṣa* plus extensibility to the *pakṣa*-realm gives merely a basis for propositions of the form 'H's are normally S' etc. On this account one can regard the transformation of type 1 to type 2 theories as a decisive step towards the *svabhāvapratibandha*-doctrine in the Dharmakīrtian version.

In order to fully understand how Dharmakīrti's teaching of *svabhāvapratibandha* could originate on the background of theories of defeasible reasoning we must, however, consider a peculiar feature of the traditional doctrines he was acquainted with. We have already earlier drawn attention to different varieties of the doctrine of the "three marks of a logical reason" (*trairūpya*) and distinguished between "ontic" and "epistemic" varieties. The former ones require (among other things) that, as a matter of fact, the *hetu* is invariably connected with the *sādhya* in the domain outside the substratum of inference, which means that the pertinent regularity must hold good in the total realm of entities apart from the *pakṣa*. If, as claimed above, the theorem of *svabhāvapratibandha* is related to the idea of a principle generating regularities in different domains and justifying the assumption that a regularity of one domain can be regarded as holding also in another domain and if the domains in question consist a) of all entities apart from the *pakṣa* and b) the *pakṣa*, so that both together constitute the whole realm of entities, the consequence ensues that *svabhāvapratibandha* must hold with unrestricted universality. We know that Dharmakīrti rejected proofs and inferences if they were grounded on some regularity which operates only in a partial domain. This is shown e.g., by the way Dharmakīrti dismisses in a passage cited above (chapter IV) the possibility of deriving qualities of herbs, if the possession of those qualities is restricted to certain "frame-conditions", like a specific soil, climate etc. Dharmakīrti's works show that their author was not ready to admit anything like a "regional *svabhāvapratibandha*". This appears quite intelligible if we assume that this Buddhist author orientated himself by ontic *trairūpya*-versions and corresponding acceptability requirements and intended that the notion of *svabhāvapratibandha* should (inter alia) represent a guarantee

against the possibility that the *pakṣa* constitutes a unique exception to an otherwise universal regularity. The situation would be entirely different if one takes epistemic *trairūpya*-conditions and corresponding acceptability criteria as a starting point. In this case the pertinent domains would be, on the one hand, the *pakṣa*, as in the former case, but instead of the realm of *all* entities apart from the *pakṣa* we would have the realm of all entities insofar as it is known of them whether they corroborate the pertinent regularity or not. For an acceptability criterion based on epistemic conditions would involve that the fact that only compliance with and not contradiction to the regularity has been *observed* is taken as a basis for deriving that the substratum of inference is consistent with the same regularity. But since the sum of the relevant domains does not amount to the totality of all entities in this case, the analogous idea of a principle unifying regularities in different realms does not involve unrestricted universality any more. Therefore the possibility of "regional *svabhāvapratibandhas*" suggests itself as soon as we regard the idea of a principle responsible for regularities in different realms on the foil of a reasoning to the effect that a regularity corroborated but not contradicted so far should also be hypostatized as being corroborated in some other instance(s). Thus the universality connected with Dharmakīrti's concept of *svabhāvapratibandha* cannot be satisfactorily explained by the mere notion of unexceptional regularity and the existence of type 2 theories which are linked to this idea. If, however, we take into consideration specific peculiarities of those type 2 doctrines of which we have every reason to assume that Dharmakīrti was well acquainted with them, it seems possible to give an account of this aspect of his doctrine according to which it would not appear accidental.

We cannot only distinguish between "tolerant" ("soft") and "intolerant" ("hard") but also between "regional" and "universal" regularities, and, since both distinctions seem to be independent of each other, between four possible subvarieties resulting from combining the features of one group with features of the other group. Leaving aside for the moment the question of the possible role and utility of "regional *svabhāvapratibandhas*" in the context of reasonings supposing the extensibility of ("hard" or "soft") regularities from domains to other domains[80] we can note that Dharmakīrti initiated a theoretical development which is characterized by the following features:

1

A great number, if not practically all, commonsense reasonings were *de facto* excluded from the realm of correct inference. This is due to

the fact that acceptability has been subjected to *svabhāvapratibandha* by Dharmakīrti and his notion of "essential connection" entailed both strict and universal regularity. To be more precise, the crucial point was not the requirement of strict and universal regularity *per se* but the demand that this regularity must hold between *hetu* and *sādhya*. If the Buddhist author had only demanded that if a conclusion should acceptably follow from a singular proposition *some* universal proposition of the form '(x) (Fx → Gx)' in which a term for the *hetu*-property occurs *within* the expression replacing 'F' must be true, inferences based on "regional regularities" would not have been necessarily ruled out. If we inferred e.g., that some herb possesses some particular taste because it belongs to such and such a species and it turned out that herbs of the pertinent species have the particular taste only insofar as they grow on certain kinds of soil, the argument could still be saved from invalidity by appealing to the fact (or claiming) that a proposition of the form '(x) ((Cx & Hx) → Sx)' is true, where 'C' gives a full specification of "normality conditions", i.e., of the non-existence of any condition which might cause non-compliance with the rule that an H is also an S, and 'H' and 'S' refer to the respective *hetu*- and *sādhya*-properties. But since according to Dharmakīrti invariable concomitance must be fulfilled for the *probans* and *probandum* themselves a reasoner would have to foresee all exceptional circumstances if he should present a valid argument for the possession of a particular taste by the respective herb or group of herb plants. It is not difficult to see that even the standard example of inferring fire from smoke is thus threatened by invalidity because there seems to be no *a priori* guarantee against the possibility that smoke could sometimes also occur without fire. It was only by resorting to artificialities of "proving" that effects of the same kind must always possess causes of the same kind that the distress could be partially relieved.[81]

2

Dharmakīrti's theory specifies acceptability only by taking *svabhāvapratibandha* as a starting and not as an end-point. Irrespective of whether we formulate an "ontic" acceptability criterion saying that an argument to the effect that Sp is acceptable if it relies on the fact that Hp and a *svabhāvapratibandha* between H-ness and S-ness exists or an "epistemic" version according to which Sp can be validly derived from Hp if, besides that Hp is established, also the existence of a *svabhāvapratibandha*-relation between H-ness and S-ness is known, no specification of the way in which the assumption of the pertinent *svabhāvapratibandha*-relation has been gained is involved. To be sure,

Dharmakīrti describes in various textual passages a normative procedure of establishing an "essential connection" for *kāryahetus* and the *tadutpatti*-relation. But since reference is made to various observances of occurrence or non-occurrence of the relevant properties in individual instances there remains no other diagnosis than that one has to jump to the conclusion of the existence of a *svabhāvapratibandha*.[82] On account of the fact that the reasoning process leading to the assumption of a *svabhāvapratibandha* is to a great extent ignored Dharmakīrti's approach exhibits a certain parallel to that of the above described version of Default Logic, where also the aspect of the working mechanism of a *given* default theory was brought into focus.

Since Dharmakīrti's theory suggests that we have to hypostatize the existence of a *svabhāvapratibandha* as an assumption and since on the other hand his *svabhāvapratibandha*-concept entails universal and strict regularity in form of an *avinābhāva* between the H- and the S-property, his doctrine evokes the impression of an affinity to a theory of syllogism where it is claimed that from '(x) (Fx $\rightarrow$ Gx)' and 'Fa' as assumptions one can derive 'Ga' as a conclusion. But viewed as a syllogistic doctrine it appears extremely exotic in view of the fact that we have here a principle entailing a proposition of the form '(x) (Fx $\rightarrow$ Gx)' but not being entailed by it, whereas in fact the proposition '(x) (Hx $\rightarrow$ Sx)' together with the proposition stated by the logical reason, namely 'Hp', are sufficient for a logically stringent derivation of 'Sp', which is intended to be proven. But the mystery evaporates as soon as we do full justice to the fact that Dharmakīrti's tenets have arisen from an entirely different background than a theory of syllogistic figures and that the complex of problems in which the tradition before Dharmakīrti was interested concerns those kinds of reasoning which form the object of that which bears the title "Non-Monotonic Logics". Dharmakīrti's theory is not some queer variant of syllogistics but represents a teaching exhibiting a point of contact with the doctrine of syllogism. We have tried to show that a number of historical contingencies were *also* decisive for initiating a development that brought those different kinds of theories closer to each other.

The circumstance that a similar degree of proximity has often been assumed by Western scholars for doctrines preceding Dharmakīrti is probably due to an undue projection of certain ingredients of Dharmakīrti's philosophy to those of his predecessors, in particular the assumption that also at Dignāga's period an unrestricted invariable concomitance (including the realm of the *pakṣa*) was commonly regarded as a necessary condition of validity. It should, however, hardly be necessary to point out that the main results of the preceding discus-

sion must not be decisively affected if it turned out that the view of an unrestricted *avinābhāva* as an indispensable acceptability-requirement existed also before Dharmakīrti.

VIII

It seems that Non-monotonic Logics give us a useful tool for analysing and understanding Indian theories of inference. This must not mean that they are the only theories which could be entitled to such a claim. Given that Non-monotonic Logics and theories of *anumāna* – at least partially – share a common subject matter the former ones are on the one hand helpful for a clearer conception of the pertinent subject matter and thereby for a better grasp of the function, scope and adequacy of *anumāna*-doctrines and their components. On the other hand, relating theoretical elements of Indian theories of inference to certain systems of Non-monotonic Logic enables us to acquire a more explicit understanding of the nature of *anumāna*-doctrines – and possibly also of modern theories on non-monotonic reasoning.

1

By taking into account that "Indian Logic" has (one of) its roots in commonsense-reasoning and that this type of deriving conclusions from facts or assumptions exhibits the feature of non-monotonicity explicated before, we can easily explain the circumstance that *anumāna*-theory concerns the acquisition of explanatory hypotheses and that explanations constitute an important object of Indian theories of inference.[83] Though the notion of the hypostatization of normality-conditions is not analytically contained in the concept of non-monotonicity, it is obvious that reasoning under the hypostatization of normality forms an important variety of non-monotonic reasoning. At any rate, this is undoubtedly a characteristic feature of many instances of commonsense-reasoning, and if Indian Logic was from its very beginning concerned with commonsense-reasoning it should be no surprise that the idea of normality has guided the theoretical elaboration. Explanatory hypotheses enable us to keep the "surprise value" of certain facts or occurrences at a maximally low level and to preserve assumptions we regard as supported by other facts and events and which otherwise (i.e. without the hypostatization of the explanation) might have to be abandoned. Accordingly many of the examples we find in the ancient Indian literature concern cases where the proposition to be inferred allows one to avoid assumptions of abnormality and which constitutes an explanation if the pertinent abnormalities were inexplicable. The restriction involved

in the transgression from type 1 to type 2 doctrines amounts, regarding explanations, to a narrowing down of the scope to explanations which are necessitated in order to avoid unique abnormality. That this alone implies a substantial reduction of the theoretically covered area of commonsense-reasoning needs no further demonstration.

2

Considering inference as (a type of) non-monotonic reasoning and *anumāna*-theory as explicating such reasoning has also consequences for the evaluation of inference as means of cognition and consequently of epistemological issues such as those which are addressed by the general theory/theories of "means of (valid) cognition". In particular, it affects the evaluation of the different varieties of theories of "means of (valid) cognition" = *pramāṇa* in the Indian tradition.

There are theories which assign a very wide scope to inference in the sense of *anumāna* and theories which limit the scope by assuming more means of valid cognition and attributing certain functions to them instead of *anumāna*. If we leave out of account the special requirements which have been set up by various theoreticians for *anumāna* and refer exclusively to the features of non-monotonicity and the hypostatization of normality-conditions, the assignment of an extremely wide range becomes in fact plausible. It would have a parallel in the claim that Non-monotonic Logics possess an extraordinary vast field of applications, a claim which might not be unfounded after all. If this were granted, one might feel inclined to follow the views of those theoreticians who accepted only two kinds of *pramāṇa*, perception and inference, trying to subsume a series of other alleged means of cognition under inference, like a number of Buddhist authors or Praśastapāda in the Vaiśeṣika-school.

A connection might even be construed between the subsumption of the means of cognition "word" (*śabda*) under inference and the application of Non-monotonic Logics to linguistic understanding. Default reasoning seems indeed to play an eminent role in understanding of linguistic phenomena. However, it might be appropriate to draw certain distinctions which can be important both for the purpose of analysing understanding of linguistic utterances as well as text-interpretation on the background of Non-monotonic Logics and for the evaluation of claims regarding the possibility to subsume "verbal knowledge" (i.e., acquisition of knowledge derived from "words") under inference.

First of all, a distinction deserves to be drawn between a) understanding or interpreting in default of something and b) deriving an interpretation from the default of something. What is meant can be

illustrated by an example belonging to the field of philology. Suppose we have a fragmentary text presenting us a sentence S but nothing of the immediate context of S. Suppose further S possesses a straightforward interpretation while also admitting several other less straightforward ones. Under these circumstances it might be reasonable to assign to S the most straightforward reading, especially if the difference in naturalness between the straightforward interpretation and its rival alternatives is relatively high. To illustrate the second case, suppose that we possess a text that is not fragmentary (or regarding which we have no reason to suppose so) and that S appears in this text within a context which contains no clue favouring one of the less straightforward interpretations. Here it might occur that we find our assumption of the straightforward reading of S more strongly supported. But the reason would be that the non-occurrence of a context favouring an alternative interpretation represents here an evidence for the incorrectness of the alternative and the correctness of the straightforward interpretation, in contradistinction to the former case. A possible basis for this lies in a rule requiring that less natural readings have to be indicated by clues – on account of the fact that otherwise conversational maxims à la Grice would be violated. It seems, however, that the distinction between interpreting *in* default and interpreting *by* default or, in other words, by interpreting a linguistic entity in a particular way *while* lacking additional relevant information and by interpreting a linguistic entity in a particular way *because* otherwise more relevant information would be expected to exist, is also of relevance in other realms of linguistic understanding.[84]

Apart from this differentiation several levels and various respects in which defeasible reasoning comes into play are to be distinguished. At least the following aspects can be differentiated regarding understanding and interpretation of linguistic objects:

a) Assignment of linguistic objects to a particular language. Despite the fact that the assumption that e.g. some text is in Sanskrit or some utterance in Tamil appears in many cases beyond any reasonable doubt such hypostatizations rest on defeasible reasoning.
b) Hypostatization of compliance with the linguistic rules of the particular language and with "pragmatic conventions". This is not implied by a) because it is no contradiction to suppose e.g. on the one hand that Giuglio spoke German when he said 'Es ist kalt in dieser Wohnung' and on the other hand that he confused 'kalt' with 'caldo' and wanted to say that it is warm in this flat.
c) The supposition that oneself as the interpreter knows all relevant rules for understanding the textual passage or utterance. We might perhaps possess good or even overwhelming evidence that a *locativus*

absolutus is *never* used in the function of conveying that some event is regrettable, takes place during the night, occurs outside the rainy season etc. But assumptions to the effect of complete knowledge of all relevant rules are defeasible not only with regard to individual interpreters but also with regard to the community of scholars.

d) Defeasible derivations from the propositions expressed. It is important to pay due attention to culture specific divergences in this connection. If a European has a warm meal he normally uses fork and knife or a spoon for eating (except perhaps, in case certain rumours are correct, if he lives in a region known as "Ostfriesland"); in certain parts of Asia it is "normal" to use chopsticks and in other parts of the world one employs one's hands. There are many instances where one can derive from the fact that no more specific information has been expressed that the utterer believes or wants to convey that some (succession of) event(s) took its normal course. But we must consider what is in fact normal (in some environment) and what is regarded as such when "supplementing" such additional information.

e) The supposition that "normal" relationships between linguistic behaviour and propositional attitudes prevail. This is required if we want to derive in case somebody gave an order that the utterer really wants the order to be fulfilled or that when he expresses a belief he really has the respective belief etc. etc.

f) Suppositions regarding properties and qualities of the source of the linguistic object. Assuming (by default!) that something looking like a text or sounding like a linguistic utterance has been produced by some rational being we might (by a second default) derive that the linguistic production has been made with some purpose in mind.[85] More specifically, possessing some independent information regarding the producer, e.g., his possession of authority in some subject matter, one might derive that the known qualities should have a bearing on the utterance concerned, that e.g., the utterer should have been competent in assessing the truth of the proposition(s) expressed in some utterance etc. Assumptions of this kind are evidently relevant for obtaining non-linguistic information about states-of-affairs imparted by linguistic utterances.

g) Apart from these a number of more general suppositions which are not specifically related to linguistic entities have to be hypostatized, e.g., that one's senses function normally (in order to exclude the possibility that one merely hallucinates the existence of a text or an utterance), that relevant physical objects do not behave in abnormal ways (in order to rule out the possibility that the letters one sees

on the page of a manuscript have been created by magic or have undergone unnatural changes) etc.

For these reasons it can be admitted that defeasible reasonings play a key role both for understanding linguistic products and for obtaining knowledge about the producer or about the world on the basis of linguistic products and accordingly come into play in various respects which have seldom been clearly articulated or differentiated in the Indian discussions on the subsumption of verbal knowledge under inference. But this is yet insufficient for vindicating the thesis of the reducibility of *śabda* to *anumāna*, because the issue is not merely that (non-monotonic) reasonings are involved in the acquisition of "verbal knowledge" but it has to be shown that no other kind of reasoning, inferring, or deriving is involved. As far as known, the Indian discussions have never paid much attention to the phenomenon that linguistic ability involves the capacity to understand an infinite amount of sentences never experienced before. But precisely at this point an obstacle for the reducibility thesis remains which seems difficult to surmount even if we free the notion of *anumāna* from the restrictions imposed by the theoretical accounts given in the Indian tradition allowing it to comprise all kinds of defeasible reasoning. Can it be really maintained that the derivation of senses of complex expressions from the senses of constituent expressions by applying syntactic-semantic rules are nothing but defeasible reasoning processes? It should be noted that the issue is *not* the derivation of what some utterer might have meant with some sentence or other complex expression while one supposes that he complied with all relevant conventions. The question is rather what is the meaning or a possible meaning of such and such a complex expression *given* that such and such rules are not violated and the constituent expressions possess such and such senses. It represents the analogy to the question as to whether some player can win in a certain number of moves in such and such a position given that he conforms to the rules of the game and not an analogy to the question of whether he might actually bring about a winning position after a number of actual moves in consideration of the fact that he possesses the ability to hush up violations of rules.

Even if the solutions and arguments regarding the question of the number of *pramāṇas* and the problem of reducibility should not satisfy a modern reader, it appears that the question itself is not outdated. Relating *anumāna* and theory of *anumāna* to non-monotonic reasoning and Non-monotonic Logics might therefore inspire new life to those issues.

3

The background of recent developments in the theory of commonsense reasoning grants us resources for conceptualizing elements of Indian theories of inference. This in its turn seems to allow for a new assessment of certain positions attached to those elements. We have already implicitly suggested a parallel between the phenomenon of conflicting defaults and *viruddhāvyabhicārin*-fallacies. We have also seen that some textual sources indicate the view that in a situation characterized by the occurrence of *viruddhāvyabhicārin*-reasons no conclusion can be derived. It is not difficult to recognize the affinity to the "sceptical view" in the field of default theory which, by demanding that acceptable belief sets should be in the intersection of all extensions, thereby rule out the possibility to adopt (new) propositions on the basis of defaults which are counterbalanced by opposite defaults.

Interestingly there are also sources which suggest deviant positions in this regard. The *Praśastapādabhāṣya* e.g., expresses regarding some example of two contradictory reasons fulfilling the *trairūpya*-conditions and allegedly causing doubt the view that in reality both reasons do not possess equal force because the proposition established by one of them contradicts tradition (*āgama*).[86] In connection with the theorem advocated by the author of the text that "tradition" is to be subsumed under "inference" this implies that one inference can prevail over another. Relative to conflicting defaults this amounts to the position that at least sometimes one default can be overridden by another so that the proposition derivable by the overriding default must be accepted. This shows that "Indian parallels" to different positions in Non-monotonic Logics could be construed if one accepts our procurement of conflicting defaults and conflicting "reasons". A profit to be gained from such a parallelization lies in the circumstance that new ways of explaining phenomena in the foreign cultural tradition open up. In the present case it would be the idea that the fact that we encounter different views connected with conflicting logical reasons goes back to similar motives as the fact that there are different attitudes toward conflicting defaults.[87]

4

The parallelization of *anumāna*-theory and Default Logic has brought out two possible perspectives in giving theoretical accounts of non-monotonic reasoning. The first perspective could be described as state-related, the other as process-related. In the first case we abstract from the process of the origination of a default-theory and focus on the derivational properties of a *given* default-theory. In the second case we try to take into consideration how a default-theory could originate

and in particular the norms which enable us to evaluate the process of origination.

It seems that both perspectives are legitimate and needed. By adopting a "static" perspective one is in a better position to identify the range of possible formal features of default-theories because one is not restricted by considerations as to whether certain variants would be ill-motivated, applicable, "realistic" etc. It should not be necessary to expound in detail that liberating oneself from these restrictions can be extremely useful even if one's main interest is directed towards "realistic" theories because in this way and perhaps only in this way we can specify the peculiar features exhibited by "realistic" theories in contrast to features of "possible" theories. On the other hand, considerations regarding the origination-process seem to be needed both for distinguishing between different degrees of acceptability of various default-theories exhibiting same or similar formal properties from a statical perspective and for an evaluation of the significance and relevance of those formal properties. There is no reason to suppose that the relationship between process of origination and characteristics of accomplished theories is not at all accessible to formal treatment and generalization. In fact, "Indian Logic" seems to testify that they are. If our above formulated thesis concerning the role of examples is correct, a normative acceptability-requirement for default-rules can be gathered saying that any default of the form:

$$A(x): B(x)/B(x)$$

is only acceptable if the truth of '$(\exists x)$ (Ax & Bx)' has been verified or if it has been supported by former experience that a proposition of the form: 'A's are normally/typically B' holds good or if – according to the standard of type 2 theories – apart from the first requirement the truth of '(x) $(Ax \rightarrow Bx)$' has not been falsified by experiences made so far. Even if the "methodological requirements" established in the Indian tradition should not be fully adequate, they could be regarded at least as initial steps towards a formal treatment and explication of the justification of default rules and default theories.

Moreover, it might be argued that consideration of the origination-process is required for a fuller explication of rationality, because rationality does not only comprise the ability to derive "reasonable" conclusions from one's existing beliefs but manifests itself also in the capability of critically reflecting on the genesis of ones present beliefs (and other propositional attitudes). Therefore, the argument runs, a theory focussing on changes of epistemic states could not claim to give a sufficiently comprehensive account of rationality by merely specifying restrictions

on the derivation of consequences from sets of propositions representing belief-states; rather it needs to give an account of the rationality of belief-states themselves not only under the perspective of their static properties but also under the aspect of the way it – or certain components of it – came into existence.

Be this at it may, Indian theories of inference appear to have included some "dynamical" aspects in the form of including specifications regarding the genesis of rules employed for derivations. It must be said, however, that the elaboration of this aspect remained quite rudimentary if it is measured against what would be needed. In the course of events this perspective, as in the case of Dharmakīrti, was even further pushed toward the margin. We have seen that this has probably decisively contributed to the equation of Indian Logic with a doctrine of syllogistic reasoning by Western scholars.

The danger of the syllogistic misinterpretation is, however, not the only reason why we should not ignore the methodological and process-related aspect of ancient Indian theories of inference. When discussing the acceptability condition of arguments which can be distilled from the texts like the *Nyāyapraveśa* a feature emerged which did not seem to fit the frame of Default Logic as previously described. An upshot of the analysis was that an argument is only acceptable if the thesis to be proven is, as we said, "an open issue". But being and open issue in the context of theories like the one represented by the *Nyāyapraveśa* did not only entail that the falsity of the thesis (or the truth of its negation) must not be (already) established – which matches Default Logic very well – but it was even demanded that the thesis in question should not be already known as true. This requirement is difficult to understand on the background of a perspective focussing on derivational properties of a given (default-)theory. But things are different if we adopt the viewpoint of their genesis. The point is, however, neither that defaults supporting established propositions are necessarily inacceptable nor that defaults which might be additionally employed in order to derive propositions which have been already derived by other means must violate the norms laying down whether or not a default-rule has originated in a correct manner. The point is rather one of economy and pragmatic appropriateness: The requirement that a thesis to be inferred or proven should not be already established could be translated to the postulate that if some proposition has been accepted as true or if it has been derived by default one should not try to employ or even to generate further default-rules merely for deriving the very same proposition. As it stands, the requirement is certainly not appropriate because it is without doubt often useful and reasonable to try to support propositions by different

considerations and by various reasons. But there is nevertheless a kernel of truth in the postulate of blocking support by further reasons. A cognitive system which is supposed to act successfully must be able to put a stop to search for evidence at least at some stage. If defaults were searched *ad infinitum* even the cognitive capacity would be inhibited because, at least if the cognitive system is finite, space for other projects is reduced. At this point the theory of *anumāna*, apparently without clearly recognizing this fact, touches upon an aspect which is different both from that of derivational validity and from that of the justification of inference-rules: it concerns the question of the need of possessing or acquiring rules as well as their application and thereby relates to the problem of relevance.

It should not have been inappropriate to point this out because one can gather from the above remarks that the rejection of propositions known to be true as "fallacious theses" (*pakṣābhāsa*) need not be specifically connected with the context of (public) debate but can also be explicated relative to default reasoning, regardless of the "public-private" dichotomy.[88]

5

From the establishment of a connection between ancient Indian theories of inference and non-monotonic logic(s) a number of consequences result for the assessment of the historical development.

There has been a tendency, probably largely due to the view that what is called "Indian Logic" is "essentially" a doctrine of syllogistic reasoning, to suppose a progression from "mere reasoning by analogies" to an increasingly disciplined and sound way of inferring which is reflected in the theoretical development. The main achievement in the history has often been seen in the introduction of the notion of "invariable concomitance" or "pervasion", of *avinābhāva* or *vyāpti*, which was regarded as embodying a universally quantified proposition to the effect that every possessor of the *hetu*-property is also a possessor of the *sādhya*-property but not necessarily vice versa. It is an unattractive consequence of this assumption that it entails that "the Indians" were inexplicably slow in elaborating such a concept of pervasion. It is difficult to see what should have been the delaying factors. After all, the notion of universality is neither abstract nor abstruse or theory-laden and the same holds good for ideas that everything possessing one property also possesses another property or that the extension of one term comprises the extension of another. It might be thought that it took time to realize that the implicative connection holds only in one direction, that the pertinent relationship between *hetu* and *sādhya*

does not hold the other way round. But also this does not seem very plausible, all the more because in one part of the initially mentioned ancient Sāṃkhya-work *Ṣaṣṭitantra* it was claimed that only the inference from effect to cause but not the one from cause to effect is correct, which implies that "the direction" matters.

By analyzing Indian theories of inference in view of non-monotonic logics one can free oneself from the grip of this picture. This does not merely hold good in the respect that one becomes aware of the possibility that certain variants of ancient Indian Logic might not have envisaged something like *vyāpti* at all instead of exhibiting an imperfect grasp of this notion. Such an idea might also emerge from careful analysis of relevant texts. What cannot be attained by textual studies alone is, however, the insight that theories without *avinābhāva, vyāpti* or the like were not necessarily imperfect or less perfect than those which assigned to these notions a prominent role. Rather theories with a different subject matter than those working with *vyāpti*-concepts might be involved or theories which are concerned with problems that did not require such notions for being adequately handled. A corollary to this is that the concept of derivability fitting these problems and those theories is different from the one fitting theories that regard *avinābhāva* as a necessary condition for validity and all the more different from the derivability concept of classical logic. It is our claim that precisely this holds true for ancient Indian logic.

If these claims are acceptable the historical development from the beginnings up to the innovations introduced by the Buddhist philosopher Dharmakīrti should not be described as progress towards a more perfect theoretical state. Rather it is a process characterized by shifts of emphasis and changes in the conceptions about what a theory of inference should account for and what norms should be applied to the subject-matter. This surely, goes hand in hand with a change in the view regarding what inference is or what it is "essentially" or "properly understood", but the changes involved should not be characterized as mere outcomes of gaining deeper insight and more clarity. It is true that a tendency can be observed to increase the demands for acceptability, it is not true, however, that the degree of restrictiveness necessarily corresponds to the degree of adequacy of the conception of what inference is. There is no such plain correspondence just as the fact that a theory *demands* high standards of restriction does not entail that the elaboration of the theory *fulfills* high standards of rigour.

Although, according to our analysis, the transgression from type 1 to type 2 theories was largely due to the circumstance that reasoning in other fields than everyday life moved to the centre of interest,

fields which one might refer to by the term 'scientific', it would be a fallacy to derive from this that the latter concept of inference was more "scientific" than the former. The fact is that we have inference concerned with everyday issues and inference concerned with "scientific" issues or used in scientific reasoning or discourse. We should, however, resist the temptation to jump to the conclusion that the characteristics of inferences of the latter kind must be inbuilt as ingredients of a better, deeper, "more scientific" concept of inference. Here the development of Indian theory of inference could be used as a warning example. We should not commit an analogous mistake of leveling out all the different fields and the standards connected with them. Even though it is true that everyday life and different sciences (comprising the humanities) essentially rely on default reasoning there is room for accounting for differences: One might use default-rules in the theoretical accounts of these reasonings but the norms and standards for establishing and accepting default-rules must not be uniform and it appears plausible to set up stricter norms for scientific reasoning as well as for other areas in which time pressure matters less.

It would be equally a mistake to regard the transgression from type 2 to type 3 as a fuller elaboration of the "genuinely logical aspects of inference". To be sure, in so far as Dharmakīrti is taken as a representative of a theoretician who advocated a type three doctrine, one needs to admit that the reforms were motivated by serious considerations regarding inadequacies of former views, as we tried to show. The crux is, however, that those motives do not yield compelling grounds for the adoption of type three and the rejection of type two theories. One might even speculate that Dharmakīrti would perhaps not have rejected off hand non-monotonic validity notions if he had not had certain inferences in mind where the conclusion follows in fact "analytically" from an assumption and if he had not succumbed to the temptations of a unified theory. But the marriage between reasoning on credit and reasoning on capital was not well arranged. This is not to say that different types of reasoning should never be integrated into one theoretical framework. After all, Default Logic involves such an integration by the mere fact that extensions comprise both default- and classical derivations. This possesses even some parallel within Dharmakīrti's theory in the form of the admission of complex proof- and inference-structures where both *kārya-* and *svabhāvahetus* are integrated.[89] But one can appreciate this innovation without accepting his imposition of monotonicity on all varieties of reasoning, including reasonings employing *kāryahetus*.[90]

The fact that Dharmakīrti's theory suppressed the aspect of defeasibility promoted the impression of a syllogistic doctrine. This shows us

the questionable aspects of interpreting Indian philosophical theories in the light of their own tradition. At any rate, the (sometimes propagated) maxim of understanding cultural phenomena from their own background is in danger of being embraced out of intellectual laziness: Instead of taking the trouble of analyzing the pertinent subject-matter and acquiring insights into the nature of systems of thoughts and ideas one looks for ready-made accounts and interpretations. But in the case of the Indian philosophical tradition also the fact is significant that the project of giving a historically faithful account is practically inexistent in the tradition itself. Accordingly the way of dealing with one's own tradition generally reflects rather what was deemed as being of importance and significance and at best very indirectly throws light on what actually is to be found in preceding stages of the historical development. This does not at all mean that it is futile to study the impact of cultural phenomena on the later tradition. On the contrary, one might even say that precisely because of the distortions due to changing conceptions and priorities the aftermath of philosophical theories and their reception in the later tradition constitutes an interesting topic to study.[91] But this is an entirely different programme than using later tradition as a witness for previous events. In the case of Indian inference, at least if what has been previously said in this article is mainly correct, quite far-reaching shifts of perspective and changes of conceptions have occurred.

The projection of Indian theories of inference and proof on the foil of non-monotonic reasoning and Non-monotonic Logics opens not only the way to an upgrading of doctrines without *vyāpti*, it allows also for a rehabilitation of certain tenets emphatically rejected by Dharmakīrti and his tradition and which became more or less obsolete at later times. This holds in particular good for a doctrine which is only indirectly testified by polemics in various works of Dharmakīrti but which has been supposed to represent the teaching of some predecessor who tried to think out the consequences of Dignāga's theory, named 'Īśvarasena' (possibly Dharmakīrti's teacher).[92] Accepting this hypothesis we can say that Īśvarasena gave a deeper and more satisfying account of the defeasible aspects of inferring than Dharmakīrti, who tended to push them to the margin or glossed them over by rhetorics. If, however, we assigned the roles of a winner and of a loser in that controversy on the criterion of which side succeeded better in winning acceptance, we would have to say that Dharmakīrti's theory won and Īśvarasena's lost at least as far as the later Buddhist tradition is concerned (and the tradition of Western scholars who accepted this evaluation). But since Non-monotonic Logics grant us the possibility to obtain a clearer conception of the peculiarities of commonsense-reasoning they enable

us to look at such developments with a more critical eye. On this background we can say that Īśvarasena's teachings deserved a much better fate than they had in the tradition following Dharmakīrti. Since, as we tried to expound, Dharmakīrti's innovations embodied in fact important achievements in *certain* respects not only a fairer but also a more fruitful way of dealing with one's own philosophical tradition would have been to trace the truths and the insights included in the different doctrines and to employ them completely for the construction of new theories. The circumstance that such chances are wasted also in the theoretical fields that are not or comparatively little affected by political, economical or financial interests deserves some attention and it should also make us think that even in those areas winning and losing in the form of being successful or not is a problematical criterion for value-assessment.

6

Thus a number of considerations are fit to sustain the hope that the study of the theoretical fields of foreign cultures potentially contains further-reaching significance on the strength of the fact that viewing and analysing these aspects from a distanced perspective helps us in developing both a clearer conception and a more critical attitude towards our own culture and grants us better prerequisites for learning from history. Or perhaps we should more cautiously say that investigations of this kind might possess such a relevance *if* it is relevant to learn from history, since there are reasons to doubt that such a need is really felt.

At any rate, by relating Indian theories of inference to non-monotonic defeasible reasoning one can explain a considerable range of phenomena like the doctrine of "fallacious theses" (*pakṣābhāsa*), the exclusion of "uncommon" (*asādhāraṇa*) reasons, the occurrence of pairs of "conflicting reasons" (*viruddhāvyabhicārin*), aspects of the *trairūpya*-doctrine as well as of the doctrine of the five-membered syllogism etc. This also possesses relevance for an assessment of those theoretical features. On the other hand, it seems possible to account on this basis as well for important aspects of the historical development and in particular for certain counteracting tendencies towards monotonic conceptions of inference. It appears therefore justified to characterize ancient "Indian Logic" – regardless of the lack of an explicit notion on non-monotonicity and of related concepts – as the first elaborate account of non-monotonic reasoning in history.

To be sure, there seems to be no way of ruling out *a priori* that correlations of Indian theory of inference with other ideas and other

species of "logic" might yield an equally good key for understanding or one which enables us to open even more locks than the present one does. But there is no need to insist on all costs that ancient Indian Logic "essentially is" a theory of non-monotonic reasoning. What counts more is the circumstance that by establishing this connection we can bring much more clarity into the subject.

NOTES

[1] It should be noted that at least on one reading of the text not "individual events", but "recurrent phenomena" or "general occurrences" form the basis of the inferences: not the particular change of position at a particular time but the fact that the sun is regularly to be found in different positions at different times as well as the fact that certain kinds of living beings generally exhibit desire etc. function as probatory phenomena. This must be assumed if the theorems which have to be established are to be identified with the propositions that the sun generally exhibits an invisible movement and that living creatures possess an immaterial soul and not with the propositions that the sun has moved at some particular time or that some particular being possesses a soul. Though it has to be admitted that the wording of the text is not explicit enough to allow for a safe decision between the alternative readings it seems worth mentioning that not all examples are of this kind; it is e.g. hardly probable that the inference of fire from smoke was ever conceived otherwise than as establishing the occurrence of fire at a particular place and time from the occurrence of smoke at a particular place and time.

[2] The *Ṣaṣṭitantra* presents, however, the problem that the wording of the text does not make explicit what precisely has to be regarded as the initial information serving as the basis of inference and what exactly are the propositions to be inferred. If we take only the first "mundane" example exemplifying the connection of "master and (his) belongings" quite a large number of possibilities emerge as alternative reconstructions of the inference concerned: First of all the text does not make clear whether the knowledge on which the inference is based should be described as a) (the knowledge) that there are people who exhibit the behaviour of servants at a particular time and place, b) (the knowledge) that there are people at a particular time and place who *are* servants, c) (the knowledge) that there are (in the world) persons exhibiting the behaviour of servants, d) (the knowledge) that there are servants (in the world). Regarding the *inferendum* at least the following possibilities have to be taken into account: 1) (It is inferred that) there is some king/master at the particular time and place or close by, 2) (It is inferred that) some particular person (NN) of whom it is known that he is the king/master of certain people (which are to be seen somewhere) must be close by (at the particular time), 3) (It is inferred that) some people i) known to be servants or ii) observed as behaving in the way servants normally do must have a king/master, 4) (It is inferred that) some particular person (NN) must be such that i) he is a king/master or ii) is the king/master of the people in question, 5) (It is inferred that) there are kings/masters (in the world). It is true that some of the theoretically possible combinations of "inputs" and "outputs" appear little or distinctively less probable. For example the alternative that the (general) existence of kings or masters is to be inferred possesses little probability if one understands the preceding definition of inference as implying that the inferred fact should be one which cannot equally well be established by other means of acquiring knowledge, in particular by perception. (Nevertheless, some of the examples adduced in this textual passage seem to demand interpretations according to which general existential propositions are to be inferred). At any rate, there remain several readings

compatible with the wording of the text which diverge considerably regarding the degree of cogency as well as the nature of the inferences concerned. If e.g. the basis were to be seen in the proposition that certain people *are* servants and the *inferendum* in the proposition that there must be someone who is the master of these people we would have to do with a derivation akin to "analytical" inferences. On the other hand the inference concerned would regarding its cogency and its nature be quite distinct from analytical or logical deductions if its input were the proposition that certain people behave in the way servants typically behave or exhibit some other features which give *good reasons* for regarding them as servants and the output the proposition that someone who is their master must be close by. (Consider the possibilities that a drama is played in which people act like servants or that the master of certain people has died or suddenly gone far away and that this fact has not been noticed by them).

[3] If not even this should hold true for the original import of NS 2.1.35 our point of the problematization of inference on account of its fallibility would at least apply to Pakṣilasvāmin (and other commentators of the NS).

[4] As Claudius Nenninger pointed out to me it is not absolutely certain that the author of the pertinent *Nyāyasūtras* wanted to suggest that the *inferential mark* = the logical reason should be specified in order to obtain a valid inference, although such a reading is natural and insinuated by the *Nyāyabhāṣya* (and other commentaries) on NS 2.1.36. Possibly the original intention was rather that the additional specifications indicated in NS 2.1.36 should rule out (certain types of) "deviant" and "abnormal" states of affairs and safeguard assumptions of normality, i.e. the specifications embody prerequisites under which the original inferential marks can be validly employed and the corresponding arguments are acceptable. Nevertheless, the attempted justification brought forward in the *Nyāyasūtras* would be inadequate even under these premises *if* it implied the claim that the method of specification intimated by NS 2.1.36 is apt to rule out the *possibility* of a deviancy with respect to pertinent inference-situations. This criticism might, however, be inapplicable if the import of NS 2.1.36 should be seen as a mere demonstration of the possibility to protect inferences against specific types of deviancy or to safeguard them against abnormalities in so far as they have been actually observed prior to the time at which the inference in question is undertaken.

[5] Let us suppose that the following holds good:

(a) Giuglio lives in Bologna.
(b) Inhabitants of Bologna are normally Italians.
(c) Italians are normally Roman-Catholic.
(d) Roman-Catholics are normally opposed to abortion.
(e) Opponents of abortion are normally anticommunist.
(f) Giuglio is anticommunist.

Given the truth of (a) it appears despite the plausibility of (b)–(e) questionable that we should accept as legitimate the inference from (a) to (f). After all it is a well known fact that the communist party has had a stronghold in this city. Therefore *if* we assume that the relationship of inferability under supposition of normality holds between (a) and

(a*) Giulio is Italian.

on account of (b) and between (a*) and

(b*) Giuglio is Roman-Catholic

on account of (c) and so on, but refuse to accept that the same relation holds between (a) and (f) – and not only between the set consisting of (a) together with

(g) Inhabitants of Bologna are normally not anticommunist

or

(g′) Giuglio is not an anticommunist

and (f) – this relation would lack transitivity and would not conform to "cut". There are, however, some good reasons to assume this, which are related to the circumstance that also sentences of the form 'Most A's are B's' and 'Most B's are C's' together do not entail corresponding sentences of the form 'Most A's are C's' because of the fact that if most A's are B's and most B's are C's it might still be false that most of those who belong to the intersection of the classes of A's and B's are C's (The reluctance to admit "cut" for reasonings under hypostatization of normality would suit the apprehension that our conclusions might become too risky, if we accumulate more and more – logically independent – normality assumptions).

[6] The point of the objection lies in the fact that if the inference of the existence of wind were accepted in the form propounded by the Vaiśeṣika-school inference could also pertain to individual substances, i.e. the existence of a certain individual substance and not the instantiation of some universal at a particular time-space-location would constitute the object of inference.

[7] The following paragraph tries to follow the original wording quite literally so that the complex and obscure character of some of Dignāga's formulations have been preserved. But since we have paraphrased the import of single arguments in footnotes and given a summary of the most important argumentative steps those who are less interested in the philological details of this textual passage should be able to grasp the essential points of the argumentation (according to our analysis) without having to engage in the intricacies of text-interpretation.

[8] The difference between the two alternatives is that in the first case it is proven regarding touch as the subject of inference (*pakṣa*) that it exemplifies the (universal) property of inhering in some substratum because it exemplifies the (universal) property of being a quality, whereas in the second case the universal of being in some substances which are substrata of touch is proven with respect to the generality of substanceness, which means that it is proven regarding substance in general that its domain comprises bearers of touch-qualities. According to the latter alternative the indicated fact consists in that substance in general exemplifies the (universal) property of being (among other things also) the substratum of touch and other qualities – in particular the common properties number, extension etc. (which are attributed also to wind in Vaiśeṣika-doctrine). The latter fact can be viewed as following from the circumstance that touch inheres in some substratum because of the fact that every substratum of qualities is a substance.

Our account of the difference between the alternatives is based on the wording of the two Tibetan translations of Vasudhararakṣita and Kanakavarman taken together. The passage runs in Vasudhararakṣita' version: *rluṅ la sogs pa de rjes us dpag pa ni ma yin te / gaṅ gi phyir reg bya la sogs paḥi yon tan ñid kyi(s) rten ñid kyi phyir mtshon paḥi phyir ram / yaṅ na rluṅ la sogs paḥi raṅ bźin khyad par can du rjes su dpag pa ni ma yin gyi / gaṅ gi phyir rdzas ñid tsam gyi spyi de la reg bya la sogs pa rnams kyi rten rdzas ñid du mtshon par bya ba yin paḥi phyir ro //* and in Kanakavarman's translation: *rluṅ la sogs pa la de rjes su dpag pa ni ma yin no // gaṅ gi phyir reg bya la sogs pa la ni yon tan ñid yin paḥi phyir rten pa ñid kyi spyi mtshon pa yin no // yaṅ na rluṅ la sogs paḥi raṅ bźin gyi khyad par can rnams rjes su dpag pa ni ma yin te / de reg bya la sogs pa rnams kyi spyi (r)tsam rdzas la brten pa ñid du mtshon par byed pa yin no //* – vgl. H. Kitagawa 1965: 450–451.

If one follows Kanakavarman's version alone one is inclined to interpret the second alternative in the sense of: "Not the peculiarities of the nature of wind etc. are to be inferred, but the fact that touch etc. inhere merely in some substance in general (the property of the inherence in substance in general of touch etc.)". However, if we adopt this interpretation it becomes more difficult to see the relevance of the difference between the alternatives and the point of explicitly distinguishing between them. This holds also good for the interpretation embodied in the translation of R. Hayes 1980: 249, which runs: "Or, to explain it another way, it is not the specific nature of Wind etc. that is inferred, but it is just the fact of being supported by some substance, which fact is common to touch (and the other qualities), that is indicated" as well as for Hayes' rendering of the same passage in R. Hayes 1988: 234–235, which is practically identical to the one cited above. M. Nozawa's sketch of the train of thought of this textual passage, though it is intended to improve on earlier translations, and in particular the translation of Hayes 1980, does not make the relevant distinction clear either. Nozawa 1991: 33 gives the following paraphrase: "**Dig** refutes the inference of Wind from touch. Since it is not the particular, Wind etc., but the general property of not being without any substratum, i.e. a general property of qualities, that is pointed out in this inference."

[9] Or: the existence of a connection between the particular substance 'wind' and a specific touch quality.

[10] It is not clear whether the expression *yon tan khyad par (med pa)* (in the Tibetan version of Kanakavarman cited below) should be understood in the sense of '(non-existence of a) distinguishing feature' or rather in the sense of '(non-existence of a) distinguishing character of the [relevant touch-]quality'. Nevertheless, both interpretations allow us to assign to the phrase *yon tan khyad par med paḥi phyir ro* the import of conveying that there is nothing on which the assumption of a relevant difference between the wind and the other substances could be based, i.e. there is nothing which can prevent that the same principle which should exclude other substances than wind as possible substrata of the specific touch-quality applies also to wind.

Alternatively, one could take the expression *yon tan khyad par* as referring to some specific quality of wind other than touch, so that the import of *yon tan khyad par med paḥi phyir ro* is that no specific quality of wind exists which has been previously observed as occurring together with some specific touch-quality – so that by the same token by which other substances should be excluded wind must be excluded too.

[11] Possibly, the author of the PS has here the following in mind: If it were so that it is already established elsewhere that some particular quality of touch inheres in some wind-substance possessing its characteristic qualities, one might on another occasion infer that a particular touch quality occurring somewhere (co-occurs with the same characteristic qualities observed earlier and accordingly) inheres in a wind-substance. In such a case a disanalogy would exist with respect to the other accepted substances like earth etc. because they and their characteristic qualities have not been previously observed as going hand in hand with the specific touch quality. But the situation is not like this and therefore all arguments excluding these other substances as possible substrata would equally apply to any other substance apart from them.

The translation of R. Hayes 1980: 249 suggests quite a different argument rejecting the objection: "Q: Suppose it is argued that it (= the particular substance, Wind) is proved by a process of elimination, i.e. it is established that this inference regarding the nature of things such as Wind is through a process of elimination, as follows: "Touch is absent in visible things, but (it is) not (absent) in invisible things."

A: That is not the case, because it (= the substance Wind) is not proven to exist, and because (even if it were proven to exist, then) touch could be denied (to belong to it) in the same way (as it was denied to belong to the other elements).

Q: It being established that Wind exists, there is no denying it.

A specific substance is inferred on the basis of a specific quality without (recourse to) a general quality, because of that substance's connection with that specific quality; that being the case, (the existence of) Wind is established.

A: (True), but the existence of touch (in wind) is not established; it can be denied (in wind) in the same way it was denied in the substance Earth and the other substances. Because it is not a specific quality."

In R. Hayes 1988 the author rejects his own earlier translation on the ground that it presupposes (wrongly) that "the quality touch was said by the Vaiśeṣikas to inhere in only one substance, wind", whereas "the real issue here is that the Vaiśeṣikas taught that the touch that inheres in wind is distinct from the kind of touch that occurs generally in the other elements." – Cf. R. Hayes 1988: 250, footnote 3. Accordingly a new translation is given which runs as follows: "Suppose it is argued that it [scilicet, the particular kind of touch that is putatively unique to the substance wind] is confirmed by a process of elimination. That is, suppose it is established that this inference regarding the nature of things such as wind is through a process of elimination, as follows: "The touch is absent in visible things, but not in invisible things." That will not do, because it has not been confirmed as existing, and because the touch could be denied in the same way. While it is not possible to disconfirm its presence, you are confirming wind and so on by inferring a specific substance through a specific quality by excluding a general quality from a relation with the specific quality. Its presence, however, is not confirmed and its rejection is the same as with earth and so forth, because there is no special quality."

Apart from the obvious disagreement regarding the nature of the exclusion-proof – we assume that the proof is meant to exclude all visible substances as well as all invisible ones (other than wind itself), whereas Hayes assumes it as proving that "touch is absent in visible things, but not in invisible things" – it does not become completely clear how exactly the author of the translation understood the argument of Dignāgas answer in this passage and how far it coincides with our above given explanation, though it is obvious that Hayes' later translation comes closer to our interpretation than his earlier rendering. Since the explication advocated above harmonizes best with Kanakavarman's Tibetan translation (without being entirely incompatible with that of Vasudhararakṣita) it may be cited here: *gal te yoṅs su lhag pas grub pa yin te yoṅs us lhag pa las rluṅ la sogs paḥi raṅ bźin rnams la rjes su dpag pa ḥdi ḥgrub par ḥgyur te / ji skad du mthoṅ ba rnams la reg bya yod pa ma yin la / ma mthoṅ ba rnams la yaṅ ma yin no źes bya ba la sogs pa lta bu yin no / źe na / ma yin te de yod pa ma grub paḥi phyir daṅ / dgag pa mtshuṅs pa ñid kyi phyir ro // yod pa la ḥgog pa mi srid ciṅ / yon tan gyi khyad par daṅ ḥbrel pa las yon tan spyi spaṅs nas / yon tan gyi khyad par gyis rdzas kyi khyad par dpog par byed na / rluṅ la sogs pa rnams grub pa yin no // yod pa ni ma grub pa yin la sa la sogs pa daṅ ḥgag pa mtshuṅs pa yin te / yon tan khyad par med paḥi phyir ro //* – Cf. H. Kitagawa 1965: 451.

[12] That is, the circumstance is decisive that the particular touch-quality used for the proof of the existence of wind is observed without the qualities of the other substances like odour, taste, colour being equally observed.

[13] This interpretation rests mainly on the version of Kanakavarman, where the crucial passage runs as follows: *gal te ma mthoṅ ba tsam gyis (ma) mthoṅ ba ḥgag pa byed na de yaṅ mi rigs te / lus can ma yin pa ni gnod par bya ba ma yin paḥi phyir daṅ / yon tan gyi rjes us dpag paḥi phyir ma mthoṅ ba rnams la yid kyi reg bya dgag pa ni ma yin gyi / ḥon kyaṅ snaṅ ba rnams la mthoṅ baḥi phyir reg bya rnams ni snaṅ ba ñid yin no // de dag kyaṅ du ma yin paḥi phyir reg bya ḥdi gaṅ gi yin źes reg bya la the tsom za bar ḥgyur gyi / thams cad la bkag pas rluṅ rjes su dpog pa ni ma yin no /.* – Cf. H. Kitagawa 1965: 451–452.

R. Hayes follows at some places Vasudhararakṣita's version, but it seems quite difficult to reconstruct a plausible argumentation on the basis of his translation: "Q: Suppose one argues that touch is denied in visible substances just on the ground that

it is invisible itself. A: That also is incorrect. Touch cannot be denied as a quality of things that are visible, corporeal and resistant; in fact, the mind infers touch as a quality of those things because touch is observed when (those) other (properties) are observed, and it is not observed when they are not observed. Therefore touch does belong to visible things. Thus, since there are more possibilities than one, confusion arises as to what touch belongs to, so one cannot infer Wind by denying all other possibilities." – Cf. R. Hayes 1980: 250 and R. Hayes 1988: 236; (both versions are practically identical).

[14] If this assessment of the argumentation is mainly correct, it must be regarded as doubtful that the train of thought has been correctly represented in the description of M. Nozawa 1991: 33, where we find the following paraphrase of the pertinent textual passage: "**Vai** answers that Wind is proved by elimination (*pariśeṣa*), since [it is said in our sūtra:] 'This touch does not belong to perceptible substances' (2-1-10). (K 110a2–3, V 28b6–7)
Dig criticizes that elimination presupposes the existence of Wind but Wind has not been proved to exist, and that a particular touch must eliminate the other substances as well as Wind itself which is not the substratum of this particular touch (K 110a3, V 28b7)
Vai says that the existence of Wind cannot be denied, and that a particular substance can be inferred from a particular quality by removing general qualities on the basis of the relation with the particular quality. (K 110a3–4, V 28b8)
Dig points out the difficulty of elimination. If the existence of touch in Wind is not established, it is denied in Wind in the same way as it is denied in the other substances such as Earth etc. It cannot be said to be a specific quality. It is not right that [the other] imperceptible substances [than Wind] is eliminated on the mere basis of invisibility. Incorporeal substances are not eliminated, so that there remains the possibility of the touch belonging to Mind (*manas*). Touch is experienced in perceptible substances as well, and so it might belong to perceptible substances. Thus there are too many possibilities, therefore doubt arises as to which substance this touch belongs to. It is impossible to infer Wind from denying the existence of this touch in all other substances than Wind (K 110a4–7, V 28b8–29a3)"

[15] They cannot merely consist in the fact that the Vaiśeṣika-proof assumes particulars as lying in the range of inference, because it occurs in the function of an objection against Dignāga's thesis that inference unexceptionally aims at establishing the instantiation of universals in certain substrata, so that on pain of circularity this tenet must be disregarded in the context of the rejection of the Vaiśeṣika-position.

[16] A specific touch-quality which (according to Vaiśeṣika-doctrine) has not been observed in the other visible substances earth etc. is touch that is neither warm nor cold nor changed by the influence of fire (*apākaja*). – Cf. E. Steinkellner 1979: 130, footnote 499.

[17] The relevant passage runs in the *Pramāṇavārttika* as follows (R. Gnoli 1960: 14, 20): *yad āha / yady adarśaṇamātreṇa dṛṣṭebhyaḥ pratiṣedhaḥ kriyate / na ca so'pi yukta iti / katham ayuktaḥ / anupalambhād abhāvasiddheḥ / nanūpalabdhilakṣaṇaprāpteḥ sparśasya yukta eva pratiṣedhaḥ / na yuktaḥ / dṛśyatatsvabhāvaviṣayamātrāpratiṣedhāt / pṛthivyādi sāmānyena gṛhītvā 'yaṃ pratiṣedham āha / tatra ca tūlopalapallavādiṣu tadbhāve 'pi sparśabhedadarśanāt / asyāpi kvacid viśeṣe saṃbhavāśaṅkayā bhavitavyam iti sarvatrādarśanamātreṇāyuktaḥ pratiṣedha iti /*
For the parallel in the *Pramāṇaviniścaya* cf. E. Steinkellner 1973: 108, 6 and E. Steinkellner 1979: 130–131.

[18] This would even make the assumption possible that among the normally visible substances earth etc. there are invisible subspecies.

[19] See PV (R. Gnoli 1960: 15, 11): *yadi kathaṃcid vipakṣe 'darśanamātreṇāpratibaddhasyāpi tadavyabhicāraḥ / kvacid deśe kānicid dravyāṇi kathaṃcid dṛṣṭāni punar anyathānyatra dṛśyante / yathā kāścid oṣadhayaḥ kṣetraviśeṣe viśiṣṭarasavīryavipākā bhavanti / nānyatra / tathā kālasaṃskārabhedāt / na ca*

taddeśais tathā dṛṣṭā iti sarvās tattvena tathābhūtāḥ sidhyanti / guṇāntarāṇāṃ kāraṇāntarāpekṣatvāt / viśeṣahetv abhāve tu syād anumānam / For the parallel in the PV in cf. E. Steinkellner 1973: 108, 18 and E. Steinkellner 1979: 131–132.

[20] *ṣaḍlakṣaṇo hetur ity apare, trīṇi caitāny abādhitaviṣayatvaṃ vivakṣitaikasaṃkhyatvaṃ jñātatvaṃ ceti.* – cf. E. Steinkellner 1967a: 85, 21.

[21] One crucial requirement according to this theory is e.g. that the thesis which someone attempts to establish by inference has not been (already) falsified by perception.

[22] This rules out the possibility that someone argues in a valid manner if he states two logical reasons apt to establish incompatible propositions. It is not clear, however, whether this mark is also meant to apply to cases where some other person than the one who proves or infers, in particular the opponent in a debate, has presented some counterinference. At least the formulation of the mark suggests that this is not the case, but it seems that Dharmakīrti takes it in such a way that it should guarantee the invalidity of arguments under these circumstances.

[23] This amounts to the condition that a proposition of the form '(x) ((x $\neq$ p & Hx) $\rightarrow$ Sx)' holds true.

[24] The propositions 'Hp' and '(x) ((x $\neq$ p & Hx) $\rightarrow$ Sx)' together do not entail 'Sp'. 'p' = the *pakṣa* could at least theoretically represent a unique instance of "abnormality".

[25] If it holds true that if the *probandum* does not occur (at some instance) then there is some cancelling means of knowledge it must by contraposition also hold good that if there is no cancelling means of knowledge then the *probandum* occurs. Since it must equally be assumed that if there is some cancelling means of knowledge there is some cancelling fact, it follows that if there is no cancelling fact there is no cancelling means of knowledge and accordingly the *probandum* occurs.

[26] The upshot is accordingly that any logical reason would be inappropriate irrespective of whether there is or there is not a cancelling fact.

[27] Since the proposition that if there is no *probandum* a cancelling *pramāṇa* exists is equivalent to the claim that it is not the case/it is excluded that on the one hand there is no *probandum* but on the other hand a cancelling *pramāṇa* does not exist, the negation of this proposition is tantamount to the claim that it is the case/not excluded that there is no *probandum* but a cancelling *pramāṇa* does not exist.

[28] This argument becomes most plausible if the talk of the non-existence of cancelling means of knowledge is taken to refer to its general, absolute non-existence or even to the impossibility of its existence (the impossibility being grounded in the circumstance that a cancelling *fact* does not exist). Under these premises lack of cancelling means of knowledge and lack of cancelling facts would be equivalent – or at least approach equivalence – so that the plausibility of the step from the possibility of the occurrence of lack of cancelling means of knowledge together with lack of the *probandum* to lack of probative force concerning lack of cancelling facts would become immediately obvious.

[29] I.e., whenever there is a cancelling fact a cancelling fact is known to exist or, in other words, there are only cancelling facts if there is also knowledge of cancelling facts.

[30] I.e., if it has not been recognized by some person who wants to prove or infer that e.g., the proving property occurs in the substratum of inference (*pakṣa*) or that the proving property never occurs when the *probandum* does not occur or if, irrespective of whether or not these conditions are *in fact* fulfilled, doubt prevails regarding this question.

[31] It is also not necessary here to pursue further the problem as to who advocated the theory of the sixfold logical reason. There are some grounds to believe that certain commentators of Dignāga's works and in particular some person called 'Īśvarasena'

– who might have been Dharmakīrti's teacher – held such views. For further details concerning this question cf. E. Steinkellner 1967b: 192–193 and 1966.

[32] The one parallel is to be found in the third chapter of the *Pramāṇasamuccaya* (PSV[1] f.47a6; PSV[2] f.133a5–6) and runs as follows: *gal te gaṅ gi tshe sgra rtag par khas len pa deḥi tshe ḥdi gtan tshigs ñid du ḥgyur ro źe na // gal te ḥdi la byas paḥi phyir źes pa la sogs pa mi rtag pa ñid kyi gtan tshigs su nam yaṅ mi ston naḥo // (gñis ka dmigs paḥi don ltar na ni ḥgal baḥi don yin paḥi phyir the tshom gyi gtan tshigs so //)* (Vasudhararakṣita)
de lta na gaṅ gi tshe sgra ñid rtag par khas len par byed pa deḥi tshe ḥdi gtan tshigs ñid du ḥgyur ro źe na // gal te ḥdi la yaṅ mi rtag pa ñid kyi gtan tshigs byas pa ñid la sogs pa ḥga źig ston par mi byed na ni ḥgyur na / (gñi ga dmigs pa na ḥgal ba dag don gcig la mi srid paḥi phyir the tshom gyi rgyu yin no //) (Kanakavarman) – Cf. H. Kitagawa 1965: 498.

Another parallel exists in the *Nyāyamukha*, T 1628 p. 2b20–23 and T 1629 p. 7c16–19 – cf. G. Tucci 1930: 34–35.

[33] Cf. E. Steinkellner 1967b: 203–204, footnote 45, regarding some views held by Dignāga-commentators.

[34] Such a view is even suggested by other portions of the NP itself. The three "marks" of a valid reason are e.g. exemplified at the beginning of the text on the basis of this proof of the non-eternality of sound. – See A. B. Dhruva 1968: 1,8ff = M. Tachikawa 1971: 140.

[35] It has to be admitted, however, that this last consideration possesses any probative force regarding the opinions of the author of the NP only insofar as it can be assumed that Śaṅkarasvāmin did not borrow a term from the tradition which was incorrectly formulated according to his own views.

[36] That means of course that we have two valid arguments under the Vaiśeṣika-premise that there is something like the universal soundness.

[37] Lack of validity can be combined with the assumption of not context-sensitive validity of the constituent-arguments because not two, but three arguments (or proofs) were possible bearers of validity or non-validity: The two arguments mentioned and the complex argument mentioning them.

[38] The formulation *(ubhayoḥ saṃśayahetutvād) dvāv apy etāv eko 'naikāntikaḥ samuditāv eva* = "(Since both are reasons for doubt), these two, taken together, are one inconclusive [reason]" is ambiguous between a reading in the sense of: "(Since ...), any of both arguments is such that, if it is taken together with its respective counterpart, it is one inconclusive reason" (individual reading) and "(Since ...), the group of both these reasons taken together is one inconclusive reason". The phrase would express context-sensibility of validity, if the first reading were adopted.

[39] See A. B. Dhruva 1968: 5, 7–18 = M. Tachikawa 1971: 143 and M. Tachikawa 1971: 125–126.

[40] A. B. Dhruva 1968: 7,9–10 = M. Tachikawa 1971: 144 (§ 3.4.) *eṣāṃ pakṣahetudṛṣṭāntābhāsānāṃ vacanāni sādhanābhāsam.*

[41] I.e. the opponent in the debate does not agree that the property to be proven is exemplified anywhere at all. This holds good in the present example because the advocates of the Sāṃkhya-doctrine do not admit that anything perishes.

[42] Here the question might arise as to the difference between the situation where a thesis is contradicted by inference (= variety 2 above) and the situation of "antinomical" *viruddhāvyabhicārin*-reasons that has been discussed before. The difficulty arises because of the fact that, according to our analysis, in both cases an argument is made invalid by the circumstance that there is an other inference and another argument suited to establish the contradictory of the thesis which the proponent wishes to prove.

This does, however, not refute our assertions we have made above. There are a number of possibilities which might constitute a basis of the distinction between

the two situations in question although it appears difficult to establish with certainty what the actual motives lying behind this discrimination were. Perhaps the most probable solution is to assume that some Indian theoreticians felt (intuitively) obliged to differentiate between a) the case where a thesis is incompatible with a commonly accepted fact and b) the case where a thesis is not discordant with commonly accepted suppositions but incompatible with a proposition which can be derived in compliance with certain formal standards but is not universally accepted – because e.g. the argument supporting the proposition in question essentially relies on specific assumptions not commonly shared by everyone. If, in the case of a), the commonly accepted supposition contradicting the thesis in question depends on (previous) inference, it is possible, but not absolutely necessary that the pertinent accepted belief rests on commonly accepted arguments: It is (at least theoretically) possible that all the persons sharing the belief hold it for different reasons and that they would adduce different arguments in its favour. There is, however, no indication to be found in the texts which testifies that the author of the NP or his contemporaries based any theoretical decision on this latter consideration.

[43] The expression 'supported by evidence' has to be taken here in a broad sense including support by direct perception as well as self-evidence.

[44] This means that the *trairūpya*-conditions entail that for all entities which are not identical with the *pakṣa* it holds good that if they exemplify the proving property they also exemplify the property to be proven but not that (unrestrictedly) everything possessing the proving property possesses the property to be proven. – Cf. my paper "Zur Interpretation der drei Merkmale des logischen Grundes", in: *XXIII. Deutscher Orientalistentag, Ausgewählte Vortäge*, Stuttgart 1989: 392–403, as well as my monography *Studies on the Doctrine of Trairūpya*, Wien 1994. Regarding the exclusion of the *pakṣa* in regard to the *trairūpya*-conditions two and three see also H. G. Herzberger 1986.

[45] This has been clearly seen by Dharmakīrti as the above portrayed discussion of the doctrine of the sixfold reason in the *Hetubindu* shows.

[46] These reservations are necessitated by the doctrine of fallacious examples occurring in the NP, which need not to be discussed here in detail, and the existence of the second, third and fourth variety of fallacious reasons belonging to the category of "adverse" (*viruddha*) reasons, namely *dharmaviśeṣaviparītasādhana, dharmisvarūpaviparītasādhana* and *dharmiviśeṣaviparītasādhana*.

[47] It might perhaps be appropriate to point out that our terminology adopted here deviates from that of M. Tachikawa 1971. In particular, what has been called "contradicted" above must not be confused with the *denotatum* of this word in the latter work where it refers to the category of *viruddha*.

[48] More precisely: That exemplification of the *probans* together with non-exemplification of the *probandum* is abnormal cannot rely on the mere circumstance that the supposition that instances exhibiting the *probans* normally exhibit the *probandum* is supported by facts of actual co-occurrence of the pertinent properties. In particular, the basis for the pertinent abnormality cannot in this case consist in the fact that a plurality of instances exemplifying the *probans* also exemplify the *probandum*, in contradistinction to cases where normality-assumptions follow in an indirect manner from theoretical considerations, as e.g., if one assumes that, if some gas possesses a certain temperature the mercury-column of a thermometer will "normally" rise to a certain height, because some physical theory *predicts* this (even though *this* particular temperature and the corresponding position on the scale of the thermometer might never have been observed before). It is a significant feature of "Ancient Indian Logic" – and perhaps one of its major shortcomings – that it did not provide for the possibility that normality-suppositions could be indirectly grounded on theoretical predictions and insisted that propositions of the form 'A's are normally B' should be supported by actual exemplifications of the properties concerned in a domain of entities to which the entity or group of entities in question (= the subject

of inference) does not belong. The decisive point is, however, that *once* we grant (for the sake of argument) this supposition, important theoretical features exhibited by the exposition in the *Nyāyapraveśa* and similar texts appear well-motivated under the hypothesis that inferring under normality-assumptions is at stake.

[49] In other words, a logical reason can only be acceptable if it is able to show that 1) the supposition of the truth of the proposition to be inferred/proven is required in order to maintain the assumption that some instance in question (the *pakṣa*) does not represent a singular abnormal case in a certain respect and 2) the pertinent normality-assumption does not entail singular abnormality in some other respect. Or alternatively: A logical reason can only be acceptable if it is able to show that the supposition of the truth of the proposition to be inferred/proven is required in order to allow regarding the instance in question for the assumption of (its compliance with) some (respect of) normality such that 1) all other instances (known so far) comply with it and 2) its assumption regarding the pertinent case does not imply singular abnormality in some other respect.

[50] This hangs together with the fact that the existence of instances exhibiting the lack of any two properties H and S constitutes at best a, so to speak, counterbalanced support for the assumption that all H's are S. If any e lacking both H and S should strengthen the hypothesis that all not-S are not-H and that all H are S it would on account of the same fact also strengthen the hypothesis that all H are not-S or that some particular object p probably does not exhibit S. This is so at least as long as the relevant support relies merely on "distributive facts" concerning the properties in question – and not on additional theoretical considerations (or other circumstances able to furnish indirect support). For any increase in the number of instances exhibiting the non-occurrence of both H and S (of not-H together with not-S) is also an increase in the number of instances exhibiting not-S.

[51] For an introduction into the different systems of Non-Monotonic Logic see G. Brewka 1991 and D. W. Etherington 1988.

[52] This is close to the notation used by R. Reiter 1980 in "plain text" – except that the "justifications" (the formulas corresponding to '$B_1(x)$' etc.) are preceded by 'M' there. Otherwise defaults can also be written as: $\frac{A(x):B_1(x),\ldots,B_n}{C(x)}$

[53] For technical reasons also the case where n = 0, i.e. defaults with no justifications, is admitted.

[54] The page numbers of Reiter 1980 follow the page numbers in M. L. Ginsberg 1987, where this article has been reprinted. We use here the symbol '-' for representing negation (instead of '¬' appearing in Reiter 1980 and Brewka 1991).

[55] Or: any set S such that $\Gamma(S) = S$

[56] Since theoremhood or being a theorem in this sense is not equivalent to being an element of an extension, which on account of *D2* $Th(\Gamma(S)) = \Gamma(s)$ (and because of $p \vdash p$) amounts to being a theorem on the basis of classical derivability, we use an asterisk in order to differentiate between the less and the more demanding notions of 'theorem'.

[57] For the sake of brevity we omit the set-brackets, writing 'p is H' instead of '{p is H}' etc.

[58] and which is sometimes referred to in the texts by the same term as the second member in the five-membered syllogism, namely *hetu*.

[59] For a more detailed discussion and analysis of the relevant textual material see my study *Vier Studien zum Altindischen Syllogismus* Reinbek 1994, in which the philological and interpretational problems are dealt with.

[60] At this place, one might object that we have merely shifted the difficulty: *If*, as we claimed, the supposition that the *upanaya* expresses only the fact that example and *pakṣa* are alike in so far as they both exhibit the *probans* entails the hypostatization of "bizarre intentions" to the creator of the doctrine of the five-membered syllogism, we cannot avoid the attribution of similar "bizarre intentions" to some

later commentators by our hypothesis. Since the view that the *upanaya* states that *dṛṣṭānta* and *pakṣa* share the proving property has been indubitably held by some authors, one might ask why it should not be legitimate to ascribe the same view to the creator of the doctrine. This is no decisive counterargumant, however: Despite the fact that *what* is ascribed is the same it makes a difference in this case *to whom* the pertinent view is ascribed. More particularly, the supposition that the creator of the doctrine held the opinion that the *upanaya* expresses a fact which trivially and evidently follows from what has been stated in the previous context is to a significant degree more implausible than the attribution of the same opinion to later commentators and interpreters. This is so because a possibility exists to account for the origination of such a view among the interpreters of the doctrine which is not applicable with regard to its creator or anyone who adopted the perspective of the creator of a theory. The emergence of the view that the *upanaya* expresses the agreement between *dṛṣṭānta* and *pakṣa* in respect of the proving property – as well as the view that it expresses the agreement in respect of both the proving property and the property to be proven – can be explained as the result of a reflection on the problem of the precise nature of the agreement expressed by the word *tathā* occurring in the *upanaya*. Since, on the one hand, the notion of "normality" was (according to our analysis) only implicit in the doctrine of the five membered syllogism as well as in ancient Indian theories of inference in general and no expression representing this concept was current at that time and since, on the other hand, the idea of a "conditional property" corresponding to expressions of the form 'if some x is F, x is G' is relatively unnatural, it appears understandable that interpreters trying to explicate the pertinent correspondence between example(s) and substratum of inference referred to more familiar notions and located the agreement in the possession of "straightforward" properties (like the proving property or the combination of the proving property and the property to be proven). To be sure, if there were such obstacles preventing interpreters and commentators from referring to the notions of normality or of conditional properties in an explicit manner similar impediments should have existed for anyone who created or participated in the development of the doctrine of the five membered syllogism. But we do not claim that whoever created or elaborated this doctrine explicitly referred to these concepts, not even that he possessed anything like an explicit grasp of these ideas. It might be more realistic to assume that during the stage of the development of this doctrine and in particular at the time when the *upanaya* was incorporated in the theory nothing more than a vague and implicit grasp of the function of this member existed – comparable to the grasp of the communicative purpose as well as the function of particular linguistic expressions when some writer struggles for an adequate formulation. The decisive point is that we can understand the genesis of formulations referring to agreements regarding the proving property or regarding both the proving property and the property to be proven if we assume that something like *tathā cāyam* was the original formulation of the *upanaya* and that the person(s) who formulated it in this manner was (were) aiming at that which we have hypostatized as its objective.

[61] Car. VIII, 30 *atha pratijñā; pratijñā nāma sādhyavacanam, yathā nityaḥ puruṣa iti.*

[62] Car. VIII, 31 *atha sthāpanā; sthāpanā nāma tasyā eva pratijñāyā hetudṛṣṭāntopanayanigamanaiḥ sthāpanā ....*

[63] *atha pratiṣṭhāpanā; pratiṣṭhāpanā nāma yā tasyā eva parapratijñāyā viparītārthasthāpanā ....*

[64] It is also remarkable that the puzzling difference between "antinomical" reasons (*viruddhāvyabhicārin*) and theses contradicted by inference (*anumānaviruddha*), which has been mentioned before, can be projected on the foil of Default Logic. Whereas the latter tenet could be correlated with the situation in which a default theory

contains the negated counterpart of some proposition as a member of its W-set, the former parallels the case in which a theory contains two conflicting default-rules.

If we suppose e.g. that a default theory D contains in its W-component the proposition that pots are not eternal, if, in other words, we hypostatize some W_i of D, such that

W_i: –Eternal (Pot)

– thereby allowing the use of generic singular terms in our theory – the proposition that pots are/that the pot is eternal could not be the element of any extension of D. Even if D contained, apart from W_i,

W_j: Heat-resistent (Pot)

and

D_n^*: Heat-resistant (x): Eternal (x)/Eternal (x)

the "justification-requirement" of D_n could not be met with respect to pots on account of W_i. If, on the other hand, we consider the default theory D*:

W_1: Audible (Sound)
W_2: Produced (Sound)
D_1: Audible (x): Eternal (x)/Eternal (x)
D_2: Produced (x): –Eternal (x)/–Eternal (x)

the situation is different. We would obtain two extensions, one containing that sound is eternal and one that sound is not eternal. But, on the sceptical view at least, the proposition that sound is eternal – as well as the proposition that sound is not eternal – could not constitute a theorem*.

Now, if we extend our theoretical outlook by considering not only the range of default-inferences licensed within a default theory but also the question as to whether or not propositions contained in the W-set of a default theory might have been gained by default-inferences, default-derivations come into play at (at least) two different stages, and we could differentiate between "theory-internal" and "theory-external" defaults. Thus, if we equated *anumāna* with default-inferences, we could not only relate the difference between the doctrine of fallacious theses, and in particular the tenet of theses contradicted by inference, and the tenet of *viruddhāvyabhicārin*-reasons to another theoretical framework but were also enabled to account for the relevance of this distinction.

[65] One question dealt with in the frame of Default Logic is e.g., whether the only interesting defaults are "normal" defaults, i.e. defaults of the form 'A(x): B(x)/B(x)', whether one needs "semi-normal" defaults of the form 'A(x): B(x) & C(x)/C(x)' or still other kinds of defaults.

[66] The same holds also good with respect to other systems of Non-Monotonic Logics. In the framework of "Circumscription" e.g. the counterpart of the problem, which default(-rules) should be hypostatized is constituted by the question as to which "abnormality"-predicates should be introduced and minimalized, i.e. in which particular way from a given set of premises a superset of these premises should be construed such that certain formulae are monotonically derivable that cannot be (classically) deduced from the original set. This is a "material" issue which transgresses the question(s) regarding formal properties of Circumscription.

[67] It is true that the usual term denoting the first member, viz. *pratijñā*, betrays that the doctrine of the five-membered syllogism was developed in view of public

demonstrations, but as regards the *function* of the first member it can be characterized either as expressing/claiming assertibility of a sentence or as expressing/claiming acceptability of a belief.

[68] The *Praśastapādabhāṣya* e.g. oscillates between epistemic and non epistemic formulations of the *trairūpa* conditions as if its author was not fully aware of the consequences which can be deduced from the variant wordings. Cf. also C. Nenninger 1992.

[69] For '(x) ((x $\neq$ p & Hx) $\rightarrow$ Sx)' and 'Hp & Sp' logically entail '(x) (Hx $\rightarrow$ Sx)'.

[70] For more detailed discussions of this point see my *Zur Interpretation der drei Merkmale des logischen Grundes* (1989) and *Studies on the Doctrine of Trairūpya* (1994).

[71] The relationship of inclusion between necessity of *avinābhāva* and regularity might be only apparent because there is a possible sense of 'regular' according to which it appears doubtful that the truth of a proposition (of the form of) '(x) (Hx $\rightarrow$ Sx)' entails the existence of a regularity regarding the exemplification of the H- and the S-property. Even the idea that such a proposition is necessary does not strictly entail regularity: If 'Hx' and 'Sx' were synonymous the truth of '(x) (Hx) $\rightarrow$ Sx)' might be considered as necessary, but it remains doubtful whether one is entitled to say that a regularity regarding the co-occurrence of the pertinent properties exists. Similarly, it is by no means certain that one is justified to hypostatize a proposition of the form 'H's are normally/typically S' in such cases – not merely because of the violation of "Conversational Principles" (which concern the appropriateness of *asserting* sentences of this type), but rather because the notions of regularity and normality contain additional semantic ingredients. On the other hand, it could be argued that the concept of *avinābhāva* was richer than the idea expressed by 'All H's are S' and that also the notion of its necessity was more specific than that of the necessity of the formula '(x) (Hx $\rightarrow$ Sx)'. But if this were so, Dharmakīrti's claim that his theory of *svabhāvapratibandha* merely explicates the doctrines of his forerunners could get additional justification.

[72] Since I have tried to explore the relevance of these ingredients of the *svabhāva*-concept for Dharmakīrti's proofs of momentariness elsewhere (in my book *Studien zur buddhistischen Doktrin der Momentanheit des Seienden, Dharmakīrtis Sattvānumāna*, Wien 1993) I want to omit a further elaboration of this point here.

[73] One should not think that this argument essentially depends on the occurrence of indexical elements. The terms 'his (present) life' and 'day of his birth' could be replaced by any definite description of the items in question.

[74] Even if we bar infinite domains from being possible subjects of inference, pre-Dharmakīrtian theory would allow us to take any large amount of future days as *pakṣa* – also groups or collections of entities are possible *pakṣas* in the traditional view – 'being not the last day of my life' as *sādhya* and 'being a day which follows the date of my birth' as *hetu*. One could use this strategy to derive that one will be alive on any amount of days one likes, which should be more than sufficient for most practical purposes. Besides, one might repeat this kind of inference at a later date, if desired.

[75] In contradistinction to 'x is the last day of A's life' the predicate 'x is a day on which A is critically ill' can be true of more than one day. But does the reasoning inspire confidence that one will never be critically ill in the period between the years 1990 and 3990 because one has strong evidence to believe that neither in the period before 1990 nor in the period after 3990 one never was or will be subject to some fatal disease?

[76] Note that at this level of abstraction we do not require that the regularities in both domains are alike or similar.

[77] We assume for the sake of argument that smoke does in fact not occur without fire, that it is in fact so that birds normally fly – although one might doubt that this will hold true also in the future – and that Tweety, like humans normally do, selects

his friends among members of his own species (given that Tweety is in fact what his name suggests, namely a bird).

[78] The former relation accounts among others for inferences like the above mentioned derivation of something's being a tree because it is a *śiṃśapā*-tree, the latter refers to causal connections justifying inferences from effects to causes. Although the boundaries of the realm of inferences based on the *tādātmya*-connection are partly unclear in Dharmakīrti's theory it seems improbable that inferences relying on social norms and conventions can be related to this notion without resorting to quite arbitrary distortions of the meaning of the original term.

[79] Since the regularity in question is the regularity of the concomitance of two properties this amounts to the truth of '(x) (Hx → Sx)'.

[80] See *Appendix* for more on this point.

[81] Only partially because even on the basis of the theorem that same kinds of effects must be due to same kinds of causes the trouble is merely shifted to the verification of the first *trairūpya*-condition. If smoke not caused by fire does not belong to the same species as smoke caused by fire – or is not "proper" smoke – we cannot be certain of the occurrence of smoke in any instance without already knowing that it is something caused by fire. The only way to save the situation would be to postulate that things which seem to be similar must possess causes of the same kind, surely not a very attractive supposition.

[82] Regarding certain examples of *svabhāvahetus* and inferences employing them like the well known case of deriving being a tree from being a *śiṃśapā* the existence of a non-contingent relationship between *probans* and *probandum* is immediately evident. But this only highlights the problematic nature of Dharmakīrti's equalization of the different cases by fitting them into the frame of a unified theory.

[83] It seems that all varieties of Indian theories of inference in ancient times had exclusively focussed their attention to the acquisition of true propositions from facts and no interest has been paid to derivations of propositions from mere assumptions. If our claim is correct that the idea of a purely formal derivational validity is implicit in the doctrine of the five-membered syllogism this is significant and the non-existence of doctrines explicitly dedicated to derivations from assumptions could not be plausibly explained by a lack of ability to gain a conception of formal validity. But there are other facts which explain this circumstance, in particular the intertwinement of inference and acquiring knowledge and between *anumāna*-theory and the doctrine of means of valid knowledge (*pramāṇa*). Also here the fact that the connection has not been severed is probably not due to the inability to disentangle both issues, but rather to the – probably wrong – (implicit) prejudice that inferring is of no much value if no truths are being inferred.

[84] Understanding in default is probably relevant if (a model of) the process of understanding is at stake. Hearing an utterance or reading a text the hearer or reader seems to pass to phases of provisional constructions of meaning. This must perhaps also be taken into account if one wants to explain certain kinds of (sometimes literary or poetic) effects, in particular effects of surprise. Such effects can be observed even in simple sequences of sentences like:

(a) If Eric is depressed he drinks; if he is not depressed he drinks too.

If, instead of (a), we would be confronted with

(a)′ If Eric is depressed he drinks.

we would tend to derive that the speaker means (in the sense of wanting to convey and/or in the sense of believing) that Eric is not a habitual drinker because the fact of the non-existence of further information can be employed for conveying (on the utterer's part) and for deriving (on the hearer's part) that the "provisionally constructed meaning" is the intended one.

[85] This is a defeasible assumption because sometimes, though less "normally", it occurs that somebody makes some involuntary exclamation of astonishment, surprise, fury etc.

[86] See *Praśastapādabhāṣya* (ed. Śrīdurgādharajhā Śarmā 1963): 581–590. Further C. Nenninger 1992: 42–43.

[87] It is not improbable that the reluctance to admit both alternatives licensed by pairs of conflicting logical reasons exhibited by the *Praśastapādabhāṣya* as well as by the *Nyāyapraveśa* and other sources is connected with the fact that inference has been considered on the background of scholastic issues and doctrinal controversies in the classical period. If the question of the construction and justification of theories, philosophical systems or dogmatic systems is at stake it is natural to adopt a strict attitude toward incompatibilities. The situation could be different, however, if mundane issues are concerned since in those contexts the question as to whether or not a proposition is supported by any evidence at all might appear significant. Therefore it might not be irrelevant that some old sources like the *Carakasaṃhitā* do not contain remarks that equal the disapproval of *viruddhāvyabhicārin*-reasons.

[88] Otherwise the most natural assumption would be that such theses are ruled out because they are unsuited as topics of a proper debate. But though this consideration might have also played a decisive role it is by no means certain that it was the only reason involved.

[89] For a detailed description and analysis of such cases see T. Iwata 1991: 85–96.

[90] This kind of criticism would not cease to be valid if one rejected any dichotomy between the "analytic" and the "synthetic" claiming that *all* sentences are in principle revisable or if the distinction between classical and default-inferences were attacked on the ground that *all* derivations are such that they could in principle lose their validity if further assumptions were added or new information obtained. Under these circumstance Dharmakīrti's assimilation of revisable inferences to standards of irrevisability would appear all the more problematic.

[91] It should also go without saying that what has been said does not entail that interpreting philosophical doctrines isolated from historical context constitutes a methodological *desideratum*. Nevertheless, some less extreme positions might now and then be reasonable, as e.g. the maxim of narrowing down the historical scope in order to avoid superficiality in the analysis of individual theories or particular stages of the historical development.

[92] See E. Steinkellner 1966.

[93] Or more precisely: for the predicate which expresses that some fruit (some entity) belongs to the kind in question.

[94] We generally omit brackets around the variable in open sentences mainly because we represent here the universal quantifier by the notation '(x)' and since confusions could arise otherwise. We follow, however, the convention of using brackets around the variables in defaults because this is a usual practice in a number of books and articles on Default-Logic. This slight "inconsequence" should be harmless.

[95] With respect to the well-known Tweety-example this would amount to:

$$(x)\ ((\text{Bird } x\ \&\ -(\text{Penguin } x \vee \text{Dead } x \vee \ldots)) \rightarrow \text{Flies } x)$$

or:

$$(x)\ ((\text{Bird } x\ \&\ -\text{Exceptional-Bird } x) \rightarrow \text{Flies } x)$$
$$(x)\ (\text{Exceptional-Bird } x \leftrightarrow (\text{Penguin } x \vee \text{Dead } x \vee \ldots))$$

– Cf. also G. Brewka 1991: 3.

[96] Or more precisely, that there is a rough correspondence between the number of

seats and the number of family members. It might be advisable after all to align the production not exactly with the average number of family members since place should be left for transporting visitors etc. and because it might be more reasonable and economical to orientate the standard of mass-products to values which lie somewhat above the average etc.

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WZKS *Wiener Zeitschrift für die Kunde Südasiens*. Wien.
WZKSO *Wiener Zeitschrift für die Kunde Süd- und Ostasiens*. Wien.

APPENDIX: NON-UNIVERSAL DEFAULTS AND ESSENTIAL CONNECTIONS

If it is correct that the link between principles of regularity and universality established in Dharmakīrti's theory of *svabhāvapratibandha* was not at all necessitated by theoretical requirements but rather due to an unbalanced emphasis on a particular aspect of the preceding theoretical development the question poses itself as to whether different issues which have been apparently entangled in the *svabhāvapratibandha*-doctrine can be disentangled in such a way that some of its ingredients are applicable to normal defeasible reasoning. In particular, one might ask whether a function can be provided for principles connecting domains by regional regularities, be they strict or not.

We had seen that regional variants of *svabhāvapratibandha* could be assigned a role whenever not generalizations from domains to the totality of all entities but generalizations from domains to larger domains are at stake and that the theoretical development before Dharmakīrti exhibited one aspect which might allow us to allot extensions from domains to larger domains a field of operation. It is in the context of generalizing from regularities observed in a domain to their validity in another domain and thereby their satisfaction in an enlarged realm where something which could be called "regional defaults" comes into play. These can be connected with the idea of a regional variant of essential connection. In order to see more clearly what is meant let us consider the following example:

Suppose we observe that some samples of some kind of fruit have taken between two and a half and three months to ripen after the blossom of the tree. From this it (analytically) follows that the observations relating to those samples are *compatible* with the truth of some sentence '$(x)\ (Fx \rightarrow Mx)$', where 'F' stands for the predicate referring to the kind of fruits concerned[93] and 'M' for 'matures between two and a half and three months after the blossom of the tree' or a synonymous expression. What does *not* strictly follow from the observation is the fact that this compability is not accidental. The circumstance that we are so familiar

with the idea that the length of the period of maturation correlates with a particular biological species does not disprove that the assumption of a non-contingent relationship in the individual case is the outcome of a defeasible reasoning. Mere *compliance* with a regularity or a proposition of the form '(x) (Fx → Gx)' does by no means entail the existence of a rule-based regularity, and if our previous considerations are correct this fact formed a starting point for Dharmakīrti's reform in the theory of inference. We neither need nor want to go into the details of the question as to what might trigger or justify the step from compliance with a regularity to the assumption of its non-accidentality. It should only be noted that at this point "statistical considerations" probably have an important role to play. After all, if somebody wins twice in a lottery we might attribute this circumstance to mere coincidence but if the same person wins ten times (in succession or in a very short period of time) we would probably think otherwise; we would even be ready to revise original assumptions in the light of facts of that kind such as the assumption that the play is fair etc. But once we have accepted the supposition of a non-accidental regularity in a domain of cases we can be confronted with a situation where we have to take a second step of defeasible reasoning if we want to gain further assumptions: If we encounter new samples of F-fruits which are not yet ripe or which are ripe but we do not know when the tree on which they grow has blossomed, both the assumption that those fruits comply with the truth of '(x) (Fx → Mx)' and the assumption that there is a common basis responsible for the compliance in both realms can only be reached by default reasoning. This follows from the fact that we *can* consistently maintain our old assumptions but nevertheless be forced to withdraw our prediction that the new samples comply with the regularity if information to the effect that those samples take less than two and a half or more than three months to become ripe is acquired. This is not a mere theoretical possibility since we can easily imagine having made our original observations in a certain climatic zone, say in (certain parts of) India, whereas the new samples are encountered in a different region which might be considerably cooler or more humid or more fertile etc. etc. On the other hand, *even if* no exceptions to '(x) (Fx → Mx)' should exist and if in fact the rule that F-fruits mature within a period of two and a half to three months *is* valid without exception – after all, there is also the possibility that all F-fruits, as a matter of fact, only grow in a certain region of India (which *could* be due to mere coincidence!) – it would still hold good that the assumption of those facts is due to defeasible reasoning.

But now it should be clear where regional variants of essential connections would be appropriate given that we – following Dharmakīrti – keep to the idea that all "inductive extensions" should be backed by essential connections. It could be the case that our new samples comply with '(x) (Fx → Mx)' and that this compliance is due to the same rule or (natural) law as the compliance in the original cases, although '(x) (Fx → Mx)' does *not* hold good unrestrictedly and there is no rule or law guaranteeing compliance in *all* cases. We must only think of the possibility that the new samples grow in the same climatic zone or on the same kind of soil etc. and that there are F-fruits growing under different conditions and needing either more or less time for becoming ripe.

We had seen above that Dharmakīrti probably would not be ready to admit validity to inferences in such cases. But in view of the fact that the unrestricted compliance with '(x) (Fx → Mx)' and the corresponding universal *svabhāvapratibandha* can only be assumed by default in *any* case it is questionable that we should accept his position. At any rate, if we consider the epistemic situation there is no difference between the last described case and the case in which F-fruits, as a matter of fact, do not grow elsewhere and a universal compliance exists. On this criterion at least, inferences should be valid in the former case if they are in the latter. If, however, inferences are refused acceptability in both cases, one does not only disregard the fact that "inductive extensions" under the described circumstance appear legitimate on some standard of legitimacy but faces also the consequences of setting the standards for acceptability so high that it becomes difficult to see which sphere of application remains at least as far as the realm of empirical inferences based on generalizations is concerned. But if, on the other hand, we want to account for the legitimacy of "inductive extensions" in the above cases we should allow for regional defaults which bestow legitimacy on assuming compatibility with '(x) (Fx → Mx)' and enabling one to derive that the new samples are M irrespective of whether or not the same compatibility holds good if we move to altogether different regions.

One way to express the corresponding default rules would be to stipulate terms for regularities, say e.g. '*R*' for the regularity expressed by '(x) (Fx → Mx)', and predicates for the compliance with regularities, say 'C_R' for 'complies with *R*'. Thus we can formulate the default:

$$F(x): C_R(x)/C_R(x)$$

which expresses that any F-fruit should be regarded as complying to *R* if non-compliance is not established. The "regionality" could be effectuated

either by formulae of the form '(x) (Ax → $-C_R$x)'[94] expressing that entities subject to certain conditions, like residence in cooler regions etc. are not subject to *R* or by corresponding defaults of the kind 'A(x): $-C_R$x/$-C_R$(x)'. We leave open which option is more appropriate in which contexts; in the latter case we could get conflicting defaults. These regional defaults would correspond to regional *svabhāvapratibandhas* entailing that e.g. all F's are M, but only applicable in restricted domains.

One might perhaps object that this notion of universal principles which are restricted to domains does not only *prima facie* sound contradictory but is superfluous on account of the fact that it is equivalent to the concept of a principle which applies unrestrictedly but involves a fuller specification of the antecedent-conditions, e.g. instead of '(x) (Fx → Mx)' we have '(x) ((Ex & Fx) → Mx)' or equivalently '(x) (Ex → (Fx → Mx))' where 'E' expresses the frame-conditions under which the rule corresponding to '(x) (Fx → Mx)' holds good. But it is questionable that this objection is sound. It is questionable for the same reason for which it appears so little promising to handle default reasoning in classical logic by setting up formulae expressing non-exceptionality in the antecedent within universally quantified propositions:[95] It would be necessary to list all possible exceptions explicitly but there are many unforeseeable circumstances in which something potentially can go wrong and contrary to what is "normal". If somebody has observed compliance with '(x) (Fx → Mx)' in some cases, assumes (by default) a basis for this compliance and wants to derive (by default) compliance in some new cases he normally does not possess explicit knowledge regarding (all) the factors responsible for the applicability or non-applicability of a rule. If a *svabhāvapratibandha* should represent the regularity to which somebody who assumes compliance with the same rule in new instances commits himself it should only be the regularity expressed by '(x) (Fx → Mx)' as long as no more specific information regarding the applicability-range exists. For this is the most someone not possessing more specific knowledge can tentatively assume. That seems also to correspond to a realistic account of what we in fact mostly do if we have observed compliance with a regularity and assume compliance in some further instance(s). Having observed that F-fruits ripen in a period of two and a half to three months we first hypostatize that this holds generally – except in situations where we are already aware of the relevance of special climatic conditions etc. from other parallel cases and transfer rules obtained in other spheres of experience to the present case. After having recognized that a generalization does not hold good we might replace the original by a more specific one, but thereby we have not transgressed the realm of default-generalizing and any new

hypothesis is exposed to the same kind of menace. Therefore it seems not unreasonable to assign regional varieties of "essential connection" a place if the description of the commitments involved in the process of advancing from naivety to (more) sophistication is at stake.

The same can be said *mutatis mutandis* regarding generalizations of tolerant regularities. Suppose we empirically observe that cars are normally, but not unexceptionally, five seated. We go beyond our observations if we form the hypothesis that what we observed was not accidental. Being confronted with cars about which we do not (as yet) possess any knowledge concerning the number of seats we apply a further default for deriving the hypothesis that cars in the new domain are normally five-seated. That this is the result of defeasible reasoning becomes clear if we envisage the situation that our first observations have been made in some European country where this generally holds due to the fact that cars of this type correspond to the common needs in this region whereas our new domain pertains to some country where most people have many children and need bigger cars. It should be noted that similarly as in the case of strict generalizations both a deviance and a non-deviance in different realms could be possibly reduced to a common and more fundamental rule, as e.g., the rule that cars normally possess as many seats as families normally need to have.[96] Such a rule in its turn can have either a universal or a domain-restricted validity,which becomes clear as soon as we bear in mind that people are often foolish enough to produce and to buy what is not needed.

We can derive from this that also defaults concerning the compliance with tolerant regularities as well as their corresponding bases like the propositions that people normally need five-seated cars or that industrialists produce goods fulfilling demands etc. might be "regional". It is not difficult to see that the "regionalism" of defaults and their possible grounds of validity and the interplay of various default-principles is of utmost methodological relevance for transcultural studies. As far as known, the problems connected with these intricacies have not yet been systematically investigated. But there is hope that disciplines dedicated to the study of foreign cultural traditions might obtain more significance if they are related to such issues.

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