

STANDARDS OF SCIENTIFIC INVESTIGATION :
LOGIC AND METHODOLOGY OF SCIENCE IN *CARAKA SAMHITĀ**

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INTRODUCTION

The *Caraka Samhitā*¹ is considered as one of the oldest treatises recording attempt at systematisation of knowledge in a specific area. Estimated to be redacted almost contemporaneously with Aristotle, it is an impressive and great work in life science because of its comprehension, vision, depth and scope. It consists of eight books entitled *General Principles (Sūtra sthāna)*, *Diagnosis (Nidāna sthāna)*, *Standards (Vimāna sthāna)*, *Body (Śarīra sthāna)*, *Senses (Indriya sthāna)*, *Therapeutics (Cikitsā sthāna)*, *Medicines (Kalpa sthāna)*, and *Cure (Siddhi sthāna)*, which contain a total number of 120 chapters. In the present investigation, we shall be primarily concerned with the Books on General Principles and Standards only which discuss—apart from important philosophical issues such as the concept of man, of his life and death;² question of priority of values to be pursued in the world,³ the theory of conservation of the spirit,⁴ the theory of causation of human action,⁵ and the question of determinism and freedom—the important methodological issues such as the ways of theoretical investigation (*parikṣā*), the strategy or methods of practical verification (*siddhi upāya*), standards of investigation (*vimāna*) and methods of reporting, exchanging and defending one's view (*sambhāṣa vidhi|vāda mārg*).

The book entitled *Vimāna sthāna* is exclusively devoted to methodological issues in the context of life science and provides one of the most exhaustive treatments of the epistemological and practical issues involved, although the first book, *Sūtra sthāna* also discusses some of these primarily in a philosophical-valuational context. These books make the Treatise virtually complete, freeing medico-life science from a narrow, specialist perspective and setting it in a broad philosophical, social, valuational context of an integral kind. A careful reading of other relevant Books, such as *Śarīra sthāna* and *Indriya sthāna*, suggests that the *Samhitā* was perhaps compiled and/or redacted at a time when naturalistic and organicismic outlook,—where man is understood in a cosmic setting—had not yet declined and the brahmanical idealistic distortions had not yet gained a footing. The deep humanistic outlook, repeated stress

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on the spirit of investigation and a hard-headed secular approach. In respect of health and eating habits: recommends smoking,⁶ praises liquors⁷ and enumerates good and bad effects of meats⁸—are the most striking characteristics of these books. Indeed, these characteristics are foundations of any pursuit of theoretical and applied knowledge whether in the medical science or in any other science.

The standards of scientific investigation (*viññāṇīya vimāna*) of specific diseases (*roga viśeṣa*) as laid down in the *Vimāna sthāna* and referred to in the *Sūtra sthāna* are, in fact, the indispensable methodological components of any technique of scientific investigation and subsequent theorisation. These components are the following, though not necessarily in the same order as laid down in the books:

- (a) The methods and standards of exchange of views (*sambhāsa vidhi*) within the community of investigators.
- (b) The methods and standards of dialectical criticism and defence of one's views (*vāda mārga*) within the community.
- (c) The methods and standards of examination (*parikṣā*) which must proceed at three levels:
 - (i) thinking on the general forms and methods of examination (*parikṣā vidhi*),
 - (ii) examination of the method before action is undertaken for accomplishing an enterprise (*parikṣāya kevalam parikṣyam parikṣya*),
 - (iii) examination of the specific facts of disease (*roga viśeṣa parikṣā*) for differentiating it from other diseases.
- (d) The strategies for treatment of the disease, or, to say the same, of verifying the diagnostic hypothesis (*cikitsā siddhi upāya*).

In what follows we shall undertake a detailed exposition and critical examination of these standards of scientific investigation. Medical science being a very complex enterprise involving features of physical, biological as well as social science, the treatise does not seem to search for a 'logic of investigation' independent of the observer as a psychological entity. That is to say, its concept of 'methodology' seems to involve a reflection both on a 'logic' of scientific method as well as on the traits and abilities of the investigator.

DISCUSSION OR SAMBHĀṢA

It is suggested that a medical scientist must discuss with another (*saha sambhāṣeta*)⁹ since such a discussion with the member of community (*tad vidyā sambhāṣa*) increases knowledge (*jñānābhiyoga*), clarity (*vaiśāradya*), and expressive ability

(*vācāna śakti*). When doubts arise in what was learnt earlier, discussion will dispel these doubts (*śruta saṁśayaṁ apakarṣati*), and in those having cleared their doubts (*asamdehāvata*) it will generate confidence (*adhyavasāya*). The secret opinions (*guhya-bhīmata*) and meanings (*arthajāta*) that a teacher will normally impart gradually, come out in essence (*pinden*) in discussion (*jalpa*) and conflict (*saṅharṣa*).¹⁰ There are two modes of exchange of views: smooth (*sandhāya sambhāṣā*) and conflicting (*vigrahyā sambhāṣā*). The former is to be carried out with those who are endowed with the ability to give and take knowledge and to grasp and express the statements (*jñāna vijñānā vachana prativāchana śakti sampanna*), who have insight (*vidyena*), tolerance (*kleṣa ksamaṇa*), can persuade and be persuaded (*anuneyen-anunaya kevedena*).¹¹ Discussing with such persons, one must speak and ask with confidence not fearing defeat (*nigraha bhaya*), neither seeking to defeat; he must not grasp partial meanings (*ekāntagrāhī*), neither should he say things not known to him, and must remain alert (*avahita*).¹² In carrying out the latter kind of discussion one must first examine himself (*yaḡātmana paśyan*) and the adversary thoroughly (*san̄yāk pariḡseta*) in respect of the dialectical ability (*jalpājalpāntara*), and then the assembly (*pariḡṣat*).¹³ He must weigh (*tulayet*) his own and adversary's (*jalpaka*) qualities in respect of the abilities to listen (*śruta*), understand (*viñnāna*), retain (*dhāraṇa*), and of resourcefulness (*pratibhānam*). The assembly is of two kinds: the knowledgeable (*jñānavati*) and the uninformed (*mūḡha*). Each one can be further subdivided into favourably disposed (*suhratpariḡṣat*), indifferent (*udāsina*) and unfavourably disposed (*pratiniḡṣta*).¹⁴ One ought not to engage in a discussion, under any circumstance, in an assembly of unfavourably disposed persons whether knowledgeable or uninformed. But if the assembly is favourably disposed, then one ought to engage in discussion even if it is uninformed although one should use obscure (*āviddha*), long winded (*dirghasūtra*) and complicated language (*vākyadandukai*) without giving the adversary any chance to speak.¹⁵ In an indifferent assembly, one should avoid discussion with a superior adversary without making explicit (*anāviḡkṛta*) one's weakness in the subject, and one should quickly overpower (*nigrahanīyat*) him at the weak point. Depending on the nature of adversary's weakness, one can employ suitable techniques for overpowering him.¹⁶ In conclusion, one must argue systematically (*juktjā*) and never oppose a sound argument in any conflicting discussion.

Here we notice an emphasis on debate and exchange of views. In modern research context this indicates, firstly, a stress on communication within the community, and, secondly, a search for adequacy criteria of a medical scientist. One may ask: what is the point of including the methods of debate in the process of scientific investigation of disease and therapy? The answer would be that unless criteria for competence of the therapists are evolved, there is likely to be chaos and the science would remain stagnant without proper communication. As indicated, a competent therapist must have insight, tolerance and ability to give and take, grasp and express scientific knowledge. Whether the debate is spoken or written, is a contingent matter. What is important is that it is absolutely indispensable for a cohesive community life of the investigators and scientists. The stress on methodical debate is, further, indicative of

a rationalist, argumentative spirit which is normally considered a deterrance against dogma.

One may argue that, strictly speaking, there cannot be a *vidhi* of debate as ingenuity, creativity and novelty are important aspects of discourse which cannot be prescribed by any method. It is the psychological preparedness that matters, not the rules of discourse. Indeed the purpose of *sambhāsa vidhi* does not seem to prescribe any method for creativity in discourse, rather its purpose appears to be to make the discourse rational. The method does not claim to evolve ways of psychological preparedness and ingenuity. It only indicates the conditions under which communication with a member of the community can be fruitful so that new light may be thrown on the subject or there may occur some unexpected and novel disclosure of new meanings. When it is stressed that one must argue systematically, the concept of *yukti* becomes a pivotal concept in the characterisation of debate. For, if one cannot come forward with some reasoning, it cannot strictly be called *sambhāsa*. Therefore, in the absence of responses based on *yukti*, the debate would break down into mere verbal quarrel for an argument can be opposed only by an argument and by no other means. Furthermore, the method advises never to oppose a sound argument, for obviously, it would be blatant intellectual dishonesty if one opposes an argument merely for the sake of opposing it in spite of its being convincing. It may, thus, be concluded that *sambhāsa* is indeed a necessary component of any general methodology of cognitive enterprise that seeks to investigate and examine phenomena.

DIALECTICAL METHOD OR VĀDA MĀRGA

Theoretical disputations can only be resolved by arguments. What are the norms (*vādamaryādā*) and methods (*vādamārga*) of disputation (*vāda*)? The norms of disputation characterise what is speakable, what is not speakable and when shall a view be considered untenable.¹⁷ These will normally be laid down by a formal assembly. Now the dialectic or *vāda* is understood here as a *process* wherein one debates (*vigraha*) with one's adversary in the context of a theory or ideology (*śāstrapūrvaka*) which one thereby upholds and defends.¹⁸ A precondition to *vāda*, then, is a knowledge of the *presuppositions* and contents of the theory itself.¹⁹ But apart from this, one must have (i) knowledge of the structure of the theory which can be considered as the true structure (*siddhānta*) only if its 'evidential causal statements' (*hetu*) have been subjected to the accepted standards of investigation, (ii) the fallacies which make arguments untenable and (iii) knowledge of purposes (*prayojan*) of investigation, and the ability for decisions (*vyvasāya*) and dialectical skills. These three aspects, in fact, constitute the essence of the standards of investigation as conceived in the Book and many of the concepts occurring here will be found occurring in other contexts also. The concepts that represent these three aspects are, as in the order presented in the Book:

- (i) The statement of proposition or hypothesis (*pratijñā*) which is sought to be established (*sthāpanā*) or refuted (*pratisthāpanā*); the causal-empirical or

evidential statements (*hetu*) providing evidence in favour of it or against it (*uttara*), and examined by all the four means of investigation, namely perception (*pratyakṣa*), inference (*anumāna*), support of other theories particularly of the foregoing ones (*etiḥya*), and analogy (*auparmya*); verificatory evidence exemplifying it (*dṛṣṭānta*); that the evidence is relevant here (*upānaya*); and the deduction of conclusion (*nigamana*). The propositions so obtained (*śabda*) will constitute a true theory (*siddhānta*) which is then seen as arising within a continuing dialectical process (*vāda*) of establishing and refuting prepositions. These terms may be said to be constituting the "logical" aspect of the standards characterising the method.

- (ii) The psychological components of the methodology are delineated next and these may be taken as the indispensable psychological processes that are activated in the mind of the discoverer universally and without exception. These are doubt (*saṃśaya*), purpose (*prayojana*), scepticism (*sayyabhi-chāra*), inquiry (*jijñāsā*), judgement or decision (*vyaṅyāsāya*), grasp of the implicit (*arthaprāpti*) and estimate or expectation (*sambhava*).
- (iii) The terms indicative of the dialectical aspect of the methodology and the dialectical standards thereof include fallacies to be avoided and dialectical skills to be learnt. These are ambiguous statement (*anuyojya*) and the negation of an ambiguous statement (*ananuyojya*); raising a question (*anuyoga*), which may result into another question (*pratyayanuyoga*); defective formulation (*vākya-doṣa*) and showing the merits of correct formulation (*vākya-praśamsā*); reasoning which is deceptively correct (*chhala*); circular reasoning which is actually not a reasoning (*ahetu*); to present an argument when the time for it has passed (*atītakāla*); to point out the defects of reasoning (*upālambya*) and to modify and correct one's reasoning (*parihāra*); abandoning one's position (*pratijñāhāni*); agreeing to a position by which the adversary would score (*abhyanujñā*); reasoning by defective evidence (*hetvāntara*) and reasoning by defective sense (*arthāntara*) and finally the point of settling the issue (*nigrahasthāna*) when either the questionable has not been questioned or the unquestionable is being questioned.

These three aspects entirely characterise the dialectical method of investigation, which is not only held to be indispensable but since such a practice (*vādvigrahā*) is based on reasoning (*hetumat*), it sharpens the intellect manifold (*praśastabuddhi*) and is therefore a condition (*kāraṇabhūta*) for success (*siddhi*) in all the enterprises (*sarva ārambha*).

An elaborate presentation of all the above mentioned terms has been given in terms of their characteristics (*lakṣaṇa*). As indicated above, the dialectic (*vāda*) itself has been characterised by debate (*vigrahya kathayati*) with prior grounding in the theory or ideology (*śāstrapūrvaka*) and is said to be of two kinds (*dvividha*): critical

defence of one's position (*jalpa*) and critical remarks on other's position without having a position of one's own (*viṭandā*). In the former, one speaks in accordance with a position (*pakṣa-āśritayoti*) and tries to establish it (*sthāpavata*) by arguments (*hetubhi*) while at the same time assaulting opponent's position (*udbhāvayata*), whereas in the latter, one points out only defects (*doṣavacanamūtra*) in adversary's position.²⁰ One should speak (*brūyāt*) only after carefully examining (*samvekṣya*) and understanding (*avekṣya*) all the conflicting statements (*vākya-prativākya*) and arguments (*upapattya*); say nothing irrelevant (*apakṣtakam*), unauthoritative (*aśāstram*), uninvestigated (*apriksita*), unyielding or fruitless (*asādhaka*), confusing (*ākula*), and scopeless (*avyāpaka*). Everything spoken ought to be supported by reasons (*sarvaṇ ca hetumat brūyāt*). Since the unimpeded intellect (*anupahata buddhi*) leads to success in all enterprises; and since reasoned (*hetumanta*) and clear (*akaluṣa*) debate (*vāda-vigrahā*) multiplies the sharpness of intellect (*praśasta buddhi vardhakatyāt*), these are, therefore, basic conditions of any therapy (*cikitsā kāraṇabhūtā*).²¹

Since the presuppositions of any science, e.g. *dr̥vyā*, *guṇa*, *karma* etc. will be discussed in Section III, these will not be taken up here, although these have been laid down as the foremost elements constituting the dialectical method.

(a) *The logical structure of science*

Beginning with *pratijñā* or hypothesis, the first fourteen terms may be said to characterise the "logical structure of science". The statement of proposition or hypothesis or *pratijñā* is characterised as that statement which is sought to be ascertained (*sādhyavachana*).²² For example, 'puruṣa is eternal' is the statement of a proposition which may be sought to be established. Establishing (*sthāpanā*) is characterised by utilisation of evidence (*hetu*), analogy (*dr̥ṣṭānta*) or example, relevant application (*upanaya*), and, from these, deduction (*nigamana*) of the proposition which will then establish it.²³ Only that which has been proposed can be ascertained, for the unproposed (*apratijñāt*) can never be ascertained. For example, the procedure of establishing "Puruṣa is eternal" (*pratijñā*), "Not constructed (*akṣtakavāt*)"—*hetu*; "Like the space (*yathā ākāśam*)"—*dr̥ṣṭānta*; "As the space is unconstructed and eternal so is the *puruṣa*"—*upanaya*; "Therefore eternal"—*nigamana*.²⁴ Refutation or counter-establishment is establishment of the opposite position (*viparītārtha*) of the counter-proposition (*para-pratijñāyā*). For example, "Puruṣa is non-eternal"—*pratijñā*; "Sensible (*indriyakatva*)"—*hetu*; "As a pitcher"—*dr̥ṣṭānta*; "As the pitcher is sensible and non-eternal so is *puruṣa*"—*upanaya*; "Therefore, non-eternal"—*nigamana*.²⁵

(i) *Hetu*: Evidence is characterised as the *cause* of knowing or acquiring knowledge (*upalabdhī kāraṇa*). That which is acquired through evidence is the reality (*tattva*). Evidences are perceptual (*pratyakṣa*), inferential (*anumāna*), testimonial (*aitihyam*), and analogical (*aupamya*).²⁶

Perception is characterised as that acquisition (*upalabhyate*) which is had by the self (*ātmanā*) and senses themselves (*svayam*). Happiness, sorrow etc. are imme-

diately perceived (*ātmapratyakṣa*) whereas utterances (*śabda*) etc. are sense-perceived (*indriya-pratyakṣa*).²⁷ Inference is reasoning (*tarka*) supported by argument (*yukti-apekṣa*).^{*} For example, digestive fire is inferred from the power of digestion (*jaraṇa-saktya*), strength from the power of exercise etc.²⁸ Support from sources of the past (*aitihya*) is characterised by reliable word (*āptopadeśa*) from texts such as Vedas etc. (*Vedādi*).²⁹ Analogy is characterised by illumination (*prakāśana*) of something (*anyena*) by something else (*anyasya*) by pointing out the similarity (*sādṛśyam adhikṛtya*). For example a disease of rigidity (*daṇḍakasya*) by staff (*daṇḍena*), tetanus (*dhanustani-bha*) by bow (*dhanuṣa*) etc.³⁰

(ii) *Drṣṭānta*: Exemplificatory evidence is characterised as that which is public or available to all (*mūrkhaviduṣam buddhisāmyam*) and properly describes (*varṇayati*) that which is sought to be exemplified (*varṇyam*). For example 'fire is hot', 'water is fluid', etc.³¹ As has already been illustrated, *upanaya* is minor or first level deduction from *hetu* and *drṣṭānta*, while *nigamana* is final deduction from the entire argument.

Refuting evidence (*uttara*) is characterised by positing of negative qualities (*vaidharmya vachana*) in the 'pro-quality cause' (*sādharmya upadiṣṭe hetau*) and of positive qualities in the 'conquality cause' (*vaidharmya upadiṣṭe hetau*).^{*} For example,

if the proposition is that "Diseases have the same qualities as causes (*hetu-sadharmāṇo vikārāḥ*); cold has pro-quality causes such as contact with snow and cold wind," then its refutation will be, "Diseases have the opposite qualities as the causes (*hetu-vidharmāṇo vikārāḥ*); fever (*auṣṇya*) has con-quality causes such as contact with snow and cold wind."³²

A theory or principle (*siddhānta*) is characterised as that decision (*nirṇaya*) which is accepted or ascertained (*sthāpyate*) by many investigators (*parikṣakāiḥ*) after examining in various ways (*bahuvīdha parikṣā*) and proving by evidences (*hetu-bhi sādhyatīyā*).³³ There are four kinds of theories: universally accepted (*sarvatantra siddhānta*), accepted in a specific discipline (*pratitantra siddhānta*), derivative theory (*adhikarāṇa siddhānta*), and assumed or primitive theory (*abhyupagama siddhānta*).³⁴ A universally accepted principle or theory is that which has been accepted as proved (*prasiddha*) in all the respective approaches of a discipline (*sarvāsmīn tantrē*). For example, it is accepted by all in the science of medicine that there are diagnoses (*nidāna*), there are diseases (*vyādhavya*) and there are ways of remedy (*sādhyānām siddhi-upāya*).³⁵ Discipline specific principle is characterised as that which is proved (*prasiddha*) in a specific discipline (*ekaikāsmīn tantrē*). For example, other disciplines admit the principle of eight tastes or *rasas*, but the present one admits six, others admit the principle that diseases arise from body-air (*vikārā vātādīkṛta*) but the present one admits that they arise from body-air and basic elements (*vātādīkṛtā bhūtakṛtā*).³⁶ Derivative theory is characterised as that which is admitted as proved (*siddhānti*) when

^{*}For elaboration of *yukti*, see Section IV.

^{*}I have not been able to find better translations.

one already proved is proposed (*adhikaraṇe prastūymane*). For example, if it is established (*prastute*) that 'liberated selves do not undertake binding actions (*anubandhika karma*) since they become neutral (*niḥsprhatvāt*)' the principles of causation of action (*karmaphal*), liberation (*mokṣa*), pure-self (*puruṣa*) and rebirth (*pretyabhava*) are proved (*sidhā*).³⁷ Presumed or primitive principle is characterised as that which is presumed true (*artham abhyupagachhanti*), during the course of debate, without proof (*asidha*), examination (*aparikṣita*), authoritative support (*anupdiṣṭa*) and evidences (*ahetuka*). For example 'substance is primary (*dravyam pradhānam*)', 'Qualities are primary (*guṇaḥ pradhānaḥ*)', 'Seminal fluid or essence is primary (*viryaṃ pradhānam*)', are assumed (*kṛtvā*).³⁸

A proposition (*śabda*)³⁹ is characterised as a collection of letters (*varṇa samanvaya*) and is of four kinds: empirically exemplifiable meaning (*drṣṭārtha*), empirically non-exemplifiable meaning (*adrṣṭārtha*),* true (*satya*) and untrue (*anṛta*). The proposition with an empirically exemplifiable meaning is exemplified by 'Three causes provoke the body-humours (*tribhiḥ hetubhiḥ doṣaḥ prakūpyanti*)', 'They abate (*praśyamanti*) by six modes of treatment (*upakrmaḥ*)'. Empirically non-exemplifiable meaning is illustrated by, 'There is rebirth (*pretyabhāvaḥ*)'. 'There is liberation (*mokṣa*)'. A true proposition is that which says as the situation is (*yathārthabhūta*), e.g. 'There are ways (*sidhyapāyā*) of curing the curable diseases (*sādhyānām vyādhinām*)', 'Undertaking bears fruit (*ārambha phulāni*)'. The contrary of true is false (*satya viparyaya*).

(b) *The psychology of scientific investigation*

Beginning with doubt (*samsāya*), the next seven terms characterise the psychological components of scientific enterprise. In contrast with the foregoing terms characterising the 'logic' of science, they may be said to be characterising the nature of scientific mind.

Doubt is characterised as indecisive (*aniścaya*) state of mind arising from the dubitable signs (*sandeha lakṣaṇa*) of indeterminate or uncertain objects (*anusandigdheṣu artheṣu*). For example, some persons are seen with signs of long life and some without these; those receiving treatment, die early, while those who do not, live longer. Due to both of these facts being observed (*ubhaya drṣṭvāt*), a doubt arises whether there is premature death (*akāla mṛtyu*) or not.⁴⁰

Purpose is characterised as that objective (*yadartha*) for which undertakings (*ārambhā*) are initiated (*ārabhyante*). For instance, one resolves arguing that if there is premature death, then it cannot overpower me if I treat (*upacariṣyāma*) myself with life-giving things and avoid (*pariharisyāmi*) life-endangering things.⁴¹

*The basis of this distinction is not clear. The distinction between the observable and the non-observable is not adequate for the non-observable may be an inferred meaning. Further, the propositions may derive their meanings purely in theoretical contexts which will also be non-observable meaning. I am thankful to Professor Daya Krishna for pointing out this ambiguity.

Ambiguous or sceptical (*savyābhicāra*) is that which is discrepant (*yat vyābhicāraṇa*). For instance if one thinks that 'this' medicine may be a remedy (*yaugikam bhavet*) for 'this' disease or it may not be.⁴² Inquiry (*jijñāsā*) is the name of examination (*parīkṣā*), for instance the examination of remedies (*bheṣaja parīkṣā*).⁴³ Judgement (*vyāvasāya*), being the opposite of doubt, is characterised by a state of decision (*niścaya*), e.g. the decision that 'this' disease is born of *vāta* (*vātika*), its remedy is 'this'.⁴⁴ Grasp of the implication (*arthaprāpti*): when from one spoken meaning (*ukten eken arthen*), the other unspoken meaning (*amuktasya api aparasya arthasya*) is achieved (*siddhi*). For example, from 'this disease is not amenable to impletion therapy (*santarpana sādhyā*)', one grasps that 'this disease is amenable to depletion therapy (*apatarpana sādhyā*)'; or from 'one should not eat in day time', one grasps that 'one should eat at night'.⁴⁵ Expectation (*sambhava*) is characterised as: "that which arises (*yo yataḥ sambhavyati*) from something is 'its' expectation (*sa tasya sambhavaḥ*)."⁴⁶ For instance, six elements (*ṣaḍa dhātavo*) give rise to the expectation of pregnancy (*garbhasya*); the harmful give rise to the expectation of disease (*vyādheḥ ahgitaṃ*); the wholesome, of health (*ārogyasya hitaṃ*).⁴⁶

(c) *Skills of theorising and fallacies*

Beginning with ambiguous statement (*anuyogyā*), the next sixteen terms indicate the dialectical skills and fallacies of reasoning that are part of the process of theorising and debating. The ambiguous statement is that which is beset with defects of speech (*vākya-doṣa yukta*) and calls for further clarification (*viśeṣagrahaṇārtha*). For example, the statement 'This disease is amenable to purificatory treatment (*saṃśodhan sādhyā*)' requires clarification whether the disease is amenable to emesis (*vaman sādhyā*) or purgation (*viṛechan sādhyā*).⁴⁷ The opposite of ambiguous statement is non-ambiguous statement (*ananuyogyā*), e.g. 'This disease is incurable (*ayam asādhyam*)'.⁴⁸

The questioning (*anuyoga*) is putting the question to a person of the same discipline (*tadvidyāin*) in order to test his knowledge and dialectical ability (*jñānavijñāna vacanaprativāchan parīkṣārtha*). For example, when one proposes 'self is eternal (*puruṣa nitya*)', the question (*anuyoga*) is raised 'what is the cause (*kāḥ hetuḥ*)?'⁴⁹ The query following a query (*pratyānuyoga*) is the raising of the same question subsequent to the response (*anuyogasya anuyoga*), e.g. asking 'what is the cause of the *anuyoga*?'⁵⁰ that is, the cause of the eternality of the self is sought.

Defective speech or formulation (*vākya-doṣa*) is characterised by showing that the sense is either inadequate (*nyūna*), or superfluous (*adhika*), or meaningless (*anarthaka*), or delusive (*aparthaka*) or contradictory (*viruddha*). Without these defects the natural and true sense (*prakṛta artha*) is never lost (*praṇasyate*).⁵¹ Inadequate formulation consists in either missing even one of the five members of the syllogism or giving only one causal-empirical evidential statement (*ekem hetunā sādhyate*) where multiple causes (*baḥu hetuka*) are said to operate.⁵² The superfluous formulation is the opposite of the inadequate formulation. It also consists of quoting the irrelevant (*apratisa bad-dhārtha*) or quoting the relevant twice (*punarukta doṣatvāt*) which, again, may be

repetition of sense (*arthapunarukta*) or repetition of words (*śabdapunarukta*).⁵³ Meaningless formulation consists of merely a group of words (*pañchavargavat, akṣaragrām mātra*) without any grasp of sense (*arthata na grhyate*).⁵⁴ The delusive formulation is that which even though meaningful (*arthavat*), has no syntactical coherence (*paraspareṇa asamyujyamāna arthaka*).⁵⁵ That is contradictory formulation which gives contradictory example (*dr̥ṣṭānta viruddha*), contradicts its own basic principles (*siddhānta viruddha*), and brings in contradictory context (*sānaya viruddha*) by citing* in opposition to one's own context (*swa samaya viparita*).⁵⁶ The opposite of defective formulation is the merited formulation (*vākyaprasaṃsā*) being quite explicit in sense (*adhigata padārtha*).⁵⁷

Quibbling or reasoning which is deceptively correct is characterised by mere appearance of meaningfulness (*arthābhāsa*) whereas actually being meaningless (*anarthaka*) verbosity (*vāgavastumātra*). It is of two kinds: deception of words (*vākchhala*) and deception of general kind (*sāmānyachhala*).⁵⁸ Circular reasoning is of three kinds: Fallacy of presumed conclusion (*prakaraṇa sama*); fallacy of the presumed doubt (*saṃśaya sama*); and fallacy of unproved analogy (*varṇya sama*). For example, when one wants to establish that 'the self being independent of body, is eternal', and argues that: "Since the self is independent of body, therefore, it is eternal; body is non-eternal, thus, the self, being of opposite nature (*vidharminā*), is eternal." This is circularity (*ahetu*) since what is to be proved (*pakṣa*) is also the evidence (*hetu*).⁵⁹ In the second kind of circularity that which is the cause of doubt (*saṃśaya hetu*), is also the cause of resolution of doubt (*saṃśaya chheda hetu*). For example, if the doubt arises "This man shows acquaintance with a portion of *āyurveda*; is he a therapist?," and is resolved thus: "Because this man knows a portion of *āyurveda*, therefore, he is a therapist." This is circularity because it fails to bring out specific (*viśeṣayati*) doubt-resolving evidence (*saṃśaya chheda hetu*).⁶⁰ In the third kind of circularity the evidence is not different from conclusion (*varṇya aviśiṣṭa*). For example, if one argues thus: "The intellect (*buddhi*) is not eternal for it is intangible (*asparśatvāt*), like the word (*śabdavāt*)." This is circular because the intangibility of both intellect and word is wanting to be proved (*varṇya aviśiṣṭatvāt*).⁶¹

Belated reasoning is neither acceptable (*agrāhya*) nor effective (*asamartha*) because the opportune moment for an argument has been allowed to pass and the opponent has already passed on to a different topic (*pakṣāntarita*).⁶² Censure (*upālambha*) is expressing the defects in reasoning (*hetoḥ doṣa vachanam*) by pointing out that which is not an evidence (*ahetu*) and which is only apparent evidence (*hetvābhāsa*).⁶³ Amendment (*parihāra*) is the removal (*pariharaṇa*) of faulty statement (*doṣa vacanasya*). For example, in reference to earlier circularity, one says, "The signs of life are always found in embodied self; when the self departs (*apagamāt*) the signs do not avail."⁶⁴

*According to the Treatise, there can be only three kinds of contexts, e.g. context of life science (*āyurvedika samaya*), context of ritual (*yajñika samaya*), and context of the science of liberation (*mokṣasāstrika samaya*) and they take opposite positions sometimes, e.g. in respect of non-violence. Enumeration of only three contexts is an indicator of the stage of theoretical developments of the time.

therefore, self as different from body, is eternal." Abandoning the position involves the giving up (*parityājati*) of a stated (*parigṛhītā*) position upon refutation (*paryānuyukta*).⁶⁵ Admitting an argument by which the adversary scores the point (*iṣṭa*) while one himself loses the point (*aniṣṭa*) is also a fallacy.⁶⁶

Arguing by defective evidence involves the citing of improper evidence (*yikrat hetu*) where one ought to cite a proper evidence (*prakṛta hetu*).⁶⁷ Arguing by defective sense involves the citing of irrelevant evidence, e.g. telling about the characteristics of urinary anomalies where the characteristics of fever ought to be told.⁶⁸ Finally, the point of settling the issue involves defeat (*parājayaprāpti*) when one fails to understand (*aparijñāna*) a statement made thrice, or questions the perfect (*ananuyojyasya anuyoga*), or does not question the defective (*anuyojyasya ananuyoga*), or commits the fallacies of abandoning the position, agreeing to an unscoring position, arguing when the time has passed, making fallacious statements, reasoning by defective evidence and reasoning by defective sense.⁶⁹

There are indications in the text that while *sambhāṣa* generally stresses a spirit of 'learning' from colleagues and experts, *vāda* aims at a spirit of 'context' where the adversary is to be defeated within the bounds of strict rules of reasoning. Such a defeat would imply the general acceptance of the winning theory as more cogent and sound. It is implied that the victory of the theorists will be taken to be the victory of the theory itself for the justification or test for the theory is its rational defence in the face of the contesting theory and disagreements. Elaborate and detailed account of *vāda mārga* in the text can be taken as indication of the importance given to reasoning and theorising. The concept of a theory, the concept of justification of a theory and the concept of structure of a theory which get meaning in the context of a continuing process of *vāda* sum up the 'logic' of scientific enterprise. The concept of *mārga* must again be interpreted in the sense of a method, or, rather, as one of the aspects of any general method or *vidhi* of investigation. There 'is' a definite 'path' that is required to be followed by the serious cognitive investigators. Although the Treatise does not divide the terms enumerated into three groups, we have done so because the order in which the terms have been enumerated suggests such a grouping. Failure to group the terms in a suitable way may not necessarily be seen as a default but it may imply a refusal to make any distinction between the 'logical' aspects of the process of investigation and its 'psychological' aspects. For if we see the process of investigation as one in which the investigator is an important ingredient, then certainly it will be a serious mistake to ignore the universal psychological components of investigation that are independent of any specific investigator.

It may be noticed that in the first group of terms what is of singular importance is the five membered syllogism. A theory may be characterised as a set of established contentions (*pratijñā*). Are these established contentions deductively related? It seems they need not be for at least in the Treatise there is no indication for such a relation. Thus the contentions are about a group of facts which belong to a set whereas the

contentions have no deductive link. For example the contention of 'eternal nature of self' (*purusa nityatva*) need not be deductively linked to the contention of 'multiplicity of selves' (*purusa bahutva*), although the two facts belong to the same group or set. Analysis of the structure of five membered syllogism (*naya*) reveals that it does not make any distinction between deductive inference and inductive inference. The *naya* subsumes the 'empirical' in it by insisting that there are four and only four ways of ascertaining the *hetu*. Thus the *hetu* can be ascertained either by direct perception or by inference or by testimony or by argument by analogy. Thus, while the concept of *hetu* becomes a central concept in the larger structure of *naya* as a complex argument, this concept of *hetu* itself depends on the concepts of reasoning (*tarka*)* and argument (by analogy) or *yukti*. The complex nature of human intellect active in theorisation, is thus revealed in the structure of the five membered *naya* which can be characterised as primarily 'deductive' if the *hetu* is ascertained by *anumana* or *yukti* and as primarily 'inductive' if it is ascertained by perception. Furthermore, as the concept of *upanaya* suggests, we can conceive the entire structure as an argument within argument, the internal argument consisting of the *hetu*, the *dr̥ṣṭānta* and the *upanaya* and the enveloping argument consisting of the contention, the internal argument, and the conclusion. Thus if we say that H (*hetu*). D (*dr̥ṣṭānta*):. U (*upanaya*): $\equiv E$, then the *naya* can be said to be of the form of P (*pratijñā*). E :. N (*nigumana*). It may also be noted that *hetu*, *dr̥ṣṭānta* and *upanaya* are all *tarkas* in their own right. For example, if we consider the earlier example, the *hetu* says that 'the self is not constructed' and ascertains it by any of the four modes of ascertaining so that in effect the reasoning is: 'self is not constructed because observed or inferred or testified etc.' Similarly, the *dr̥ṣṭānta* says that 'self is not constructed like the space is not constructed' which is again a *tarka*. And finally the *upanaya* says that 'as the space is unconstructed and eternal, so is the self' which is again a *tarka*. The three forms of the *tarkas* are '...because...'; '...like...'; and 'As...so...'. Unfortunately, it is not clear how these forms of reasoning can be reduced to the 'If...then...' or 'and', 'or' forms which indicates that, as presumed by modern propositional logic, the latter are not necessarily the primary forms of *tarka*.

Here the problem of a strict distinction between *tarka*, *yukti*, *anumāna*, *upanaya* and *upamāna* arises. *Anumāna* has been defined in terms of *tarka* whereas *yukti* has been defined in terms of *upamāna* so much so that the two are considered as synonyms and have often been employed interchangeably. But if *anumāna* has to be defined in terms of *tarka*, then, since *hetu* presumes *anumāna* and *naya* presumes *hetu*, a distinction must have been made between different degrees of complexity of the *tarka*, which distinction does not seem to have been made at least in the present text. Therefore, at least for the purpose of present analysis of the structure of the complex argument involving *tarka within tarka*, we can say that the simplest form of *tarka* is the *anumana-tarka*, bit more complex is the *upanaya-tarka* and the most complex is the *naya-tarka* which conjointly lead to the establishment of a contention and its con-

*One ought not to confuse this earliest use of the term *tarka* with its later use in discussion on counterfactuals.

clusive acceptance as a member of the theoretic-set.* The *hetu-tarka* and the *yukti-tarka* may be considered as of the same level as the *anumana-tarka*, but this is only a conjecture calling for further examination.

The conception of a theory or theoretic principle as that which is to be accepted only after public examination conducted in 'diverse ways' and advancing 'proof by evidences', involves the notions of both inter-subjective testing and logical correctness. The division of theoretical principles into four kinds is again quite revealing since with its help one can analyse the structure of a theory in terms of various kinds of principles involved. It is interesting to note that the 'primitive theoretic principle' is very much akin to the 'axioms' of Euclidean geometry since it is accepted without proof, examination or evidence. The examples given are that of some of the basic concepts such as substance (*dravya*), quality (*guṇa*) etc. being fundamental—which then must be treated as self-evident, intuited (*paśyanti*) truths since the concept of substance for instance has no meaning unless translated as 'There is something'. So is true of other fundamental concepts such as *guṇa*, *karma* etc.

We should also note the reflection on the concept of 'proposition' and its four-fold division. Propositions are said to be 'empirical' where something perceptual corresponds to the proposition, the concept of *artha* indicating something concrete about which the syntactical arrangement stands. Or they may be 'conceptual' or 'logical' where nothing perceptual belongs to them. Yet all those propositions can be held to be true or false depending on whether they stand for the situation as it is or they do not do so, or whether they contradict the context in which they occur or do not do so.

While examining the 'psychological element' in scientific investigation, we note that inquiry or *jijñāsā* has been defined in terms of examination (*parīkṣā*), which gives rise to a doubt that examination is not a purely epistemological concept but has the attendant psychological component, whereupon reference must be made to something occurring in the mind of the investigator. The text is not explicit about this and appears to present *jijñāsā* as something which has to be defined in terms of the more primitive *parīkṣā*. But actually neither seems more primitive than the other for one is incomplete unless attended by the corresponding component. Similarly, there will arise problems if expectation or *sambhava* is sought to be interpreted as objective property of events such as of the six elements giving rise to pregnancy. There is no question of objective 'expectation' here for the combining of six elements must necessarily give rise to pregnancy—in so far as this process is in itself concerned. But subjective expectation of the examiner makes sense, for having a limited knowledge of *hetus*, he can only 'expect' what is going to take place. This issue relates to probability

*For example one can proceed to argue as follows:

- (1) p because q —*anumāna-tarka*.
- (2) (p because q). (like p_1 because q_1)—*upanaya-tarka*.
- (3) (p because q). (like p_1 because q_1). (As ' p_1 because q_1 ' so p because q)—*naya-tarka*.
- (4) Finally one can conclude that 'since (1) and (2) and (3), therefore p '.

and scepticism in the modern context, and it is interesting to note that scepticism, doubt, *jijñāsā* and expectation find expression in the context of the psychology of the investigator although not in the 'logical' aspects of investigation and theorising.

In respect of the dialectical skills and fallacies of reasoning, one is inclined to suspect that argument has been seen more as a *contest*, an intellectual *battle* and there is no corresponding stress on the examination of the 'logical' structure of the complex arguments. There is a negative stress on the slips, fallacies and mistakes that one is likely to make while arguing but no *positive* stress on laying down the criteria of validity of arguments. One is likely to conclude that for them *an argument was valid unless fallacies could be pointed out*. Aristotelian insight of relating the truth/falsity of premises with that of conclusion for understanding 'validity' does not seem to have been developed. Detailed discussion of *vākya-doṣa* and *hetvāntar*, however, indicates that these are considered to be the criteria for proving the *invalidity* of a *naya*. The examination of the *hetu* and the *dr̥ṣṭānta* appears to be central here, for an argument may turn out to be invalid due to diverse defects in respect of these two. Particularly important are the criteria of 'inadequacy' and 'contradictoriness'. Inadequacy of the *hetu* and contradictory *dr̥ṣṭānta* will render an argument 'fallacious' but it is not clear whether it will be rendered 'invalid', unless it is presumed that every fallacious argument is invalid. Inadequacy of the *hetu* consists in providing only 'one *hetu*' in the argument where more than one are operating. That is to say, if the case in point is that of multiple causation, one will argue fallaciously if one does not argue on the basis of 'all' the causes involved. One may here object that it is difficult to find out which are the relevant causes and whether 'all' the relevant ones have been considered. Actually, our ability to uncover and consider all the relevant *hetus* depends upon the meticulousness of our examination or *parīkṣā*. But if our instruments of examination keep on improving, our knowledge of *hetus* will also do so. Similarly the criterion of contradictoriness stresses that the argument should not involve contrary exemplification--which again is a matter of examination. Nor should it contradict some basic theoretic principle which is already presumed as established, nor should it contradict the theoretical context within which it has a meaning. Obviously, these are some of the basic criteria for the adequacy of a theoretical structure but it is not imperative that all successful theoretical structures satisfy them. For example, synthesis of two contexts can be the proof of a successful theory. Similarly, it may sometimes be necessary for a theory to give up some of the presumed fundamental principles in order to represent experience adequately.

A general feature of the entire method of *vada* is that no distinction has been made between 'strictly logical' and 'strictly psychological', nor has a distinction been made between the 'context of discovery' of a *naya* and the context of its 'justification'. As it appears, the *naya* cannot be strictly 'logical' for the examination of the *hetu* can be done both by direct observation as well as by inference and psychological considerations are bound to arise wherever observation and inference are present. Furthermore, psychology of the investigator is considered an important factor in

vāda as is evident from the concepts discussed. On the other hand, the justification of a *naya* consists in its being free from fallacies. But the concept of 'fallacy' is not a purely logical concept here, as it involves the concepts of *relevance*, *correctness* and *examination*. Therefore, it is implied that even during the process of discovery of a *naya*, the avoidance of fallacy has to be a precautionary concern of the investigator throughout.

METHOD OF EXAMINATION OR *PARĪKṢĀ VIDHI*

In so far as the philosophical basis of any knowledge-seeking is concerned the treatise divides any scientific investigation into three parts: (i) investigation of the fundamental causes (*kāraṇa*), (ii) investigation of the nature of the enterprise (*kārya*) which is being undertaken, and (iii) investigation of the purposes (*prayojana*) of the enterprise. The 'form' of empirical investigation (*parīkṣā*) itself has been discussed repeatedly.⁷⁰

It is asserted at the very beginning that the two fundamental 'causes' underlying all change (*sarvabhāvanā*)⁷¹ are the direction or tendencies (*pravṛtti*) called the assimilative (*sāmānyā*) and the differentiative (*viśeṣa*). The assimilative is the cause of increment (*vṛddhi*) of all things at all times and of their uniting (*ekatvakara*). The differentiative is the cause of decrement (*hrāsa-hetu*), and differentiation (*prathakarva kṛta*). The assimilative cause has been defined as similarity (*tulyārthatā*) and the differentiative cause as dissimilarity of all things at all times. The third fundamental cause is the primordial unity (*apṛthagabhāva*) of substances and their attributes and may be called the relation of law* (*samavāya*) which is eternal (*nitya, niyata*). The other three causes which are dependent and not fundamental are the factor or quality or attribute (*guṇa*), action or motion (*karma*), and substance (*dravya*). The quality as cause is inactive (*niśceṣṭa*) component of lawful relation (*samavāyi*).⁷² The action is the cause of contact (*samyoga*) and separation (*vibhāga*), is sustained by substance (*dravya āśrita*), is the activity (*kriyā*) of performance (*kartavya*), and does not depend on any other action.⁷³ The substance is that which sustains the action or motion and the qualities (*karma guṇā āśrita*) and which is an active (*saceṣṭa*) component of the lawful relation (*samavāyi*).⁷⁴

The *purpose* of the science of life is considered to be the endeavour for attaining the equidistribution of elemental forces (*dhātusāmya kriyā*). The *nature* of the enterprise consists in investigation into the problem of equidistribution of elemental forces (*dhātusāmya*).⁷⁵

1. All empirical investigation is largely the investigation of the fundamental causes. The 'logical' form of empirical investigation has been discussed in the context

*That certain attributes must *always* belong to certain substances can be seen as foundation of 'natural law'.

of the philosophical problem of a moral-causal order, of the dialectical method of the examination of differential diseases (*roga viśeṣa*), and of the examination of that which is to be examined. In the first context it is asserted categorically that there are four and only four methods of empirical investigation (*caturvidha parikṣā*) which are: learning from authority (*āptopadeśa*), perception (*pratyakṣa*), inference (*anumāna*) and argument by analogy (*yukti*), in the order given in the text.⁷⁶ In the second context,⁷⁷ when the logical structure of scientific enterprise is being discussed, the causal-empirical statements (*hetu*) are said to be formed in four-fold way, namely perception, inference, learning from tradition or authority (*etiḥya*), and analogy (*aupamya*) (in the order appearing in the text). These are said to be the conditions or 'causes' of empirical knowledge (*upalabdhi kāraṇa*) and lead to the achievement or understanding (*upalābhyate*) of the real (*tatva*). In the third context, when the science of differentiating the diseases (*roga viśeṣa vijñāna*) is being discussed, its three-fold method (*trividha*) is held to be learning from authority (*āptopadeśa*), perception, and inference while inference is so defined that the concept of argument or reasoning (by analogy) (*yukti*) is incorporated in it.⁷⁸ In the fourth context, when a contrast is made between the method of examination (*parikṣyam parikṣya*) and the reflection on this method (*parikṣaya*), the forms of examination are held to be 'primarily' perception and inference, although learning from authority (*upadeśa*) has also been included as the third one.⁷⁹ From this presentation of the general forms of examination, we may surmise that the Treatise considers perception and inference as the only two fundamental forms of examination or conditions of empirical knowledge since analogy (*aupamya*) or argument (by analogy) (*yukti*) can be incorporated in the inference itself and learning from the authority of text-books or teachers (*etiḥya, upadeśa*) can be considered as an obvious precondition to any ability for examination of any kind.

2. In the context of the examination of specific diseases, it has been said that one first learns from authoritative sources and then examines by means of perception and inference for if nothing has been learnt beforehand, what shall one achieve through examination (*parikṣāmāṇaḥ kim vidyāt*)? One learns from authoritative sources about the source, nature, characteristics, causes and effects of diseases as also about the prescriptions (*pravṛtti*) and prohibitions (*nivṛtti*) in the treatment (*pratikārārtha*). Perceptual examination includes inspection by the eyes, the ears, the nose and by touching the entire natural and foreign materials (*prakṛti-vikṛti yukta*) of the patient's field. Inferential examination of those aspects which can be known only by inference (*anumān-geya bhāva*) includes the inference of digestive fire from the capacity for digestion, of strength by capacity for exercise, of the keenness of intellect by decision-making ability (*vijñānena vyavasāyen*), of the understanding by comprehension (*medhā grahaṇena*) and so on. One should also interrogate (*paripraśnena*) the patient regarding dreams, what is pleasant or unpleasant (*sukha-duḥkha*) and attractive or repulsive (*dviṣṭa-iṣṭa*). A keen examiner (*arthavit*) decides (*adhyavaseta*) only after thoroughly and critically investigating (*sarvathā sarvam ālochyam yathāsambhavam*) the case (*tatve*). Unless the knowledgeable (*tatvavit*) physician enters the spirit (*antarātmānam avisati*) of the patient, he cannot successfully treat him.⁸⁰

Stressing on the importance of empirical investigation, the Treatise discusses in detail the objects to be investigated by means of authoritative source, perception and inference. One learns from the authoritative source the details about the disease and prescriptions (*pravṛtti*) and prohibitions (*nivṛtti*) about its treatment (*pratikārārtha*). The details include the knowledge of exciting factors (*prakopana*), source (*yoni*), onset (*utthāna*), nature (*ātmāna*), location (*adhsthāna*), pain (*vedana*), symptoms (*sansthāna*), sound-touch-colour-taste and odour (*śabda-sparśa-rūpa-rasa-gandha*), complications (*upadrava*), stages of aggravation, steadiness and abatement (*vyādhi-sthāna kṣaya-samanvita*), consequences (*mudarka*), name (*nāmāna*) and concomitants (*yoga*). Perceptual investigation involves the use of all the five senses (except the tongue) for ascertaining the disease (*rogatattva*).⁸¹ Investigation should be done through the ear (*śrotreṇa parikṣeta*) the sounds in the body (*śarīropagata śabda*), such as intestinal sounds (*antrakūjana*), the sound of the joints (*sandhi-sphuṣana*), sounds of finger, knuckles (*aṅguli parvaṇā*), and variations in voice (*swara viśeṣān*).⁸² One should examine with the eyes (*cakṣusā parikṣet*) the colour (*varṇa*), shape (*samsthāna*), proportions (*pramāṇa*), lustre (*chāyah*), and diseases of the natural body (*śarīra prakṛti vikāro*), etc.⁸³ Since the taste cannot be examined directly, it ought to be examined inferentially by interrogating the patient (*ātura paripraśnena*) regarding the taste of the mouth (*mukharasa*), insipidity of body secretions (*śarīra-vaivasya*), sweetness of body secretions (*śarīra mādhuṛya*) etc. by inference.⁸⁴ Normal-abnormal smells (*prakṛti vaikārikān gandhāstu*) should be examined by nose and normal and abnormal feel (*prakṛti-vikṛti yukta sparśa*) by the hand.⁸⁵ The inferential investigation of factors (*anumāṅgeyāh-bhāvāh*) involves inferring digestive fire (*agni*) from the power to digest (*jāraṇa śaktyā*); strength (*bola*) from the power for exercise (*vyāyāma śaktyā*); state of senses (such as ear etc.) from the acuity of perception (*arthagrahaṇena*); state of the sensorium (*manā*) from adequate receptivity (*artha avyabhicharaṇena*); the state of consciousness (*vijñānena*) from decision-making (*vyavasāyena*) ability; of seminal strength (*vīrya*) from enthusiasm (*utthānena*); of the disease with latent symptoms (*gūḍhaliṅga vyādhi*) by testing with therapeutic or provocative medication (*upaśaya anupśayābhyām*); of the degree of morbidity (*doṣa pramāṇa viśeṣa*) by the intensity of provocative factor (*apacāra viveṣena*); and of the dreams etc. by interrogating the patient.⁸⁶ A specialist (*kārya tattva viśeṣajñā*) must not be confused (*muhyati*) in his enterprise if he is to attain the goal.⁸⁷

3. One must reflect on the method of the enterprise itself (*kārya parikṣā*). Reflecting on any method of investigation (*parikṣayā prakṣyam parikṣa*) in general, it is asserted that there are ten aspects (*daśavidha*) of any prior examination: cause (*kāraṇa*), means (*karaṇa*), the source of enterprise (*kāryayoni*), the enterprise or the effect (*kārya*), the goal of the enterprise (*kāryaphala*), the necessary consequence of the enterprise (*kārya anubandha*), the place or region (*deśa*), the time (*kāla*), effort (*pravṛtti*), and strategy (*upāya*).⁸⁸ Only after examining the ten aspects would it be adequate to launch an enterprise (*kāryārtha pravṛtti*). One must ask at the outset: what kinds of examination methods (*katividhāya parikṣayā*) are to be employed for what kinds of examinations (*katividhameva parikṣyam*)? What are the different objects of examination

(*parikṣa viśeṣa*)? How the examination is to proceed (*katham parikṣitavya*)? What is the purpose of examination (*parikṣā kimprayojana*)? The ten aspects of examination (*parikṣa viśeṣa*) ought to be examined one by one (*prthak prthak parikṣitavya bhavanti*).⁸⁹ In the context of medical practice, these have been elaborated,⁹⁰ as follows: The cause of investigation is that which acts (*karoti*), which is the doer (*kartā*).⁹¹ This is the doctor (*bhīṣaj*),⁹² whose examination includes the competence in doctoring (*bhīṣajyāti*), expertise in applying the knowledge (*sūtrārtha prayoga kuśala*), and detailed and proper knowledge of life (*āyuh sarvathā viditam yathāvat*). Seeking equilibrium of elemental forces (*sarvadhātusāmya*), constantly watching the progress of his effort (*kāryābhini-vṛtti paśyan*), he should, in the beginning, examine himself (*ātmanam parikṣet*) whether he has the ability to undertake the effort. An ideal doctor will have the qualities of the mastery of theoretic knowledge (*paravadātsrutatā*), comprehension of practice (*paridṛṣṭakarmatā*), skill (*dakṣya*), meticulousness (*śaucam*), deftness (*jitahastatā*), ability to design adequate instruments (*upakaraṇavattā*), sensitivity of all the senses (*sarvendriya upaṇnatu*), knowledge of human nature (*prakṛtijñātā*) and knowledge of prompt mental association (*pratipattijñātā*).⁹³

The means or implement is that which is employed as an instrument (*upakaraṇāy upakalpate*) during the effort (*prayatnamānasya*) for the achievement of one's goal. Various ways and means (*upāya*) that are employed during the effort for equilibrium (*dhātusāmya*), are the instruments (*upakaraṇāy*) called 'medication' (*bhēṣaja*)⁹⁴ or therapy. Therapy as a means has been further sub-divided on the basis of methodological presumptions (*vyapāśraya bhedāt*), and on the basis of components (*aṅga bhedāt*). On the former basis its divisions are: practical therapy (*daiva vyapāśraya*) or a therapy which analyses the ultimate causes of human disease to action (*karma*) and morality; and rational therapy (*yukti-vyapāśraya*) which analyses the causes of disease in terms of inadequate distribution of elemental forces. The former will involve efforts (*ceṣṭā*) such as *mantra*, meditation, fasting, *yoga* etc. while the latter would involve efforts such as purification (*saṁśodhana*) and sedation (*upaśamana*) with observable results (*dṛṣṭaphala*).⁹⁵ On the latter basis, its divisions are: physical therapy (*drvayabhūta*) and non-physical therapy (*adravyabhūta*). The non-physical therapy is included in the strategy (*upāya*) and involves the employment of non-physical states (*amūrta bhāvaviśeṣa*) such as frightening, causing surprise, obliterating the memory, threatening, inducing sleep, inducing pain (*vadha*), binding (*bandha*) etc. The examination of the means of physical therapy involves a knowledge of the nature (*prakṛti*), quality (*guṇa*) and effect (*prabhāva*) of the medicine, its origin in respect of time (*rtu*) and place (*deśe*), the manner of its gathering, preserving and preparing (*upaskṛta*), the quantity (*mātrāya*) and manner (*vudhasya*) of its rational application (*yukta*) that will eliminate (*apakarṣati*) or allay (*upaśamayati*) the disease (*vyadhī*).⁹⁶

The source of enterprise (*kārya yoni*) is that which is activated (*vikriyamāṇa*) and thus transformed (*āpadhyate*) into the effect (*kāryatvam*).⁹⁷ The maldistribution of the elemental forces (*dhātuvaśāmya*) is the source of the enterprise. Its characteristic is the emergence of disease (*vikārāgama*). Its examination involves the observation

(*avekṣaṇa*) of the nature of maldistribution (*vikāraprakṛteḥ*), of high or low degree, of the curability or incurability (*sādhya-asādhya*) of the disease, and of its mild or acute (*mṛdu-dāruṇa*) stage.⁹⁸

The effect or the enterprise is that aiming at (*abhisandhāya*) the fulfilment (*abhinirvṛtti*) of which the doer or the cause endeavours (*pravartate*).⁹⁹ Equidistribution of the elemental forces (*dhātusāmya*) is the effect here and it is characterised by alleviation of the morbid condition (*vikāra upaśama*). Its examination involves consideration of factors such as alleviation of pain, restoration of normal voice and complexion (*svaravarṇa yoga*), flowering of the body (*śarira upacaya*), increase of strength (*bala vṛddhi*), desire for food, relish while eating, proper digestion, approach of sleep at proper time, happy wakeful state, not seeing abnormal dreams, elimination of fatus, urine, feces and semen, and the marks of healthy (*avyāpatti*) mind (*manabuddhi*) and senses (*indriyānām*).¹⁰⁰

The goal (*kāryaphala*) is the desired (*iśyati*) accomplishment of effect (*kārya abhinirvṛtti*) in accordance with a plan of action (*prayojana*).¹⁰¹ The goal here is the attainment (*avāpti*) of happiness (*sukha*) and is characterised by a sense of fulfilment (*tuṣṭi*) of the mind (*manabuddhi*), senses and the body.¹⁰²

The consequence (*anubandha*) is that which binds (*anubandhanāti*) the doer in good or bad state (*śubhāśubha bhāva*) resulting from the effect posteriorly (*kāryāi uttarkālan kāryanimitta*).¹⁰³ Life (*āyu*) is the consequence here and is characterised by the co-existence of the vital forces (*prāṇai sah saṃyogaḥ*).¹⁰⁴

The place or region (*deśa*) is the basis (*adhiṣṭhāna*) in which the cause and the effect occur.¹⁰⁵ It is both the habitat (*bhūmi*) and the patient (*ātura*)¹⁰⁶ himself. The examination of the habitat (*bhūmi parikṣā*) may be both for the knowledge of the patient (*ātura pariñāna hetu*) as well as for the knowledge of the drug (*auśadha pariñāna hetu*). Examination of the habitat of the patient involves finding where the patient is born and grown and attacked by disease; what are the habits of food, work and living (*āhārjāta, vihārjāta, ācārjāta*); what are their nature (*satva*), adaptation (*sātmya*), proclivities (*doṣa*) and diseases (*vyādhi*).¹⁰⁷ The examination of the patient which is the region of cause (*kārya deśa*) involves finding the measure of life, strength and disease (*āyusaḥ-bala-doṣa-pramāṇa jñāna hetu*) since this will determine the measure of dosage. It involves examining general nature (*prakṛti*) in respect of the dominance of elemental forces, in respect of disease (*vikṛti, vikāra*), in respect of the basic matter (*sāra*), as regards compactness (*samhanana*) or organisation (*samyojana*), as regards proportions of the body (*śarira pramāṇa*), in respect of adaptation (*sātmya*), of psychology (*satva*), of strength of digestion (*āharaśakti*) and exercise (*vyāyamaśakti*), as regards age (*vayaḥ*) and life (*āyu*).¹⁰⁸

Time is change (*pariṇāma*).¹⁰⁹ It is to be characterised by periods (*samvatsara*) and the state of the patient (*āturāvasthā*). The period may be divided into seasons

(*rtu*). A particular state of the patient may be proper time for administering the drug or it may not be. Its examination involves repeated observations (*muhuh muhuh avekṣaṇa*) of all the specific states (*sarvāvasthā viśeṣa*) of the patient for the administration of the drug (*auśādha prayogārtha*). It is the opportuneness of time that brings about success (*paryāpti*) for a drug administered before or after the adequate time does not bear fruit (*yaugika*).¹¹⁰

The effort (*prayatni*) is the action undertaken for a purpose (*kāryārtha cestā*) and is synonymous with *kryā*, *karma*, *yatna*, *kārya samārambha*.¹¹¹ It is characterised by proper and co-ordinated effort (*kriya samayoga*) of the physician, drug, patient and the nurses.¹¹²

The strategy (*upāyah*) is the proper integration (*sauṣṭhaya*) and planning (*abhidhāna*) of the cause, means and the source (*kāraṇa, karaṇa, kāryayoni*). Strategy does not involve the effect, the goal and the consequence (*kārya-kāryaphalānubandh varjyānam*) and it is so called because it accomplishes the effect (*kārya abhinirvartaka*). The strategy is not operative (*upāyārtha*) once the effect has occurred or the goal has been attained or the consequence has followed.¹¹³ It is to be characterised by the attributes (*guṇasampat*) of the doctor, medicine etc., by proper adaptation (*sāmya*) in respect of time, space, and measure; and by the proper use (*avacāraṇa*) of properly prepared medicine (*samyak upapādita*).¹¹⁴ The ten-fold *upaya* will be considered in another section.

The purpose (*prayojana*) of these ten aspects of investigation is the proper determination (*pratipattijñāna*) of the line of treatment, which means knowledge of execution (*anuṣṭhānājñāna*) of proper treatment (*pratipattavya*) of the disease (*vikāra*).

It was indicated in the preceding section that the fundamental presuppositions of the science in whose context the *vāda* occurs are to be included in the *vāda mārga*. The nature of the enterprise under discussion involves the knowledge of equidistribution of elemental forces (*dhātusāmya*). But the knowledge of elemental forces themselves presupposes knowledge of their causes. In other words, every science, in so far as it is founded on the method of empirical investigation, presupposes a fundamental *conceptual framework*, in the light of which its facts are to be interpreted and its problems understood. The concept of *dhātu* and the problem of *dhātusāmya* could, then, be understood only in terms of some intuitively obvious and self-evident 'axioms' which, as shown earlier, cannot be questioned if the problem itself is accepted as soluble in principle. The Treatise discusses the six fundamental 'causes' as 'axiomatic' in the light of such a view. These are the causes of our experience of multiplicity and change. Thus, multiplicity and change, in general, cannot be understood unless we admit as obvious truths that there have to be substances, attributes, the primordial unity of the two (*apṛthagbhāva*), similarity and dissimilarity of the two, and finally uniting and disuniting of the two. Only when some such fundamental propositions have been accepted,* can we proceed to examine the specific problem of *dhātusāmya*.

Further, the concept of *parīkṣā* has also been discussed under the problem of *hetu-parīkṣā*, in the preceding section but its detailed discussion has here been undertaken because of its generality and applicability in diverse contexts. The examination of the six fundamental causes must, then, become part of the method itself. For example, one can ask: what are the particular substances and attributes involved? What are the particular and general features involved? What are the mutual actions and interactions? Indeed, it seems imperative that every scientific causal analysis begin with such fundamental questions.

The fundamental axioms may be divided into two types: the first three (*sāmānya*, *viśeṣa* and *samavāya*) make obvious the 'logic' of things and the last three (*dravya*, *guṇa*, *karma*) make obvious the *nature* of things. Or, to say the same, the multiplicity of our experience must have a certain definite 'nature' and 'logic' if it is to be apprehensible at all. It is this nature and logic of things which is causally responsible for the possibility of any *kārya* or 'effect' or 'product'. Axioms expressing the logic of things have been explained in terms of the relations of similarity (*tulyārthata*) and unity (*apṛthagbhāva*) between the things. The other three, those expressing the 'nature' of things have been explained in terms of each other as well as in terms of *samavāya*. Therefore, one may suspect the axiomatic nature of these last three if by axioms we understand those truths which are independent of each other.

Samavāya as eternal (*nitya*) unity (*apṛthagbhāva*) of substances and attributes is quite close to the concept of 'natural law'. Concept of law may not necessarily derive from causation. One may conceive it as founded in the axiom that there must be a 'necessary' relation between substances and attributes, where substance is understood as an active *samavāyi* and the attributed as inactive *samavāyi* being dependent on substance. So are contact and separation of things dependent on substance although no necessary relation can be conceived here. One may then conjecture that the appearance of 'necessity' in 'natural laws' has its origin in the eternal *samavāya*.

The effect or product of these fundamental causes has been conceived as a state of *dhātusāmānya*, or a state or equidistribution of elemental forces. This has reference not only to the *normal health* of the human organism but also to the entire universal organism, the former being an integral component of the latter. The problem arises when this equidistribution is disturbed for certain reasons and the therapeutic action is required for restoring this state of equidistribution. The question, then, is, 'By what method can this state be restored?' One has, then, to resort to a reflection on the methods of investigation in general as also on the components of the methodology of restoration of the state of equidistribution itself.

*If '*dravya*', '*guṇa*' etc. are understood as 'categories of thought' rather than highly abbreviated forms of axioms such as 'there are substances', 'there are attributes' etc., then also we can argue that if our thought is to faithfully portray reality, these categories must 'stand' for 'something' or at least generate thought that is isomorphic with reality. This is to say almost the same as saying that if a scientific structure is to provide the understanding of multiplicity of experience it has to proceed from some 'self-evident' propositions or propositions which are presumed to be true so that a fundamental conceptual framework becomes available within which the experience is rendered apprehensible. I am thankful to Professor Daya Krishna for raising this point.

It may be noted that there is a good deal of ambiguity in the presentation of the 'modes' or means of examination in general. Sometimes the stress is on *yukti*, elsewhere it is ignored, yet at some other point the concept of *aupamya* or analogy is presented as its synonym. While *yukti* has to be understood as *argument* by analogy, *aupamya* is merely the presentation of analogy. However, if *yukti* or *aupamya* are included in the definition of inference and if *śabda* is considered as expert opinion being a condition of knowledge and examination, then we are left only with two modes of examination, namely perception and inference. These two are, then, also the fundamental 'causes' of the apprehension of experience and in order that these may truly be the causes one must systematically and repeatedly employ them for correct apprehension.

The ten-fold examination *a priori* of any undertaking constitutes the 'methodological reflection' in general. The most important aspects of this methodological reflection are *pravṛtti* or effort and *upāya* or strategy, for a reflection on these two will largely determine the success or failure of the undertaking. The effort has to be properly co-ordinated and the strategy has to be such that there is proper adaptation of time, space and measure, as also a proper integration of causes, means and sources. One may here ask what is meant by *proper co-ordination* of effort, or *proper adaptation* and *proper integration* of the factors of strategy? Agreed that strategy has to be contemplated prior to the effect, is it not desirable that there be a proper adaptation of *upāya* and *pravṛtti* so that a continuous modification of one in the light of the other is sought? At least in the Text there are no indications of such an interplay between the two, which must indeed be kept in mind for the success for an enterprise.

It should be clear that this ten-fold examination of an enterprise prior to its undertaking, is of the most general kind and speaks very little about the details of the 'method' itself which one must adopt in the analysis of the disease and its cure by administration of medicines. Method or *upāya* has been considered as only one of the components that characterise an enterprise and it may differ for different enterprises depending on their nature, context, and aims. The problem of methods specific to successful therapy of a rational kind, thus demands consideration of this tenth factor which is *upāya*.

THERAPEUTIC STRATEGY OR *CIKITSĀ SIDDHI UPĀYAH*

The attributes or factors (*guṇa*) of disease, medicine and doctor without whose knowledge a proper (*yathāvata*) treatment is impossible, are:¹¹⁵ accessibility (*aparātva*) and inaccessibility (*parātva*), scheme or reasoning (*yukti*), number (*saṃkhyā*), compounding or addition (*saṃyoga*), division or decomposition (*vibhāga*), analysis or particularity (*prthakatva*), measure (*parimāṇa*), treatment or preparation (*saṃskāra*), and practice (*abhyāsa*). These ten factors enumerate all the aspects of a proper 'strategy' of treatment (*cikitsāyā siddhi upāyāḥ*) and are like the experimental method of verification of the diagnostic hypothesis. Their characteristics (*lakṣaṇai*) are as follows: Inaccessibility or accessibility (*parāparatve*) of the disease to a specific medicine are

to be characterised by place (*deśa*), time (*kāla*), age (*vayaḥ*), measure of dosage (*māna*), preparation of dosage (*pāka*), strength of the patient and medicine (*vīrya*) and the nature of dominant chemistry (*rasa*) etc.¹¹⁶ That scheme or proposal (*yojanā*) which is the aptest and most applicable (*yujyate*) is called reasoning (*yukti*).¹¹⁷ Number (*saṃkhyā*) is characterised by computation (*ganita*).¹¹⁸ Compounding (*saṃyoga*) is the joining together (*sahayoga*) of materials (*dravyāṅām*).¹¹⁹ Such compounding may be born of conflict (*dvandvaja*) of two, of many (*sarvaja*), of one (*ekaja*) or of action (*karmaja*) and is temporary (*anitya*).¹²⁰ Decomposition is dividing (*vibhakti*) which separates (*viyoga*) and grasps the parts or disjuncts (*bhāgaśa graha*).¹²¹ Analysis or particularity is non-joinability (*asaṃyoga*) and is characterised by peculiarity (*vailakṣaṇya*) and differentiation (*anektā*).¹²² Measure is characterised by standard (*māna*).¹²³ Treatment or preparation (*saṃskāra*) of medicine is the instrument or means (*kāraṇa*) for modification.¹²⁴ And, finally, persistence or practice (*abhyāsa*) is repeated employment of an object or idea (*bhāva abhyasana*) and is characterised by forming habit (*śilana*) and continuous action (*satata kriyā*).¹²⁵

About reasoning (*yukti*) it has been remarked elsewhere¹²⁶ that it depends on quantity (*mātrā*) of medicine and time (*kāla*) of dosage; that success (*siddhi*) resides (*pratiṣṭhita*) in reasoning; and that the knower of reasoning (*yuktijñā*) is superior to the knower of substance (*dravyajñānavatā*). An example of reasoning (by analogy) is: 'Just as crops are expected (*saśya-sambhava*) from a land which is combined with irrigation (*saṃyoga*) ploughing, seeding and right weather, so too, conception is to be expected (*garbhāṅām sambhava*) from the combination of six *dhatus* (*ṣaḍadhātu saṃyoga*).'¹²⁷ It is by such reasoning that the intellect (*buddhi*) sees (*paśyati*) the object produced by multiple causes (*bahukāraṇa yogajāna bhāvāna*).¹²⁷

Unfortunately the ten *upāyas* or methods of successful rational therapy have not been discussed in great detail in the Treatise. These have been called the *attributes* (*guṇa*) of the doctor and the medicine which are respectively the cause (*kāraṇa*) and the means (*karaṇa*) of the therapeutic enterprise.

One may raise a doubt if the ten-fold *upāyas* are exhaustive or whether they are the necessary and sufficient conditions of successful therapy? Although no such explicit claim has been made in the Text, they appear to be a guarantee of success provided they are correctly apprehended. *Yukti*, for example, largely determines therapeutic success: that 'these medicines will cure 'this' disease. Equally important is the role of practice or *abhyāsa* which is the repeated employment of *yukti* in respect of a large number of diseases. At least one other classical text¹²⁸ employs the concept of *upāya* and guarantees that if these are resorted to, the destruction of suffering (*kleśa hāna upāya*) is imminent.

One may here seek a distinction between practice or *abhyāsa* and effort of *pravṛtti* (as employed in the preceding section). One may conjecture that while effort indicates a co-ordinated and systematic activity, the concept of practice is indicative of an 'insight'

into the adequacy of the *yukti*. One is reminded of the concept of 'induction by intuition' that Aristotle employs in his *Posterior Analytics*, and which is presumably largely dependent on practice of prolonged observation.

The concept of *yukti* is very important and needs elaboration. It is like a *diagnostic hypothesis* that conjectures that a certain combination of medicines is most likely to cure a certain disease. One conjectures as follows: 'Just as *A* is the cause of *B*, *p* may be the cause of *q* and *p* may be remedied by *m*.' Such conjecture is more likely to be correct the greater the insight acquired through practice. The formation of a *yukti* is like proposing a hypothesis and attempts at cure are like verifying the hypothesis. Such verification will be dependent on consideration of other factors such as measure, combination etc. and will help in ascertaining the correctness or incorrectness of the *yukti*. Normally, the novelty of a disease and failure in its cure does not call into question the theoretical structure of a therapeutic science but one may become conscious of its limitations and seek to improve it. Competing therapeutic systems are generally accepted by doctors and superiority of one over others is difficult to establish by any rational standards. Therapeutic success is normally considered verificatory while failures are not taken as definitive falsifications since there exist large number of variables which could be responsible for failure. It is interesting that the Treatise distinguishes between different possible therapies and rational therapy has been considered as only one of the three. It entertains the concept of an Ultimate Therapy (*sattva avajaya*) by which even the possibility of disease can be transcended. Since the causes of disease are ultimately traced to the misuse of the sense objects in the rational therapy, this therapeutic system becomes the one having only limited scope and aims, but conceptually linked to the ultimate therapeutic system. One may develop rational criteria of the superiority of a therapeutic system by marking its conceptual overlap with the ultimate therapeutic system.

The problem of adaptation of *yukti* and *abhyāsa* to each other may be raised here again. Although not pointed out in the Text, this adaptation contains the possibility of progress of the therapeutic theoretical structure. If the diseases encountered are novel, the *yuktis* have to be novel too and will stress greater intuitive insight on practice. A dialectical relationship between the conjectural hypotheses and the experimental verificatory administration of medicine will then explain the dimension of progress of the therapeutic system,—in particular the theoretical progress. This may involve further analysis of the basic concepts, further addition to the multiplicity of causes of diseases, further discovery of the properties of medicines, and so on.

GENERAL REMARKS

The general picture of a scientific enterprise that emerges from the above presentation is that of a continuing theoretical investigation of the *causes* by means of *naya*, *pratyakṣa* and *anumāna* to be systematically carried by *vāda mārga* and *sambhāsa vidhi*; and of a continuing effort and strategic reflection in terms of *yukti* and *abhyāsa*

to be systematically contemplated and executed in the *kārya parīkṣā* and *cikitsā siddhi upāya*. The concepts of *vāda* and *sambhāṣa* express the stress on systematic theoretical investigation, whereas those of *kārya parīkṣā* and *siddhi upāya* express the stress on systematic practical endeavour. The link between the practical and the theoretical is established by the *yukti* which is an argument in the light of theoretical knowledge and practical insight. A *yukti* presupposes theoretical knowledge of the causal link between a *doṣa* and a disease or *vyādhi* and hypothesises a causal interaction between a specific medicine or *rasa* compound and the accentuated *doṣa* by virtue of which the disease would presumably be cured. Thus the theoretical component of *yukti* can be ultimately resolved into the knowledge of *hetus* whereas its verifiability or falsifiability is a function of the practical insight or *abhyāsa* as also of the correct examination (*parīkṣā*) of the *hetus*. Thus, progress in theoretical knowledge would consist of uncovering the *hetus* that were previously not known or were unsuspect. Such arrival of new *hetus* may contradict past *hetus* or make them redundant forcing a new kind of formulation of the *naya*. The manner of examination, that is, the instruments of examination, will also affect the ascertainment and discovery of *hetus* as also the practical insight of the doctor. Theoretical progress, however, consists of approximation of the medicinal therapeutic system to the ideal therapeutic system which has been conceived in terms of fundamental epistemological and psychological causes responsible for disease and its cure not by any medicine but by epistemic treatment consisting of some sort of educational coaching and psychotherapy.

In this complex medical enterprise, direct observation or *pratyakṣa hetu* does not enjoy any special status as compared to inference or *anumana-hetu* since it is conceded that the range of the perceptible is very little. The role of argument or conjecture or *tarka* is great in guessing the unperceived causes. Indeed some things might have to be accepted even though their causes are not known and they are not intuitively obvious. Such being the situation, observation of facts will largely be made in the context of the conceptual system and the core of the theoretical framework cannot be easily tampered with. The *rasa* or taste, for instance, is only a secondary quality from Galilean standards, and cannot provide a reliable foundation to any science, yet the therapeutic system considers this to be the only basic quality of the material substances (*bhautika bheṣaja*) by means of which a causal link with the *doṣas* can be established. Therefore, considering the limited stress on and insensitive means of observation, the theoretical sensitivity of the therapeutic system is not very high although its compass is very large so far as the considerations of the different kinds of causes operating on the disease are concerned. The theory employs the fundamental physics of the *dhātus*, the chemistry of the *rasas* and the physiology of *doṣas* in order to tackle the deepest problems of the origin of life, the necessity of death, the role of *karma* or practical causation and the invasion of disease.

What criteria can be given, in such a situation, for distinguishing a 'scientific' therapeutic system from a pseudo-scientific one? Is it meaningful to talk of a degree

of scientificity of a theory since many alternative therapeutic systems can be simultaneously active and none can be decisively refuted rationally and made defunct? If, for instance, *falsifiability* is considered a characteristic of a scientific therapeutic system, then it is difficult to find one that is not falsified quite often, if by falsification we mean failure to cure a disease. If it be said that it is normally difficult to establish crucial falsification since many factors come into play in a therapeutic situation, then, again it shall have to be rejected as an unfeasible criterion for complex theoretical systems. Neither can *workability* be considered a criterion for scientificity since *workability* does not require explanation of why a disease was cured or what were the causes operating and how these were rendered inactive by administration of certain medicine. It is necessary for a scientific therapeutic system to at least make intelligible and explain how diseases arise and what is the mechanism of their cure, even though such an explanation does not work in certain cases. Keeping these considerations in mind the distinction between a strictly scientific and a pseudo-scientific theoretic system must be rejected. One can alternately inquire into the 'degree' of scientificity of the therapeutic theoretic system in terms of certain characteristics which are by and large displayed by it in its historical journey through the practice of the therapists.

The characteristics of a genuinely scientific therapeutic system that emerge from the considerations of the past sections are:

1. That scientific practice is characterised by both theoretical, contemplative practice and experimental, laborious practice which is carried out with the aim of rendering the experience of disease intelligible in terms of certain observed causes and their medicinal remedies.
2. That there are certain directing principles of a methodological nature which must be adhered to by the practising therapists with as much rigour as possible since they will make the investigation as much rational and objective as the conditions permit.
3. The community of therapists must cultivate a spirit of learning and exchange of views to be characterised by *samvāsa* so as to improve the scientific understanding of the phenomena of disease.
4. The therapeutic practice of such a community is guided by a rational spirit of argument and counterargument so that decisions may be made about the correct and the incorrect, the true and the false. This continuing process of *vāda* involves a knowledge of fundamental conceptual presuppositions, basic methods of epistemological inquiry, basic principles of argument, psychological characteristics of the scientific imagination and rules determining the correct and the incorrect position, the true and the false principles, the adequate and inadequate theories.
5. While the *vāda mārga* as a continuous process of investigation is the enveloping mechanism of scientific practice, it must be supplemented by continuous empirical examination or *parikṣā* which plays a critical role vis-a-vis the

vāda mārga. The *parikṣā* is both direct observation of data and facts as also a reflective process on the factors influencing scientific practice.

6. The community of scientists must continuously seek to improve the strategy of therapeutic success. An insight into the *upāya* will come through measurement and precision, ability to conjecture or *yukti*, and, of course, sustained scientific practice of analysing the causes and remedying them.

One can say that if any community of investigators can be characterised by these six characteristics being reflected in their practice then it will be scientific. How these scientists will resolve issues and arrive at decisions, what principles will be accepted and rejected, how certain data will be interpreted and so on, will be contingent upon the history of that specific scientific practice which is carried out in specific stage of development of a specific society in a given historical period.

NOTES AND REFERENCES

¹See S. C. Vidyabhusan, *A History of Indian Logic* (New Delhi: Motilal Banarasidas, 1978), pp. 25-35. Also D. P. Chattopadhyay, *Science and Society in Ancient India* (Calcutta: Research India Pub., 1979). The latter book makes only passing references to methodological issues of science as discussed in *Caraka Samhitā*, Jamnagar, 1949.

²Life is characterised as contact or conjunction (*saṃyoga*) of *bhūtas* and *ātman*, particularly the *bhūtas* must get organised as body (*śarīra*) consisting of nine *dhātus* such as *rasa*, *rakta*, *majjā* etc., as senses (*indriya*) structured by specific combinations of *bhūtas* and *tanmātrās*, and as sensorium (*sattva* or *mana*). See p. 9, *sūtra* 42. The question of relation between life and health or *saṃyoga* and *dhātusāmya* has, however, not been raised.

³The three pursuits mentioned in order of priority are: pursuit of life (*prāṇisānā*), pursuit of wealth (*dhanaiśānā*), and pursuit of a better after-life (*paralokaiśānā*). Pursuit of life is supreme (*purvātaramāpadyate*) since the giving up of life means giving up everything. Pursuit of wealth comes next because there is no demerit more demeritorious than having long life without apportionances that make life worth living although one must not adopt wrong means (*aviagrahitāni*) for earning wealth. Pursuit for better after-life comes last but a doubt arises whether there is an after-life or not. A very interesting criticism of empiricists (*pratyakṣeparā*), nihilists (*nāstikya*) or the ones who do not believe in the existence of *ātman*, orthodox thinkers (*āgampratyayāt*), naturalists (*svabhāva*), accidentalists (*yadrūchām*), and theists (*paranirmāṇam*) or those who argue for a creator God, follows whereby the non-destructibility of the spirit and existence of after-life is argued on the basis of causation in the realm of human action. See pp. 158-164, *sūtras* 2-15.

⁴Argument for the existence of indestructible spirit is the basis of argument for after-life. It is argued that the perceptible is little (*pratyakṣam alpam*) whereas the imperceptible is large which is known by testimony (*āgam*), inference (*anumāna*) and argument (*yukti*). The subtle sensible materials by which we perceive, are themselves imperceptible. The spirit can be known only by latter kind of examination. See p. 161, *sūtras* 7 and 8.

⁵Arguing against absolute determinism, the Treatise ascribes a conditional causal role to *inheritorship* of the consequences of one's actions (*daiva*) as well as to present effort (*puruṣakāre*). The action done by the same spirit in the past life (*pūrva daihikam ātmakṛtam karma*) is inheritance. A powerful effort can defeat a weak inheritance, and a powerful inheritance would defeat a weak effort. See pp. 783-85, *sūtras* 29-35.

⁶Smoking presumably cures heaviness of head, rhinitis, throat spasm, worms, excessive torpor, stupefaction of the mind and hypersomnia. But it has to be done methodically through a long pipe. See pp. 75-77, *sūtras* 27-48.

⁷Meat eating is praised since no other food excels meat in its roborant action (p. 495, *sūtra* 87). Liquor is praised as an effective post-prandial drink for those suffering from weak gastric fire and insomnia as the result of torpor, grief, fear and fatigue. See p. 552, *sūtra* 324.

⁸Old wine is purificative of body-channels, digestive-stimulant, light and appetising. It gives courage, virility, mental exaltation, satisfaction, plumpness and vitality. If it is taken by virtuous men in proper manner and systematically, it is like nectar. See p. 520, *sūtras* 193-95. Meat juice

is praised as most nourishing and cordial. For those that are wasted, convalescing, emaciated, deficient in semen and desirous of enhanced strength and complexion, meat juice is to be regarded as nectar itself. It is promotive of voice and youth, intelligence and sense faculties and longevity. If those given to constant labour, indulgence in women and wine, take meat juice daily, they will never fall ill or become weak. See pp. 549-50, *sūtras* 312-315.

⁹pp. 871-79, *sūtras* 15 to 22.

¹⁰p. 872, *sūtra* 15.

¹¹p. 873, *sūtra* 17.

¹²p. 873, *sūtra* 17.

¹³p. 874, *sūtra* 18(2).

¹⁴p. 875, *sūtra* 20(1).

¹⁵p. 876, *sūtra* 20(4).

¹⁶p. 878, *sūtras* 21-22.

¹⁷p. 881, *sūtra* 26.

¹⁸p. 882, *sūtra* 28(1).

¹⁹p. 881, *sūtra* 27. The concepts *dravya guṇa* etc. have been enumerated in the beginning of the discussion on *vāda mārga* which indicates that a knowledge of the 'theory' itself is presupposed.

²⁰p. 882, *sūtra* 28(2).

²¹p. 905, *sūtra* 67.

²²p. 883, *sūtra* 30.

²³p. 883, *sūtra* 31.

²⁴p. 883, *sūtra* 31.

²⁵p. 884, *sūtra* 32.

²⁶pp. 884-85, *sūtra* 33.

²⁷p. 890, *sūtra* 39.

²⁸p. 890, *sūtra* 40.

²⁹p. 890, *sūtra* 41.

³⁰p. 891, *sūtra* 42.

³¹p. 885, *sūtra* 34.

³²p. 886, *sūtra* 36.

³³p. 886, *sūtra* 37(1).

³⁴p. 887, *sūtra* 37(2).

³⁵p. 887, *sūtra* 37(3).

³⁶p. 887, *sūtra* 37(5).

³⁷p. 888, *sūtra* 37(6).

³⁸p. 888, *sūtra* 37(7).

³⁹p. 889, *sūtra* 38.

⁴⁰p. 891, *sūtra* 43.

⁴¹p. 892, *sūtra* 44.

⁴²p. 892, *sūtra* 45.

⁴³p. 892, *sūtra* 46.

⁴⁴p. 893, *sūtra* 47.

⁴⁵p. 893, *sūtra* 48.

⁴⁶p. 893, *sūtra* 49.

⁴⁷p. 894, *sūtra* 50.

⁴⁸p. 894, *sūtra* 51.

⁴⁹p. 895, *sūtra* 52.

⁵⁰p. 895, *sūtra* 53.

⁵¹p. 895, *sūtra* 54(1).

⁵²p. 896, *sūtra* 54(2).

⁵³p. 896, *sūtra* 54(3).

⁵⁴p. 896, *sūtra* 54(4).

⁵⁵p. 897, *sūtra* 54(5).

⁵⁶p. 897, *sūtra* 54(6).

⁵⁷p. 898, *sūtra* 55.

⁵⁸p. 899, *sūtra* 56.

⁵⁹p. 900, *sūtra* 57(1).

⁶⁰p. 901, *sūtra* 57(3).

⁶¹p. 901, *sūtra* 57(4).

⁶²p. 902, *sūtra* 58.

⁶³p. 902, *sūtra* 59.

⁶⁴p. 903, *sūtra* 60.

⁶⁵p. 903, *sūtra* 61.

⁶⁶p. 903, *sūtra* 62.

⁶⁷p. 903, *sūtra* 63.

⁶⁸p. 904, *sūtra* 64.

- ⁶⁹p. 904, *sūtra* 65.
⁷⁰p. 12, *sūtra* 53.
⁷¹p. 10, *sūtra* 44-53.
⁷²p. 11, *sūtra* 51.
⁷³p. 12, *sūtra* 52.
⁷⁴p. 11, *sūtra* 50.
⁷⁵p. 12, *sūtra* 53.
⁷⁶pp. 164-166, *sūtra* 16-26.
⁷⁷p. 890, *sūtra* 39-42.
⁷⁸p. 796, *sūtra* 3-13.
⁷⁹p. 911, *sūtra* 83.
⁸⁰pp. 796-804, *sūtra* 1-13.
⁸¹p. 798, *sūtra* 6.
⁸²p. 799, *sūtra* 7(1)
⁸³p. 799, *sūtra* 7(2)
⁸⁴p. 800, *sūtra* 7(3).
⁸⁵p. 801, *sūtra* 7(4,5).
⁸⁶p. 802, *sūtra* 8.
⁸⁷p. 803, *sūtra* 11.
⁸⁸p. 906, *sūtra* 68-80.
⁸⁹p. 947, *sūtra* 131. Elsewhere there is a three-fold division. See p. 183. *sūtra* 54.
⁹⁰pp. 911-18, *sūtras* 84-94 and pp. 945-48, *sūtras* 128-134.
⁹¹p. 906, *sūtra* 69.
⁹²p. 912, *sūtra* 86(1).
⁹³p. 913, *sūtra* 86(2).
⁹⁴p. 913, *sūtra* 86(3).
⁹⁵p. 913, *sūtra* 87(2).
⁹⁶p. 915, *sūtra* 87.
⁹⁷p. 906, *sūtra* 71.
⁹⁸p. 916, *sūtra* 88.
⁹⁹p. 907, *sūtra* 72.
¹⁰⁰p. 916, *sūtra* 89.
¹⁰¹p. 907, *sūtra* 73.
¹⁰²p. 917, *sūtra* 90.
¹⁰³p. 907, *sūtra* 74.
¹⁰⁴p. 917, *sūtra* 91.
¹⁰⁵p. 907, *sūtra* 75.
¹⁰⁶p. 917, *sūtra* 92.
¹⁰⁷p. 917, *sūtra* 93.
¹⁰⁸pp. 918-941, *sūtras* 94-124.
¹⁰⁹p. 907, *sūtra* 76.
¹¹⁰pp. 945-46, *sūtra* 128.
¹¹¹p. 907, *sūtra* 77.
¹¹²p. 946, *sūtra* 129.
¹¹³p. 946, *sūtra* 129.
¹¹⁴p. 908, *sūtra* 78.
¹¹⁵p. 947, *sūtra* 132.
¹¹⁶p. 438, *sūtra* 29-30.
¹¹⁷p. 438, *sūtra* 31, further exemplification in the following *sūtras*.
¹¹⁸p. 438, *sūtra* 31.
¹¹⁹p. 338, *sūtra* 32.
¹²⁰p. 438, *sūtra* 32.
¹²¹p. 438, *sūtra* 33.
¹²²p. 438, *sūtra* 33.
¹²³p. 438, *sūtra* 34.
¹²⁴p. 438, *sūtra* 34.
¹²⁵p. 438, *sūtra* 34.
¹²⁶p. 33, *sūtra* 16.
¹²⁷pp. 165-66, *sūtras* 24-25.
¹²⁸ Patañjali; *Yoga sūtra*