CHAPTER 1

INTRODUCING INDIAN LOGIC

1.1 "LOGIC" IN WHAT SENSE?

"Logic" I shall here understand to be the systematic study of informal inference-patterns, the rules of debate, the identification of sound inference vis-à-vis sophistical argument, and similar topics. One may feel somewhat apologetic today to use the term "logic" in the context of classical Indian philosophy, for "logic" has acquired a very specific connotation in modern philosophical parlance. Nevertheless, the list supplied in the opening sentence is, I believe, a legitimate usage of the term, especially when its older senses are taken into account. S.C. Vidyabhusana's monumental, but by now dated, work *A History of Indian Logic* (1921), has misled many non-Sanskritists. For both he, and scholars such as H. N. Randle and T. Stcherbatsky, used such terms as "Indian logic" and "Buddhist logic" when their intention was to write about the theory of *pramāṇas* or accredited means of knowing in general, perhaps with particular emphasis upon the specific theory of *anumāna*, inference considered as means of knowing. I have chosen not to follow the same path; instead, I shall take "logic" in its extended and older sense in order to carve out a way for my own investigation. I shall use the traditional *śāstras* and try to explain their significance and relevance to our modern discussion of the area sometimes called "philosophical logic." I shall include much else besides, as the initial list shows, but will try to remain faithful to the topic of logic, debate, and the study of inference. I. M. Bochenski included a separate, albeit sketchy chapter called "The Indian Variety of Logic," in his great work *A History of Formal Logic* (1956). This will, perhaps, be enough to justify my use of the term "logic" when I am trying to cover similar ground.

Logic as the study of the form of correct arguments and inference-patterns, developed in India from the methodology of philosophical debate. The art of conducting a philosophical debate was prevalent probably as early as the time of the Buddha and the Mahāvīra (Jina), but it became more systematic and methodical a few hundred years later. By the second century BC, the intellectual climate in India was bristling with controversy and criticism. At the center of controversy were certain dominant religious and ethical issues. Nothing was too sacred for criticism. Such questions as: "Is there a soul different from body?", "Is the world (loka) eternal?", "What is the meaning, goal, or purpose of life?", and, "Is renunciation preferable to enjoyment?", were of major concern. While teachers and thinkers argued about such matters, there arose a gradual awareness of the characteristics or patterns of correct—that is, acceptable and sound—reasoning, and concern about how it differs from the kind of reasoning that is unacceptable.

1.2 AN HISTORICAL SKETCH OF LOGICAL ISSUES IN INDIA: DEBATE AND LOGIC

Logic developed in ancient India from the tradition of vādavidyā, a discipline dealing with the categories of debate over various religious, philosophical, moral, and doctrinal issues. There were several vāda manuals available around the beginning of the Christian era. They were meant for students who wanted to learn how to conduct debates successfully, what tricks to learn, how to find loopholes in the opponent's position, and what pitfalls to be wary of. We will examine some of these manuals in chapters 2 and 3. Of these manuals, the one found in the Nyāyasūtras of Akṣapāda Gautama (circa 150 AD) is comparatively more systematic than others. We shall hence follow it in this introductory exposition.

Debates, in Akṣapāda's view, can be of three types: (i) an honest debate (called vāda) where both sides, proponent and opponent, are seeking the truth, that is, wanting to establish the right view; (ii) a tricky-debate (called jalpa) where the goal is to win by fair means or foul; and (iii) a destructive debate (called vitaṇḍā) where the goal is to defeat or demolish the opponent, no matter how. This almost corresponds to the cliché in English: the good, the bad and the ugly. The first kind signals the employment of logical arguments, and use of rational means and proper evidence to establish a thesis. It is said that the participants in this kind of debate were the teacher and the student, or the students themselves, belonging to the same school.

The second was, in fact, a winner-takes-all situation. The name of the game was wit or intelligence. Tricks, false moves, and unfair means were

allowed according to the rules of the game. But if both the debaters were equally clever and competent, this could be kept within the bounds of logic and reasoning. Usually two teachers of different schools would be participants. This used to take place before a board or jury called the *madhyastha* (the mediators or adjudicators) and a chairman, usually a king or a man with power and money who would organize the debate. The winner would be declared at the end by the consensus of the adjudicators.

The third type was a variety of the second type, where the winner was not supposed to establish his own position (he may not even have had a position) but only to defeat the opponent using logical arguments, or as the case was, tricks or clever devices. It was explicitly destructive and negative; hence philosophers like Vātsyāyana (circa 350 AD) denounced this form of debate in unambiguous language. Again, a clever and competent opponent might force the other side into admitting a counter-position ("If you deny my thesis p, then you must admit the thesis not-p; therefore, please establish your thesis"), and if the other side yielded, the debate was decided in favor of the former, or it would turn into the second form of debate.

The notoriety of the third type was universal, although some philosophers (for example, Nāgārjuna, Śrīharṣa) maintained that if the refutations of the opponent were done on the basis of good reason and evidence (in other words, if it followed the model of the first type, rather than the second type) then lack of a counter-thesis, or non-establishment of a counter-thesis, would not be a great drawback. In fact, it could be made acceptable and even philosophically respectable. That is why Gauḍa Sānātani (quoted by Udayana; see Matilal, 1986: 87) divided the debates into four types: (i) the honest type (*vāda*), (ii) the tricky type (*jalpa*), (iii) the type modeled after the tricky type but for which only refutation is needed, and (iv) the type modeled after the honest one where only the refutation of a thesis is needed. Even the mystics would prefer this last kind, which would end with a negative result. The different types of debate, and the philosophical significance of the 'refutation-only' type, are discussed in depth in chapter 2.

Apart from developing a theory of evidence (*pramāṇa*) and argument (*tarka*) needed for the first type of debate, the manuals go on to list a number of cases, or situation-types, where the debate will be concluded and one side will be declared as "defeated" (or *nigraha-sthāna*, the defeat situation or the clinchers). The *Nyāyasūtra* lists 22 of them. For example, (a) if the opponent cannot understand the proponent's argument, or (b) if he is confused, or (c) if he cannot reply within a reasonable time limit—all these will be cases of defeat. Besides, these manuals identify several standard "false" rejoinders or *jāti* (24 of them are listed in the *Nyāyasūtra*), as well as some underhand tricks (*chala*) like equivocation and confusion of a metaphor for the literal. These "tricks," "false rejoinders," and "defeat situations" are examined in

detail in chapter 3. Now we may survey the type of logical theorizing that arose out of the study of debate in India.

The Nyāya Model

Akṣapāda defined a method of philosophical argumentation, called the *nyāya* method or the *nyāya* model. This was the standard for an ideally-organized philosophical disputation. Seven categories are identified as constituting the "prior" stage of a *nyāya*. A *nyāya* starts with an initial doubt, as to whether *p* or not-*p* is the case, and ends with a decision, that *p* (or not-*p*, as the case may be). The seven categories, including Doubt, are: Purpose, Example, Basic Tenets, the "limbs" of the formulated reasoning, Supportive Argument (*tarka*), and Decision. Purpose is self-explanatory. The example is needed to ensure that the arguments would not be just empty talk. Some of the basic tenets supply the ground rules for the argumentation.

The "limbs" were the most important formulation of the structure of a logical reasoning; these are a landmark in the history of Indian logic. According to the *Nyāyasūtras*, there are five "limbs" or "steps" in a structured reasoning. They should all be articulated linguistically. The first step is the statement of the thesis, the second the statement of reason or evidence, the third citation of an example (a particular case, well-recognized and acceptable to both sides) that illustrates the underlying (general) principle and thereby supports the reason or evidence. The fourth is the showing of the present thesis as a case that belongs to the general case, for reason or evidence is essentially similar to the example cited. The fifth is the assertion of the thesis again as proven or established. Here is the time-honored illustration:

Step 1. There is fire on the hill.
Step 2. For there is smoke.
Step 3. (Wherever there is smoke, there is fire), as in the kitchen.
Step 4. This is such a case (smoke on the hill).
Step 5. Therefore it is so, i.e., there is fire on the hill.

The Buddhists and others argued that this was too elaborate for capturing the essential structure. All we need would be the first two or the first three. The rest would be redundant. But the Nyāya school asserted all along that this *nyāya* method is used by the arguer to convince others, and to satisfy completely the "expectation" (*ākāmkṣā*) of another, you need all the five "limbs" or steps. This is in fact a full-fledged articulation of an inference schema.

Returning to the *nyāya* method itself, the supportive argument (*tarka*) is needed when doubts are raised about the implication of the middle part of

the above inference schema. Is the example right? Does it support the evidence? Is the general principle right? Is it adequate? The "supportive arguments" would examine the alternative possibilities, and try to resolve all these questions. After the supportive argument comes the decision, one way or another.

Another seven categories were identified as constituting the "posterior stage" of the *nyāya* method. They consist of three types of debate (already mentioned), the group of tricks, false rejoinders, and clinchers or defeat situations, and another important logical category, that of pseudo-reason or pseudo-evidence.

Pseudo-evidence is similar to evidence or reason, but it lacks adequacy or the logical force to prove the thesis adduced. It is in fact an "impostor." The *Nyāyasūtra* notes five such varieties. Although these five varieties were mentioned throughout the history of the Nyāya tradition (with occasional disagreement, for example, Bhāsarvajña, who had six), they were constantly redefined to fit the developing logical theories of individual authors. The five types of pseudo-evidence were: the *deviating*, the *contradictory*, the *unestablished* or *unproven*, the *counter-balanced*, and the *untimely*.

Since there can be fire without smoke (as in a red-hot iron ring), if somebody wants to infer presence of smoke in the kitchen on the basis of the presence of fire there, his evidence would be pseudo-evidence called the "deviating." Where the evidence (say a pool of water) is usually the sign for the absence of fire, rather than its presence, it is called the contradictory. An evidence-reason must itself be established or proven to exist, if it has to establish something else. Hence, an "unestablished" evidence-reason is a pseudo-evidence or a pseudo-sign. A purported evidence-reason may be countered by a purported counter-evidence showing the opposite possibility. This will be a case of the "counter-balanced." An "untimely" is one where the thesis itself precludes the possibility of adducing some sign as being the evidence-reason by virtue of its incompatibility with the thesis in question. The "untimely" is so-called because as soon as the thesis is stated, the evidence will no longer be an evidence. (For further elaboration, see Matilal, 1985, §1.5).

The Sign and the Signified

All this implicitly spells out a theory of what constitutes an adequate sign. What we have been calling "evidence," "reason," and sometimes "evidence-reason" may just be taken to be an adequate or "logical" sign. The Sanskrit word for it is *liṅga*, a sign or a mark, and what it is a sign for is called *liṅgin*, the signified, the "marked" entity. This is finally tied to their theory of sound inference, that is, inference of the signified from the observation of the logical

sign. This is the pre-theoretical notion of the "sign-signified" connection, as explained here. Note that this notion of "sign-signified" relation is different from the "signifier-signified" relation that is mentioned in some modern linguistics, especially Saussure.

A sign is adequate or "logical" if it is not a pseudo-evidence, that is, a pseudo-sign. And the five types of pseudo-sign have already been identified. We have here a negative formulation of the adequacy of the sign. A little later on in the tradition the positive formulation was found. The fully-articulated formulation is found in the writings of the well-known Buddhist logician, Diṅnāga (circa 400–480 AD), in his theory of the "triple-character" reason. We will discuss his contribution briefly below, and in more detail in chapter 4. In fact, an adequate sign is what should be non-deviating, that is, it should not be present in any location when the signified is absent. If it is, it would be "deviating." Thus, the identification of the first pseudo-sign captured this intuition, although it took a long time to get this fully articulated in the tradition. A sign which is adequate in this sense may be called "logical" for it ensures the correctness of the resulting inference. Thus, we have to ask: if the sign is there, can the signified be far behind?

The Triple Nature of the Sign

Diṅnāga formulated the following three conditions, which, he claimed, a logical sign must fulfill:

1. It should be present in the case (object) under consideration.
2. It should be present in a *similar* case or a homologue.
3. It should not be present in any *dissimilar* case, any heterologue.

Three interrelated technical terms are used here. The "case under consideration" is called a *pakṣa*, the "subject-locus." The "similar case" is called a *sapakṣa*, the "homologue." The "dissimilar case" is called a *vipakṣa*, the "heterologue." These three concepts are also defined by the theory. The context is that of inferring a property A (the *signified* in our new vocabulary) from the property B (the *sign*) in a location S. Here the S is the *pakṣa*, the subject-locus. The *sapakṣa* is one which already possesses A, and is known to do so. And the *vipakṣa* is one which does not possess A. The "similarity" between the *pakṣa* and the *sapakṣa* is variously explained. One explanation is that they would share tentatively the signified A by sharing the sign B. An example would make it clear. Smoke is a sign of fire on a hill, because it is present on that hill, and it is also present in a kitchen which is a locus of fire, and it is absent from any non-locus of fire.

The third condition is easily explained. The sign must not be present where the signified is not present. For otherwise, as we have already noted, the sign will be *deviating*, and would be a "pseudo-sign." Why the second condition? Did Diṅnāga overshoot his mark? Is not the second condition redundant (for the first and the third seem to be sufficient to guarantee adequacy)? These questions were raised in the tradition by both the Naiyāyikas like Uddyotakara (circa 550–625 AD), and the Buddhists like Dharmakīrti (circa 600–660 AD). Some, such as Dharmakīrti, maintained that it was slightly repetitious but not exactly redundant. The second condition states positively what the third, for the sake of emphasis, states negatively. The second is here rephrased as: the sign should be present in all *sapakṣas*. The contraposed version can then be formulated with a little ingenuity as: the sign should be absent from all *vipakṣas*. For *sapakṣa* and *vipakṣa*, along with the *pakṣa*, exhaust the universe of discourse.

Other interpreters try to find additional justification for the second condition to argue against the "redundancy" charge. The interpretation becomes complicated, and we will postpone going into the details until chapter 4. Logically speaking, it seems that the second condition is redundant, but epistemologically speaking, a case of the co-presence of *A* and *B* may be needed to suggest the possibility, at least, that one may be the sign for the other. Perhaps Diṅnāga's concern here was epistemological.

Diṅnāga's Wheel of Reason/Sign

When a sign is identified, there are three possibilities. The sign may be present in all, some, or none of the *sapakṣas*. Likewise, it may be present in all, some or none of the *vipakṣas*. To identify a sign, we have to assume that it is present in the *pakṣa*, however; that is, the first condition is already satisfied. Combining these, Diṅnāga constructed his "wheel of reason" with nine distinct possibilities, which may be tabulated in Figure 1.1.

Of these nine possibilities, Diṅnāga asserted that only two are illustrative of sound inference for only they meet all the three conditions. They are Numbers 2 and 8. Notice that either (– *vipakṣa* and + *sapakṣa*), or (– *vipakṣa* and ± *sapakṣa*) would fulfill the required conditions. Diṅnāga is insistent that at least one *sapakṣa* must have the positive sign. Number 5 is *not* a case of sound inference; this sign is a pseudo-sign. For although it satisfies the two conditions 1 and 3 above, it does not satisfy condition 2. So one can argue that as far as Diṅnāga was concerned all three were necessary conditions. The second row does not satisfy condition 2 and hence none of Numbers 4, 5, and 6 are logical signs; they are pseudo-signs. Numbers 4 and 6 are called "contradictory" pseudo-signs—an improvement upon the old *Nyāyasūtra* definition

FIGURE 1.1
DIÑNĀGA'S WHEEL OF REASON

1 + *vipakṣa* + *sapakṣa*	2 – *vipakṣa* + *sapakṣa*	3 ± *vipakṣa* + *sapakṣa*
4 + *vipakṣa* – *sapakṣa*	5 – *vipakṣa* – *sapakṣa*	6 ± *vipakṣa* – *sapakṣa*
7 + *vipakṣa* ± *sapakṣa*	8 – *vipakṣa* ± *sapakṣa*	9 ± *vipakṣa* ± *sapakṣa*

+ = all, ± = some, – = none.

of contradictory. The middle one, Number 5, is called "uniquely deviating" (*asādhāraṇa*), perhaps for the reason that this sign becomes an unique sign of the *pakṣa* itself, and is not found anywhere else. In Diṅnāga's system, this sign cannot be a sign for anything else, it can only point to itself reflexively or to its own locus. Numbers 1, 3, 7, and 9 are also pseudo-signs. They are called the "deviating" signs, for in each case the sign occurs in some *vipakṣa* or other, although each fulfills the second condition. This shows that at least in Diṅnāga's own view, the second condition (when it is combined with the first) gives only a necessary condition for being an adequate sign, not a sufficient one. In other words, Diṅnāga intended all three conditions jointly to formulate a sufficient condition.

Development of the Wheel by Uddyotakara

Diṅnāga's system of nine reason-types or sign-types was criticized by Uddyotakara, the Naiyāyika, who argued that it was incomplete. We will summarize the main points here; they are discussed in greater detail in §4.10 and chapter 5. Diṅnāga did not consider at least two further alternatives: (a) a situation-type where there is no *sapakṣa*, and (b) a situation-type where there is no *vipakṣa*. The sign's absence from all *sapakṣas* (or all *vipakṣas*) should be distinguished from these two situations. Let us use "0" for the situation-type which lacks any *sapakṣa*, or *vipakṣa*, and "–" for the situation-type where the sign is present in *no sapakṣa* or *vipakṣa* (as before). Hence combining the four possibilities + *sapakṣa*, ± *sapakṣa*, –*sapakṣa*, 0 *sapakṣa* (no *sapakṣa*) with the other four (+, ±, –, 0) *vipakṣa*, we get sixteen portions in our wheel of reason, and the new wheel contains more sound inferences, that is, adequate signs. For example,

This is nameable, because this is knowable.

Here "knowability" is the sign, which is adequate and logical for showing the nameability of an entity, for (in the Nyāya system) whatever is knowable is also nameable (that is, expressible in language). Now we cannot have a heterologue or *vipakṣa* here, for (again according to the Nyāya system) there is nothing that cannot be named (or expressed in language). Within the Buddhist system, another example of the same argument-type would be:

This is impermanent because it is a product.

For Buddhists everything is impermanent and a product. Later Naiyāyikas called this type of sign "*kevalānvayin*," the universal-positive-sign; that is, it is a characteristic of every entity.

Uddyotakara captured another type of adequate reason or logical sign, but he formulated the example of this reasoning (or inference) negatively, that is, in terms of a counterfactual. This was done probably to avoid a doctrinal quandary of the Nyāya school (to which he belonged) in which the explanation of analytic judgements or *a priori* knowledge always presents a problem. His typical example was:

The living body cannot be without a soul, for if it were it would have been without life.

This is the generalized inference called "universal negative"—*kevalavya-tirekin*—in the tradition. The subject *S* which has a unique property *B* cannot be without *A*, for then it would have been without *B*. Since *B* is a unique

that something is a tree from the fact that it is a beech tree, for a beech tree cannot be a beech tree without being a tree. This only defines invariability or necessary connection. The second type of sign is one when we infer the "natural" causal factor from the effect, as we infer fire from smoke. It is also the nature or the essence of smoke that it cannot originate without originating from fire. Hence invariable relation means: (i) an essential or necessary property of the class, and (ii) a casually necessary relation between an effect and its invariable cause. Dharmakīrti's contribution is examined in the early sections of chapter 5.

The late Naiyāyikas said that the absence of a counter-example is what is ultimately needed to legitimize the inference-giving relation between A and B. If B is the sign, then B would be the logical sign if, and only if, there is no case where B occurs but A does not occur. If B occurs where A does not, that would be a counter-example to the tacitly assumed rule of inference, "if B then A." As we know from the truth-table of the propositional logic, "if B then A" is falsified only under one condition, when not-A is true along with B. Thus Gaṅgeśa (f. 1325 A.D.) defines this relation:

B's non-occurrence in any location characterized by absence of A.

Alternatively, another definition is given:

B's co-occurrence with such an A as is never absent from the location of B.

The first is rephrasing of the first definition of *vyāpti* (invariable concomitance) in the *Vyāptipañcaka* of Gaṅgeśa. The second is an abbreviation of what is called his *siddhāntalakṣaṇa,* "accepted definition." These developments, in the analysis of the concept of the invariable concomitance or inference-warranting relation between sign and signified, made by the later Naiyāyikas, will be elaborated in chapter 7 of this book.

On the "Steps" in the Process of Inference: Members of the Syllogism

An essential part of the theory of inference is obviously the knowledge of concomitance or invariance between the inferable property, A, and the reason, B, the *hetu*. Our knowledge of such invariances is derived, rightly or wrongly, from our observation of such examples illustrating the togetherness of B and A; we call them *sapakṣas*. The *Nyāyasūtra* author insisted upon the citation of the example to justify or support the reason, to show that there is a relation of concomitance or invariance backing the reason.

A question arises regarding how many steps we need in what is called *"parārthānumana"* or "demonstration to others" of the entire process of inference one makes within oneself. A demonstration is something like the verbal articulation of the process of inference. The Naiyāyikas assert that there should be five steps in this verbal articulation of the inference, where the fifth step would re-state the thesis proven by the reason backed by the required invariance relation. The Buddhist, on the other hand, would need only three steps—statement of the thesis, of the reason, and also of the example. Praśastapāda (circa 450–500 AD) made a very significant comment in his *Padārthadharmasaṃgraha*, while he was explaining the five-step verbal articulation of the Nyāya demonstration. The last step is a re-statement of the thesis and, hence, the opponent obviously points out that it is redundant, for the thesis has already been stated and that it is proven by the adequate reason. The thesis is stated in the first step and the reason in the second step. Hence, says Praśastapāda, if we depend upon what is presented not simply verbally but also by implication as well as the significance of what is presented verbally (compare *arthāt*), then one can only state the first two steps and satisfy the other (opponent) side. We quote (1971: 241):

> Therefore, after stating the thesis, one should verbally articulate only the reason. For intelligent people will be reminded of the invariance based upon prior observation of co-presence and the lack of it (in suitable examples), and therefore they will acknowledge the thesis as established. This verbal articulation should end here (with the statement of the reason).

This was apparently a challenge to the Buddhist to bring down the number of steps in the argument from three to the first two: the thesis and the reason. It is interesting that Dharmakīrti boldly accepted the challenge and said:

> For intelligent people only the reason would be stated (PV II.27).

(There may be a chronological problem here, however. Praśastapāda is considered to be a junior contemporary of Diṅnāga, for he assimilated all the logical developments of Diṅnāga into his re-statement of the Nyāya-Vaiśeṣika system of logic. It is also generally believed that he preceded Dharmakīrti. I accept this chronology, and my above comment is based upon its truth. If, however, it can be shown that Dharmakīrti preceded Praśastapāda, then the above statement has to be modified accordingly. My argument here is not concerned with this issue, however, and the chronological controversy would not upset anything else I have said here about logic. It is significant to note

though that Udayana quotes the relevant line of Dharmakīrti while he comments
on this particular passage of Praśastapāda.)

1.3 INDIAN LOGIC VERSUS WESTERN LOGIC: DIFFERENCES

If one were to ask at the outset, what is the difference between so-
called Indian logic and Western logic, the question would be almost a non-
starter. We may put a counter question: "What *is* Western logic?", and
thousands of conflicting answers are available from the text books since the
time of Aristotle. There is, however, a "modern" conception of logic, and we
may try to spell out the difference between Indian conceptions of logic and
this. In the broadest terms, one may note briefly the following differences.

First, certain *epistemological* issues are found to be included in the
discussion of what we wish to call "Indian logic." The reason is obvious.
Indian logic is primarily a study of inference-patterns, and inference is clearly
identified as a source of knowledge, a *pramāṇa*. So the study includes gen-
eral questions regarding the nature of the derivation of knowledge from in-
formation supplied by evidence, which evidence may itself be another piece
of knowledge. Epistemological questions, however, are deliberately excluded
from the domain of modern logic.

Second, to a superficial observer, discussion of the logical theories in
India would seem to be heavily burdened with psychologistic and intuitionistic
terminology—a feature which, since Frege, logicians in the West have tried
carefully to weed out from modern logical discussions. Yet the role of psy-
chology, how one mental event causes another mental event or events and
how one is connected with the other, seems to be dominant in the Indian
presentation.

The Indians psychologized logic, but perhaps without totally commit-
ting the blunder into which an emphasis on psychology may often lead. Thus
one may claim that they psychologized logic, without committing the fallacy
of psychologism. Alternatively, the claim could be that this was a different
conception of logic, where the study of the connections between mental events
and the justification of inferentially-acquired knowledge-episodes is not a
fault (for a development of this idea, see Matilal 1986, §4.7).

Third, historically, from the time of the Greeks, the mathematical model
played an important part in the development of logic in the West. In India, it
was grammar, rather than mathematics, that was dominant, and logical theories
were influenced by the study of grammar. Why this was so is a question that
we cannot answer. This point is to some extent related to the second.

Last but not least, the usual distinction, so well entrenched in the Western
tradition, between deduction and induction was not to be found in the same

way in the Indian tradition. The argument patterns studied were at best an unconscious mixture of the two processes. Yet it seemed that these mixed patterns were not very far from the way human beings across cultural boundaries would tend in fact to argue or rationally derive conclusions from the available data or evidence or premises.

This last point needs to be emphasized for another reason. Almost all modern treatments of the character of the argument pattern in Indian logic have tended to analyze it as a form of *deductive* reasoning. At best, this might have contributed to an appreciation that forms of rationality in classical India, to the extent they are reflected in the "logical" argument patterns, were not very different from what they are in the West. However, it has also undermined certain unique features of the Indian argument patterns, or at least blocked our clear understanding and appreciation of such features.

One reason for this confusion of modern scholars is that the *inferred* conclusion in the Indian theory was regarded as a piece of knowledge (derived normally from the observation of adequate evidence), and hence it was accorded that certainty which we usually associate with states of knowledge. Inductive conclusions by contrast are, in today's terms, only probable, although they may sometimes have a very high degree of probability. The inductive element of the argument patterns studied by the Indian philosophers has thus often been lost sight of by modern scholars who emphasize the alleged certainty of the inferred conclusion, and then go on to equate the Indian argument patterns invariably with deductive or syllogistic forms.

Let me develop this point further. Since the time of Stcherbatsky, Randle, and others, and even still today, the typical example of the model of inference in Indian logic is reformulated as follows:

A   Wherever there is smoke, there is fire.
       There is smoke on the yonder hill.
       Therefore there is fire there.

A is clearly an example of the form that we call *Barbara* in traditional Aristotelian Logic. In modern first order predicate logic, it would be an example of an inference schema which uses universal instantiation, and would have the form (see Quine, 1961),

$$\{(x)\ (Fx \supset Gx) \cdot Fa\} \supset Ga.$$

A is derived from, and hence regarded as transformationally equivalent to, the following presentation of the argument, which is the one *actually* used in the Indian texts:

B   The hill is fire-possessing.
           Because it is smoke-possessing (or because of smoke).
           For example, the kitchen.

The idea being considered is that whoever asserts *B* means exactly *A*.

The common reconstruction of the Indian argument pattern, *B,* is in fact more often presented, not exactly as *A,* but as

A':   Wherever there is smoke there is fire, *as in a kitchen.*
           There is smoke on the yonder hill
           Therefore there is fire there.

The argument pattern *A* undergoes, however, an often unnoticed but important metamorphosis when it is presented as *A'*. The citation of the example, "kitchen" underscores first of all the fact that unlike the first proposition in *A* (or Aristotle's universal premise) the premise here is unambiguous. For the schema "$(x) (Fx \supset Gx)$" in *A* represents any universal proposition *with or without existential presupposition* (for the problems related to the existential import of the subject term of universal propositions in Aristotle, such as "All *S* is *P*" or "All *F*s are *G*s", one may consult P. F. Strawson, 1966). However, the citation of an example in the first proposition of *A'* shows that it is a universal proposition along with existential import. In other words, the subject term now is definitely non-empty.

In the above *A'*, and in *B*, the insistence on the presence of an example should thus not be lightly dismissed as an inessential detail. For it brings to the fore the inductive nature of the first premise, and thereby exposes the "weakness" of the entire argument pattern from a purely deductive point of view. The Indian philosopher of logic did not generally think of this feature as an indicator of the weakness of their theory of inference (although the skeptics, as well as the Cārvāka or the Lokāyata, who were opponents of the idea that inference is a source of knowledge, severely attacked the theory just on this ground). To counter this attack, the Indian logicians sought some way to accord the conclusion of this type of argument almost the same degree of certainty that is given to the conclusion of a normal deductive argument. However, the point remains that the importance attached to the citation of an example in the Indian schema, *B*, highlights the fact that it cannot be reconstructed as a purely deductive argument, along the lines of *A*.

It is a commonplace in modern logic to distinguish between truth and validity. Roughly, validity has to do with the rules of inference in a given theory. The conclusion may be validly derived from the premises, if and only if the rules of inference are not violated, while it may still be a false judgement. The soundness of the conclusion in deduction depends also upon the

adequacy or the truth of the premises. It is now-a-days claimed that a logician's concern is with the validity of inference, not with its soundness, which may depend upon extra-logical factors (the truth of the premises). This is the ideal in formal logic. In India, however, this distinction was not often made, for the philosophers wanted their "logically" derived inferences or their conclusions also to be pieces of knowledge. Thus, validity must be combined with truth. It was allowed that some wild guesses or "invalidly" derived inferences might happen to be true. Such "invalid" derivation, however, would not be a proper route to knowledge. This point will be further clarified when we discuss Diṅnāga in chapter 4.

The point just made is that Indian logic is not formal logic. This does not imply, however, that by introducing some aspects of formal logic in order to interpret the Indian theories we cannot gain any sort of deeper understanding of Indian logic. In fact, we can. Hence, reductions to Aristotelian syllogistic inference along the above lines, and even modified use of Venn diagrams (for example, Chi, 1969), have very often been fruitful in our attempt to understand, analyze and explain the Indian theories, as long as they are taken in context.

Let me develop this point a little further. Since Łukasiewicz, it has been fairly well-known in the West that Aristotle's syllogistic need not be interpreted as resting on an ontology of individuals and the mechanism of quantification. It can be seen instead as involving four operators "A" "E" "I" and "O," treated as primitives, holding upon variables "u" and "v" which range over non-empty terms (which stand for properties or sorts). This dispenses with the standard logical subject-predicate analysis of sentences, in which the subject identifies an object and the predicate *sorts* (is true of) that object. Modern logic in the Fregean tradition, on the other hand, requires, in its semantics, a domain of individuals, to which are attached properties and relations. Likewise, by subjecting the inference-patterns formulated and studied in the logical texts of India to various different reductions and translations, we might get closer to the nature of Indian logical theories, provided we remain cautious and sensitive to the peculiarities and differences. Venn diagrams, rules of propositional and first order predicate logic, some issues from the logic of classes and relations—all these can be used in our study, if only to underline the differences and uniqueness of Indian logic.

As far as the inductive character of the Indian argument pattern is concerned, it is reminiscent of J. S. Mill's theory of inference and induction. Presently we will see how the general premise is supposed to be supported by a positive as well as a negative example, called the homologue (*sapakṣa*) and heterologue (*vipakṣa*). This invites comparison with Mill's Joint Method of Agreement and Difference, which is regarded as stronger, in its power to generate certainty or high probability, than either the Method of Agreement

or that of Difference, when employed independently. Mill, however, obtains certainty by implicitly basing his theory upon a presumed relation of strict and necessary causation between the observed and inferred properties, thereby ruling out accidentally true generalizations. Indian argument patterns too were initially based upon a number of ontological relations, causation, part-and-whole, essential identity and so on, and this feature justified the so-called assumption of certainty or knowledgehood of the inferred conclusions. However, the history of inference unfolded differently in India, for there it took the form of a search for a logical, that is, inference-warranting relation, which was called *vyāpti*—"pervasion" or "concomitance," between the evidence and the conclusion.

We may conclude this section with a quotation of H. N. Randle, who, incidentally, wrote a paper on Indian logic long ago in the journal *Mind* (Randle, 1924). In his book, *Indian Logic in the Early Schools,* published by Oxford University Press in 1930, he said:

> Indian formalism in fact seems to break off abruptly at the point at which western formalism begins, perhaps by a fortunate instinct.   (1930: 233, fn. 3)

He was obviously no lover of formal logic, and perhaps would have been surprised by today's development in the area of formal logic in the West. However, he continued:

> But if formal logic is admitted to have a certain methodological value— I think it is as good a mental discipline to turn [Diṅnāga's] wheel of the reasons as to plough the sands of Barbara and Celarent. The study of either logic is almost a necessary introduction to the philosophical literature of either civilization.   (ibid.)

The world of philosophy and scholarship has moved a long way since the days of Randle. Still, what he said in the concluding sentence of the above passage is very true even today.

1.4 SOME GENERAL CHARACTERISTICS: SUBJECT AND PREDICATE

Any study of logic is intimately connected with the language in which it is conducted. Needless to say, the Indian "logicians" did not use symbols, formulae, or axiomatic constructions in an artificial or formal language. Indian logical theories were discussed primarily in Sanskrit, and the structure of the Sanskrit language figures prominently here. This fact has created some problems of interpretation, for it is extremely difficult, though not impossible,

to transfer the philosophical and logical problems from the narrow confines of Sanskrit to the modern philosophical audience in general.

It is commonplace in logic to talk about the analysis of propositions. In the context of logic in Sanskrit, we have to talk about the analysis of Sanskrit propositions. A Sanskrit proposition is what is expressed in a Sanskrit sentence. It will appear that the analysis proposed by the early Sanskrit writers would not be entirely unfamiliar to one accustomed to the usual subject-predicate analysis of modern or traditional Western logic, nor is it unrelated to it. However, the logical as well as grammatical analysis of Sanskrit sentences presents some significant contrasts with the usual subject-predicate analysis. Unless these points of contrast are noted, it will be difficult to appreciate fully some of the concerns of the Sanskrit logicians.

A sentence in Sanskrit is regarded as the expression of a "thought" or what is called a cognitive state (*jñāna*), or, to be precise, a qualificative cognitive state (*viśiṣṭa-jñāna*). A simple qualificative cognitive state is one where the cognizer cognizes something (or some place or some locus, as we will have to call it) as *qualified* by a property or a qualifier. It is claimed by most Sanskrit writers that to say that something or some place is qualified by a qualifier is equivalent to saying that it is a locus of some property or "locatable." As I have discussed elsewhere (Matilal, 1968, 1971), a qualificative cognition is actually to be thought of as a propositional cognition or a judgement. In this and subsequent sections, we will investigate how the Indian analysis of the structure of such states relates to Western analyses of the subject-predicate distinction.

A proposition, in its basic form, is usually explained by Western writers in terms of what we call a *predication*. A simple or atomic proposition is thus better understood as involving the "basic combination" of predication. This expression—"basic combination"—was once used by W. V. Quine (1960: 96). The idea was sharpened by P. F. Strawson (1974). Strawson explains the structure of the so-called basic combination of predication as (1) a combination of (2) a subject and (3) a predicate, and said that it lies at the focal point of our current logic. He has further claimed that:

> [i]f current logic has the significance which we are inclined to attach to it, and which our contemporary style of philosophizing in particular assumes, then it must reflect fundamental features of our thought about the world. (1974: 4)

The claim may be too strong. For all we can say is that the said structure reflects primarily the basic way in which we are accustomed to think about the world. We might be trained and then be accustomed to think about the world in a different way, but in that case our language would not admit a

predominantly subject-predicate structure. This is at least conceivable. In Jonathan Swift's *Gulliver's Travels*, three professors of the School of Languages at the Grand Academy of Lagado, were trying to work on a project that would shorten the academic discourse by leaving out, among other things, "verbs and participles, because in reality all things imaginable are but nouns" (p. 219, 1919 edn.). The point is that while a project need not be a radical or outlandish as this one, even a slightly different proposal may appear odd or queer to our readers today who are well-accustomed to modern qualificational logic as well as the subject-predicate analysis of the basic sentences.

The "current" logicians generally agree that the basic predication may best be pictured in the neutral logical schema "*Fa*." It represents a combination of a singular term or a (proper) name and, to use Quine's terminology, a general term or a *predicate*, a combination which forms a sentence. By "general term" are meant such grammatical terms as substantives, adjectives, and verbs. (Even names or so-called singular terms can be systematically reparsed as *predicates* by following the Russellian trick of representing them as descriptions. However this part of Quine's proposal is controversial and may be ignored for the moment). Verbs, according to Quine, may be regarded as the "fundamental form" of predication, and the adjectivals and the nominals (substantives) may be assimilated into the "verbals." In other words, such phrases as ". . . . is an *F*" and ". . . . is *F*" are mere stylistic varieties of the verb form ". . . . *Fs*." Predication, then, is illustrated indifferently by "Mama is a Woman," "Mama is big," and "Mama sings" (1960: 96).

Strawson analyses the "basic propositional combination" as a tripartition of function, as I have already noted. This is represented by a simple symbolism "ass *(i c)*," where "*i*" represents a particular, "*c*" the concept specification and "ass *( )*" the propositional combination. The former two underline the duality, that, following Strawson, we may still call the subject and the predicate, while the isolation of the third element is important to capture the function of presenting the particular and the general concept as assigned to each other in such a way as to have a propositional combination. In our "ground level" subject-predicate sentence, the third function is usually associated with the second. Hence the *predicate* is usually a verb or a "verbal phrase," that combines syntactically the concept-specifying element and the indication of propositionality.

This dual role of our ordinary predicate phrases must be recognized, even if we try to maintain Quine's strictures against the predicate-term being accessible to quantifiers or the variables of quantification. Apart from worries about ontological commitment to abstract (in Quine's words, intentional)

properties, there does not seem to be any good reason why we cannot quantify over the predicate-properties which are denoted by singular abstract terms such as "sweetness" or "singing."

Now, in the Indian context, the basic combination is not called a proposition. It is a structured whole that is grasped by an atomic cognitive event. We call it an atomic *qualificative (viśiṣṭa)* cognition. One element is called the *qualifier* while the other the *qualificand*, and their combination forms the structured whole. It can be represented by:

$Q \ (a \ b)$

where "*a*" represents the qualificand, "*b*" the qualifier, and "*Q( )*" the indication of "qualificativity." I shall be using these symbols for convenience only, as I have done in my earlier writings (especially Matilal, 1968). One can read "*Q (a b)*" as "*a* qualified by *b*." The similarity of this symbolism with Strawson's "ass *(i c)*" may not be only superficial. As far as the separation of the syncategorematic element of a given combination is concerned, both agree. Both leave us open to treat the "predicate" element as a singular (abstract) property. For the cognition of a blue pot can be expressed either as a sentence ("This pot is blue.") or as a phrase ("this blue pot"). Besides, our symbolism admits the following two basic rules:

(1) $Q \ (a \ b) \cdot Q \ (a \ c) \rightarrow Q \ (a \ (b \ c))$
(2) $Q \ (a \ b) \cdot Q \ (b \ c) \rightarrow Q \ (a \ Q \ (b \ c))$.

"*Q (a (b c))*" can be read as "*a* is qualified by both *b* and *c*" and "*Q(a Q (b c)*" as "*a* is qualified by *b*, and *b* in its turn is qualified by *c*."

1.5 QUALIFIER VERSUS PREDICATE-PROPERTY

A qualifier and a predicate-property may not always be the same, such that we can say that there is only a terminological variation. In fact, an Indianist would like to say that not all predicate-properties are qualifiers nor are all qualifiers predicate-properties. This is not simply because in an expression such as "there lies the blue pot" the qualifier, which is the blue pot, would probably not be called a predicate-property. Even if we concede this, still, in a given situation, a predicate-property, that is, what the Indianist would call a *vidheya-dharma*, may not be the same as the qualifier property (*viśeṣaṇa*). Let me illustrate this point. Suppose I wish to infer a property, *s*, as belonging to a given locus, *p*. Naturally the inferable, for example, the to-

be-inferred property (*sādhya*), would be the *vidheya-dharma*, for example, the predicate-property. According to our basic intuition, the subject is what is being talked about and the predicate is what is being talked about it. Sometimes, it has been said to be a distinction between *that* and *what*. Consider now the following two "propositionally equivalent" verbalized expressions, representing two numerically different knowledge-episodes:

(a) Sound (noise) is impermanent (that is, impermanence-possessing).

(b) Impermanence resides in sound (noise).

The qualifier in the first is impermanence, while in the second, it is residence-in-sound. The qualificand in (a) is sound but in (b) impermanence is the qualificand. Thus, the qualifier-qualificand distinction is always related to the structure of some knowledge-episode or qualificative cognition. However both (a) and (b) can alternatively be reached as inferred conclusions, for example, as the resulting knowledge-episodes of a process of inference. In either case, the to-be-inferred property, that is, the predicate-property, remains the same, impermanence. For, it does not matter whether (a) is reached or derived from the knowledge-episode (premise), "sound has product-hood which is pervaded by impermanence" or (b) is reached from "Product-hood which is pervaded by impermanence resides in sound;" in either case, it cannot be denied that impermanence is the property we wish to establish by the inference. This may lead one to believe that the qualifier-qualificand distinction is perhaps closer to a subject-predicate distinction conceived as based upon a grammatical criterion (confer Strawson, 1974), though even this could be misleading.

1.6 A SKELETAL THEORY OF INFERENCE

The last point in §1.5 may appear a bit enigmatic unless we give an account of a skeletal theory of inference in the context of Indian logic. This skeletal theory seems to be presupposed, consciously or unconsciously, in all the representations of inference-patterns in India, although it became more explicitly formulated somewhat later in the history. I shall present it as a theory of substitution, where one property, by virtue of its logical relation with another property, forces the substitution of the latter in its place. That is (taking "p" to stand for the locus or *pakṣa* of the inference, "h" for the reason-property or *hetu*, and "s" for the to-be-inferred property or *sādhya*: