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SPECIAL ISSUE

*Language, Thought and Consciousness*

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## EDITORIAL

A common myth about the creation of the universe in ancient cultures and religions of the world is that God created the world and all its beings through utterance or the word/speech. The Greek called it *Logos*, though in all its uses *logos* may not mean speech; it may denote reason, measure, law, etc. All the same, *logos* is in a fundamental way the same as 'Word'. A pre-Socratic philosopher, Xenophanes (born 570 BCE), in one of his extant fragments, says that "God shakes or puts into motion all things without effort, only with the thought (*phreni*) of his mind or intelligence (*noou*)."<sup>1</sup> If this mental energy implies words, then this can be read as a version of creation by word. The *Gospel according to Saint John* is more explicit, it says: "In the beginning there was Word, the Word was with God, the Word was God". In the Jewish Old Testament also there are several references to the power of the Word. In the ancient Egyptian account of cosmogony, the High God Ptah is said to have given life to all gods "through his heart and through his tongue". In the Indian tradition too, we see some account very similar in spirit, in the *R̥gveda*. Bhartr̥hari, in the fifth century CE, in his treatise on language, *Vākyapadiyam*, states that the world devolved out of *śabda* 'word'<sup>1</sup>. Interestingly, he says, echoing the account in the *veda*, that in the beginning there was only consciousness which was one with the ultimate, immutable and eternal Brahman from which came *vāc*<sup>2</sup>, that is, language. This was in tune with his monistic metaphysics. His four-fold division of language is well-known. According to his doctrine, there are three abstract levels of language — *parā*, *paśyantī* and *madhyamā*, in decreasing order of abstractness; the fourth, is known as *vaikhari*<sup>3</sup>, which is the form men speak. Of course, we cannot take these accounts seriously, yet it is worth noting that our ancestors (in all cultures, for that matter) somehow seem to have intuitively understood the connection between language and reality, the word and the world. The great Sanskrit poet Kālidāsa, in the opening stanza of *Raghuvamśa Mahākāvya*, has famously analogized the union of Lord Śiva and Pārvati, 'parents of the world', to the coming together of word and meaning.

Language, from those early days to today, has never ceased to be a mystery. The fact that humans have been using language to convey

their ideas, feelings and emotions, and also to express thoughts, disagreements, arguments, dreams and what not does not in any way make language any less of a mystery. If anything, this power of expressibility embedded in language renders it an even greater enigma. There is a host of questions about language that we have no good answers for. Foremost, among them is the one concerning the origin of language. A second one, as inscrutable as the first, is why there are so many languages, thousands of them! A little further into language proper, why are the grammars of languages so different from one another? It is not so much the words (and their associated meanings) that make the learning of a second language difficult, it is the grammar. Why are they designed so different, and who is behind the design? Or can we simply ignore grammar and get along with language?

### Language and Thought

Once we start reflecting on language, it becomes imperative to look at the relation between language and thought. The activity of thinking presupposes the existence of a language. It is quite plausible that language arose in humans because of the need to think coherently and systematically. Communication with other members of the society (or speech community) came later. Be it as it may, one needs to go one step further and take note of the presence of consciousness which is a precondition for thought. Thus, language, thought and consciousness can be said to constitute the three vertices of a cognitive triangle. All the three have been studied independently, and interdependently, by thinkers since the beginning of time. This special issue of *Studies in Humanities and Social Sciences* (SHSS) attempts to bring together recent studies by philosophers, linguists, cognitive scientists and historians, on this theme.

The relation between thought and consciousness is an important strand that has been explored by philosophers for a very long time. Thought has been defined in a number of ways. For Frege, thought is the sense of a sentence. Wittgenstein agrees when he describes thought as a proposition with a sense. Others who take thought as dispositional mental states having propositional content conceive them as having potentiality for thought-acts with specific content. Another way is to conceive these mental states as having potentiality for complex behaviour of an organism in the presence of the right stimuli. Thought has also been characterised as mental acts, with specific propositional content. Therefore, they can be called

thought-acts. Consciousness, however, is the most evasive of the three. One could be talking about phenomenal consciousness defined in terms of experiential properties. Sensory states are examples of this. Brentano insists that consciousness, per force, is intentional in that it is a mental state that is directed towards an object or state of affairs. A third way consciousness is characterized is as awareness. The paper by C.A. Tomy juxtaposes thought and consciousness, each looked at in three different ways as indicated above, and then considers all possible combinations and permutations to arrive at the deeper conceptual relation between the two.

### Structure of the Language Faculty

In the last 60 or so years, the structure of the unique language faculty in humans has been the focus of investigation, owing to the 'Chomskyan turn' in Linguistics. Noam Chomsky's signal contribution in this field, the so-called "innateness hypothesis" underscored the structural similarities among languages of the world, which, in turn, inaugurated a massive research programme that undertook the task of meticulous examining of the syntactic properties of the languages of the world. The pooling of the results of this investigation led to the first truly universal model of syntactic description, the so-called 'Government and Binding' theory, in 1981. Further studies uncovered deeper principles that underlie the organization of the language faculty, culminating in the current minimalist model.

K.A. Jayaseelan's article shares with the reader his excitement about the possibilities ushered in by this minimalist syntax. The push has been towards explaining the principles of Universal Grammar completely in terms of a) the legibility conditions imposed on a derivation by outside systems that interface with language and b) considerations of computational efficiency. Not only has this brought linguistics into the domain of biology, but also close to brain research. The questions are so framed that they now look more and more potentially verifiable by experiments in brain studies. Jayaseelan cites the example of how minimalism replaced bounding theory by the late building of adverbial adjuncts and relative clauses, and what the latter implies for memory, a module of mind/brain that plays a significant role in the online assembling of sentences.

The Chomskyan programme also influenced studies on mind/brain by cognitive scientists. Cognition is a property of mind which, in the ultimate analysis, must be reducible to a series of electrochemical neuron activity in the brain cells. The remarkable strides made in

brain mappings like real-time eye-tracking have made it possible to study the connections between language cognition and other systems like vision. This has also enabled researchers question earlier notions of domain specificity of cognitive functions. Does language share brain centres supposedly dedicated to other functionalities like mathematics and music? The fact that these and similar questions are now being raised augurs well for the study of mind in coming days that can radically alter the long-held mind-matter dichotomy. Included in this issue are two articles that report the results of experiments conducted using sophisticated brain imaging technology. The first one is by R. K. Mishra, a linguist-cum-cognitive scientist, who first gives a brief history of the eye-movement studies, starting from Yarbus (1967), followed by Cooper (1974) and Just and Carpenter (1976). The eye-mind hypothesis claimed that the locus of our gaze reflects what is on our minds at that moment. The experiments run by Mishra and his team were intended at testing the cross-modal nature of cognition where both vision and language interacted dynamically. They used the visual-world-paradigm and studied ambiguous homophone processing (in Hindi). The eye-movements measured showed not only comprehending of language by subjects (who included illiterates) but also their predictive strategies.

Mythili Menon's article reports the experiment where the team tried to seek the cognitive connection between the system of language and the system of music. In particular, the study was aimed at finding out whether language processing and music processing have shared representations, and whether they can be activated across domains. For this they selected sentences in English with relative clauses that could modify either of two noun phrases, as in:

(i) *Jessica visited the doctors of the supermodel who lived in LA.*

The underlined relative clause in (i) is ambiguous as regards which of the noun phrases 'the doctors/the supermodel' it modifies. The hypothesis was that high/low attachment of relative clauses resembles changing the notions of harmonic distance in western music. The novelty, however, was in the employing of the priming paradigm across the domains of syntax and music. It has been observed that if the subjects are primed with a certain structure, where a reading with an alternative structure is possible, with subsequent inputs they tend to go with the primed structure. This had been tried out earlier with active/passive structures and with transitives.

The results of this highly controlled experiment provided striking



evidence for the domain general level abstraction in the level of representation of hierarchical structural information.

### Language and Mind

At the same time, it is true that many a philosopher of mind believes that a purely mechanistic view of mind is not going to provide satisfactory answers to the mysteries of human mind. Foremost among these is the creative capacities of human mind, which is at variance with those of the animal kingdom. Similarly, man alone seems to be able to seek meaning in thought and action. A teleological explanation of human mind alone can address these aspects; more broadly, human nature itself may have to be understood in terms of its end/goal. The ontological structure of human subjectivity is a new field in the contemporary philosophy of the mind. Mind is the space of meanings and reasons, and it makes the world belong to this space, opines Ramesh Chandra Pradhan in his contribution, wherein he defends a teleological view of human mind and human nature. Humans are gifted with rational capacities that enable them to create new meanings in science, philosophy, art, religion and literature. Arguing against the mechanistic/reductionist view of the mind, Pradhan points out that mind is intentional in the real sense of the term, and that it is endowed with the capacity to make the mental states goal-oriented. Another aspect of the mind is consciousness and its normative structure. Transcendental consciousness brings into the picture the emergence of meaning and normativity.

Often we take for granted the existence of a 'self' in discourses on consciousness and/or on the philosophy of mind. Buddhist philosophy denies the idea of a self, either as an owner of the experience, or as the agent of action including the thinking of thoughts. The fifth century Theravada Buddhist commentator and scholar, Bhadantācariya Buddhaghosa, denies the existence of a self. Jonardon Ganeri seeks parallels in current philosophy of mind to the notion of the self in Buddhaghosa's formulation, according to which there is no 'self', a self that is the doer of actions and owner of experience. What is mistakenly called 'self' is nothing but attention, asserts Buddhaghosa. One may describe 'self' as minded body. Ganeri points out that Rune Johansson has described *citta* as a sort of core self, variously realized as a conscious centre within personality, a conscious centre of activity, purposiveness, continuity and emotionality. But it is Brian O'Shaughnessy characterization of self as "attention centering" that Ganeri thinks comes closest to Buddhaghosa's understanding of self.

## Meaning in Language

It is not from linguists, whose profession it is to study the phenomenon called language from all angles, that we have heard on meaning, but from philosophers. Why, in the first place, are philosophers interested in language? What is their stake in such a seemingly mundane activity as speech, for they are known to deal in topics more sublime. The answer is not far to seek. The primacy of language in human affairs makes it mandatory for a seeker of the true nature of things to probe deep into this uniquely human asset. All our present-day knowledge is made possible because we have language. Therefore, it is no wonder that philosophers have engaged with language from the early days. All branches of philosophy seem to have a connection to language one way or the other because meaning is embodied in the sentences we speak/write.

When we consider meaning in language, one question to be settled is whether we are taking the speaker's meaning or the hearer's meaning. In other words, an approach based on the speaker's meaning is anchored to 'I mean', whereas the one based on the hearer's meaning is anchored to 'he means'. They, therefore, represent subjective and objective attitudes to meaning, respectively. Amitabha Das Gupta's article dwells on this distinction; reinterpreting and extending Kalidasa Bhattacharyya's work on meaning, he suggests that meaning be best treated as an amalgam of both subjectivity and objectivity. The indexical 'this' in an utterance, though semantically vacuous, is enormously significant in the context of utterance. The demonstrative 'this' can denote in two ways: either denote the thing spoken just before or to the thing that is pointed to by the speaker. Das Gupta points out that the Western tradition has, by and large, adopted the standpoint of the speaker; in the Indian tradition, Nyāya epistemology in particular, has taken the hearer's standpoint, as witnessed in the *śabdabodha* debates. This partly reflects the idealist-realist split in their philosophy.

All through the history of epistemology in the West, the focus has been on 'knowledge' as the prime epistemic category. Syed A. Sayeed is wondering why 'understanding' has never been recognized as a distinct, autonomous epistemic category. He argues that understanding cannot be conflated with knowledge; no, it is a cognitive phenomenon distinct from knowledge. For example, says Syed, you may know a poem, but you may not have understood it. Knowing a joke is not the same thing as understanding a joke. *To understand* is to make sense of what is presented to the consciousness; and *understanding* is the state of attainment of a sense of what is

presented to consciousness. Reading *Theaetetus* closely, Syed shows that “in this dialogue, there are many points where, Plato, in his struggle to find an adequate definition of knowledge, stumbles upon ‘understanding’, but moves on without noticing it.” Syed also opines that what Socrates was seeking was ‘understanding’, not knowledge; also, “some pre-Socratic philosophers had a fairly perspicuous grasp of this notion”. Thus, having made a strong case for understanding as a distinct cognitive category, Syed, incidentally tying together the three sub-themes of the present volume, notes that i) within language poetry ii) within thought philosophy and iii) within consciousness emotion represent the ideal object of understanding.

### Other Concerns

Probal Dasgupta’s article is a little off-beat, it may not be wrong to characterize it as belonging to the genre of Linguistic science fiction. Dasgupta’s concern, as he puts it, is to place some classical notions at the heart of the democratic imagination, notions such as freedom of speech, freedom of enquiry, possibilities for criticism and debate, in the context of questions of consciousness. For doing this he invents a novel method, that of retelling the Ascan thought experiment by Gene Wolfe (1983). The members of the imagined community in that fictional piece do not speak by forming new sentences, as is generally the case with speakers of natural languages; they reproduce statements from an officially approved text. The point is to show what happens if a community, due to cultural domination of an extreme kind, systematically flouts the principle that sentences are in principle assembled online. Dasgupta reminds us that structural violence, while bloodless, is nevertheless a system that violates fundamental rights, at all times. The author wants to drive home the point that for consciousness to be meaningful there has to be an atmosphere that allows unfettered thinking.

Rajan Gurukkal’s article is a survey of different forms of textual knowledge and their epistemic properties, in the Indian knowledge traditions, sketched from the early vedic period to sixteenth century CE. Using the lens of historical epistemology, he identifies certain logical procedures evolved and applied by the ancient thinkers in order to ensure reliability of knowledge. Originally known by the name *ānvīkṣikī*, which was recognized as one of the four fields of knowledge, the system of knowledge validation came to be accepted across the board<sup>4</sup>. Gurukkal also highlights the key contribution made by Pāṇini’s *Aṣṭādhyāyī*, “The fundamental property of knowledge according to Pāṇini is the theoretical generalization of

the ideal, made inevitably at the instance of the empirically given reality, if possible after checking each specific instance.”

Gurukkal examines the texts in Ayurveda, Mathematics and Astronomy, among others, and draws a significant conclusion that epistemic properties have a universality that endows a distinctive quality to deeper knowledge, no matter which field of enquiry. Likewise, the region in which the study was conducted is immaterial, there is a single cognitive thread of epistemic control running through all kinds of knowledge production. Instead of making silly, unfounded claims about how all the new scientific inventions were known in the Vedic period, an all too familiar exercise among the ultra-nationalists today, it will serve the cause of knowledge much better if the proponents of this were to realize the true imperatives of scholarly pursuits.

When this special issue was conceived, I mailed Prof. Noam Chomsky, requesting him for a paper. He promptly responded, saying:

Intriguing and appealing suggestion, and I wish I were in a position to undertake the task. But I am afraid I cannot. Commitments are just too intense, too far ahead.

Really sorry, and thanks for the kind wishes.

NOAM CHOMSKY

Though I deeply regretted the opportunity lost, Chomsky’s words were both inspiring and reassuring. I humbly dedicate this issue of SHSS to NOAM AVRAM CHOMSKY, the intellectual *non pareil* of our times.

### Notes

1. *śabdasya pariñāmoyam ityāmnāya vido viduh.*  
That is, this world is transformed out of word, say those who are well-versed in the *Vedas*.
2. *vāc*, also spelt *vāk*, is the goddess of speech.
3. *tuṛīyam vācam manuṣyāḥ vadanti.* ‘Men speak the fourth form of language.’ *Rgveda*, I, 164. 45
4. The following verse bears testimony to this:  
*pradīpah sarvaśāstrāṇāṃ upāyah sarvakarmāṇāṃ  
āśrayah sarva dharmāṇāṃ śaśvadānvīkṣikī matah*

C.A. Tomy, 'The Nature of the Relation between Thought and Consciousness'. *Studies in Humanities and Social Sciences*, Volume XXIII, Number 2, Winter 2016: 1-31.

## THE NATURE OF THE RELATION BETWEEN THOUGHT AND CONSCIOUSNESS

C.A. Tomy

Thought and consciousness are undoubtedly two of the most significant features of human mental life. The moment we juxtapose them, there arises a few questions naturally. Is there any relation between the two? If so, how are they related? Is it merely an accidental matter of fact that humans possess both thought and consciousness? Or is there any deeper logical or conceptual relation between the two such that at least one of them cannot occur or be conceived without the other? Any theoretical enterprise that purports to enquire into the nature and functioning of the human mind cannot expect to make any progress without answering these questions. From a logical point of view, there are only four possible ways we could conceive how thought and consciousness are related to each other. The first is to think that there is no conceptual relation whatsoever between thought and consciousness. Accordingly, either of thought and consciousness can be conceived apart from the other, which implies that they are distinct. On this view, if we were to discern some sort of relation holding between them, the relation in question is not necessary but merely accidental. The second way of conceiving the relation goes in the opposite direction: it says that neither thought nor consciousness can be conceived apart from each other. It means that there is a necessary or conceptual relation between the two, which could either be a relation of identity or at least a necessary and invariable correlation between them. The third way of envisaging the relation considers thought as a necessary condition for consciousness to occur; that is to say, though thought could occur without consciousness, it is not possible for consciousness to occur without thought. The fourth position is the converse of the third: it views consciousness as a necessary condition for thought but not *vice versa*. It allows the possibility of consciousness without thought while not conceding the possibility of thoughts without consciousness. The third and fourth approaches could also be construed as

reductionist in their orientations. It is possible to hold that the third position views consciousness in terms of thought while the fourth understands thought as some form of consciousness. The discussion of these positions assumes that our domain of discourse is restricted to thought and consciousness and that we want to understand how they relate to each other without taking into consideration other possible factors involved.

Which among the above four possible ways of conceiving the relation between thought and consciousness really obtains between them? The goal of this paper is to find out an answer to this question by means of an analysis of the concepts of thought and consciousness. However, the endeavour is not easy as there is no straightforward way to choose one of the four positions as the correct answer. What makes the choice difficult is the fact that there are myriad uses of the terms, 'consciousness' and 'thought', requiring us to clarify their meanings and then specify the nature of the relation that obtains between the two, given each of the diverse meanings of either of the terms. Hence, for answering the question, our first task would be to identify the ways in which the terms 'thought' and 'consciousness' are used in contemporary philosophical literature. This I shall set out to do in the first section of the paper, restricting my discussion to three senses each in which 'thought' and 'consciousness' are predominantly employed. By 'thought' we could mean mere propositional content, a contentful dispositional mental state or an act of the mind. Similarly, the term 'consciousness' could stand for phenomenal consciousness, intentional consciousness or awareness<sup>1</sup>. The next step in answering the question is to pair each of the three senses of the term 'thought' with each of the three senses of the term 'consciousness' so as to identify which among the four possible ways of conceiving the relation between them is realized in each pair. This task is accomplished in the second section, showing which among the four logically possible relations is exemplified between thought and consciousness in each of the pairs already identified. The exercise demonstrates that from among the three senses of 'consciousness' and the three senses of the term 'thought', consciousness as awareness and thought as act of the mind are primary. In the third section, I discuss the nature and function of awareness by showing that there is an inseparable relation between thought-act and awareness, and other senses of 'thought' and 'consciousness' are some way dependent upon their primary meanings.

## I

*The Meanings of 'Thought' and 'Consciousness'*

We employ the term 'thought' primarily in three inter-connected ways. First of all, we employ 'thought' to mean propositional content conceived as subsisting on its own. Alternatively, one could view it as representational content abstracted from their normal loci such as mental states or natural language sentences. Thoughts, in this sense, are bearers of truth-values. Frege, for example, characterizes thought in this way:

I call a thought something for which the question of truth arises. So I ascribe what is false to a thought just as much as what is true. So I can say: the thought is the sense of the sentence without wishing to say as well that the sense of every sentence is a thought. The thought, in itself immaterial, clothes itself in the material garment of a sentence and thereby becomes comprehensible to us. We say a sentence expresses a thought. (Frege, 1956: 292)

In a similar vein, Wittgenstein says: "A thought is a proposition with a sense" (2002: No. 4). A logical or mathematical proposition, which is purely formal, is not a thought for Wittgenstein because it lacks sense. Neither Frege nor Wittgenstein understands thought as a mental state or episode. Just as mental states and episodes come to have thought content, various sentences of natural languages too express thoughts. Mental states and ordinary language sentences are merely carriers of thought along with other possible representational systems. If one maintains along with Frege 'that mankind possesses a common treasure of thoughts which is transmitted from generation to generation' (1996: 188) then by 'thought' one means merely propositional content.

Secondly, we employ the term to signify dispositional mental states having propositional content. Thought understood in this way is an unconscious mental state, which could be conceived as a potentiality. Depending upon what the potentiality of the state is for, thought as a disposition could be conceived of in either of the two ways. One, it could be conceived of as a potentiality for thought-acts with specific content, the result of whose exercise we report using language. The unconscious belief that  $p$  is a disposition to utter that  $p$  if the potentiality is exercised. That is, the dispositional thought that  $p$  could actualize the occurrent thought that  $p$ , which may lead to the utterance that  $p$ . Two, it could be conceived of as a potentiality for the production of complex behaviour of an organism in the

presence of the right stimuli. Dispositional states of this kind are invoked particularly for the explanation of non-verbal behaviour, which otherwise could not be explained.

Thirdly, it is used to designate acts of the mind, specifically those acts having propositional content<sup>2</sup> They are often referred to as 'thought-acts'. A thought-act is an occurrent representational mental state whose content is normally expressed by a *that clause*. The way it is used here, 'thought-act' is a generic term that covers occurrent mental states of propositional attitudes like beliefs, desires, hopes, etc. It is a feature of the thought-act that there is always an awareness of its occurrence.

Coming to consciousness, we know that it is a multi-faceted phenomenon; hence it is only natural that the term 'consciousness' is employed in many ways in ordinary language to reflect one or the other of its aspects. Consider, for example, the following description of John, a hypothetical football player, in the middle of action:

John is *trying to kick* the ball to the goal post. He becomes *aware* of the presence of the defenders of the opposite team and of the position of the goalkeeper. He *thinks* that one of the defenders could easily divert the ball if he were to directly kick it to the goal post. He *notices* that one of his fellow forwards in the right wing is free. He *believes* that the player is in an advantageous position to score a goal, if the ball is passed onto him. So John *decides* to loft the ball over the opposition defenders to the teammate. But suddenly by a powerful tackle by one of them, John falls down and his right leg gets injured. He *feels severe pain* and is *angry* with the defender. He controls his anger because he *knows* that display of any aggressive behaviour towards the player would fetch him a red card.

John, in the above description, is a conscious person and the linguistic expressions such as 'trying to kick', 'aware', 'thinks', 'notices', 'believes', 'decides', 'feels severe pain', 'angry', etc. are used here to describe a few aspects of his conscious mental life. It is held that such diverse features fall under three general categories of consciousness, namely phenomenal consciousness, intentional consciousness, and awareness.<sup>3</sup> To specify the kind of relation that is obtained between thought and consciousness, it is necessary to clarify the concept of each of these three types of consciousness.

Phenomenal consciousness is defined in terms of experiential properties: a mental state is phenomenally conscious if and only if it is experienced in a certain way. Mental states of this kind are generally described by saying that there is "something it is like" (Nagel, 1974) to be in those states. For instance, sensory states are phenomenally



conscious because they possess some intrinsic qualities that are felt in their own characteristic ways. The ways things appear, sound, taste, etc. to someone who sees, hears, or tastes them, are said to be intrinsic qualities of the concerned sensory states. For example, when a person looks at the blue sky, the sky appears blue to the person. Independent of the experience of the subject who views the sky, the sky cannot be considered as appearing blue. The quality of “being-appeared-blue-to” (Shoemaker: 1991) is a felt quality of the perceptual state in question. Similarly a pain that one feels has some experiential features, which are essential for its being a pain. Sensory states having such qualitative characteristics are considered to be phenomenally conscious. A phenomenally conscious state is believed to be non-cognitive, non-representational and functionally indefinable.

By intentional consciousness we mean those features of our conscious experience by virtue of which it is about, directed towards or represents an object or a state of affairs in the world. When Mary believes that Mount Everest is the highest Himalayan peak, her belief is about Mount Everest. Philosophers like Brentano are of the view that intentionality is the defining feature of our mentality; hence there cannot be any mental states that are not intentional (Brentano, 1973). It could be debated whether intentionality is an essential feature of our conscious mental life; but it cannot be denied that at least some of our conscious mental states are intentional.

By awareness, we mean that feature of our mental states on account of which we come to know of their occurrences. An awareness state has two important properties, namely that it is reflexive and transitive; it is reflexive because it reveals itself, and transitive in the sense that it is always of something. Reflexivity and transitivity could be viewed as two aspects of the intentionality of an awareness state, that is an awareness state is directed towards itself and is also about things other than itself, which include objects, qualities, states of affairs in the world as well as other mental states, phenomenal or intentional. It is the reflexivity of awareness states that sets them apart from intentional mental states properly so-called.

## II

### *The Ways Thought and Consciousness are Related*

We have seen that there are four possible ways of conceiving the relation between thought and consciousness. It is possible to find

out which of the four actually holds between them, depending upon the answers we get for the following two questions:

- (1) Is it possible for thought to occur without consciousness?
- (2) Is it possible for consciousness to occur without thought?

Let us assume that both the questions have definite answers, either affirmative or negative. If the answers to (1) and (2) are both affirmative, then they imply that thought and consciousness are distinct. If both have negative answers, then neither consciousness nor thought can occur without the other, which would mean that there is an invariable and necessary relation between the two or they are numerically identical. If (1) has a positive answer and (2) has a negative answer, then it is possible for thought to occur without consciousness but the latter cannot occur without the former. This would mean that thought is necessary for consciousness or that consciousness is dependent upon thought. Finally, a negative answer to (1) and an affirmative answer to (2) would mean that thought cannot occur without consciousness, but consciousness can occur without thought. This would imply that consciousness is a necessary pre-condition for thought.

One can arrive at any of the above positions only if there are definite answers to questions (1) and (2). But we do not have such answers, because the questions are vague given that the terms ‘thought’ and ‘consciousness’ are used in diverse ways. Our answers to them depend upon the senses in which we employ the two terms in (1) and (2). If we consider pairing each of the three senses of ‘thought’ with each of the three senses of ‘consciousness’, then there are nine possible ways in which questions (1) and (2) could be raised and answered. Accordingly, there are nine possible ways of specifying the nature of the relation between thought and consciousness. We shall now proceed to consider each of the nine ways of formulating the questions and answering them.

#### *A. Thought as Propositional Content and Phenomenal Consciousness*

If by ‘thought’ we mean merely propositional content without reference to the individual mind in which it is supposed to be located either as a thought-act or as a disposition, and by ‘consciousness’ we signify phenomenal consciousness, then we can rephrase questions (1) and (2) as

(A1) Could there be propositional content without phenomenal consciousness?

(A2) Could there be phenomenal consciousness without any propositional content?

Once we keep in mind that phenomenal consciousness is a mental phenomenon and the propositional thought content is conceived without reference to its locus in mind, answers to (A1) and (A2) become obvious: thought as a propositional content can be conceived—it is indeed conceived—without any phenomenal features. Taken by itself the propositional content, say, that the Earth is round has no qualitative feels or phenomenal features associated with it. In answer to (A2), it is clear that in conceiving phenomenal consciousness we do not think any propositional content as being part of it. So, it is possible that qualitative or phenomenal features of a mental state can occur without any propositional content. We have affirmative answers to both the questions. They show that thought as propositional content and thought as phenomenal content are distinct.

### *B. Thought as Propositional Content and Intentional Consciousness*

To understand how intentional consciousness stands in relation to thought as propositional content, we must ask the questions:

(B1) Could there be intentional consciousness without propositional content?

(B2) Could there be propositional content without intentional consciousness?

Answers to these questions appear to be straightforward. With regard to the first question, it could be said that an intentional conscious state need not always be directed to a state of affairs, representable by a proposition because it is possible that the state in question is about an object or some particular feature of the world. This shows the possibility of having intentional consciousness without propositional content. In answer to (B2), we could easily grant the possibility of propositional content without intentional consciousness for two reasons. First, many of our natural language sentences express thoughts as propositional contents; yet, we do not consider them to be intentionally conscious. Second, we tend to believe that there are unconscious dispositional mental states with propositional content. Though we grant intentionality to such unconscious mental states, it is at least odd, if not a blatant contradiction, to say that unconscious dispositional mental states are intentionally conscious. Thus, we have affirmative answers to both the questions. They show

that thought as propositional content and thought as intentional consciousness are clearly distinct. And this is the expected answer because thoughts are conceived of here as abstracted from natural language sentences that express them or as the mental states that token them, and by consciousness we understand a property that belongs solely to mental states and processes, and not to abstract entities.

Despite the answers given above to (B1) and (B2), their formulation may strike us as problematic. It could be argued that since by 'thought' we mean abstract propositional content and by consciousness we mean essentially a mental phenomenon and not a characteristic of anything non-mental whether abstract or concrete, it is not right to ask whether abstract thought is intentionally conscious. Our talk of thought as propositional content makes no reference to tokening of such thoughts in mental states or natural language sentences. Such a talk is in abstract and neutral vocabulary. So we must reformulate questions (1) and (2) in equally abstract and neutral terms. This could be done using the term 'intentionality' instead of the expression 'intentional consciousness'. The expressions 'intentional consciousness' and 'intentionality' are not synonyms. Anything that exhibits the feature of aboutness or represents an object or a state of affairs is said to be intentional in general. The class of things that are intentional in this way includes our mental states, linguistic expressions, pictorial representations, etc. Since we consider consciousness as essentially a mental phenomenon, it would be quite strange to characterize linguistic expressions or pictorial representations as intentionally conscious, though they exhibit intentionality. We consider linguistic expressions certainly as intentional but not as exhibiting consciousness. And among the various mental states that are intentional, it is not only some of our occurrent mental states but even some of the dispositional mental states too are intentional. A dispositional mental state, we know, is an unconscious mental state; so if we consider 'intentional consciousness' as a synonym for intentionality, then we end up with the contradiction that an unconscious dispositional state, which is intentional, is conscious. The oddity of this sort arises primarily because we employ the adjective 'conscious' to characterize occurrent mental states, those mental states we are aware of as occurring.

Using 'intentionality' as a neutral term to signify a feature restricted to common mental states, natural language sentences and pictorial representations, and a host of other symbol systems in place of the expression, 'intentional consciousness', we may rephrase (1) and (2) as

(B3) Could there be propositional content without intentionality?

(B4) Could there be intentionality without propositional content?

The answers to (B3) and (B4) can specify how thought as abstract propositional content is conceptually related to the feature of intentionality. In response to (B3), it is possible to maintain that thought as propositional content is always directed to some state of affairs and, therefore, possesses intentionality. Indeed, propositional content is necessarily intentional because we cannot conceive a proposition without it being about some state of affairs or other. Thus, our answer to (B3) is pretty much straight forward. But this sort of an answer is unavailable in the case of (B4). Most of our mental states, if not all, are intentional. But intentionality, as we have already noted, is not restricted to mental states alone as natural language sentences and pictures have the capacity to represent. Since intentionality can be attributed to mental states, and linguistic expressions, we can pose the question with reference to both language and the mind. So we may further refine and disambiguate (B4) into (B4a) and (B4b):

(B4a): Could mental states be intentional without having propositional content?

(B4b): Could linguistic expressions in general exhibit intentionality without conveying propositional content?

In response to (B4a), it could be held that not only mental states with propositional content but also ideas or concepts, which do not have propositional structure, refer and are, therefore, representational. Thus, ideas or concepts are intentional though they do not possess propositional content. This means that we have an affirmative answer to (B4a): it is possible that some of our mental states are intentional though they lack propositional structure and content. (B4b) could also be answered on similar lines: in addition to natural language sentences that express propositional content, words and phrases are intentional in spite of not carrying propositional content because they are about objects or some features of the world. On the basis of above answers to (B4a) and (B4b), one could affirmatively answer (B4) and grant the possibility that there is intentionality without propositional content. Thus, we have a negative answer to (B3) and affirmative answer to (B4) suggesting that intentionality is a necessary feature of thought as propositions but it is not restricted to propositions. So 'thought as propositional content' is not co-extensive with 'being intentional in general'; rather the former picks up only a subclass of the intentional. Keeping this consideration in mind, one could assume that intentionality of concepts or that

of non-sentential linguistic expressions such as words and phrases is intentional in the primary sense, whereas the intentionality of thoughts or natural language sentences are explained in terms of intentionality of ideas and concepts or that of non-sentential linguistic expressions. Thus, intentionality of thoughts and natural language sentences are dependent upon intentionality of concepts and non-sentential linguistic expressions, respectively.

The affirmative answers given to (B4a) and (B4b), notwithstanding it is equally possible to come up with negative answers to them, by rejecting the possibility of intentionality without propositional content. One may argue that intentionality of thoughts or natural language sentences are primary and the intentionality of concepts or words is derived through a process of abstraction from the intentionality of mental states or sentences having propositional contents. This would mean that intentionality of non-sentential linguistic expressions as well as that of ideas or concepts is derived from intentionality of propositional content, which, according to this view, is primary.<sup>4</sup> Given this position, intentionality of propositional content is presupposed even when we speak of the intentionality of concepts or non-sentential linguistic expressions. Hence we have a negative answer to (B4), leading us to the conclusion that there is a necessary relation between thought and concepts or between natural language sentences and non-sentential linguistic expressions.

The answer to (B3) is negative: it is not possible to conceive propositions without intentionality. But one's answer to (B4) depends on what one considers as the basic semantic unit. If concepts and natural language sentences are taken as fundamental, then the answer to (B4) is affirmative because we can conceive the intentionality of words and concepts without assuming the intentionality of propositions. With a negative answer to (B3) and affirmative answer to (B4), we would grant primacy to intentionality of concepts or non-sentential linguistic expressions and explain intentionality of thoughts or sentences in terms of the intentionality of the former. Alternatively we could think of the intentionality of thoughts or natural language sentences as primary and consider the intentionality of concepts or words as derivable from the intentionality of the former. In this case, we have a negative answer to (B4): we cannot conceive of intentionality of concepts or non-sentential linguistic expressions without presupposing the intentionality of propositions. This, along with a negative answer to (B3), would mean there is some sort of conceptual relation between intentionality of propositions and the intentionality of the concepts

and non-sentential linguistic expressions. In a nutshell, what position one takes on this issue depends on one's semantic intuitions.

*C. Thought as Propositional Content and Awareness*

To identify the nature of the relation between consciousness and propositional content when by 'consciousness' we mean awareness, questions (1) and (2) may be reformulated as

(C1) Is it possible to conceive propositional content without awareness?

(C2) Is it possible that an awareness episode takes place without propositional content?

The possibility that propositional content as such can be conceived without reference to awareness is evident from the fact that we grant that there can be unconscious representational mental states as well as natural language sentences with propositional content. Hence the answer to (C1) is affirmative. But can awareness be conceived apart from propositional content? An awareness state is always transitive, meaning that it invariably has or is directed to some object; hence it is necessary that an awareness state is contentful. And certainly, contents of some of our awareness states are propositional in nature. But it is not necessary that all of them are propositional. Sometimes the content of an awareness state could be merely a phenomenal state or it could be directed to an object or its property in the world without signifying any propositional content. Hence, the answer to (C2) is that it is possible that an awareness state can occur without propositional content. Our answers to both (C1) and (C2) are in the affirmative; hence we conclude that thought in the sense of propositional content and thought as awareness are distinct.

Our discussion so far shows that the nature of the relation between thought as propositional content and consciousness varies depending upon what we take consciousness to be. If consciousness is understood as phenomenal consciousness, then there is no way they could be conceived as identical or as being necessarily related to each other as either could occur without the other. We arrive at a similar conclusion if by 'consciousness' we mean awareness, because awareness and propositional content can be conceived apart from each other. With regard to the relation between thought as propositional content and intentionality, we have seen that thought cannot be conceived without intentionality. Whether intentionality can be conceived of apart from thought or not depends upon what

one considers as the basic semantic unit. If the basic semantic units are concepts or words, then intentional content could occur without there being propositional content whereas propositional content cannot occur without its being intentional. This would lead us to the conclusion that intentionality is a necessary condition for thought as propositional content. On the other hand, if the basic semantic unit is considered as a proposition or a sentence, then we can identify intentional content with propositional content, and the intentionality-attributed concepts or words as derived from the intentionality of propositions. Though we can rightly attribute intentionality to propositions or sentences, it would be quite strange to attribute intentional consciousness to abstract entities like propositions or sentences since consciousness is considered fundamentally a mental phenomenon. Similarly, some of our unconscious representational mental states are ascribed propositional content but it would be inappropriate to suggest that unconscious representational mental states are intentionally conscious. This indicates that the expression 'intentional consciousness' perhaps should be restricted to occurrent mental states. With this, let us proceed to discuss how thought understood as dispositional mental state with content is related to consciousness.

#### *D. Dispositional Mental States and Phenomenal Consciousness*

Another way we employ the term 'thought' is to refer to a dispositional state with propositional content, say the dispositional belief that  $p$ . How does thought in this sense relate to phenomenal consciousness, intentionality and awareness? We shall first try to figure out if thought as a disposition is conceptually related to phenomenal consciousness. To do this, we render questions (1) and (2) as (D1) and (D2) and answer them.

(D1) Could thought as disposition be conceived of without phenomenal consciousness?

(D2) Could phenomenal consciousness be conceived of without thought as disposition?

Given the meaning of 'dispositional mental states' and 'phenomenal consciousness', answers to the above questions are obvious enough. As an unconscious mental state, a dispositional mental state is not felt in any way at all the subject who possesses it. So, there is nothing it is like to have a dispositional mental state. Phenomenal conscious states are not like dispositional mental states



in this regard. It is necessary that there is something it is like to have such states. For example, there is something it is like to be in a state of pain or in a state of being-appeared-green-to. But there is nothing it is like to have a contentful dispositional mental state. Given that by 'thought' we mean contentful dispositional mental state, the answer to (D1) is in the affirmative: thought as a disposition can be conceived of without any phenomenal features. This answer follows from the meanings of 'dispositional state' and 'phenomenal state'. The answer to (D2) is also affirmative. It is by definition true that a phenomenal conscious state is not a dispositional mental state with propositional content. Hence that there could be phenomenal consciousness without dispositional thought content is almost trivially true as its negation is absurd. We have affirmative answers to both (D1) and (D2). Hence either of the two—thought as dispositional content and phenomenal consciousness—can be conceived of without the other. What follows from this is that thought as dispositional mental content and thought as phenomenal consciousness are distinct.

#### *E. Dispositional Mental States and Intentionality*

In order to determine how thought as a dispositional state with content, say the disposition to believe that  $p$ , is related to intentional consciousness, we need to render (1) and (2) as (E1) and (E2):

(E1) Could there be thought as dispositional mental state without intentional consciousness?

(E2) Could there be intentional consciousness without thought being a dispositional mental state?

Both the questions sound awkward because the way we use the term 'consciousness' seems to contradict our understanding of a dispositional mental state as an unconscious state. But the intent of these questions can be better appreciated if the term 'intentional consciousness' in (E1) and (E2) is replaced with 'intentionality'. The resultant questions are (E1a) and (E2a):

(E1a) Could there be thought as dispositional mental state without intentionality?

(E2a) Could there be intentionality without thought being a dispositional mental state?

The answer to (E1a) is obvious. A thought conceived as a dispositional mental state is always representational; hence it cannot be conceived without intentionality. In answer to (E2a), it is easy to

see that we can conceive of intentionality apart from dispositional mental states because there are thought-acts as well as linguistic expressions, which are clearly intentional but not dispositional. Thus thought, as a dispositional mental state, is not possible without intentionality whereas intentionality is not restricted to dispositional mental states. So we conclude that intentionality is a necessary condition for thought as a dispositional mental state. Though thought as dispositional mental state is intentional, yet it is odd to characterize it as intentionally conscious because a dispositional mental state by definition is an unconscious mental state.

### *F. Dispositional Mental States and Awareness*

We can determine the nature of the relation between thought conceived as contentful dispositional mental state and consciousness understood as awareness, by answering (F1) and (F2).

(F1) Could there be thought as contentful dispositional mental state without awareness?

(F2) Could there be awareness without there being contentful dispositional mental state?

Answer to (F1) follows from the definition of ‘dispositional mental states’. A dispositional mental state is a state that remains inaccessible to awareness. It means that a dispositional mental state is conceived apart from awareness. If it is necessary that a dispositional mental state by its very nature exist without awareness, then we cannot deny the possibility that dispositional mental states with content exist without awareness. The answer to (F2) follows from the nature of the awareness state. An awareness state, being always an occurrent mental state, cannot be a dispositional state. Hence, an awareness state can be conceived and is always conceived of as apart from dispositional mental states. Since answers to both (F1) and (F2) are affirmative, it follows that an awareness state and a contentful dispositional mental state are distinct.

Our discussion of the relation between thought as contentful dispositional mental state and thought as consciousness shows that thought in this sense is distinct from both phenomenal consciousness and awareness, while it cannot be conceived without intentionality. A dispositional mental state is called a thought only because it possesses propositional content. With this, let us now move on to discuss how thought in the third sense, namely thought-act, is related to phenomenal consciousness, intentionality and awareness.

*G. Thought-Act and Phenomenal Consciousness*

A thought-act, as we understand, is a mental episode or an occurrent mental state with propositional content. To understand the nature of the relation between thought-act and phenomenal consciousness, we must answer (G1) and (G2):

(G1) Can a thought-act occur without phenomenal consciousness?

(G2) Can phenomenal consciousness occur without being a thought-act?

To answer them we need to have a better grip on what we mean by 'phenomenal consciousness'. Phenomenally conscious states are those mental states about which it can be said that there is something it is like to have them. This general characterization of phenomenal states is due to Nagel (1974). But his original question is not directly concerned with phenomenology of mental states per se; rather it is to do with the phenomenology of a creature belonging to a particular species of animal. For his discussion, he identifies bats and humans as examples of two species and argues that what it is like to be a bat is different from what it is like to be a human. What it is like to be a bat is a function of sensory states that a bat is capable of possessing. These sensory states are not anything like the kind of sensory states that we humans have though it is possible that bats and humans can have identical non-sensory cognitive states. On the basis of this, Nagel concludes, it is not possible for us humans to know what it is like to be a bat. For Nagel, bat's phenomenology is a function of its sensory states. Therefore, it is reasonable to conclude that there is something it is like to have those sensory states. By phenomenological feature of a sensory state we mean its qualitative content.

In this context, it is reasonable to ask whether phenomenology is restricted to sensory states with qualitative features. Each particular sensory state of a certain kind has its own characteristic qualitative feel, and it is different in nature from the phenomenal features belonging to sensory states of a different type. What is common to these different kinds of sensory states is that they possess the general phenomenal property, namely, that there is something it is like to be in those states. Certainly, this general feature can be attributed to a mental state only if it possesses some subjective feel. But there is no reason why this general feature is attributable only to sensory states. Any mental state that we are aware of as occurring can be said to have a subjective feel associated with it. For example, consider the non-sensory occurrent state of believing. There is something

it is like to have an occurrent state of belief, and what it is like to believe is different from what it is like to be in a state of desiring. Thus, it is not only feeling of pain or seeing something blue that possesses a subjective feel but even occurrent states of propositional attitudes like believing, hoping, desiring, etc. have their own subjective feels. Hence, we could say that there is something it is like to have those cognitive states.<sup>5</sup> This is not to say that the subjective feels accompanying sensory states and those related to no-sensory cognitive states are of the same kind. It is possible for us to differentiate between the subjective feels connected with sensory states and those associated with occurrent propositional attitudes. With regard to the former, we say that they have certain qualitative features. They arise in us insofar as we are in contact with physical objects including our own bodies. What is common to these qualitative states is that there is some aspect of spatiality built into them. Since these qualitative feels pertain to senses that relate to outer objects or objects in space, we shall call them *outer subjective feels*. Thus, the qualitative feel associated with the appearance of blue, the taste of honey, the sound of a trumpet, feeling a pain, feeling a tickle, etc. are outer subjective feels. In contrast, those subjective feels that accompany various occurrent cognitive states could be called *inner subjective feels*; as such they are not related to any external objects<sup>6</sup>. Their main function is to differentiate between various occurrent states of the mind. For example, given the thought content, *p*, I may believe that *p*, doubt that *p*, remember that *p*, etc. My believing that *p* is differentiated from my doubting that *p* or my remembering that *p* on the basis of the difference in subjective feels characteristic of them.<sup>7</sup>

Once the distinction between inner and outer subjective feels is granted in characterizing phenomenally conscious states, the questions (G1) and (G2) turn out to be ambiguous because we are not sure whether 'phenomenal consciousness' means inner subjective feel or outer subjective feel. (G1) can be disambiguated into (G1a) and (G1b) and (G2) into (G2a) and (G2b). Thus, we have two pairs of questions as substitutes for (1) and (2). The first pair is:

- (G1a) Can thought-acts occur without inner subjective feels?
- (G2a) Can inner subjective feels occur without thought-acts?

The second pair is:

- (G1b) Can thought-acts occur without outer subjective feels?
- (G2b) Can outer subjective feels occur without thought-acts?

To understand the nature of the relation between phenomenal

consciousness in general and thought-acts, we must address both the pairs of questions. Our understanding of thought-acts is that they are occurrent mental states with propositional contents. It is a necessary feature of thought-acts that when they take place, their subjects are aware of their occurrence, that is to say that they feel their occurrence. In addition to being able to be aware of their occurrences, we are capable of differentiating among various kinds of mental acts. From a phenomenological perspective, we type-differentiate or type-identify occurrent mental states on account of their differences or similarities among the inner subjective feels that accompany them. We differentiate an act of believing from an act of doubting because beliefs are felt differently from the way desires are felt. To put it differently, acts of belief are different from acts of doubts because what it is like to believe is different from what it is like to doubt.<sup>8</sup> Given this understanding, a thought-act has two essential features: a thought-act is what it is on account of its propositional content and the subjective feels necessarily accompanying it. This implies that our answer to (G1) must be in the negative: there can be no thought-acts without inner subjective feels. But can there be inner subjective feels without the occurrence of thought-acts. We come to know of the occurrences of mental states, whether cognitive or non-cognitive, by their inner subjective feels, which are the marks of their occurrences for the subject. So inner subjective feels are not confined to mere thought-acts; sensory episodes and emotions too have their own inner subjective feels. Hence, our answer to (G2a) is that inner subjective feels can occur even if thought-acts do not occur. Since thoughts cannot occur without the inner subjective feels, the latter are necessary conditions for thought-acts to occur.

Let us now consider (G1b) and (G2b). (G1b) asks whether thought-acts can occur without outer subjective feels. By outer subjective feels we mean those qualitative features associated mostly with sensory states or proprioceptual states. A thought-act, we know, is not a sensory episode; it is a cognitive episode, which does not have any felt quality of the sort that our sensory states possess. Outer subjective feels or qualitative features do not necessarily accompany the occurrent thoughts like the thought that the earth is round, the thought that  $2 + 2 = 4$ , etc. Thus, we have an affirmative answer to (G1b), namely, that thought-acts as propositional episodes can occur without outer subjective feels or qualitative features.

Outer subjective feels may be directed to external physical objects or bodily states; yet they cannot be characterized as thought-acts having propositional contents. Consider, for example, the occurrence of a pain, which has felt qualitative features. But the feeling of pain

by itself does not have a propositional thought content, though on the basis of the pain felt, one may reach the conclusion that there is some damage to the tissues in that part of the body where pain is being felt. This means that the answer to (G2b) is that outer subjective feels or qualitative sensory states can occur without the occurrence of thought-acts having propositional nature. Since both (G1b) and (G2b) have affirmative answers, we conclude that thought-acts and outer subjective feels (qualitative features) are distinct.

Our discussion shows that no occurrent mental states, whether they are cognitive episodes, like thought-acts or sensory states, can occur without inner subjective feels. In fact, it is the inner subjective feels that accompany mental states that enable us to characterize them as occurrent mental states. Thus, all occurrent mental states have inner subjective phenomenology. But the occurrent mental states could be divided into two classes: those that necessarily have outer subjective feels and those that are bound to possess propositional contents. Only sensory states have outer subjective phenomenology, which is not a necessary feature of the cognitive mental episodes that we characterize here as thought-acts with propositional content.

#### *H. Thought Acts and Intentional Consciousness*

The next question we examine is how thought-acts stand in relation to intentional features. To answer this, we shall raise the following questions:

(H1) Can a thought-act occur without intentional consciousness?

(H2) Can there be intentional consciousness in the absence of thought-acts?

Thought-acts are mental episodes with propositional content, and being contentful mental episodes they are representational episodes directed towards some possible states of affairs. So our answer to (H1) is that thought-acts being occurrent mental states with propositional contents cannot occur without being intentional. On the other hand, intentionality can be exhibited even in the absence of thought-acts. It is not a feature restricted to thought-acts, for there are two sorts of mental states that are considered to be intentional, but are not thought-acts: dispositional mental states with propositional content and sensory states that are directed to external objects or bodily states. Availability of such states shows that intentional features can occur even in the absence of thought-acts. We do not tend to ascribe intentional consciousness to dispositional

mental states despite having contentful mental states because ascription of intentional features alone would not suffice for a mental state to be regarded as possessing intentional consciousness. But the availability of conscious mental episodes like sensory events, which are intentional but lacks propositional structure shows that it is possible for intentional consciousness to occur without being thought-acts. So our answer to (H2) is that intentional consciousness can occur without being thought-acts. Since thought cannot occur without having intentionality while intentionality can occur even in the absence of propositional thought content, intentionality is a necessary feature of every thought-act.

### *I. Thought-Act and Awareness*

Finally, to determine the nature of the relation between a thought-act and an awareness episode we shall answer (I1) and (I2):

- (I1) Can a thought-act occur without awareness?
- (I2) Can an awareness episode occur without being a thought-act?

The key to answering this question lies in the meaning of the term 'thought-act'. In this essay, we have been using the term to refer to an occurrent mental state with propositional content. We consider a state occurrent if and only if the subject is aware of its occurrence. This means that we cannot conceive of an occurrent mental state without awareness. Thus, the answer to (I1) is that thought-acts cannot occur without awareness. We have varieties of awareness of episodes. Thought-acts, as we have defined, belong to one such variety. In addition to thought-acts, we are aware of the occurrence of a multitude of sensory states, which are not propositional in nature. This shows that there are awareness episodes that are not thought – acts. So our answer to (I2) is that awareness episodes can occur without being thought-acts. Our answers to (I1) and (I2) shows that each thought-act must be an awareness episode but not all awareness episodes are thought-acts. Thus thought-acts are dependent upon awareness episodes but not *vice versa*.

It follows from our observation that thought-acts necessarily have three features of consciousness. First, they are, without exception, awareness episodes; it is on account of the possession of the feature of awareness that we hold mental states to be occurrent. Second, they are intentional because they possess propositional content. Third, they are phenomenal, as they invariably possess inner subjective feels on account of which we come to know of their occurrences.



They, however, do not necessarily possess outer subjective feels or qualitative features belonging to sensory states. We may note that a sensory episode also possesses all the three features of consciousness. Being occurrent states, they are states of awareness. Like thought-acts, they are phenomenal and intentional. However, they differ from thought-acts with regard to the nature of their phenomenality and intentionality. The phenomenality of thought-acts primarily consists in their inner subjective feels whereas that of sensory episodes includes, in addition, the outer subjective feels. Sensory episodes are intentional as they mostly represent perceptual properties of things while thought-acts are intentional because of their propositional structure and content. In this way, the intentionality of thought-acts is much more complex than that of sensory episodes.

The paradigmatic case of thought-acts, we considered so far are awareness events having propositional structure and content. An awareness event occurs always from a first person point of view. So thought-acts which necessarily have propositional structure and content can be conceived of as representational episodes with the added representation 'I am aware'. This means that thought-acts can be expressed in embedded propositions. For example, a thought-act whose content is the proposition that grass is green can be rendered as 'I am aware that grass is green'. That is to say, in the way we have been conceiving, thought-acts are those awareness episodes whose objects have propositional structures. However, it is possible to have a broader understanding of thought-acts in which any awareness episode could be construed as thought-acts. Since an awareness episode has the first person perspective, it can be considered as a thought-act having a subject and an object to which the act of awareness is directed, making it possible to render the awareness episode in a propositional form having a subject and a predicate. On this broader understanding, even sensory events can be considered thought-acts. Occurrence of a sensation is an awareness episode because there cannot be a sensation that the subject is not aware of. Consider, for example, the sensory episode of appearing of something blue to a subject. It has a first person perspective and is directed towards an object. So it is possible to describe it in the form of a proposition: 'something blue appears to me' or 'I am aware of something blue'. Insofar as we could express it in the form of a proposition, this awareness episode could be considered as a thought-act. Any representation accompanied by the additional representation 'I am aware' is a thought in the broad sense. It differs from the thought-act in the narrow sense in that it lacks the structure of an embedded proposition that the latter necessarily possesses.



If one were to answer (I1) and (I2) in the light of the broad sense of 'thought-act', one would arrive at the conclusion that a thought-act cannot occur without being an awareness episode and conversely an awareness episode cannot occur without being a thought-act. This along with the principle of the identity of indiscernibles, which states that any two objects that share all their properties are identical, implies that thought-acts and awareness episodes are identical. So if by 'thought' one understands thought-acts in the broad sense and by 'consciousness' one means awareness, then one can identify thought with consciousness. Such identification of is not unknown in the history philosophy. For example, Descartes identifies thought with consciousness and when he does this, he is cognizant of the fact that he understands the term 'thought' as thought-act in the broad sense. He makes it clear in his *Principles*:

By the term 'thought', I understand everything which we are aware of as happening within us, insofar as we have awareness of it. Hence thinking is to be identified not merely with understanding, willing and imagining, but also with sensory awareness. (Descartes, 1985 p. 195).

He expresses the same view about thought in his second replies: 'Thus, all the operations of the will, the intellect, the imagination and the senses are thoughts' (Descartes, 1984:113). Thus, thought and consciousness can be identified only if by 'consciousness' we mean awareness and by 'thought' we understand thought-acts construed broadly as awareness episodes.

Along with this broad sense of thought-acts, it is possible to have a broad understanding of both intentional consciousness and phenomenal consciousness. Intentional consciousness in the broad sense would mean merely directedness or aboutness, without requiring that the content of the awareness episode necessarily have a propositional structure. Thus, any awareness episode, which represents objects, properties, or states of affairs, could be understood as intentional consciousness. An awareness episode is necessarily intentional in the broad sense because it is either a thought-act whose object is a proposition representing a state of affairs or a sensory episode directed towards some aspects of the world. Phenomenal consciousness in the broad sense would mean subjective feels accompanying occurrent mental states. They could be inner subjective feels that accompany thought-acts in the narrow sense, i.e., occurrent cognitive episodes like believing, remembering, doubting etc. with propositional contents or outer subjective feels, namely qualitative features that belong to sensory episodes. Since an awareness episode is either a thought-act or a sensory episode, it must

possess at least the inner subjective feel. That is to say, an awareness episode must necessarily exhibit phenomenal features in the broad sense. Thus, both phenomenality and intentionality, if construed broadly, are necessary and inseparable features of awareness, which is the most basic and primary form of consciousness.

Many philosophers assume that awareness, phenomenal consciousness and intentional consciousness are three different types of consciousness, and a mental state belonging to any one of these states is distinct and separable from a state belonging to either of the other kinds of mental states. They arrive at this position as a result of practice of abstracting one aspect of our conscious mental states from others and highlighting it for the purpose of theorizing about consciousness. Thus, we abstract phenomenality, intentionality or awareness from consciousness depending on what we want to do. In our talk of sensation, for example, we suppress intentional features of a sensory state and concentrate on its qualitative aspects. In theoretical discussions on the nature of the sensation of pain, there is a dis-emphasis on its intentional features and the awareness of its occurrence, which results from an implicit view that only the qualitative feel of the sensation pain is essential to pain. Contemporary philosophical discussion of consciousness is centered on qualia, which are nothing but qualitative features of sensory states. When philosophers talk of a quale, say the state of being-appeared-blue-to, they want to concentrate on the qualitative feel of the sensory state considering it apart from its features of awareness and intentionality. In this process, we often forget that a qualitative mental state cannot occur without awareness and intentionality. The quale of being-appeared-blue-to cannot occur without an appearance, which is a state of awareness directed to some object or property. A quale is merely a mode of the awareness of an object or its property. Similar considerations apply *mutatis mutandis* to the other two features of consciousness: intentionality and awareness.

### III

#### *Nature of Awareness*

What emerges from our discussion so far is that awareness is the most fundamental feature of our consciousness and a thought-act, irrespective of whether it is construed narrowly or broadly, would not qualify to be characterized as an occurrent mental state without the feature of awareness. Bearing in mind the centrality of awareness

in characterizing consciousness and thought-acts, we shall probe briefly into the general features of awareness episodes. What is important to note about awareness is that it can never occur without the features of phenomenality and intentionality; hence they are necessary features of an awareness episode. That an awareness episode is invariably phenomenal does not mean all awareness episodes exhibit qualitative aspects because, as we have already seen, qualitative phenomenal features are restricted to those awareness episodes that are sensory. A mental state has a phenomenal feature only if there is something it is like to be in that state. All awareness states are phenomenal states because there is always something it is like to be in those states. Conversely all phenomenal states are states of awareness because there cannot be a phenomenal state, which its subject is unaware of. That is to say, a phenomenal state, like being in pain, cannot be a state that the subject is not aware of. The claim made here is not merely that the terms 'awareness state' and 'phenomenal state' are co-extensive but that there is a necessary relation between phenomenality and awareness such that it is not possible for one to occur without the other.

There cannot be an awareness state that does not represent some state of affairs or is at least directed to some features of the world. Hence, as is the case with phenomenality, intentionality too is a necessary feature of awareness. However, terms 'intentional mental states' and 'awareness states' are not co-extensive because we grant intentional mental states that are not available to awareness. In answer to question (F1), we maintained that it is possible that there are intentional states that are not states of awareness and that dispositional mental states belong to this category. This would mean that though an awareness state is necessarily intentional, its converse, viz., that an intentional state is necessarily a state of awareness, does not hold. Despite this, one can maintain that a dispositional state having intentionality has some sort of conceptual relation to awareness. This can be clarified as follows. Intentionality can be considered as an active feature of a mental state because it *represents* or *is directed towards* something. But we attribute this active property to some dispositional mental states. Being an inert state, a dispositional mental state appears to be an unlikely candidate for exhibiting the active feature of intentionality. On the other hand, an awareness state is an active state and it is part of its active nature that it is directed to some object or state other than itself. Thus, awareness state appear to be the proper and natural loci of intentionality. How are, then, we justified in attributing intentionality to dispositional

mental states? The answer is that our attribution of intentionality to dispositional states is in some way dependent on the intentionality of awareness states. When we say a dispositional mental state, say a belief, is intentional, we do not mean that it is actually intentional, but only that it is potentially intentional, meaning that if it were activated and made available to the awareness, it would have represented or been directed towards some state of affairs. Thus, even when we speak of the intentional features of unconscious dispositional states, it is with reference to intentionality of the states of awareness.<sup>9</sup> Had it been impossible for our awareness states to be intentional, and had it been impossible for the dispositional states to be activated and made available to awareness, it would not have been possible for us to attribute intentionality to dispositional mental states.

A feature of awareness that has not received enough attention in contemporary discussion on consciousness is the revelatory function it plays in our mental life. Awareness exhibits a four-fold revelatory function. First of all, awareness reveals the intentionality of occurrent mental states. Second, it reveals the phenomenal features or the subjective feels — qualitative (outer) or non-qualitative (inner) feels as the case may be — of the occurrent mental states. Third, an awareness episode reveals its own occurrence. Fourth, an awareness episode is I-revealing or self-revealing. We have some idea about what it means to say that awareness reveals intentional and phenomenal features of our occurrent mental states primarily because we understand what it means to say that a given mental state is either intentional or phenomenal. To say that an awareness episode reveals intentionality of an occurrent mental state means that it informs us of the representational content of the occurrent state. And to say that an awareness episode reveals the phenomenality of an occurrent mental state means that it tells us what kind of mental state it is, that is whether it is a qualitative sensory state like being in pain, being appeared-blue-to, etc. or whether it is a cognitive state like belief, desire, etc. But we need more clarity on the other two revelatory functions of awareness episodes.

Let us examine what it means to say that an awareness episode reveals its own occurrence. The revelation of the occurrence of an awareness episode is achieved by the very same awareness episode itself and it could be viewed as a reflexive feature by which an occurrent mental state reveals itself. We may say that it is of the nature of an awareness episode that it reveals itself. An immediate fall out of this view is that the awareness of the occurrence of a mental state is infallible, that is, when an awareness state occurs, we cannot be mistaken about its occurrence and the kind of mental state it is. For example, if I

am aware that I believe that  $p$ , even if  $p$  is false, my awareness that I believe that  $p$  cannot be false. This feature of an occurrent mental state could be rejected on the ground that an occurrent mental state,  $M$ , cannot reveal its own occurrence; what reveals the occurrence of  $M$  is another awareness state  $M'$  directed towards  $M$ . This latter view about how the occurrence of a mental state is revealed identifies the revelatory function of a conscious mental state with its intentionality. Just as intentional features of  $M$ , a first order mental state, reveal the objective features of the world, the intentional features of  $M'$  which is a higher order mental state directed towards the first order mental state,  $M$ , reveal the occurrence of  $M$ . This position, unlike the view adopted in this paper, entails that revelatory function of a higher order awareness episode is fallible just as the first order mental states could go wrong with regard to the features of the objective world. The position, however, is unacceptable because apart from opening up the possibility of a regress, it leads to a contradiction as it grants the possibility that a subject could be unaware of the occurrence of an awareness episode.

An awareness episode is I-revealing, means that it invariably occurs from the first person point of view, that is, it always occurs with the representation 'I am aware'. Each thought-act in the narrow sense could be conceived as an embedded propositional episode of the sort, say, I am aware that snow is white; I believe that the grass is green; I think that the earth is round, etc. Similarly, being awareness episodes, sensory states too are I-revealing. A feeling of pain, for example, can be conceived as occurring necessarily with the representation 'I feel', a visual sensory episode with the representation, 'I see' or 'I seem to see', etc. Two philosophers who articulate the I-revealing function of awareness episodes are Descartes and Kant. Descartes' *cogito* argument is built around the I-revealing function of awareness episodes. Construing thought-acts in the broad sense, he arrives at 'I exist' (*sum*) from 'I think' (*cogito*). *Cogito* entails *sum* because each awareness episode is necessarily accompanied by the representation, 'I am aware' or 'I think'. The I-revealing function of the awareness episodes makes it clear how Descartes reaches 'I exist' from 'I think' using his method of doubt. Doubt is a thought-act and being a thought-act, it is an I-revealing awareness episode. What could be subjected to doubt is the truth of the propositional content of the awareness episode or the reality of the objects and properties represented by the awareness episode and not the thought-act of doubting which necessarily accompanies the awareness that I am. Therefore, each act of doubt reinforces that I am.

Kant is of the view that each mental representation, irrespective of whether it is sensory or conceptual, is *capable* of being accompanied by the additional representation 'I think' whereas any act of judgment is *always* accompanied by 'I think'. Since for Kant 'thought' in the strict sense of the term is a function of the faculty of understanding, it could be asked why Kant grants that a representation belonging to the faculty of sensibility is capable of being accompanied by 'I think'. The answer to this question lies in the distinction between 'thought' and the representation 'I think'. By 'thought' Kant means a propositional mental episode representing a possible state of affairs, which is a function of the faculty of understanding. On the other hand, 'I think' is an awareness episode, which is the function of a different faculty, the faculty of apperception.<sup>10</sup> This is the reason why Kant expresses 'I think' alternatively as 'I am', 'I am aware', etc. (For example, see Kant, 1998: Bxl, B131-2, B137-8, B 140, B155, B 157, A 266). Any conscious representational episode, for Kant, is a complex representation involving contributions from more than one faculty. However, no conscious representation can take place without involvement of the representation 'I think' or 'I am aware' added by an act of apperception. The representations 'I think', 'I am aware', 'I feel', 'I am', etc. added to occurrent mental states are responsible for imparting them the first person point of view. This shows that each conscious mental episode, whether propositional or sensory, is from the first person point of view.

The first person point of view is often contrasted with the third person point of view or what Nagel calls 'the view from nowhere', which is considered as the objective point of view. It is generally believed that these two kinds of points of view by their very nature are opposed to each other. But the fact is that the third person point of view is anchored on the first person point of view: it results from abstracting the content of the thought-act from an awareness-episode which is from the first person point of view. For example, given the propositional thought-act, 'I am aware that grass is green', if we jettison the clause 'I am aware' and concentrate only on the embedded proposition 'the grass is green' the thought that we have is said to be from the third person point of view. Thus, an abstract thought or a thought from the third person point of view is nothing but a thought-act minus its first person point of view.

### Conclusion

We have been inquiring whether there is any conceptual relation between thought and consciousness. Since concepts of both thought

and consciousness are multifaceted, we identified three important senses in which each of the terms, 'thought' and 'consciousness', is employed in the philosophical literature to see how each of the three senses of one term relate to each sense of the other term. First, we examined how thought in the sense of proposition is related to phenomenal consciousness, intentionality and awareness. We found that thought in this sense is distinct from phenomenal consciousness, and awareness, but it cannot be conceived without intentionality. On the other hand, an answer to the question, whether intentionality can be conceived without thought or not, depends on what one's basic semantic intuitions are. If propositions are considered as basic semantic units, then any intentional content that we can conceive of becomes dependent upon propositional content. If the basic semantic units are taken to be concepts instead, then intentionality turns out to be merely a necessary condition for thought because intentional features can occur without being thoughts (propositions) while thoughts cannot occur without intentionality.

Next, we probed how thought as dispositional mental state stands in relation to phenomenal consciousness, intentionality and awareness. This led us to the view that thought as dispositional mental state and thought as phenomenal consciousness are distinct since it is not possible for phenomenal mental states to be dispositional or for dispositional mental states to exhibit any phenomenal features. Similarly thoughts as dispositional mental states and thought as awareness episodes are also distinct because it is definitionally true that a dispositional state is not a state of awareness and *vice versa*. However, thought as a dispositional mental state would not be called 'thought' if it were not representational. From this we conclude that dispositional mental states are necessarily intentional though we can conceive of a mental state as being intentional without it being dispositional.

Finally, we explored how thought as an act of the mind is linked to phenomenality, intentionality and awareness. In order to get a proper picture of the relation, we distinguished between two senses of term 'thought-act': a narrow sense and a broad sense. In the narrow sense, thought-act is an occurrent mental state with propositional content, and in the broad sense, a thought act is an awareness episode irrespective of whether its structure and content are propositional or non-propositional. We also differentiated between two kinds of phenomenal features, which we labelled as outer and inner, respectively. Outer phenomenal states are qualitative sensory states while inner phenomenal features are the subjective feels that necessarily attend all occurrent mental states,



sensory or cognitive. If, by a phenomenal mental state, we mean a qualitative sensory state, then thought-act in the narrow sense is not phenomenal. On the other hand, if we use it to signify a mental state that necessarily possesses inner subjective feels then thought-acts in the narrow sense are phenomenal. Thought-acts in the broad sense in any case will have phenomenality since all of them necessarily possess inner subjective feels while some of them exhibit qualitative features in addition. Thought-acts, regardless of whether they are understood broadly or narrowly, necessarily possess intentionality because we cannot conceive them without intentionality though we can conceive of intentionality apart from thought-acts per se. So, we conclude that intentionality is a necessary condition for thought-acts to occur. In the same way, we found that awareness is a necessary feature of thought-acts because a thought-act, narrow or broad, is an occurrent mental state and an occurrent mental state cannot be what it is without awareness. However, an awareness episode can take place without being a thought-act in the narrow sense, but it is not possible for awareness to occur without being thought-acts in the broad sense. So, our consideration of the nature of awareness episodes and thought-acts lead to the conclusion that awareness is a necessary feature of thought-acts in general. According to the broader understanding of thought-acts, the properties of thought-acts and awareness episodes cannot be differentiated. Therefore, on the basis of Leibnitz' principle of the identity of the indiscernible, thoughts in the broad sense and awareness episodes turn out to be identical.

We cannot conceive of thought in any of the three senses we have identified without intentionality; hence intentionality could be viewed as the essential feature of thoughts in general. Similarly the primary sense of 'consciousness' is awareness because we cannot have phenomenal or qualitative states without having awareness. The same is true of intentional consciousness, which is nothing but a thought-act. The real connecting link between thought and consciousness in general is intentionality because neither of them can be conceived without it.

### Notes

1. I do not claim that these are the only ways that the term, 'consciousness' is used in the philosophical literature; it is also used in other senses such as creature consciousness, self-consciousness, and monitoring consciousness.
2. The term 'thought-act' can also used in a broader sense to signify any conscious mental episode irrespective of whether it has a propositional content or not.



See the discussion below on the nature of the relation between thought act and awareness in section 2. I.

3. It is a moot question whether all aspects of consciousness are reducible to one or more of these three types of consciousness. It could also be debated whether phenomenal consciousness, intentional consciousness and awareness are three different kinds of consciousness or whether they are inseparable features belonging to each conscious state. Using empirical evidence from blind sight cases, Norton Nelkin makes an argument to show that phenomenality, intentionality and awareness—he considers only introspective awareness—are distinct and separable states of consciousness (See Nelkin, 1993). In their theorizing about consciousness, many contemporary philosophers either tacitly assume or explicitly endorse positions similar to this. For example, Sidney Shoemaker's refutation of inverted spectrum argument is based on the assumption that phenomenality, intentionality and awareness are distinct (Shoemaker, 1982). Ned Block is of the view that phenomenal and intentional states are distinct states of consciousness and both must be distinguished from access-consciousness (Block, 1995). I do not claim that Nelkin's 'introspective awareness,' Block's 'access-consciousness' and Shoemaker's 'awareness' mean the same though one can discern a family resemblance among these concepts. For a defence of the position that phenomenality, intentionality, and awareness are inseparable features of a conscious mental state, see Tomy, 2003 and 2013.
4. Alternatively, one could also answer the questions (B3) and (B4) by arguing that intentionality and thought as propositional content are identical or at least inseparable: when one entertains a concept or utters a word under appropriate circumstances, the concept or the word signifies a proposition. For example, if one is having the concept of rose or utters the word 'rose' in the presence of a rose, the concept or the word could be understood as conveying the existential proposition that there is a rose. Hence both concepts and words could be seen as having propositional content.
5. Block acknowledges this. He says: 'P-conscious properties [properties of phenomenal consciousness] include the experiential properties of sensations, feelings, and perceptions, but I would also include thoughts, desires, and emotions' (1995: 230).
6. The distinction between inner and outer subjective feels is motivated by Kant's distinction between inner and outer sense (Kant, 1998: A 22-23, B 37).
7. It could be said that we differentiate among various contents of a given type of an occurrent mental state on account of the differences in their phenomenal features. This position assumes that contents of occurrent mental states have their own phenomenal features. Accordingly, there is something it is like to believe that the earth is round and this phenomenal feature is different from what it is like to believe that the earth is flat. Ned Block considers this to be a viable position when he observes: 'A feature of P-consciousness [phenomenal consciousness] that is often missed is that differences in intentional content often make a P-conscious difference. What it is like to hear a sound as coming from the left differs from what it is like to hear a sound as coming from the right.' (1995: 230). He, however, does not believe that phenomenal content is reducible to intentional content. For him, both are distinct though phenomenal content often has intentional aspects.
8. In addition to the question how we know of the occurrences of mental states, the question, how occurrent mental states of one kind are differentiated from

another kind is answered here. In answering the latter, it is possible to take one of the two approaches different from the approach adopted here. I shall call the first one representational approach and the second one computational approach. According to the representational approach, thought-acts are type-identified on the basis of higher order representations that accompany them. Locke takes this approach in order to differentiate memory ideas from other kinds of ideas. A memory idea, for him, is nothing but '[p]erceptions, which it [the mind] has once had, with this additional [p]erception annexed to them, that it has had them before' (Locke, 1975, Book II, Chapter X, Section 2: 150). One could take a similar approach for differentiating various kinds of thought-acts: a thought-act is called a belief if it occurs with added representation 'I believe' and it is called a doubt if it comes with the additional representation 'I doubt' and so on. The computational approach is a more recent one. According to Jerry Fodor, who champions this approach, we differentiate between the belief that  $p$  and the desire that  $p$ , because beliefs and desires are computational states constituted by different algorithms. Invoking a metaphor invented by Stephen Schiffer (1981) various computational modules that Fodor postulates are generally described as boxes. If the proposition  $p$  is tokened in the belief box of the subject S, then we say that S believes that  $p$  and if it is in S's desire box, then we say that S desires that  $p$ , etc. These two approaches constitute two competing theoretical models for accounting for the differences among various types of mental states. But they do not explain how we come to know what additional representation is accompanied by the occurrent mental state or which computational box a proposition is placed in. From a phenomenological point of view at least, it is neither by identifying algorithms that computes the propositions nor by reading the content of the added representations, but on account of the inner subjective feels, which necessarily accompany them, that we come to know of their occurrences. Similarly, it is on account of the differences in their inner subjective feels that we differentiate among the diverse kinds of mental states. There can be no occurrent mental states without some kind of inner subjective feels that come with them.

9. John Searle (1991) holds a similar position.
10. For Kant, human intuitions belong to the sensibility, and a representation that is not an intuition is a thought in a very general sense. So the representation 'I am' contributed by apperception is a thought and not an intuition.

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## MINIMALISM AND THE JOURNEY TOWARDS BIOLINGUISTICS

K.A. Jayaseelan

### I

Chomskyan generative grammar differentiated itself from traditional grammar – and from other contemporary rival theories of linguistics (like the British theories of Firth and Halliday and American structuralist theories) – by starting from mentalist claims. One of the claims was that the grammar of a language is represented in the mind of a speaker-hearer of that language, and it is by virtue of this representation – this “grammar-in-the-mind” – that the speaker-hearer produces and understands the language. This claim (in itself) may sound somewhat obvious and therefore not very interesting to a contemporary ear. But it must be remembered that the claim was made at a time when the reigning paradigm in the social sciences was behaviourism; any mention of a thing called ‘mind’ was taken to be unscientific, since (for a behaviourist) only things that could be observed could be the subject of an empirical science. Chomsky was flying in the face of contemporary science when he said that the object of study in the linguistic sciences was a postulated mental entity. Chomsky called this grammar-in-the-mind ‘competence’ rather than ‘knowledge’, presumably to emphasize that it was more akin to a skill or ability: the speaker-hearer could do things with it rather than describe or understand it.

One may contrast Chomsky’s notion of ‘competence’ with Saussure’s notion of ‘langue’. For Saussure, ‘langue’ is the system underlying a language that exists in a speech community, possibly as a system of mutually accepted conventions; if it exists in a speaker-hearer’s mind, it does so only as a result of the speaker-hearer learning the conventions. For Chomsky, the competence in a speaker-hearer’s mind is not something that is learnt, at least not learnt in the usual sense in which one speaks of learning any system of knowledge. Rather it is the expression, or maturation, of an innate

instinct of ‘language-making’ that is a biological endowment of the human species.

This is the “innateness hypothesis” of Chomsky regarding the acquisition of language. The idea is that a human child is born with the knowledge of the formal properties that characterize the grammars of all languages; we can speak of these formal properties, taken together, as constituting a Universal Grammar (UG). UG is, of course, not present in the child as a set of rules. What the child is endowed with (at the time of birth) is a mechanism for constructing UG-compliant grammars; the rules of UG are (as it were) inherent in the workings of this mechanism. The task of a linguist (then) is analogous to that of a biologist trying to reconstruct a bird’s instinctive knowledge of how to build a nest by looking at how the bird goes about its nest-building task.

## II

Now an important thing to keep in mind is that the above-mentioned ‘mentalist’ claims translated into ‘physical’ claims. Chomsky talked about ‘mind/brain’, not ‘mind’ alone. It was claimed that the language faculty is localized in a part of the brain, and is therefore physically realized. Should we then expect UG to be physically represented in the brain?

Brain research has found nothing corresponding to UG in the brain. But this should not be surprising. Imagine a Martian observing two humans playing chess. What he will see are the actual movements; he cannot see the rules according to which the movements are made. When brain research examines the brain during a language-related activity, what it sees are the movements, and not what determines the movements. If language-making is an instinct of the human species, we should look for UG in the part of the brain where instincts are encoded; and that – we are told – is the old part of the brain, the brain stem, which is the least understood part of it. And we still have no idea how instincts are physically represented in the brain stem.

But even apart from this handicap, there are other reasons why brain research and language research have not been able to converge in a better way. We can say that the fault lies on both sides. Admittedly, brain research is still in an early stage. The first tentative attempts to investigate the brain-language relation depended on medical cases like accidents where the patient suffered a brain injury; the investigator tried to determine which language functions were impaired and tried to correlate this to the location of the injury. As Chomsky remarked in the course of an interaction with biologists at



CCMB (Hyderabad) in 1997, this type of research was like someone driving a crowbar into a computer and then seeing which functions of the computer were damaged!

But one thing that happened as a result of the early investigations of the brain (in the 1950's) was that our picture of the mind underwent a change. We now know that the mind is not a unitary thing; it has a modular structure. (In this respect, it is like the body, which consists of organs.) The different things that we do with the mind, like memory, logical reasoning and processing of sensory data, are localized in different parts of the brain. The language faculty also has a location in the brain. Salutary as these developments are, however, they still give us only a broad picture of the brain-language relation.

On the side of linguistics, our understanding of language also needed to evolve. Our early conception of the principles of UG was as things which were specific to the language faculty; we thought of them as 'isolated' in the brain. UG existed in the mind/brain in a kind of 'modular isolation'. We had no prior conception of what sort of thing would qualify to be a UG principle. If some constraint could be shown to hold across a number of languages, it would be immediately taken to be a UG principle.

In the 1980s, the paradigm of research in the Chomskyan school was known as the Government-and-Binding Theory. All the principles that made up the subcomponents of this theory — such as Case Theory, Binding Theory, Bounding Theory — were unthinkingly taken to be UG principles. The distance of such principles from any conceivable realization in the brain was unbridgeable.

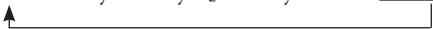
Let us illustrate one such 'UG principle' which was invoked to explain the so-called island constraints. Syntactic islands are configurations from which subextraction is not possible. For example, in the following sentences, we can see that extraction is allowed from the main clause, but disallowed from the embedded adverbial clause. (The star sign '\*' prefixed to (1b) indicates that the sentence is ungrammatical.)

- (1) a. **Who** did you hit \_\_\_\_\_ [ before you hit Bill ] ?  

- b. \* **Who** did you hit Bill [ before you hit \_\_\_\_\_ ] ?  


One could imagine that these sentences could be uttered as questions in a context where an interlocutor has just said either (2a) or (2b):

- (2) a. I hit *someone* [ before I hit Bill ]; but I don't know who.  
 b. I hit Bill [ before I hit *someone* ]; but I don't know who.

Both these sentences are fine, because there is no extraction from the position of 'someone' in either. Let us lay to rest a possible conjecture that (1b) is bad because the extraction is from an embedded clause and so the movement is 'too long'. In (3) below, the movement is equally long, but the sentence is fine; the difference here is that the embedded clause is a complement and not an adverbial adjunct.

- (3) **Who** did you say [ that you hit \_\_\_\_\_ ] ?  

 An arrow points from the blank space in the embedded clause to the word 'Who' in the main clause, indicating movement.

It is not only adverbial clauses that disallow subextraction from within them. Relative clauses also behave in the same way. In fact there is a host of syntactic configurations that are opaque to subextraction. Explaining their behaviour was the task of a subcomponent of GB called Bounding Theory. The central proposal here was that apparent long extraction was actually done in short steps, each step being to the left boundary of the immediately containing clause; and complement clauses offered a landing site for the step – an “escape hatch” – in their left periphery, but adverbial and relative clauses did not.

It is difficult to see how this explanation would translate into observable brain behaviour. In more recent linguistic work (however), an alternative analysis has been proposed for certain of the syntactic islands. In Nunes & Uriagereka (2000), it is claimed that adverbial adjuncts are built-up separately from the main clause in a parallel derivation; and that they are already 'spelt out' when they are merged with the main derivation. ('Spell-Out' is an operation by which a syntactic structure is interpreted both phonetically and semantically, i.e. is assigned a phonological form and a meaning. After a structure has undergone Spell-Out, no further change can apply to it; in particular, no phrase can be extracted from it.) In fact, there had been an earlier suggestion, in Lebeaux (1988), that relative clauses are merged in the derivation 'late'. Although this suggestion was made in order to explain certain anaphoric relations, we can readily see that it falls in line naturally with the Nunes-Uriagereka analysis that adjuncts are derived separately. Putting the two ideas together, we can say that adjuncts – whether adverbial adjuncts or

relative clauses – are not only built up separately, but built up late. This would explain their island behaviour. We can now dispense with the Bounding Theory of GB. Although we, perhaps, do not yet have fine enough tools to observe the brain to determine whether there is a ‘timing’ difference between the building up of the main derivation and that of adjuncts, this is a potentially verifiable hypothesis by brain research – unlike the Bounding Theory.

### III

Actually the one big thing that made early Chomskyan linguistics psychologically unreal was the way a sentence (or a clause) was generated. In the *Aspects* model – i.e., the theoretical model set out in Chomsky’s *Aspects of the Theory of Syntax* (1965) – this task was conceived as follows: first one selected the symbol S (which stood for ‘sentence’), then applied a phrase structure rule that rewrote it as follows:

(4)  $S \rightarrow NP \text{ Aux } VP$

Other phrase structure rules rewrote NP, Aux and VP (in various ways, to reflect the variety of types of Noun Phrases, auxiliaries and Verb Phrases that English can have). One could eventually have (among other options) the following pre-terminal string. (A pre-terminal string is a string of category labels that can only be replaced by lexical items, not by other category labels.)

(5) Det N Tense V Det N

Now an operation of “lexical insertion” took place, replacing each of the category symbols with a lexical item (word or morpheme) of the appropriate category. The result could be the following:

(6) the princess -ed kiss the frog

This would be (with bracketing, which we have not indicated) the ‘deep structure’ of the sentence *The princess kissed the frog*.

Note that sentence generation proceeds from top to bottom, beginning with S and ending with words and morphemes. This was an algorithm that Transformational Grammar inherited from the IC-analysis (‘immediate constituent analysis’) of structuralist grammar. The main focus in these early days was to get the constituent structure



right in terms of an algorithm that had the mathematical property of recursion. (Recursion enabled the grammar to generate an infinite set of sentences.)

But this top-to-bottom procedure could make no pretence to psychological reality. Obviously, a speaker does not plan an utterance by first choosing the category symbol S! He or she does not first prepare a syntactic frame by going through a sequence of rewrite rules, and *then* choose words to fit the frame. Instead, a speaker starts with ideas, which correlate with words. The words then determine the syntactic frame. For example, in (6), it is the choosing of the verb 'kiss', a transitive verb, that determines that there should be a direct object. Similarly it is the choice of the nouns 'princess' and 'frog' that determines that there should be a determiner in the phrases containing these nouns.

The first indication of a reversal of the direction of structure-building was the proposal in GB theory (Chomsky 1981) of a new principle called the Projection Principle. This said that all syntactic structure is projected by lexical items; or, to put it more strongly, there can be no syntactic structure except what is projected by lexical items. As we know, each lexical item brings with it a small structure around it, which is necessitated by its meaning. This is the structure of the phrase that the lexical item is the head of. For example, 'kiss' requires a 'kisee,' which must be a 'thing'; and things are signified by nouns. This means that 'kiss' brings with it the structure of a transitive verb phrase; or in other words, 'kiss' projects such a phrase and is the head of that phrase. Similarly, the Tense morpheme '-ed' projects a clausal structure. The Projection Principle says that all the structure in a sentence is put together from the structures projected by its lexical items.

A corollary of the Projection Principle was that the old phrase structure rules were dispensed with, as being redundant. But in the 'GB days' – i.e., throughout the 1980s – we continued to build sentence structure from top-to-bottom, which was an anomaly.

This anomaly was addressed in the next big development in Chomskyan linguistics. In an extended essay titled "A Minimalist Program for Linguistic Theory" (1992), Chomsky proposed an overhaul of theory; the new theory came to be known as Minimalism. Perhaps, the most striking innovation of the new theory was the proposal that syntactic structures should be built from bottom to top. Chomsky didn't need to be extremely innovative to come up with this proposal, because the bottom-to-top algorithm was already the sentence-building procedure of two rival, contemporary

approaches to Grammar, namely Tree Adjoining Grammar (TAG) (which was being developed by a group of computational linguists) and Montague Grammar (which was being pursued by some semanticists).

But a thing to note is that with the new algorithm, a certain syntactic operation came to prominence, namely Merge. Merge became the driving force of syntax; given a Lexicon, i.e., a dictionary of words and morphemes, it could build every possible structure — the infinite number of structures — of a language. In Minimalism it was further suggested that Merge be restricted to being binary; that is only two syntactic elements could be put together in a single application of Merge. But the syntactic elements that are so put together can themselves be simple or complex. All the permutations and combinations are possible: both terms can be simple, cf. (7a), one term can be simple and the other complex, cf. (7b), or both terms can be complex (cf. 7c).

- (7) a. [the] + [cheese] → [the cheese]  
 b. [eat] + [the cheese] → [eat the cheese]  
 c. [the mouse] + [eat the cheese] → [the mouse eat the cheese]

Now since the Lexicon contains only simple elements, the question arises: where do the complex elements come from? Obviously, if the Merge operation could source its terms only from the Lexicon, it would be unable to handle cases like (7b) or (7c). The answer has to be that Merge can take (as a term) the output of other Merge operations. This forces us to the conclusion that there are parallel Merge operations taking place, perhaps simultaneously, in different sites of the mind/brain. That is, there is parallel processing of language in the mind/brain. Now this is a computational idea, and not a purely syntactic idea.

Many imaginative extensions suggest themselves at this juncture. For example, when we are speaking about Merge, are we speaking only about Language, or also about thinking? A property of Language that has often been emphasized by theorists of Language is that Language is infinite, in the following sense: while one can say how many words and morphemes a language has, that is, the Lexicon of a language is numerable, one cannot say how many sentences a language has, i.e., its sentences are innumerable. It achieves this infinity because of

recursion: one can have a sentence inside another sentence, a noun phrase inside another noun phrase, etc. (This fact is captured by the dictum ‘Language makes infinite use of finite means.’) Now one can say the same thing about thoughts: they are innumerable. Another property of Language is its creativity: every sentence one speaks is a ‘new’ sentence, in the sense that it is made up for that occasion. Now one can say the same thing about thoughts: each thought arises as is appropriate for an occasion. So then, can we extend the driving mechanisms of Language to thought? To put it more narrowly, is binary merge also the operation by which the mind/brain puts together thoughts? We shall not pursue these ideas here because we still know very little about these questions. At the same time, we can keep in mind Chomsky’s observation that Language is the best understood part of human cognition.

To come back to our original question: how has linguistics changed in order to make itself more amenable to investigations of the brain? As we saw, Minimalism was a kind of watershed: it proposed a derivational algorithm that went from bottom to top, starting with words and ending with structured sequences of words, which seems to mimic the way in which a speaker goes about putting together an utterance. Besides, this algorithm had a central driving mechanism, Merge, which (as we pointed out) seems to have resonances in other parts of brain research such as our investigation of Cognition. Apart from all this, an important step of Minimalism was the insistence that all the principles of language must be explained either (i) as economy conditions, or (ii) as legibility conditions imposed on derivations by the two outside systems that interface with language. On the sound side, the interface is with the articulatory system, which is a physical system and which is not particular to language in any sense: the lips, and the tongue, and the larynx have other functions. And the articulatory system tells language: “If you generate a sound that requires the tongue to be both high and low in the mouth at the same time, I cannot do it!” Similarly the meaning-making component of the brain — which again is not particular to language: its primary job is to make meaning of the world (of things and events) — tells language: “If you have an unbound variable, i.e., an expression whose reference cannot be determined, I cannot interpret it.” By forcing linguistic research to take cognizance of outside systems, Minimalism brought UG out of its modular isolation.

Similarly, Chomsky (2000) (“Minimalist inquiries”) proposed the theory of phases. This says that a derivation is spelt out in small chunks called ‘phases’. Once a chunk is spelt out, the derivation

no longer has to remember its internal structure. Therefore, at any point of the derivation, the derivation has to remember only what is currently being built up, because the earlier part of the structure — the earlier phase — is reduced (as it were) to a ‘word’. This lightens the burden of the derivational memory. The larger point is that linguistics is now taking into account another module of the mind/brain, namely memory. (In early stages of Chomskyan linguistic theory, memory figured only in a minor role, e.g., in explaining some performance errors.)

In “Beyond Explanatory Adequacy” (2004), Chomsky insisted that the principles of UG should be completely explained in terms of (i) the legibility conditions imposed on a derivation by the outside systems that interface with language, and (ii) considerations of computational efficiency. We should do this in such a way that, after what can be explained by these two factors, the residue of UG should be nil.

Now these factors are language-independent. Interface conditions are things that language responds to. Computational efficiency could be even organism-independent: the need to limit the “length of wiring” in an operation is something that applies to all biological systems.

What we see then is that since the beginning of Minimalism, Chomsky has been moving towards biolinguistics, i.e., a linguistics that is based in biology. This should make its approximation to brain research easier.

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## THE INTERACTION BETWEEN LANGUAGE AND VISUAL PERCEPTION

R.K. Mishra

### Introduction

Language is a very complex yet structured symbolic system which humans use to communicate. Much of the twentieth-century linguistics has revealed its internal structural organization as well as its many surface varieties found around the world. Psycholinguists have discovered many psychological and neurobiological aspects of language processing using different methods. However, in spite of the many applications of these techniques that can even map neural functioning as one uses language, our knowledge is limited. Although we can describe the symbolic structures of language using models, we are yet to know how it is supported by our brain's general cognition. Cognitive scientists have made substantial progress in exploring which cognitive systems influence language processing in different modalities. For example, how working memory, vision, and attention modulate the functioning of language. Chomsky has said that the study of language is part of cognitive psychology. By saying so, he situated its investigations within the ambit of psychology and biology. In last few decades, experimental psycholinguists and cognitive psychologists have unearthed which psychological mechanisms influence the processing of language. In this paper, my focus is to examine and narrate how language influences our visual perception. How comprehension of language leads to subtle variations in our cognition. Among many examples of domains where such a thing occurs, I will demonstrate with experimental examples the case of language-driven eye-movements. In particular, I will demonstrate the cross-modal nature of cognition where both vision and language interact dynamically. With the use of sophisticated techniques like the online recording of eye-movements that manifest our visual and attentional shifts, it will be obvious that the processing of language is multimodal. Both speaking and listening to language influence

what we see and the concepts we activate. Albeit these conjectures may be valid at least with regard to certain specific experimental procedures this can be extended to the real world situation. The empirical investigation of language processing together with visual processing has led to a clearer understanding of our basic cognition. Although Fodor had declared that language processing is modular, it appears that it is not so. After introducing the fundamental nature of language-mediated eye-movements, I will discuss some specific experimental details that reveal such cross-modal interaction, particularly the activation of phonological and semantic systems during spoken-word processing and speaking. These results have also been extended to the processing of language in bilinguals. In sum, speaking, listening and seeing appear to influence one another dynamically during cognitive processing.

#### Listening and Looking: The Language Attention Interplay

We create language to describe what is there around us. Our sentences describe the relationships between objects or actions agents perform on objects. Therefore, listening to some language implicitly forces us to search for such objects described by the language. Of course, one can always make a sentence whose meaning is abstract and one cannot readily find any object in the environment that matches to its description. In most ordinary situations, we actively or even implicitly look for objects that we hear about. For example, if you are in a room and you hear the word 'fan', it's likely that you will look up towards the roof. This quick shift of attention towards the roof is an outcome of our sensorimotor experience. A lot has been written on these perceptual and sensorimotor aspects of language in cognitive linguistics (Talmy, 2000). Since sentences are about something, our visual system searches the objects as soon as we comprehend them. While the above description seems intuitive and even simplistic, empirical data demonstrating this has come only now. The precise manner in which spoken language leads us to look for objects or agents in the environment can be studied tracking eye-movements of people in naturalistic contexts. It was Cooper (1974) who first showed that as soon as people hear a word, they shift their gaze towards an object which matches the description. Cooper used eye-tracking as a method to study this dynamic relationship between spoken language comprehension and shifts in attention towards objects in the environment. He presented four or so line drawings on a computer monitor and then a speech fragment about it. For

example, when people heard the word ‘Africa’, they looked at the picture of a lion immediately in the display. This shift of attention to an object which was related to the spoken word was very fast. This mechanism can be explained by assuming activation of sensorimotor experiential knowledge triggered by the language. This interaction has been one of the most central tenets of embodied cognition. Many have studied using other methods how people mentally simulate events when they listen to sentences. Thus, Cooper was the first to demonstrate that language comprehension is a dynamic multimodal process. It is not a mere symbolic computation which is amodal. Importantly, that study also opened up the possibility to further examine how and why language comprehenders look for objects in the environment described by sentences. Later researchers termed these studies that mapped language-mediated eye-movements to objects as visual world studies. These studies then claimed the very non-modular and interactive nature of language processing.

The human visual and attention system has evolved to help us find the prey and other objects of interests in the environment. One of the properties of attention is to shift continuously from one point of interest to another (Klein, 2000). Cooper had also demonstrated that people are not merely looking at the object directly referred to by the language but also at related objects. For example, early studies showed that when participants heard a word, they also looked at an object which sounded like it. Many later studies have shown that language comprehenders activate phonological, semantic as well as perceptual information about the object and they actively look for any object which is related in any manner in the environment. In one early study it was demonstrated that when people heard a word, they also looked at an object which was semantically related to that word. A comprehensive review of such studies is beyond the scope of this chapter, and the interested reader is referred to many important reviews that describe them (Huettig et al., 2011; Mishra et al., 2013).

The idea of Cooper was very powerful, at once, both from a methodological and conceptual points of view. Cooper used the commonsense understanding that language refers to things in the world including actions. Before him, the Russian psychologist Alfred Yarbus (1967), in his famous monograph titled “Eye Movements and Vision”, dealt at length with the physiological nature of eye-movements as well as on the top-down influence of context on our visual perception. Yarbus had developed his eye-movement measuring device, although very complicated compared to today’s easy-to-use video-based eye trackers. Yarbus presented participants



a painting that depicted a stranger entering a room full of people, and asked participants a few questions as they looked at the painting while he tracked their eyes. His main interest was if people looked at objects of interest in the picture with regard to the questions. That is, if top-down goal influenced visual perception. Of course, the interaction between top-down and bottom-up factors and their role in cognition has a very long and contentious history in cognitive psychology and perception. Simply speaking, top-down goals are endogenous and self-driven while bottom-up forces depend on the saliency of the objects. Philosophically, one can also stretch this line of argument to basic division in human sciences into the rationalist and the empiricist traditions. Yarbus found that people's eye-movements depended on what they were evaluating in each question (Figure 1). Yarbus's technique was excellent, and it showed that where we look often is an outcome of what we want to look for. Although environmental stimuli trigger many a times eye-movements and we look at things as if automatically against our will, soon after top-down factors start playing a role. Yarbus conclusively showed that saccades (very rapid eye-movements that change point of view) and fixations (stable eye-movements) reflect our ongoing cognition. Yarbus measured what is known as a scan path for his studies. A scan path is a chronological record of a viewer's fixations as he inspects a picture. The scan path can give clear ideas about the perceptual and cognitive trajectory of his processing, moment by moment. Ever since then, cognitive scientists have used these observations as the gold standard to examine human cognition in a visual context. Thus, Cooper was already standing on the shoulders of giants when he thought of examining how spoken language may influence ongoing cognition in a cross-modal situation.

Some technical details must now be given about the main methodological aspects of Cooper's experiments before we start appreciating how influential this development was in the history of most cognitive psychology and psycholinguistics.

Unlike Yarbus, Cooper was not interested in just examining where people look, given some visual stimulus. He was interested in getting hard evidence about the fact that words activate many concepts related to them. Most contemporary psycholinguists believe in the spreading activation of concepts. That is, given one concept, all other related concepts become active during cognitive processing. Cooper also used fragments of spoken words as his primary independent variable in his studies. By giving participants spoken words and then presenting a display that contained line drawings, he made the



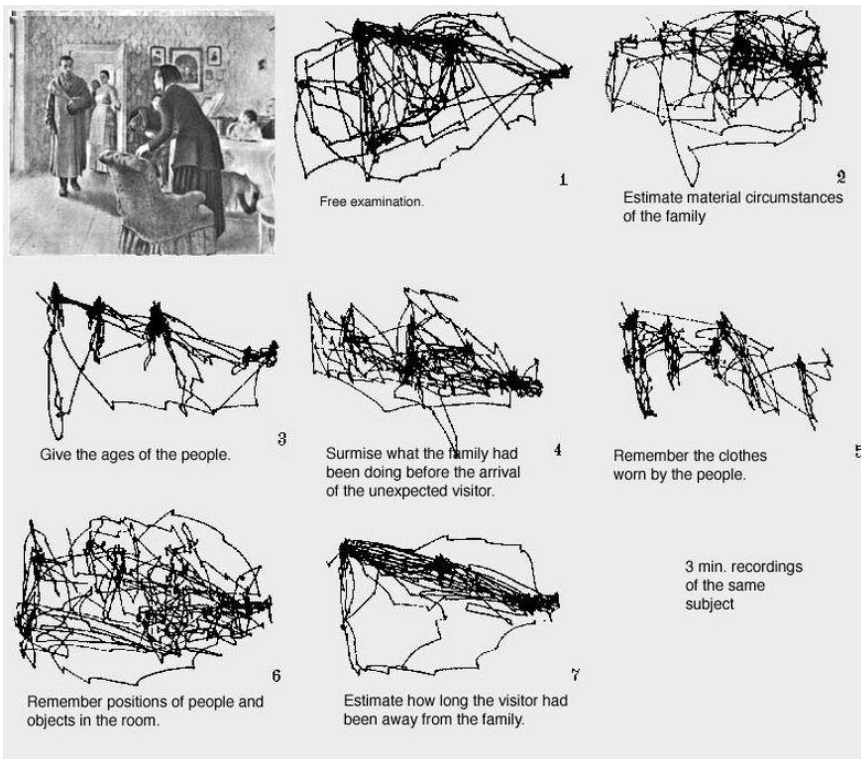


Figure 1. Russian psychologist Yarbus's experimental results.

experiment cross-modal. His main aim was to examine the magnitude and extent of concept activation as reflected by the eye-movements. It is not enough just to conclude that language perceivers activate concepts related to what they hear but the key question is when do they activate this. Thus, the temporal aspect of the issue became pivotal in all later use of this paradigm. Cooper also very cunningly manipulated the objects and their significance as well as their inter-relationship with the spoken word's meaning in his design. While the participants saw the object which the language described, there was also a related object in the display. This allowed Cooper to measure the time course of concept activation in relation to the target. Target in this parlance is what is referred to by the spoken language. In most modern forms of this visual world paradigm, authors have shown that language users also activate objects related to the spoken word in the absence of the referred object in the display (Huettig, Rommers, & Meyer, 2011; Mishra, Olivers, & Huettig, 2013). This makes sense since often in the real world we do not see the object mentioned by the language as such in our vicinity but something that

is related to the object. Evolutionarily, this must have been preferred by the system to make us more alert and careful. Cooper also showed that semantic and conceptual information is active instantly with the spoken word presentation. In the many modern uses of this paradigm, dubbed as visual world paradigm, researchers still use the basic assumptions of Cooper albeit with some modifications. They still measure activation of concepts as one listens and looks at a display. The paradigm is used now to answer key questions in psycholinguistics, and the examples are many. The paradigm has not only been used in answering fundamental questions related to time course of concept activations during spoken-word recognition but also more deep questions about mental states (Altmann & Kamide, 2009) and many more. Much of this history with regard to current uses and their theoretical significance have been captured in Mishra (2015).

Apart from Cooper, it was the eye-mind hypothesis by Just and Carpenter (1976) which brought different variables together in understanding what eye-movements reflect about cognition. Just and Carpenter used eye-tracking in understanding linguistic and cognitive processes in reading. The eye-mind hypothesis claimed that the locus of our gaze reflects what is on our minds at that moment in time. The locus of the gaze that happens for a sustained period also can be taken as the locus of selective attention. Thus, in the context of reading which is an acquired cognitive skill unlike speaking and listening, readers swiftly move across words as they acquire information for comprehension. These rapid movements are nevertheless irregular and uninterpretable. The important work by Keith Rayner (1975) on this has revealed how eye-movements show the very subtle aspects of linguistic comprehension during reading. Note that the eye-mind hypothesis was different from the way Yarbus had explained his results. Of course, the paradigms differed in important ways, but both approaches have used eye-tracking as their main method. Both were interested in knowing how eye-movements reveal about ongoing cognitive processing. Just and Carpenter measured saccades and fixations as readers read the text for comprehension. More importantly, they found that readers are not always looking at each word as they are reading ahead. There is a certain amount of automaticity to be observed during eye-movements in reading. Although what I describe later is more on the lines of Cooper and Yarbus (I discuss top-down goals), I also think that knowledge gained from eye-movement analysis in reading has offered very influential theorization about the dynamics of cognition. Reading being a complex visuo-linguistic process is

well suited to measure the temporality of cognition. One important finding in the field has been that fluent readers always acquire information ahead of their eye-movements to those parts through parafoveal processing. That is, they intuitively know what comes next using anticipatory processes, and this often influences how long they are staying at the current location. But reading as a paradigm has its constraints, as is well known. Primarily because a vast amount of individual differences is observed with regard to reading fluency and reader's attention span. Reading is not as easy and natural as listening and speaking. Further, many have developmental dyslexia and also poor reading because of various reasons starting from socio-economic to cognitive. Nevertheless, the eye-mind hypothesis certainly helped pitch the focal point of using eye-tracking to measure active cognition.

If one reads the history of this fascinating multidisciplinary work on perception, cognition, eye-movements and the use of language, it will become clear that many cognitive psychological constructs have been invoked far too often in explaining the results. One such example is the construct called attention. It's clear that when we are inspecting something visually, we are paying attention to it in a layman's terms. However, there is considerable disagreement on this simple theorization till date. Hoffmann and Subramaniam (1995) did find evidence for the claim that eye-movements indeed indicate attentional locus. However, what about parafoveal perception and looking around randomly when we acquire information from our surroundings? The point I am trying to bring home is if attention is centrally deployed when I am looking at something with respect to some spoken language. Cooper in his original work had not dealt with this point at length, and it was taken up by psycholinguists only later. For example, it is now known that both working memory and attention (Altmann & Kamide, 2007; Huettig, Olivers, and Hartsuiker, 2011) are involved in such language-mediated eye-movements, as seen in the Cooper type of experiments. The key role of language in centering attention has been well developed by cognitive linguists (Talmy, 2000). For example, Talmy found that a sentence has a figure-ground construct like the way we see natural scenes. What is emphasized in a sentence is what is under attentional focus. Jackendoff (1987) in his many theorizations has also compared linguistic processing to visual processing. According to Jackendoff, language transduces what we grasp from visual processing. Although language used to describe the visual world is not always enough and cannot be so, it helps bring attention to things that matter. For example, as is well-known, the many deictic and referential

systems employed by world's languages demonstrate this function of language. This also includes prepositions that tell us where to look for something in the surrounding. Therefore, spoken language channelizes attention in the environment which in turn is reflected by eye-movements. Although the exact mechanism that connects eye-movement programming to the attentional mechanism is beyond the scope of this paper, it can be asserted that human language system is a powerful manifestation of our core attentional system. Language expresses even in dynamic conversational situations what is important then, and speakers and listeners cooperate accordingly. Thus, the role of attention in understanding the key interplay between visual perception and linguistic analysis is very crucial. Finally, eye-movements, the way we measure today in the so-called visual world paradigm, reflect the combined dynamic interplay between language, vision, and attention (interestingly, the theme of the monograph by Mishra, 2015).

Michel Spivey in his 2007 book *The Continuity of Mind* emphasizes the dynamic aspects of cognition which online methods like eye-tracking record. Cognition is never all or none. For example, even during sentence processing our cognitive system entertains many interpretations of the sentence before it settles on one. This has been amply demonstrated in the extensive research on ambiguous sentence comprehension. Since language is often ambiguous and context-bound, what we interpret at which moment in time depends on many factors. Again, Fodor, in his essay on Modularity, had not considered this possibility and had settled for the view that structural interpretations are cognitively impenetrable. However, it has been shown many times that our comprehension system always considers possible alternatives of interpretation before finally rounding off one as the one appropriate for the moment. The visual world eye-tracking paradigm allows us to capture this moment-by-moment nature of competition among the alternatives which is a hallmark of human cognition. Reaction time studies do not allow us this possibility since their data often indicate the very end stages of cognitive decision-making. Tanenhaus and colleagues, in the context of sentence processing using visual world had demonstrated that what we hear and what is in front of us at the moment can dynamically alter our interpretation. Similarly, the use of visual world paradigm in spoken-word comprehension also shows that even when we hear a word, we activate all possible competitors related to this word. This, at once, shows the fluid yet automatic nature of cognitive processes. Although context can modify the interpretations of words, yet competition does

occur. This is what I will demonstrate later using one experimental example from my studies where the visual world paradigm was used in ambiguous homophone processing in the Hindi language. Likewise, language comprehension is also all the time massively predictive. Listeners generate many probable representations when they actively process any fragment of language. Typical entities of languages like adjectives and certain case markers can help generating such predictions. For example, in Hindi, adjectives are gender congruent with the nouns they modify. When listeners are presented with such adjectives, they can anticipate the appropriate nouns that are good enough for them. This was also demonstrated by Mishra and Singh (2014) in an eye-tracking visual world study in Hindi. Thus, the visual world method allows us to capture at once the dynamic and evolving nature of cognition and also crucial process like prediction and anticipation.

Both anticipation and simultaneous consideration of alternatives during language interpretation are now considered a regular feature of language processing. Early work by Altmann and colleagues on anticipation using the visual world eye-tracking method showed that human participants could predict an event's outcome by listening to sentence fragment. Listeners can also predict the prototypical attributes of an agent using their contextual knowledge. For example, in one study Altmann and Kamide (2007) presented a display which had a girl and a man with a bike as agents, along with the picture of a candy and another object. When participants heard the sentence that began with the fragment 'the girl will eat ...', most participants looked at the candy. Similarly, when the sentence began with the sentence "the man will ..." they orientated their gaze towards the motorcycle. This shows that listeners used their contextual knowledge of the real world in shifting their attention. Therefore, this was not just an act of structural interpretation of the sentences or predicting its semantics but situating that comprehension in the environment itself. This embodied, and sensorimotor angle to sentence comprehension in the presence of visual scenario offers rich understanding into the dynamics of language comprehension. Similarly, in another study, Altmann and colleagues examined if listeners use mental simulation to map changes in event state. They presented pictures where either an empty or a half empty glass was seen. Participants listened to a sentence that began "the man will drink the beer..." Immediately listeners started to look at the half empty glass in anticipation. This demonstrates that language users mentally simulate events and change of states as they incrementally

listen to the language. Eye-tracking evidence could demonstrate not just when participants started to look at the object that confirmed their predictions but for how long. Such evidence also corroborates other findings that have shown mental simulation during language comprehension. The key point here is anticipation and prediction which seems to motivate the eye-movements towards such objects that are relevant. Thus, eye-movements measured in such a scenario don't just indicate if people are comprehending the language but also their predictive strategies.

### Context and Ambiguity in Spoken Sentence Processing

Much of what I have said so far dealt with both methodological and conceptual aspects of the visual world paradigm. Along with it, I mentioned that this allowed the study of contextual language processing in a systematic manner where eye-tracking data provide valuable online measures. More importantly, using information processing cross-modally also allows us to study anticipatory and predictive processes during language processing. Furthermore, this can be useful to study how language users consider alternative meanings that may not be appropriate during the comprehension process.

Ambiguity during sentence processing may arise because of the way we process words. Take, for example, the English word “pen”, which has a dominant meaning of a writing instrument and a non-dominant meaning of ‘enclosure’. Dominance here is linked to frequency of use in everyday speech. A long-standing debate in the psycholinguistics of lexical ambiguity resolution has been the effect that the sentence context has on lexical ambiguity resolution. In the context of lexical homophones, one may wonder if the primary (dominant) meaning and secondary (non-dominant) meanings of homophones interact differently with context. People access the dominant meaning, e.g. pen as writing instrument instantly when they find it in sentences. However, they also access the non-dominant meanings of such homophones. Many studies have found that both dominant and non-dominant meanings are active at the same time, however, to different degrees. Already it has been elaborated that such joint activations of concepts during language comprehensions are a norm of such cognition than deviance. The question is, do the subordinate meanings of ambiguous homophones get activated even when the sentence context is further biased towards the dominant meaning? Does enriching the context towards one meaning stop the activation of the other irrelevant meaning?



Mishra and Singh (2014) examined this issue using ambiguous homophones in Hindi and manipulating the sentence context. For example, a word like '*choti*' has two meanings. One meaning of '*choti*' is 'hair lock', and another is 'hilltop'. Other researchers had observed that the dominant meaning is active regardless of context (Kambe, Rayner, and Duffy, 2011). Also, even after any contextual bias, the non-dominant meaning is still activated to some extent (Duffy, et al. 1998). Others have argued that if prior context is sufficiently biased towards one meaning of any ambiguous homophone, then the other non-dominant meaning may not be active at all (Simpson, 1981). Many researchers had studied these using reading as a model. The visual world eye-tracking paradigm has been used to measure online activation of dominant and non-dominant meaning activations in the case of ambiguous homophones. For example, Huettig and Altmann (2007) presented participants a display containing line drawings that had a shape competitor of an ambiguous homophone "pen" with its dominant meaning along with distracters. Critically, the presented spoken sentences had a boosted activation of the subordinate meaning. For example, the sentence: "the welder locked up carefully, but then he checked the pen." The question was if such a strong contextual bias towards the subordinate meaning will eliminate the activation of the dominant meaning. The visual world paradigm allowed the experimenters to map activations online in the form of the proportion of fixations to different objects over time. The data showed that even when the sentence was biased towards the subordinate meaning, the shape competitors of the dominant meaning were still not ignored. This showed the pervasive nature of lexical activation even when the context clearly mandates the activation of one.

Mishra and Singh (2014) wondered what if one gives a further boost to the dominant meaning of an ambiguous homophone in the sentence; will it completely subside the activation of the subordinate meaning? If subordinate meaning activation persists, then it will indicate a complete context-independent mechanism of lexical activation. They too used the eye-tracking visual world paradigm like Huettig and Altmann (2007), and explored the effects using shape and semantic competitors. The distinction between them is perceptual, not conceptual. Shape similarity is based on low-level perceptual analysis, for example, the similarity between a coin and the moon. They both are roundish objects, but they don't share any conceptual or lexical similarity. However, there are objects that share semantic similarity but are perceptually different, e.g. a goat and a cow. Thus, Mishra and Singh (2014) wanted not just to

explore if the contextual boost to the dominant meaning overrides any subordinate activation, but how such a competition will be seen in eye-movements when we have objects that are either perceptually or semantically matching. Huettig and Hartsuiker (2007) earlier had established the time course of activations of such concepts during spoken-word recognition. Mishra and Singh (2014) used Hindi homophones. One of the meanings could be considered as dominant and the other subordinate. This fact was tested through ratings done by Hindi native speakers. Below I give sample sentences taken from Mishra & Singh (2014)

### Example of Sentences Used:

#### 1. Neutral sentence

*'Bato bato me choti ki charcha hone lagi.'*

*Talk in mountain peak/hair lock about discussion began*

'While talking the discussion on **choti** (mountain peak/hair lock) began'

#### 2. Biased sentence

*Himalaya parbat ki choti aath hajar meeter wuchi hai*

*'Himalaya mountain's peak eight thousand meter high is'*

'The **choti** (peak) of Himalaya is at the height of 8000 mts (biased sentence with dominant meaning 'mountain peak')

As is evident, one sentence was biased towards the dominant meaning while the other was neutral. The use of the word "neutral" here as far as activation goes can be tricky. Even for neutral it's assumed that the dominant meaning will get most activation compared to the subordinate meaning. The following figure (Figure 2a) represents a sample trail used in the experiment.

The results in the form of eye-movements over time to different objects for different sentence conditions showed a very interesting pattern (Figure 2b). The initial bias towards the dominant meaning did lead to low activation of the subordinate meaning. Listeners looked at the shape competitors of the critical homophone words in both sentence contexts more than the unrelated distractors. However, such eye-movements were higher for the neutral condition than the dominant bias condition. This pattern of results suggests that while context may modulate activation of irrelevant lexical items, it cannot eliminate them. Language users, thus, seem to activate all possible meanings of ambiguous words simultaneously and after some competition settle for one. As has been described before,



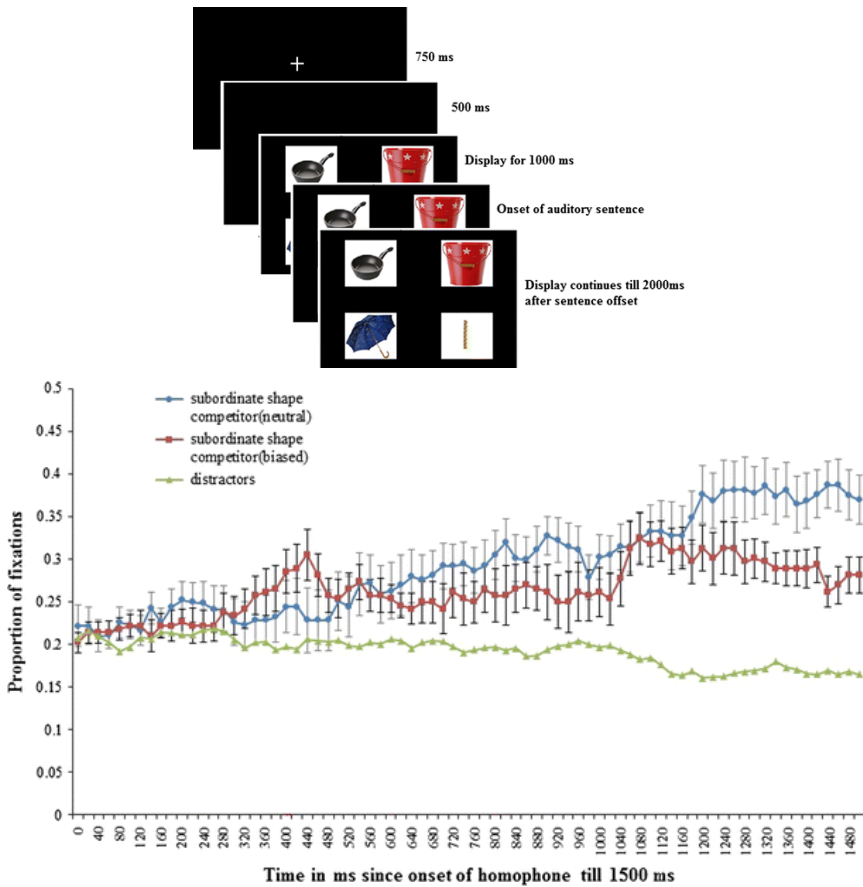


Figure 2. (a) Sample display showing four objects and trial sequence. After a central fixation, participants see four pictures on the computer screen. After a delay of 1,000 ms, a spoken sentence containing an ambiguous homophone is presented. (b) Proportion of fixation plots for different objects in the display after critical spoken word onset.

the main contribution of the visual world eye-tracking data lies in capturing the online dynamics of lexical competition in the form of eye-movements towards visual objects. Mishra and Singh (2014) also did a second experiment where they used semantic competitors of the subordinate meanings. This experiment was similar in every aspect compared to the first one. The results showed that just like the first experiment, listeners still looked at the semantic competitor of the subordinate meaning when the context was biased towards the dominant meaning. These results thus demonstrate that both perceptual information and semantic information are activated for subordinate meanings even when the context supports the dominant

meaning.

Of course, there are some caveats with the visual world method, and they often may be considered as its limitations. One argument has been that here we present the pictures in an artificial manner and in the real world spoken words occur amid a wider array of visual objects. One of the objects which are related to the spoken word is strategically placed among distracters. This may lead to strategic processing and looks among the listeners. They may know that one picture is related and therefore may look at it preferentially. For instance, in the above example, the picture that was related to the shape of the subordinate interpretation. However, this language-mediated eye-movements occur at such rapid time scale that it's difficult to conceive of any strategy (Salverda and Altmann, 2011). Secondly, when asked later, most participants seem not to note any relationship. Since there are many participants and many trials, any such strategy in some is cancelled out when grand averages are prepared. The activation patterns then give an unambiguous record of lexical activation. Such activations suggest that lexical activations during language processing are unconstrained and if at all the constraints show their effect later, in the course of time.

### Individual Difference and Language-Mediated Eye-Movements

At this point, most researchers are concerned about accounting for their data with regard to individual differences. One major objection to much of the data in psycholinguistics and cognitive psychology in the last several decades has been that they come from only very particular types of populations. In other words, invariably researchers take their participants from university students, who of course, have a very high degree of literacy and language skills. Furthermore, basic cognitive systems like attention, working memory and visual perception including familiarity with computers (most experiments are computer-based) is very high with this population. Therefore, based on this data, we do not know how such results will be with other populations, for example, say those who lack formal literacy or even those who have no computer training. Individual differences include an understanding of such basic cognitive factors of an individual and how together they influence that individual's cognition. Of course, healthy children and healthy adults differ on a wide range of tasks because children's cognitive system is still at an evolving stage. We see also a wide range of scores among adults, since not all have similar working memory capacity and attention

abilities. Much research that has explored sentence processing with regard to working memory has shown this already. Similarly, adult students who have any developmental reading impairment tend to perform poorly on many psycholinguistic tasks. Therefore, any deep and wholesome understanding of cognition, and when it comes to language, processing has to include an in-depth appreciation of individual differences. It's only now that such comparative studies are taking place and the differences obtained are stark.

Individuals may differ very significantly on their cognitive abilities based on their literacy. Many studies have shown that illiterates perform poorly on tasks that require visual discrimination and also language-based tasks. The relationship between acquisition of literacy and overall cognition is well established (Huettig and Mishra, 2014). Unfortunately, in many countries in the world as in India, a very large percentage of the general population is illiterate. Studies have shown that acquisition of reading enhances visual attention and working memory. Therefore, a fundamental difference in cognitive processing may emerge between a literate and an illiterate person. Mishra and colleagues have been studying psycholinguistic processing among illiterates as compared to literates, using methods such as eye-tracking (Huettig, Singh, and Mishra, 2011; Mishra, Singh, Pandey, and Huettig, 2012; Olivers, Huettig, Singh, and Mishra, 2014) and also brain imaging (Skeide, et al. 2017). The limited amount of psycholinguistic studies that have happened in India are with again university students. Therefore, these studies can't reveal how the findings apply to illiterates. Although previously researchers had studied cognitive deficits in illiterates, very few had studied online language processing in such a population. In the first study of its kind, Mishra and colleagues (Huettig et al., 2011) compared illiterates and literates using a visual world task semantic and phonological activation. In that study, literates and illiterates were presented with spoken sentences and pictures on a computer monitor. One of the pictures was a phonological neighbor in one study, and another was a semantic neighbor in a different experiment. The results showed that illiterates were slow in activating these related words as compared to the literate as revealed in eye-movements. This slowness can be interpreted as the result of either poorer working memory or ability to integrate visual and linguistic information online. Most recently Huettig and Janse (2016) have shown that working memory capacity influences the magnitude of language-mediated eye-movements. It's not as such a slowness of spoken language processing but slowness in activating the many related concepts dynamically. Such data reveal

that psycholinguistic processing in the illiterate may suffer as a result of the absence of literacy. More recently, brain-imaging data has also shown that functional connectivity in the illiterate brain among areas that process language and visual information is weak (Dehaene et al., 2010). A more recent work that examined the effect of long-term literacy training on illiterates' brain networks shows increasing functional connectivity. Taken together, literacy can be considered as a major factor indicating individual difference when it comes to explaining psycholinguistic and other cognitive processing. Below I describe a study where illiterates and literates were compared in a task to measure the difference in anticipatory eye-movements using eye-tracking.

Mishra, Singh, Pandey and Huettig (2012) examined language prediction in illiterates and literates using the visual world eye-tracking paradigm. Prediction has now been understood as a major mechanism which explains language processing (Pickering and Garrod, 2007). Prediction arises from experience with language use and helps in anticipating further during language processing. For example, most listeners and readers can anticipate a word that is yet to come in a sentence using their knowledge attained so far. The classic 'cloze' task used in sentence processing examines such predictive processing. It's important to note that prediction is not only used in language processing but most other types of cognitive processing. For example, Singh and Mishra (2016) demonstrated that bilinguals could anticipate a future motor action based on their current understanding of the task in an oculomotor attention task. Prediction during sentence processing is context-bound. Often users of a certain language can predict with a great amount of certainty upcoming words, taking cues of elements specific to that language. For example, the case markers present in Indo-Aryan languages like Hindi can alert listeners what to expect further. For example, at a syntactic level, case markers in Hindi such as 'ko', 'se' and 'ne', when attached to a head noun (agent/subject) at the beginning of the sentence can predict further verbal additions appropriate for such a construction. Similarly, gender markers in Hindi can help listeners to anticipate other nouns that agree with such genders during spoken language processing. Mishra et al. (2012) examined if illiterates and literates differ in their prediction during spoken language processing using eye-tracking. They exploited the fact that in Hindi, adjectives that come before nouns and modify them also agree in gender with those nouns. Further, additional elements like 'wāla' and 'wāli' used in Hindi constructions have to agree in gender

with adjectives and nouns. Below, a sketch is given of the stimuli used, and the logic pursued (Figure 3).

In Hindi, nouns are gender-marked. Adjectives modify nouns, and they also copy the gender endings of the nouns. For example, the adjective ‘uncha’ (high) modifies the noun, e.g. ‘darwaja’ (door). So when someone utters a sentence like “woh uncha wala...”, it is likely that listeners will search for a noun which is masculine and for which such an adjective is appropriate. Thus, it’s a simultaneous evaluation of physical attributes and gender agreement. The study asked if by

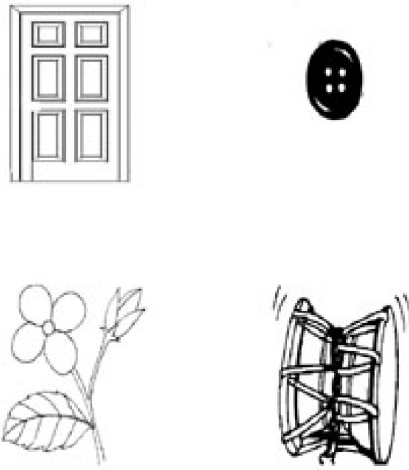


Figure 3. The figure shows four line drawings. One of the drawings is that of a ‘door’. Participants listened the sentence fragment ‘abhi aap ek uncha waala darwaja dekhenge’, literally: Right now, you are going to a high door see —You will now see a tall door. We measured eye-movements starting with the adjective towards the objects. The other three objects are unrelated distracters.

listening to such fragments, Hindi listeners could predict the correct nouns when they see objects on a computer screen. If listeners can anticipate the appropriate nouns, then they will look at such objects preferentially which can be tracked using eye-movements. The design was simple enough to be used with illiterates, as it did not involve any knowledge of written language. Figure 3 shows sample trial, showing the spoken language fragment used with such a display. To generate any useful inference, these kinds of studies require very rigid control of the stimuli. For example, we normed all the adjectives and the nouns for their gender by Hindi native speakers

who did not participate in the main experiment. We asked these native speakers which noun they will choose as the most frequently used noun with such adjectives. It was observed that participants were choosing nouns that were gender congruent. Further, the line drawings were also rated for their acceptability with the names used for them. The task was simple enough where they had to just listen to the sentences and look at the computer monitor. Eye-movements were measured continuously.

The figure below (Figure 4) shows the proportion of fixations for targets and distracters for illiterates and literates. It is evident from the data that soon after the particle onset, literates started orienting their eyes towards the correct noun that was appropriate. This deployment of attention kept on increasing for the literates as time passed. However, for the illiterates, we do not see such bias in attention emerging after the particle onset, and also the overall fixations are low. We can conclude that the literates could predict fast

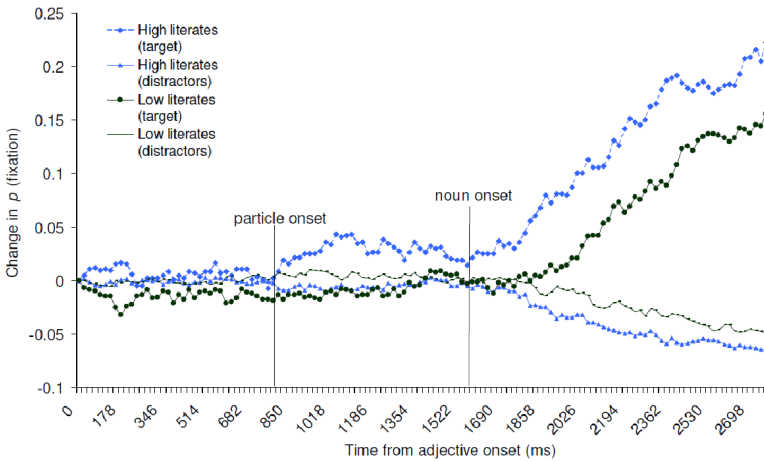


Figure 2. Changes in fixation proportions on the target objects and (averaged) unrelated distractor objects for low literates and high literates. Zero on the timeline is the acoustic onset of the adjective.

Figure 4. Change in proportion of fixations to targets and distractors for high and low literates.

the appropriate noun on the display with the adjective and particle, whereas the illiterates only look at the nouns when they heard this. Therefore, it appears that literacy levels influence predictive processing during spoken language comprehension among other factors. Such online data provide strong evidence first and foremost of the fact that listeners indulge in predictive processing using the information processed from current input. They do not wait till the complete information arrives in the acoustic stream. Why do the

illiterates show deficits in such processing when the task was easy and non-demanding?

The slowness that we saw in the illiterates in their predictive eye-movements may have many reasons. It's unlikely that they did not know the nouns or their genders. Researchers have found that illiterates are slower in naming line drawings (Reis, Petersson, Castro-Caldas and Ingvar, 2001). Is it so that illiterates did figure out which object to look at but were uncertain with regard to its phonological form? Notice that the task used involved only comprehension, not production. In the context of visual world paradigm, a long-running issue has been if listeners name objects covertly even when no production is called for, and this retrieval of phonological form mediates the eye-movements. If illiterates are slow in this mechanism, then this can explain why their eye-movements were slower. Similarly, it is possible that illiterates are slower in basic visual perception. For example, the Russian Psychologist Luria (1976) had found evidence that illiterates are bad with optical illusion. Huettig and Mishra (2014) offer an extensive historical review of the literature on the linguistic and cognitive deficits that have been found with illiterates. No one before Mishra, et al. (2012) had examined cross-modal processing in illiterates. Therefore, we can't be entirely certain without additional evidence that the slowness we found with illiterates is because of their difficulty in naming line drawings or visual perception alone. It has been suggested that the fixation proportions measured as the dependent variable in the visual world task are an outcome of both linguistic and visual processing (Huettig, Mishra, and Olivers, 2011; Huettig et al., 2011). Working memory capacity plays a role in strengthening this connection between visual and linguistic processing in such a cross-modal situation.

### Discussion and Conclusion

I began this paper with an introduction to eye-movements and particularly the visual world paradigm which has been used quite extensively to study cross-modal cognition. The paradigm's strength lies in the fact that it captures moment-by-moment the online nature of cognition. It captures the alternative considerations on the minds of subjects during processing which traditional methods like reaction time could not capture. Further, using this we not only can know how visual information influences linguistic processing but how linguistic information influences visual cognition. The data provide very rich information through mapping of eye-movements if language users are activating lexical units that are not task-related.



This is what Spivey has described in his book, *The Continuity of Mind*. Language processing is then essentially cross-modal and situated. Much of what I have said also coheres with theories from situated and embodied cognition. Classical linguistic and psycholinguistic analysis studied language in isolation from other sensory effects. However, today it is well-recognized that what we speak and what we understand through language uses rich sensory data from other modalities. Many have also studied the conceptual basis of language production using the visual world paradigm. This was not discussed at length in this paper as it was beyond its scope. The paradigm has now been applied successfully in child language research (Holzen and Mani, 2012) and also to understand disordered speech. Below, I make some general observations regarding the data from the two experiments which were presented, and their underlying theory, if any.

Experiment one explored the dynamic influence of prior information in the sentence and its effect on activation of lexical items. In this case, when the sentence was further biased towards the dominant meaning, listeners still activated the subordinate meaning of an ambiguous homophone. This more or less happened when the competitor was presented either as a shape similar or a semantically related object. The eye-movements demonstrate that listeners could activate both a perceptual feature and a semantic feature of the task-unrelated word as they listened to sentences. This kind of data could not be captured with more traditional methods like reaction times or sentence recall, without sacrificing the precision. Thus, in this experiment, the language-mediated eye-movements revealed the online tussle between different representations that we entertain as we listen to words in a sentence. Sentential syntax had no role to play either facilitating or constraining such an effect. Such spurious activations are ever present during everyday language processing. This evidence is in sharp contrast to the assumptions of the more traditional psycholinguistics. We still do not know why such spurious activations happen during language processing when extraction of one meaning appropriate for the context is the key to successful comprehension. Thus, in sum, language-mediated eye-movements as seen in a visual world task reveals how human language processing device entertains all kinds of considerations as it finally settles for one meaning. Similarly, when we do a traditional sentence-comprehension task and ask if the reader agrees or disagrees with certain interpretations, we do not know if he can consider the alternative interpretation at some point in time. This was shown



first with the classic ambiguous sentence “the horse raced past the barn fell”. There, the explanation was more syntactic. However, it’s possible that even when syntax constrains structural interpretations, listeners may still activate all other meanings momentarily.

How these results change our views about language processing in cross-modal context? First and foremost, they suggest that language processing is not modular in the usual sense of the word. Language processing uses all those cognitive processes that are used for other non-linguistic processes. For example, prediction and anticipation are processes that are used by other action systems. Language users use their everyday knowledge to predict and anticipate events or objects to be described by language. We also saw that language processing is constrained by several individual difference factors. Those who are highly literate and those who are illiterates process language differently. Although at this point it’s not possible to pinpoint the exact factors, it is clear that there is large variation among the population. This should alert us to how we do our psycholinguistic experiments and to what extent we can expect homogeneity.

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Mythili Menon, 'Domain-General Representations Shared across Music and Language'. *Studies in Humanities and Social Sciences*, Volume XXIII, Number 2, Winter 2016: 64-86.

## DOMAIN-GENERAL REPRESENTATIONS SHARED ACROSS MUSIC AND LANGUAGE

Mythili Menon

### Introduction

Music is part of human nature and culture, just like language, raising the question of what the relationship between the two is. Recent research has shown that language and music share a number of characteristics (Besson and Schön 2001; Maess et al. 2001, Patel 2003, Patel 2008, Koelsch 2005, Koelsch 2009). One of the crucial characteristics shared across the domains is that language and music use rules and representations. Both the domains use basic units (e.g., words and notes) to build rule-governed higher order representations (e.g., phrases and melodies). Neither language processing nor musical processing proceeds by retrieving 'already-constructed' well-formed sentences or melodies from long-term memory. Sentences are constructed in real-time processing by putting together constituents. Humans can, therefore, understand the meaning of a completely novel sentence, which suggests that language processing proceeds by accessing certain rules, which puts together certain elements from an existing small inventory of primitives. In a similar fashion, music involves production and processing of novel elements combining in a principled manner. Studies have shown that such sequences are perceived in a meaningful way (Antović 2009, Koelsch 2011). How are these two processes inter-related? What commonalities does musical processing share with language processing, in that there

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are activated and shared representations across these domains? An inquiry into the nature of processing across the two domains will shed light on some of the controversial issues of possibly shared cognitive resources between language and music (Jackendoff and Lerdahl 2006, Pesetsky and Katz 2011).

The rest of the paper is organized as follows: contrasting evidence from neuro-psychology for domain specificity is provided with evidence for domain generality from neuro-imaging in Section 1.1. Patel's (2003, 2008) shared resource hypothesis for language and music is in Section 1.2. In Section 2, the aims of the paper are discussed after which a brief overview of structural priming across domains is summarized in Section 3. In the next section, (Section 4), we talk about the rationale behind the stimuli and the notion of priming in the musical domain followed by the Experiment in Section 5. Section 7 summarizes the results of the experiment, followed by a general discussion and possible future work and follow up experiments.

### *Shared Processing Mechanisms/Representation between Language and Music?*

The connection between language and music has been the subject of a longstanding debate in the field of cognitive science (and recently, neuroscience), especially regarding the question of whether language and music are processed by distinct and separate psychological substrates or whether these substrates overlap with each other. This has been partly due to contrasting evidence from dissociations (Peretz and Colheart 2003, Peretz 2006) standing alongside evidence for processing mechanisms which show similarities (Koelsch 2000, Patel 2003, Patel 2008).

Let us first consider the evidence in favour of language and music sharing processing mechanisms. Early studies from neuro-imaging have shown that out-of-key chords elicited a bilateral P600 which was statistically indistinguishable from the P600 elicited by syntactically incongruous words (Patel et al. 1998). Later works have looked at early right anterior negativity (ERAN) that peaked at 200 ms when non-musicians (people with no musical training) heard out-of-key chords, similar to the early left anterior negativity (ELAN) associated with word category violations (Koelsch 2000, Koelsch and Mulder 2002, Koelsch 2009). Chords violating harmonic rules have been shown to elicit activation in areas that are related to syntactic processing in language, such as Broca's area (Maess et al. 2001). There is also evidence from children's processing where children

with syntactic processing difficulties in language also tend to have more problems in processing musical stimuli (Jentschke et al. 2008, Jentschke & Koelsch 2009). These studies point us towards the direction of an overlap of cognitive resources shared between language and music, and largely challenge the domain-specific view.

In addition to the data from neuro-imaging, there is also behavioural data that points to parallels between language and music. For example, in language, structural integrations occur when an incoming word is distant from a previous word with which it shares a syntactic dependency (Gibson 1998, 2000) or when there has been a violation of syntactic unexpectancy (Gibson 2006, Lau et al. 2006). During incremental sentence processing, different possible syntactic analyses of a sentence have different levels of activation, with the currently preferred analysis having the highest level of activation. An unexpectancy proves costly because resources must be reallocated to boost the activation of a different structure (MacDonald 1993, cf. Marslen-Wilson 1975). Such kind of unexpectancy violations have been shown to hold in musical processing as well. Events that are harmonically distant from the current context (e.g., out-of-key notes and chords) are also unexpected (Huron 2006). These require more activation and hence prove costly (Barucha 1984, Tillmann et al. 2000).

However, other researchers have argued for a dissociation between the processing mechanisms of language and music. For example, evidence from the behavioural studies of patients with musical deficits points to the independence of music and language processing (Peretz and Colheart 2003, Peretz 2006). Cases of amusics (people with congenital or acquired musical disability) and musical dissociations provide evidence for domain-specificity suggesting that may be language and music are processed differently with no overlapping of cognitive resources. These imply that brain networks can be specialized for musical functions without having considerable overlap with networks involved with language, sound perception etc. Amusics fail to show key sensitivity and they cannot distinguish between a tonal versus atonal melody.

#### *Patel's Shared Syntactic Integration Resource Hypothesis (SSIRH)*

Although some of the key findings from the neuropsychology literature have been challenged (the ones discussed above), the evidence provided by neuro-imaging opens up the possibility to test whether there are aspects of music and language (say, syntax) that

exhibit either domain specificity or suggests that there is a neural overlap (Patel 2012). One such theory, which has received a lot of attention in the current literature, is that of the Shared Syntactic Integration Resource Hypothesis (SSIRH) (Patel 2003, Patel 2008) based largely on the positive evidence from neuro-imaging. Specifically, it was proposed that structural integration involves the rapid and selective activation of items in associative networks, and that language and music share the neural resources that provide this activation to the networks where domain-specific representation reside (Figure 1).

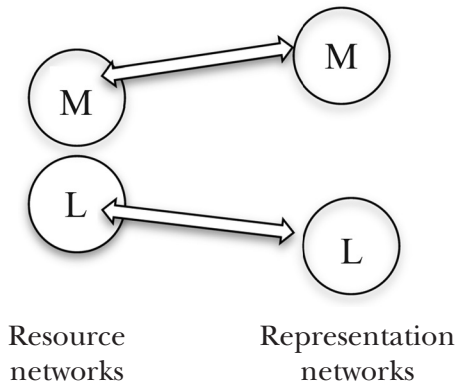


Figure 1. Schematic diagram of the shared relationship between language and music (adapted from Patel 2003, Patel 2008). Representation networks are domain-specific representations and Resource networks are domain-general activation resources.

Figure 1 shows that linguistic and musical syntactic representations are stored in different parts of the brain. In Figure 1, overlap of Resource networks is intended to schematically represent overlap in brain regions, and non-overlapping Representation networks are a schematic representation of domain-specificity. Thus, neural resources for the activation of the stored syntactic representations have considerable overlap. The relation between the neural networks and the neural architecture is an area for further research but currently the answer is unknown. Testing this requires localization techniques such as fMRI applied to within-subjects comparisons of syntactic processing in language and music (Patel 2003). One of the predictions made by the SSIRH is based on the idea that shared, limited resources activated across the two domains should show interference patterns.



### Objectives of the Paper

This paper is concerned with the relationship between language processing and musical processing at the structural level. Specifically, we test whether language and music have shared representations and whether they can be activated across domains. This ties in with the neuro-imaging evidence suggesting music and language share overlapping activation resources.

To investigate the question of whether language and music have shared representations, we used the priming paradigm. Priming refers to a change in the speed, bias or accuracy of the processing of a stimulus, following prior experience with the same, or a related stimulus (Bock 1986, Hartsuiker, Kolk, and Huiskamp 1999, Hartsuiker and Westenberg 2000, Pickering, Branigan and McLean 2002). For example, in the syntactic domain, it has been shown that people tend to produce sentences with the same structure that they have heard in the previous input (Bock, 1986; Branigan, Pickering, & Cleland, 2000; Corley & Scheepers, 2002; Pickering & Branigan, 1998)). This has been found in both production and comprehension. In sum, then, priming is a tool that allows us to probe for shared representations.

#### *Priming of Relative Clause Attachment*

In our experiment, we investigated whether musical primes influence comprehenders' choices about how to interpret ambiguous relative clauses. In particular, we focus on the well-known RC attachment ambiguity, where there are two nouns that the RC could potentially attach to, as in example (1) below. We used this structure because it is not the priming of the local syntactic representations in the representational network but rather the priming of the structural integration processes that makes use of syntactic representations to form a hierarchical structure (Scheepers 2003). The SSIRH suggests that indeed if language and music show overlap in resource networks, there should be priming possible, from music to language.

The two possible interpretations of an RC attachment ambiguity in English are shown below, for the sentence in (1). The relative clause 'who lived in Los Angeles' can be interpreted as modifying the higher noun 'doctors' (Figure 2, left tree), or as modifying the lower noun 'supermodel' (Figure 2, right tree). The two different interpretations are, that the doctors were the ones who lived in Los Angeles, or the supermodel lived in Los Angeles, respectively.

The global configurations of the two sentences differ according



(1) Jessica visited the doctors of the supermodel who lived in Los Angeles

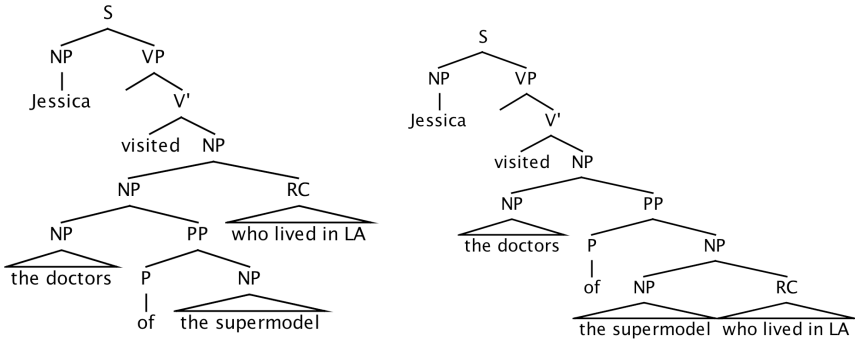


Figure 2: Hierarchical phrase structure showing high-attachment (HA) relative clause modification (left) and low-attachment (LA) relative clause modification (right).

to the modification (high attachment versus low attachment). Existing psycholinguistic research (Scheepers 2003, Desmet and Declerq 2006) has shown that when participants are primed with an unambiguous high attachment sentence, they subsequently produced a high attachment relative clause modification and vice versa. Language producers are not aware that they are reusing the structure this way. These effects can be shown in experiments where participants are constrained to use a particular structure in one trial (the prime) but are free to choose between two or more alternative structures in the following trial (the target). Priming has been shown to happen across active and passive constructions (Bock 1986, Bock and Loebell 1990, Cornelis 1996, Hartsuiker and Kolk 1998, Bernolet, Hartsuiker, Pickering 2009), for transitives in English and Dutch (Bock 1986, Bock and Griffin 2000, Bock, Dell, Chang, Onishi 2007) and recently priming has also been demonstrated across domains to which we turn to presently.

### Existing Work on Structural Priming across Domains

In addition to the large body of work on the phenomenon of syntactic priming (priming from one sentence to another), recent work suggests that syntactic priming can be found across domains (Kaiser 2009, Scheepers et al 2011) and across structures (Loncke et al. 2011).

Studies that have looked at priming across domains have shown

that there are abstract domain-general processes which are shared. Kaiser (2009) shows this for pronoun resolution. Experiment 2 and Experiment 3 linguistic primes and visuo-spatial primes were used and both primed pronoun resolutions. The connections between structured representations between mathematical processes and language have also been explored using priming techniques (Dehaene et al., 1999, Scheepers et al 2011). Uncovering global shared representations between language and music is, therefore, not entirely unexpected.

Naturally, a question to ask is whether such effects can hold between language and music? The only study we know of probing this question suggests interaction and integration between the two domains (van de Cavey and Hartsuiker 2016). In this study, the question of whether music primes language was explored in three experiments. In Experiment 2, they conducted a study using priming to see if music can affect the way participants complete ambiguous sentences in Dutch.

In our work, we build on these findings by investigating what role the nature of the stimuli plays in priming effects. Specifically, the stimuli used by (van de Cavey and Hartsuiker 2016) were beeps. We use melodies created on a piano, which sound more melodious and natural. We also had different conditions and manipulations and a different design. How did we replicate a high attachment ambiguity versus low attachment ambiguity in the musical prime? We shall look at this in the next section.

### Exploring Structural Priming in the Musical Domain

If our aim is to investigate whether musical representations can prime/influence people's processing of language, we need to be explicit about what the representations involved in music are. This section provides a detailed discussion of the musical 'equivalent' of attachment ambiguities.

Musical structures can be said to resemble a high-attachment relative clause modification and a low-attachment relative clause modification by changing the notion of harmonic distance. In Western tonal music, music within a given key selects a subset of 7 out of 12 available pitches within the octave which form a musical scale. The tonal hierarchy thus created crucially relies on physical distance between tones in a key. Listeners judge notes which are closer to each other as perceptually related whereas the more distant keys are considered further away or out-of-key (Krumhansl 1979). These can be spatially represented as in Figure 3.

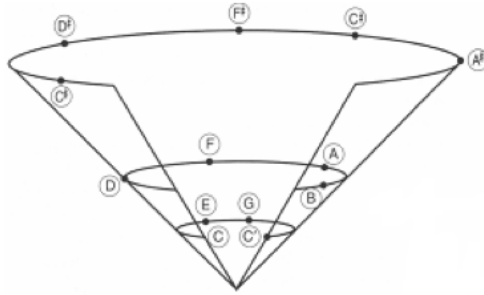


Figure 3: Multidimensional scale representation of perceived similarities between musical pitches in a tonal context (Krumhansl 1979)

A useful concept to capture and understand this notion is given by the ‘Circle of Fifths’ which is a foundational tool for any music learner. Tones from musical keys combine to form chords and chord progressions. These chord progressions follow a very orderly system given by the Circle of Fifths where increasing the distance between two keys along the circle corresponds to a decrease in the perceived relatedness between the keys (Thompson and Cuddy 1992). Figure 4 shows the Circle of Fifths.

The Circle of Fifths is designed to show the relations between different notes in a key signature. When read clockwise, each note is a fifth pitch apart from the preceding note. When read counter clockwise, each note is a fourth pitch apart from the preceding note. It also helps you determine how many sharps and flats there are in the key signature of each note. To illustrate, consider the key signature

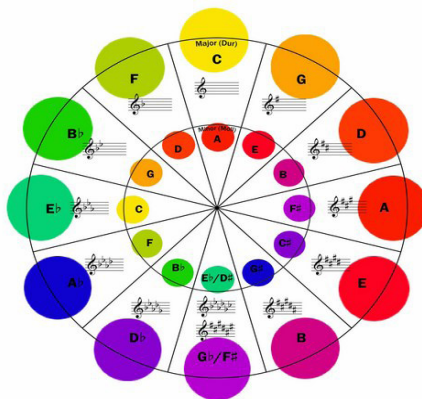


Figure 4: Circle of Fifths which was earlier called the Pythagorean Circle after Pythagoras who had discovered pitch frequencies in musical instruments and had defined an octave.



Figure 5: The key signature of C major

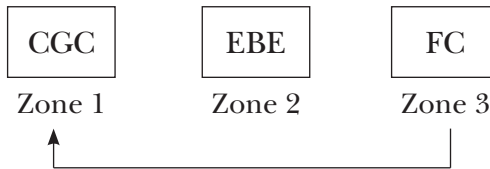
of C major which is the only key signature without any sharps or flats. The key signature of C major is F C G D A E B, as shown in Figure 5.

The two notes harmonically congruent to C major are F and G. F is a perfect fourth apart from C major and G is a perfect fifth apart. The notes that are harmonically distant from C major are A, E, and B. *Crucially, this harmonic distance can be used to model the high attachment versus low attachment alternatives in language.* In fact, this is what was done in our experiment. Melody sequences on eight notes can be divided into three zones where Zone 1 has three notes, Zone 2 has three notes and Zone 3 has two notes. In our study, the difference between a high attachment and low attachment comes from Zone 3 in terms of harmonic distance. Zone 3 either attached back to Zone 1 or back to Zone 2. As an illustration, consider a musical sequence in the C major key:

CFG EBE FC (Figure 6).



Figure 6: Toy melody created in C major for high attachment



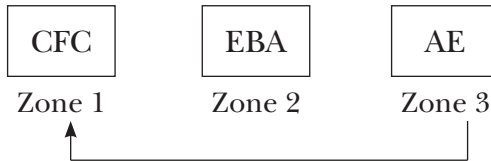
In our **high attachment musical primes**, Zone 3 attaches back to Zone 1 in that the notes used in Zone 1 and Zone 3 are harmonically congruent with each other, whereas Zone 2 is harmonically distant from both Zone 1 and Zone 2. These comprise harmonically distant notes (cf. Circle of Fifths).

In our **low attachment musical primes**, we again had three zones, but now with Zone 3 attaching back to Zone 2, thus creating the

appearance that there is only two zones. As an illustration, consider the musical sequence in C major- CFC EAB AE (Figure 7).



Figure 7: Toy melody created in C major for low attachment



A point to note is that the Zone 2 was always in a different octave just to make the difference more prominent. In cases where the Zone 3 attached back to Zone 1, the Zone 3 was in the same octave as Zone 2 (for example, if Zone 1 was in C3, then Zone 2 was in C4). Thus, except for a very general abstract nature of the similarities in structure, there was nothing else in common between the primes and the targets so that there were no other confounds suggesting priming. The details of the stimuli are given in the design and materials section below.

## Experiment

In the experiment, we investigated whether hearing a music sequence with a high attachment structure or low attachment structure (as described above) influences how people complete ambiguous relative clause structures in language. In addition to the attachment structures as described above, we also manipulated whether a pause between Zone 2 and Zone 3 (the zone which always attaches to another zone) can play a role in people's comprehension and reactivation of shared structure. The pause crucially identified the notes grouped together and manipulated the timing.

### *Method*

**Participants.** Twenty native English speakers from the University of Southern California participated (7 M, 13 F). Participants were not screened for prior musical training and musical training wasn't a prerequisite. Participants received \$10/hour.

**Design and Materials.** As explained in the preceding section, the musical primes were created on the basis of Circle of Fifths. The key

signature was always kept the same with the only difference being the attachment of Zone 3 to either Zone 1 (high attachment cases) or Zone 2 (low attachment cases). The primes were made on a piano in Macintosh's Garageband'11 software. Each note in the prime had a duration of 1000ms. In addition to a high attachment alternative and a low attachment alternative, we also manipulated the timing by using a pause. To maintain uniformity, the pause occurred before the Zone which was going to be attached back to another Zone. Thus, in both the conditions, the pause appeared after Zone 2 and before Zone 3. The timing was manipulated by increasing the timing of the notes to 3000ms. This was done uniformly across all the musical primes. The musical sequences were stored as .mp3s and converted into .wav files by using Audacity (ver. 2.0.2) [ Refer to Table 1].

Thirty sets of materials were created. Let us first consider the nature of the **musical primes**. Each set consisted of a musical high attachment condition (MHA), musical low attachment condition (MLA), musical high attachment pause condition (MHP) and a musical low attachment pause condition (MLP). These were paired with a baseline condition which was created as a repetition of three notes to seemingly create no structure (See Table 1). A total of 125 musical primes were created (120 musical primes in different conditions, 5 baselines), with the five baselines being repeated across different sets. Every musical prime consisted of eight notes divided into three zones and differed in the way Zone 3 attached back to either Zone 1 or Zone 2 and in the timing manipulated for the pause.

Let us now turn to the **target sentences** that followed the primes. Thirty target sentence fragments in English were compiled. Twenty sentences were used verbatim from Rhode et al. (2011) study, six sentences from Rhode (2008) and four sentences were made using verbs from Hartshorne and Snedecker (2012). See appendix for a list of targets. The target sentence fragments always had the format, *Subject verb the NP1 the NP2 who*. e.g., “Kevin counted the fans of the singer who”. These fragments can be completed with either a high-attachment continuation (e.g., “were shouting praises”) or a low-attachment continuation (e.g., “just finished playing *Bohemian Rhapsody*”). The subject was always a proper name counterbalanced to include equal number of female and male names. The two NPs were definite, animate nouns preceded by the definite article. The relative pronoun was ‘who’. The NPs were controlled for number. Thus, fifteen targets had NP1 as singular and NP2 as plural and the rest fifteen targets had NP1 as plural and NP2 as singular. This was

done to make the response coding easier. The completed verb would be assessed according to the number marking in order to determine whether the participant completed the sentence fragment with a high attachment or a low attachment.

We made sure that all verbs in the target fragments (e.g., ‘counted’) were non-implicit causality (non-IC verbs). This was because recent research has shown that relative clause attachment biases can be triggered by verb semantics (Rohde 2008, Rohde et al. 2011, Hartshorne and Snedeker 2012). In a series of off-line and self-paced experiments, Rohde et al. 2011 showed that when faced with an IC verb, participants were more likely to complete a sentence fragment with a high attachment bias which is unexpected since English has an overall low attachment bias (Cuetos and Mitchell 1998, Frazier 1990, Frazier & Clifton, 1996; Carreiras & Clifton, 1999; Fernandez, 2003). Thus, our targets had only non-IC verbs carefully chosen not to bias the participant towards high attachment. Twenty of the target sentences were taken verbatim from Rohde et al. 2011 (Appendix A.4). The sentences were truncated after the relative pronoun. Ten target items were created using Non-IC verbs described in Hartshorne and Snedeker (2012).

Table 1. Example sample stimuli used for Experiment 1. The underlining suggests where the attachment has taken place.

Category	Example
Musical high attachment (MHA)	GCGBF# <u>EGC</u>
Musical low attachment (MLA)	DAD <u>C</u> #BF#C#F#
Musical high attachment-Pause (MHP)	<u>CGCEBEFC</u> t
Musical low attachment-Pause (MLP)	ADAC#G#F#C#G#
Baseline prime (MB)	FCFFCFFC
Target sentence	Kevin counted the fans of the singer who

### *Procedure*

Five randomized lists were created using a Latin square design. Each list comprised six randomized blocks. 120 fillers were created (60 language fillers, 60 musical fillers). Every block contained 20 musical fillers (these were sub-divided into nine types, resembling the prime music like and the prime pause like and they encoded no hierarchical structure), 20 language fillers (these were sub-

divided into nine types, resembling the targets and contained some unrelated sentence types with connectives), five prime conditions and five targets (each block contained 30 items). The fillers were randomized and then inserted into the lists. It was manually ensured that no filler came in between a prime and a target sequence.

The lists were programmed in the Paradigm experimental software by Perception Research Systems. Participants were tested in individual sessions (~ 1 hour each), in which they were asked to perform two tasks—a language task and a music task. The language task required them to type in sentence completions into Paradigm. The music task asked them to do a rating on a scale of 1-5 (1- least melodious, 5- very melodious). They were told that there were no right or wrong answers with the sentence completion task and they should try not to skip any sentence completion. No details about the prime manipulations were revealed until debriefing. The program was run on a Windows 7 PC laptop, and the participants were told to click the left mouse button to continue onto the next screen. They listened to the music on a Philips headphones at a consistent volume of 40. Participants were given 4 trials as practice before they started the main experiment. Following completion of the experiment, participants were asked questions from a Music Training and Experience Questionnaire (adapted from Wei Looi 2006), designed to elicit information about the musical training and knowledge of the participants.

## Results

**Response Coding.** Participants' written continuations were analysed and coded as High attachment (HA), Low attachment (LA), or not applicable/unclear (NA). The number marking of the verb following the relative pronoun aided the coding into a high or low attachment category (Refer Table 2). In some cases, the verb following the relative pronoun contained no information of number (Refer Table 2), in which case the responses were coded as “not applicable” due to missing information. These cases included fully ambiguous relative-clause attachments, ungrammatical responses, or responses that did not result in a relative clause.

**Data Analysis.** Statistical analyses were conducted using SPSS (ver 21). We performed a repeated measure ANOVA, two-tailed sample t-tests and one-tailed sample t-tests.

**Rate of low attachment versus high attachment relative clause continuations.** Overall 29 per cent of target completions were classified as high attachment, 65 per cent as low attachment, and 6



Table 2. Example target response completions

Response Type	Examples for target: <i>Angela gossiped with the secretary of the lawyers who</i>
High attachment	was arrogant about the results of the case; had affairs with everyone.
Low attachment	were busy with new interesting cases; were caught stealing the bag of Aztec gold.
Not applicable	conducted shady business; worked in the corner office

per cent as not applicable or unclassified. The finding that English has a basic low attachment bias fits with previous findings (Scheepers 2003, Desmet and Declercq 2006, Scheepers et al. 2011).

Now, let us take a look at the rates of high versus low attachment continuation rates in the five conditions. Overall, there is a low attachment bias in English which is not surprising. In the baseline condition (MB), we found an overall preference for low attachment completions (73.68 per cent of the total response completions were low attachments). However, with a musical high attachment prime (MHA) condition, the low attachment bias is weaker (73.68 per cent of low attachment continuations go down to 59.45 per cent). In the high attachment pause condition (MHP), the low attachment completions become weaker (only 57.27 per cent of the completions are low attachments). When the sentence fragment is preceded by a low attachment (MLA) prime, the low attachment bias is strengthened (73.68 per cent of low attachments in the baseline condition becomes 79.31 per cent in the MLA condition), and with the low attachment and pause prime, the low attachment bias is about the same as in the baseline prime (73.68 per cent in the baseline condition becomes 75.89 per cent in the low attachment and pause condition).

To see whether the different conditions had a significant bias for low attachments (or high attachments), we used one-sample t-tests conducted on the rate of low attachment continuations, with the mean hypothesized to be 0.5. We found that in the baseline condition (where the musical prime had no structure), the rate of low attachment continuations is significantly higher than chance ( $t_1(19) = 3.890$ ,  $p < 0.001$ ,  $t_2(29) = 3.890$ ,  $p < 0.001$ ). This is expected, given the existing finding showing that English RCs have a low attachment preference. The low attachment bias is also very strong in the two prime conditions where the musical cues bias low attachment: In the musical low attachment (MLA) condition, the rate of low attachment

continuations is significantly higher than chance, as expected ( $t_1$  (19) = 6.532,  $p < 0.001$ ,  $t_2$  (29) = 7.443,  $p < 0.001$ ), similar to the musical low attachment and pause (MLP) condition ( $t_1$  (19) = 5.138,  $p < 0.001$ ,  $t_2$  (29) = 4.557,  $p < 0.001$ ). What about the conditions where the musical information is expected to bias high attachment? When the music prime was a high attachment prime (MHA condition), we see the rate of low attachment continuations is only slightly above chance ( $t_1$  (19) = 0.781,  $p < 0.444$ ,  $t_2$  (29) = 0.925,  $p < 0.363$ ). Furthermore, in the musical high pause condition (MHP) – where both the musical cues and the pause bias high attachment – we see that the results were not significantly above chance ( $t_1$  (19) = 0.476,  $p > 0.5$ ,  $t_2$  (29) = 0.559,  $p > 0.5$ ). In other words, the low attachment bias normally seen in English is completely absent in this condition, and also not reliable in the MHA condition.

Now, let us take a closer look at the effects of the variables that we manipulated, namely the **high attachment versus low attachment musical cues and the presence versus absence of the pause**. For the ANOVA analyses, the baseline condition was excluded, and we ran an ANOVA with two factors, namely (i) musical attachment height (HA musical prime versus LA musical prime), and (ii) pause (presence versus absence of pause between Zones 2 and 3).

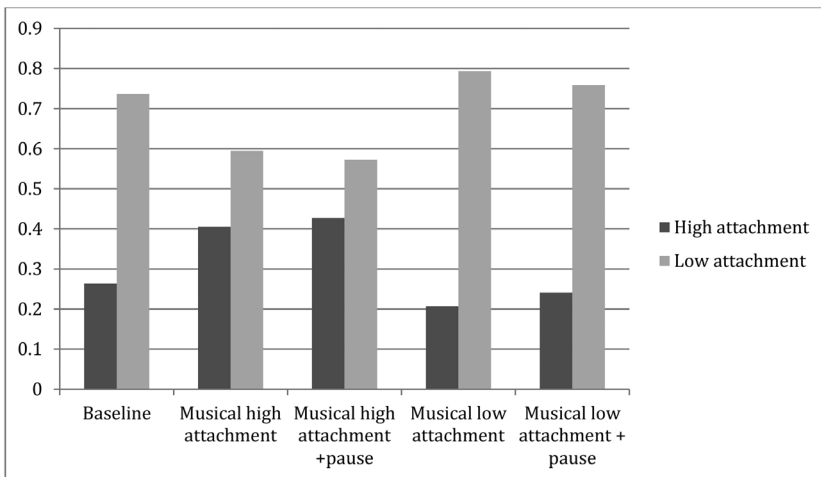


Figure 8. Results from experiment: Mean proportion of target response completions.

We next ran a repeated measures ANOVA on the independent variables- musical cues and pause versus no pause. Overall, we found a main effect of musical attachment height ( $f_1$  (1,19) = 12.305,  $p = 0.002$ ,  $f_2$  (1,29) = 14.490,  $p = 0.001$ ): low attachment musical primes

resulted in a higher rate of low attachment RC continuations than did high attachment musical primes. In other words, the structure of the musical primes had an effect on people's linguistic completions. There was no main effect of pause versus no pause ( $f_1(1,19) = 0.828$ ,  $p = 0.374$ ,  $f_2(1,29) = 1.114$ ,  $p = 0.3$ ), and there was no interaction between the two factors ( $f_1(1,19) = 0.088$ ,  $p = 0.77$ ,  $f_2(1,29) = 0.066$ ,  $p = 0.8$ ).

**Planned comparisons** using paired t-tests were also conducted. We compared the rate of low attachment completions in the baseline condition and the musical high attachment condition, and found that there was a significant difference in the low attachment completions in the baseline condition ( $M=0.7$ ,  $SD=0.19$ ) and musical high attachment conditions ( $M=0.6$ ,  $SD=0.32$ ) conditions;  $t_1(19)=2.102$ ,  $p = 0.05$ ,  $t_2(29)=1.979$ ,  $p = 0.05$ . We also compared the baseline to the musical high attachment pause condition, and found that there was a significant difference in the low attachment completions in the baseline condition ( $M=0.7$ ,  $SD=0.19$ ) and musical high attachment conditions ( $M=0.5$ ,  $SD=0.3$ ) conditions;  $t_1(19)=2.437$ ,  $p = 0.025$ ,  $t_2(29)=2.525$ ,  $p = 0.017$ . In contrast, the rate of low-attachment continuations in the baseline condition did not differ significantly from the rate of low-attachment continuations in the music low attachment conditions ( $M= 0.7$ ,  $SD= 0.18$ );  $t_1(19)=-1.053$ ,  $p = 0.3$ ,  $t_2(29)=-1.814$ ,  $p = 0.245$ , and the musical low attachment pause conditions ( $M= 0.7$ ,  $SD= 0.18$ );  $t_1(19)=-0.305$ ,  $p = 0.764$ ,  $t_2(29)=-0.254$ ,  $p = 0.8$ .

Overall, if we collapse the musical high attachment and the musical high attachment pause conditions, and the musical low attachment and the musical low attachment pause conditions, we get the pattern shown in Fig 9:

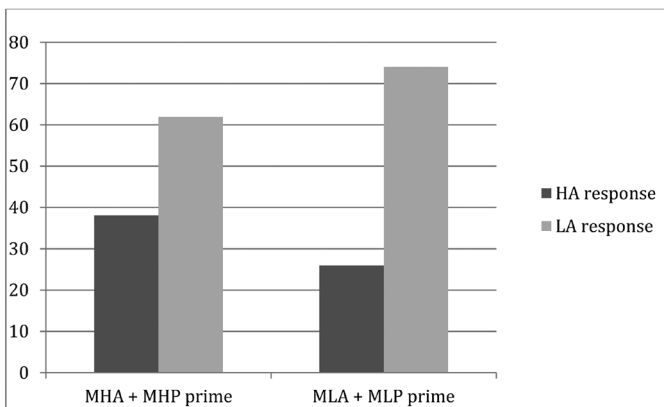


Figure 9. Overall priming effect

The high versus low primes were significant predictors for the type of sentence completions. Specifically there were 48 per cent more low attachment responses after a low attachment prime (MLA + MLP), whereas this number fell to 23.84 per cent after a high attachment prime (MHA + MHP). In other words, there was a 24.2 per cent priming effect (see Figure 11). The results are 10 per cent more than van de Cavey and Hartsuiker's (2016) results for musical priming in Dutch.

### *Musical ability and target completions*

There was also an inverse patterning seen in the case of musical ability which the participants were asked to self-assess. Overall, participants with lower musical ability produced a higher proportion of high attachment completions than participants with higher musical ability (see Figures 10 and 11). There were five participants in each of the groups and the high musical ability group self-assess on a scale of 1-5 (1- less proficient, 5- highly proficient) at 4-5. The low musical ability group self-assesses at 1-2. Statistical analyses have not yet been conducted on this data, due to the small size of the group.

## General Discussion

We found that the low-attachment bias normally seen in English is completely absent in the musical high attachment pause condition (MHP), and also not reliable in the musical high attachment condition (MHA). Overall, there was a main effect of musical attachment height. Low-attachment musical primes resulted in a higher rate of low attachment relative clause continuations than did high-attachment musical primes. In other words, the structure of the musical primes had an effect on people's linguistic completions.

The results of this experiment provide striking evidence for the domain general level of abstraction in the representation of hierarchical structural information. This challenges domain-specific theories that use local structures to account for syntactic priming. The results also challenge domain specific theories of syntactic processing. One possibility is the shared resource hypothesis (SSIRH) where there is a considerable overlap between resource networks. Put in other words, both language and music draw from a similar pool of limited processing resources to process incoming linguistic (syntactic) elements. A key prediction of the SSIRH is that syntactic integration in language should be more difficult when these limited integration resources are taxed by the concurrent processing of

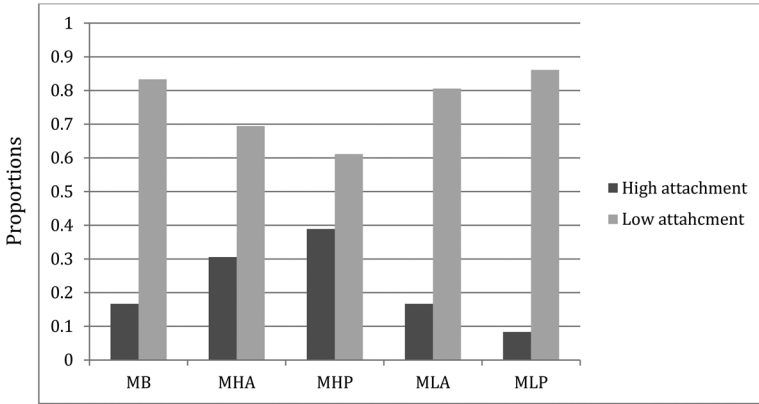


Figure 10: Target sentence completions by high musical ability participants (self-assessed as 4 on a scale of 1-5).

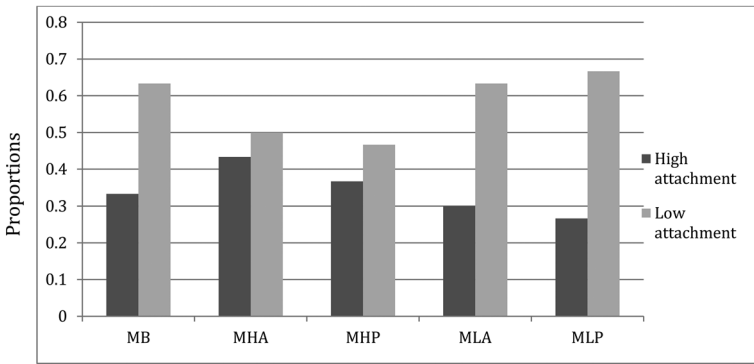


Figure 11: Target sentence completions by low musical ability participants (self-assessed as 1 or 2 on a scale of 1-5).

musical syntax (and vice versa). This is seen in the slowdown with RTs while the participants processed targets. Although there was a considerable slowdown with all of the targets, the slowdown was least when the participant gave an LA response (1389ms on an average) and it was highest when the participant completed the sentence fragment with a HA response (1870ms).

We built on van de Cavey and Hartsuiker (2016) by showing that the priming effect can actually be strengthened by using stimuli that sound more music-like. Our piano-generated melodies produced an overall priming effect of 24.2 per cent, a 10 per cent increase from van de Cavey’s findings. We, however, could not find a main effect with the pause versus no pause condition, suggesting that musical cues are sufficient to get the priming effect without the additional pause cue that one might expect to matter.

An interesting thing to note is the difference in responses between self-assessed high-music ability participants and the self-assessed low music ability participants. The latter group (self-assessing at 1 or 2) performed considerably better than the high music ability group in completing HA completions (based on graphs only). This is contrary to our expectation. However, it has been seen in previous research that self-reported “years of musical training” may be a relatively imprecise measure of musical expertise (Slevc et al. 2009).

A potential possible confound with the pause condition could be that the place which we manipulated the pause was kept uniform across the two conditions, it was always after Zone 2 (the domain which is harmonically distant) and before Zone 3 (the domain which is harmonically similar to either Zone 1 or Zone 2). A better design could be to manipulate the pause after Zone 1 in the low attachment condition because this is the where the attachment is happening. This is currently being run as a follow-up study. (Menon and Iseminger, 2017; Menon and Coleher, in prep.)

#### Note

1. If considerable neural resources overlap in the activation of stored syntactic representations then this should lead to commonalities in structures built up for musical sequences and sentences. This then leads us to the big question of what does priming truly entail, (i) If there is priming, it could suggest that the representations are shared, or (ii) the processes of building up the representations and the mechanisms involved in using those representations are shared. We could have priming because the representations are the same even if the ways of using/activating those representations are different, or we could have priming because although the actual representations are different, there is something abstractly similar in how we process the representations. Or it could be that there is no clear distinction between the notion of representation and using that representation. We will not attempt to answer this bigger question in this paper, though see Wang et al (under revisions).

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## Appendix 1

*List of Targets*

1. Anna studied with the chef of the aristocrats who
2. John lived next to the teacher of the second graders who
3. Jenny joked with the maid of the executives who
4. Nick stood near the captain of the sailors who
5. Angela gossiped with the secretary of the lawyers who
6. Bob greeted the leader of the activists who
7. Laura knows the manager of the cashiers who
8. Zack recognized the daughter of the shopkeepers who
9. Sarah jogs with the uncle of the toddlers who
10. Adam resembled the representative of the employees who
11. Tina met the gardeners of the millionaire who
12. Justin carools with the cousins of the accountant who
13. Emily waited with the nieces of the florist who
14. Joe ran into the brothers of the athlete who
15. Jessica worked with the doctors of the supermodel who
16. Brian visited the associates of the businessman who
17. Melissa babysits the children of the musician who
18. Frank talked to the servants of the dictator who
19. Tracy chatted with the bodyguards of the celebrity who
20. Kevin counted the fans of the singer who
21. James appreciated the servant of the anchorists who
22. William watched the student of the teachers who
23. Lisa saw the accountant of the chefs who
24. Sandra toiled with the farmer of the landlords who
25. Ron read to the kids of the boxer who
26. George went with the sisters of the comedian who
27. Nancy took the babies of the friend who
28. Carol studied the sons of the doctor who
29. Mathew recommended the psychiatrist of the sopranos who
30. Ivana alerts the refugees of the mother who

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## THE TELEOLOGICAL VIEW OF MIND AND CONSCIOUSNESS

R.C. Pradhan

In this paper I will defend the teleological view of mind and consciousness which has been of late out of fashion because of the increasing emphasis on the mechanistic approach to mind and consciousness in the recent philosophy of mind. The new discoveries in cognitive science and the brain sciences in general have led to the belief that all there is to mind is its mechanical functions and the laws operating behind them. This has led to what may be called the disenchantment<sup>1</sup> of the mind and its creative dimensions. This is responsible for the loss of the teleological view of mind and consciousness as a result of which human nature has been explained in mechanistic terms.

I will argue that the teleological view of mind and consciousness is imperative because of the fact that mind operates in a non-mechanical and creative way, making it impossible to map the functions of the mind within a mechanistic model. The right model for explaining the mind and its activities is the teleological one that has been found in the history of the philosophy of mind right from Aristotle to Hegel and beyond. However, the teleological model needs to be examined afresh in view of the contemporary discoveries about the mind and consciousness.

### I

#### *Mechanism Versus Teleology: Two Models of Explanation*

The two models of explanation which have been handed down in the history of philosophy from Aristotle onwards are mechanism and teleology. Mechanism holds that the only way the phenomena could be explained is by locating their causal mechanisms which underlie them. The mechanistic model explains everything in terms of the mechanical/causal laws because it believes that all the natural

phenomena in general fall under the mechanical laws. The latter are the universal and necessary laws which make the phenomena intelligible<sup>2</sup>. Such being the case, the mechanistic sciences, under the influence of Galileo and Newton, went to the extent of saying that the whole universe could be understood as a huge machine that is operating under the strict laws of nature which can be mapped by mathematics and physics<sup>3</sup>. This trend in the physical sciences continues to dominate sciences in general, including the mind/brain sciences.

The teleological model of explanation, on the contrary, has been under threat from the mechanistic model because the former has always viewed the universe differently by supposing that the mechanical laws are not enough to explain the universe. There is something more to the universe than the mechanical sciences can dream of and that is that the universe has a core of meaning or intelligibility which is rational<sup>4</sup> in nature and can be understood only in terms of what Aristotle called the ends or the telos which define the natural phenomena<sup>5</sup>. Of course, it is not easy to decipher the ends of any natural phenomena by mere empirical inspection, but a deeper reflection can always reveal the why and how of the phenomena. That is why there is no scientific respectability to the idea of teleological explanation of nature, let alone of the human nature. Nonetheless, the teleological explanation has a rational validity which needs to be probed further.

Let us understand first why teleology was needed at all as a way of understanding reality. Is it because the world really has a purposive nature and so we cannot avoid the teleological aspects of the world? Or is it only a way of making things fit into a coherent pattern so that we can make sense of the whole domain of reality that otherwise appears puzzling to the naked eyes? The answers to these questions lie in how we approach the questions themselves. If we are realists about the way the world works, we will certainly ascribe some sort of purposiveness to the world-phenomena, and accordingly go with Aristotle in believing that the world is genuinely operating with a purpose, however unintelligible it may be to us in the absence of the so-called scientific evidence. Aristotle was really committed to the view that the world has final causes<sup>6</sup> which make the world teleological to the core, thus allowing for the fact that no natural process takes place unless it is having an end or goal. Those who do not share Aristotle's world-view are likely to hold that the idea of having ends is too anthropocentric a view to be true of nature in general. Of course, they may concede that human actions have

in a limited sense ends or purposes, but that does not justify any ascription of purposiveness to the cosmic events as well. However, we may have occasion in the following sections to question the non-Aristotelian view as such with regard to the cosmic events though we have no doubt that even the non-Aristotelians will accept that human actions do have a teleological explanation<sup>7</sup>.

## II

### *Limitations of The Mechanistic Worldview*

The more we probe the basic presuppositions of the mechanistic worldview, the more we are convinced that it fails to account for the rational order of the world, that is, the over all sense of the world as a cosmic order. Mechanism is alright when it imposes a mechanistic system on the world for making the events in the world fall within a certain pattern. The scientific laws are a case in point which aim at explaining the coherent patterns in the world-events. But beyond the laws, what? If we ask why we have these laws and not any other, the only answer is that they appear true to our intelligence and so are valid as far as our mind goes. Beyond this we can be compelled to say nothing. This has been the position of the modern mechanistic sciences. They have nothing to say about why we have these laws and nothing more. The 'why' question is almost absent from the vocabulary of the empirical sciences across the board. The why questions are left to the philosophers to raise to open up new ways of understanding the world<sup>8</sup>.

Mechanism is a way of postulating strict laws for explaining the natural necessity of the law-like patterns in the universe. Such was the challenge before the scientists in the early days of modern science. They had no clue as to what happens in nature so that it exhibits uniform patterns in the space-time world. The mighty galaxies are mechanically organized so that we can map out their position and distance in the outer space. The physical reality is so enormous that we can hardly say anything about it except within our mathematical compass. That is the reason why modern science is mathematical in its general approach and so evasive about any telos of the world. In fact, for it nothing in nature has a goal or purpose. Everything is factual and contingent and so falls within a mechanistic system. Given the initial conditions of the world, we can map out its future outcomes<sup>9</sup>.

The mechanistic sciences searched for mechanical laws not only

in the realm of the physical world but also in the human world. The naturalism of the mechanistic sort overruled any attempt to differentiate the human world from the natural world<sup>10</sup> because it believed only in one form of naturalism which can unify the entire world that includes the physical objects as well as the human beings. The difference between man and nature was unknown to the early scientists because they thought man is part of the physical world and therefore there cannot be a separate set of laws governing the human world. Aristotle's warning that human nature is distinct and that it obeys its own laws was not heeded to by the mechanistic sciences. The idea of the second nature<sup>11</sup> was an anathema to the modern scientists. The result of ignoring man's unique position in the world was disastrous because man was reduced to a physical object in the hands of the materialists of all hues<sup>12</sup>.

It is the philosophers under the influence of Aristotle, Kant and Hegel who could realize the fallacy of the naturalistic explanations of the human mind and consciousness. These philosophers who are generally called idealists, rationalists and spiritualists made every effort to mark out a separate place for man in the universe, not by showing that man is a super-natural being but by showing that we need a better way of understanding man's mental activities which constitute the very structure of the human organism. Human organism is a part of the animal kingdom, and yet it has some features which are rational in nature as they are constituted of some extra-physical features like mind and consciousness. Therefore, man is supposed to be a thinking and rational being who lives in nature but is not reducible to the level of natural objects like stones and sticks<sup>13</sup>.

### III

#### *Mind and Human Nature*

The teleological view of mind and human nature, in general, presents a better view because of the fact that it resists the reduction of man to just physical objects the way the materialists demand. The anti-reductionist stand demands that man be understood as a rational being who can think and reason out things in view of the set goals which are pursued not just for survival but also for a meaningful life. It is the pursuit of meaningful life which is central to the human nature<sup>14</sup>. Moreover, it is to be noted that the human beings, on account of being gifted with rational capacities, can create new meanings in science, philosophy, art, religion and literature<sup>15</sup>.

This is the idea that is central to the meaning-seeking nature of man which has been well crafted by teleological thinkers, like Plato, Aristotle, Kant and Hegel, who have raised man above the level of just biological beings as described by Darwin and others. It is not the case that human beings evolved only as surviving animals on the Earth; human beings did evolve more as social and cultural beings who sought meanings even within their biological nature<sup>16</sup>. The life of the Buddha and Jesus and other moral heroes of mankind have demonstrated that life is not a just a biological survival only.

To understand the mental nature of the human beings one has to go beyond the gross physical nature and must include the large domain of social and cultural meanings which have evolved through centuries. This is what is signified by the fact that human beings are basically thinkers, as Descartes emphasized and what idealists like Hegel developed as the rational nature of man. If one takes the Hegelian view of the human reality, one cannot but decipher the teleological view of the evolution of consciousness from the individual to the social and to spiritual consciousness, in a hierarchical order<sup>17</sup>. Hegel's phenomenological study of the mind or the spirit<sup>18</sup> is a standing monument of the teleological study of man, society, culture, religion and art. This makes it clear that man cannot be understood unless we place him in the broad frame of an evolving consciousness.

Let us see if such a view of man and the mind fits into our contemporary view of man according to which human beings are more or less biologically evolved beings having cultural and social inclinations. For the contemporary scientific worldview, human nature is more a matter of scientific study which takes man as an animal having a bundle of biological propensities. This view of man completely denudes human nature of anything teleological which cannot be explained mechanically. This is what is generally called the disenchantment of the human nature which means that there is no space of meaning and reasons<sup>19</sup> in human nature beyond what is natural and mechanical. This is the way human beings have lost touch with their inherent nature which is rational and meaning-giving, in the Hegelian terms.

The teleologists have always laid emphasis on the fact that the human beings carry on their life with certain ends and goals and always perform actions with a purpose and according to certain reasons. The human actions, thus, are embedded within reasons so that they can be judged according to the normative standards already laid down<sup>20</sup>. The normative view of human actions is the

most important aspect of the teleological view of the human mind and nature. Mind is not just a mechanical device of conducting the brain functions, but the total system of normative functions of the mind driven by ends and goals. Mind is a global normative space of reasons and values all set within a well-structured mental system. The Hegelian notion of Reason represents the mind in a better way than the functionalist or materialist view of mind as a set of brain activities<sup>21</sup>.

#### IV

##### *The Material Mind versus the Teleological Mind*

It is interesting to note that the teleological view of the mind and consciousness goes straight against the materialist view of the mind which identifies the mind with brain functions. The latter view of the mind inherits its ontological presuppositions from the early materialists like Hobbes who opposed the Cartesian dualism between the mind and the body. The subsequent materialists made it their sole agenda to denounce the mind as an independent reality and opt for the physical world as reality. This resulted in the mind-body identity theory and all other hard and soft varieties of materialism<sup>22</sup>. Materialism is well known for its anti-teleological view of mind because it denies that there could be any place for purposiveness in the activities of the mind and other human activities. For the materialists, the mind does not have any residual power above the power of the brain as a physical organism. Everything that we ascribe to the mind in terms of the intentional states are nothing but the brain activities or the brain processes<sup>23</sup>. The so-called intentionality of the mind as discovered by the phenomenologists, like Husserl, is either denied completely or only given a secondary status as the intentional stance<sup>24</sup>. But the fact of the matter is that mind is intentional in the real sense of the term and is endowed with the capacity to make the mental states goal-directed. Intentionality is teleological rather than mechanical and is, thus, made to have contents which can teleologically be mapped.

Another feature of the mind, which is eminently noticed by the phenomenologists, is consciousness and its normative structure<sup>25</sup>. This structure is what the rationalists call the rationality of the mind. But the phenomenologists go further in discovering the transcendental nature of consciousness because of their commitment to the non-naturalist nature of consciousness and the accompanying Transcendental Ego. These ontological features do



add a teleological dimension to the nature of consciousness because of which we can always make room for a hierarchical division of consciousness. What the transcendental consciousness brings into the picture is the emergence of meaning and normativity within consciousness. This is the greatest discovery of phenomenology as a theory of consciousness.

Like Hegel, Husserl is also a teleologist because he believes that mind and consciousness are propelled by the goal of making the conscious states of the mind overcome their naturalist limitations and emerge into the normative domain of transcendental consciousness<sup>26</sup>. The latter is a normative domain of immanent teleology that makes consciousness responsive to the inner goal of creative meaningfulness such as in ethics, religion, art and literature. This has been emphasized by the mainstream Husserlians who make the claim that consciousness is defined by a creative flow that knows no worldly boundaries<sup>27</sup>. We can go further in finding out the ontological structure of human subjectivity within the domain of consciousness. This has made the ontology of subjectivity a new field of research in the contemporary philosophy of mind.

## V

### *Subjectivity, Freedom and Creativity*

The subjectivity of the human consciousness which has been the underlying themes of modern philosophy since Descartes has a major role to play in the evolution of the teleological view of the mind in contradistinction with the materialist and the mechanistic view of the mind prevalent in the anti-Cartesian tradition. This made it possible for Kant to make the claim that the self's own discovery of itself in the moral realm is facilitated by the mind's aspiration to rise higher than its worldly condition. The noumenal freedom, which the self enjoys beyond the empirical world, is part of the teleological journey of the self beyond itself and the world. Kant's moral self is the self that enjoys freedom in a realm of transcendence and becomes identical with the noumenal self<sup>28</sup>. This would not have been possible had the self been condemned to be a part of the natural world the way the materialist wanted.

Freedom, however, does not remain an individual possession because the idea of a community becomes important even for the exercise of freedom. The community of the moral selves becomes the new demand for the possibility of moral actions. Kant's Kingdom of Ends becomes the foundation for Hegel's idea of the moral

consciousness which evolves out of the individual consciousness<sup>29</sup>. This evolution of the self or spirit is an important indication of the fact that there is no limitation on the evolution of the self for the realization of its freedom. This makes the Hegelian self or spirit evolve continuously till it becomes the universal and absolute spirit. This spiritual evolution of the self is the hallmark of Hegel's teleological spiritual worldview. There is, thus, the culmination of the evolution of the self and the world in the emergence of the absolute spiritual consciousness<sup>30</sup>.

The creativity of the mind and consciousness is evident in the very idea of the mind evolving into a universal mind and consciousness. This is further accentuated by the need of consciousness making new inroads into the higher reaches of the mind's flourishing. The mind is free to create new realms of meaning in the creative pursuits of philosophy, morality and religion. There is no doubt that mind's own self-making effort is evident in the history of human culture as it takes various turns to reach higher realms of meanings. Bergson has grappled with this problem in his theory of the creative evolution of man's life and consciousness<sup>31</sup> in which the flow of consciousness takes creative turns in its effort to reach sublime heights in moral and spiritual experience. In this the human will has freedom in creating new meanings without any hindrance from the world because of the ceaseless flow of the creative mind. The Bergsonian *elan vital* gives a vital clue to the inner energy of the mind to evolve into a self-effulgent spiritual consciousness<sup>32</sup>.

The way self and its will have been given importance in the Enlightenment project of modern philosophy has not been completely rejected by the post-Enlightenment thinkers. The reverberations of the Kantian and the Hegelian thought are noticed in the thoughts of the twentieth century thinkers like Sartre, Heidegger and Wittgenstein. The self is assertively self-conscious in Sartre's existentialism and Heidegger's metaphysics of Being. Freedom is the new slogan of existentialist metaphysics because there lies the new teleology of the mind and consciousness. The aspiration for transcendence might be subdued but it is not completely denied<sup>33</sup>.

The self is still struggling to catch a glimpse of its own free creativity in its liberation from the world and its tantrums. Heidegger voices the concern of the self or Dasein to make room for a transcendental mental space for free will which is the hallmark of the self's sojourn in the world. Heidegger's open revolt against the self's bondage is a sign of the fact that transcendence is still the hallmark of the will<sup>34</sup>.

Wittgenstein's effort to get the self liberated from the world is evident in his idea that the transcendental self<sup>35</sup> makes freedom its

hallmark. The self is the new locus of meaning and values because it is completely autonomous in its creation of meanings. This makes the self evolve from its worldly location to its ultimate destination in its spiritual consciousness. Wittgenstein does not deny that self is inclined to make the world its moral counterpart because there is the necessity of the world to realize the moral and spiritual meanings and values.

## VI

### *The Mind and the World: A Teleological Unification*

Now the question is: Can the mind and the world share a teleological platform in terms of meanings? The plausible answer is that both the mind and the world share a common destiny so far as the realization of meanings and values is concerned. The meanings are the ends or the values which the mind and the world aspire to realize. This could be known from the fact that the mind creates the values and imposes them on the world for the sake of a possible teleological unification. The unification takes place in the following way. First of all, the mind develops its consciousness on an onward journey which includes its intervention in the world by virtue of moralization of the world events as being part of the cosmic moral order. The cosmos is brought into the circle of the meanings in the effort of the mind to have a moral control over the world<sup>36</sup>. This is clearly shown in the effort of the idealists to make the world belong to the space of meanings and reasons<sup>37</sup> by making it intelligible in terms of the latter. This is the Kantian and the Hegelian way of idealizing the world in terms of moral and spiritual meanings which makes the mind and the world meet in the common goal of pursuing a spiritual journey. The world sheds its physical pretensions and wears the garb of the spiritual meanings, thus making the worldly events fulfill certain goals. It is not that the worldly events themselves are directed by an external teleology as some evolutionists believed<sup>38</sup>, but by an internal teleology of meaning fulfillment.

The cosmic order cannot be viewed as a mere series of events without any human meaning because the cosmos is interpreted and understood in terms of the human categories. Therefore, there is no way we can detach the cosmos from the human point of view. The human point of view is as important as the God's eye point of view because there is a human as well as non-human way of understanding the cosmos<sup>39</sup>. It is the human point of view which makes the cosmos meaningful and valuable. Therefore, the teleological view of the

universe cannot be ruled out. Of course, nothing follows from it regarding any superhuman agency setting a goal for the universe. Therefore, there is no demand for predetermination of the universe as it is suggested by the external teleologists. All that is demanded is the way we can make the universe humanly intelligible. The universe is thereby re-enchant<sup>40</sup> as meanings are given back to the world which it lost because of the objective mechanistic view of the world. The mechanistic view of the universe has done no service to the world because it takes away everything that could be ascribed to it for making it meaningful to the human beings. It is nonetheless not the case that man is the measure of everything as opined by Protagoras. But it cannot be denied that man measures the values which the world must have in order to be humanly intelligible<sup>41</sup>.

The mind and the world can never come together unless we make the mind the space of meanings and reasons, and make the world belong to this space. This has been the dream of philosophy throughout the centuries: to make the world meet the demands of the mind for making meanings relevant to the world. If the world would have been a mere series of mechanically organized events, such a world would have been of no concern to philosophy. That is why, from Plato till now, we are debating whether the world is having a rational and teleological order.

Kant's effort to reconcile the mechanistic and the teleological views of the world aims at a unification of the mind and the world in the sense that he shows that even though the mechanistic laws have a role to play in explaining the world, it is the teleological view of the world which brings in purposiveness<sup>42</sup> to the cosmic order. The idea of the telos of the world is a matter of human mind's search for coherence and meaning in the world which Kant captures through his analysis of the reflective teleological judgements<sup>43</sup>. Kant, in a way, achieves the mind-world unification by making the world fulfil the mind's demand for unification and coherence through teleological reflections.

## VII

### *Conclusion*

The debate whether mechanism or teleology holds the key to the understanding of the mind and the world is still relevant because we are at the crossroads of the human understanding. The mechanistic worldview has lost its supremacy because there is no way we can escape a teleological view of the mind and the world. We are in need

of a reformulation of the argument in order to see how we must search for a teleological view of the human mind and the world as such.

### Notes

1. The idea of dis-enchantment is due to Max Weber who tells us how modern science has led to this situation in which nature has been denied of any human meaning. Dis-enchantment is associated with the loss of meaning and values in the context of the scientific understanding of the world.
2. The mechanistic explanation is basically a causal explanation which is the mainstay of modern science.
3. Edmund Husserl has diagnosed the malaise of modern objectivist science in his *The Crisis of European Sciences and Transcendental Phenomenology: An Introduction to Transcendental Phenomenology*, trans. David Carr (Northwestern University Press, Evanston, 1970).
4. The 'rationality' of the world-order is the way we humans interpret it. It is not necessary that the world has a reason of its own.
5. Aristotle, *Physics*, 2.8.199b 27-9
6. *Ibid.*
7. In philosophy of action, the two dominant models of explanation are the reason-explanations and the causal explanations. The reason-based explanation is the teleological explanation which searches for the goals or the ends which are necessarily associated with actions.
8. Wittgenstein throws light on the limitations of the scientific explanations when he shows that these achieve very little in explaining how the universe works. See his *Tractatus Logico-Philosophicus*, trans. D.F. Pears and B.F. McGuinness (Routledge and Kegan Paul, London, 1961), 6.52.
9. Hempel's D-N model in naturalistic explanation is a representative of the mechanistic model which is based on the idea of natural laws.
10. See John McDowell, *Mind and World* (Harvard University Press, Cambridge, Mass., 1994) for a discussion on the difference between two kinds of naturalistic explanations, one for the purely natural events and the second for the human nature.
11. *Ibid.* Human nature is the second nature. The second nature is so called because it is different from the first nature which is what science is concerned with.
12. Materialism is well known for its general assumption that everything is physical in nature and that all laws operating in the universe are physical laws.
13. Materialism suffers from reductionism because it reduces everything to matter and denies that mind is an independent reality. For more discussion on this, see David Chalmers, *The Conscious Mind: In Search for a Fundamental Theory* (Oxford University Press, Oxford and New York, 1996).
14. See Owen Flanagan, *The Really Hard Problem: Meaning in a Material World* (The MIT Press, Cambridge, Mass., and London, England, 2008) for a discussion on the centrality of meaning-seeking to the human nature.
15. *Ibid.*
16. *Ibid.*
17. See Hegel, *Phenomenology of Spirit*, trans. A.V. Miller (Oxford University Press,

- Oxford, 1977) for discussion on the different stages of the evolution of consciousness.
18. Ibid.
  19. Cf. McDowell, *Mind and World*, Lecture II.
  20. Ibid. Cf. Flanagan, op.cit.
  21. Cf. D. Dennett, *Brainstorms: Philosophical Essays on Mind and Psychology* (The MIT Press, Cambridge, Mass., 1981) for an anti-Cartesian and anti-Hegelian method of explaining mind and consciousness.
  22. Cf. Chalmers, *The Conscious Mind* for discussion on the varieties of materialism.
  23. For a discussion on the brain-mind identity theory see J.J.C. Smart, "Sensations and Brain Processes" *Philosophical Review*, 68 (1959): 142-56
  24. See Dennett, *Brainstorms*, op.cit on the idea of intentional stance.
  25. The intentional states are rational and normative according to Husserl. See his *Ideas: General Introduction to Pure Phenomenology* (George Allen and Unwin, London, 1931).
  26. The transcendental consciousness, according to Husserl, represents the highest stage of human consciousness because it is free from all the elements of naturalism. See Husserl, *Ideas*. op. cit. See also J.N. Mohanty, *The Possibility of Transcendental Philosophy* (The Nijhoff, Dordrecht, 1985).
  27. Ibid.
  28. See Kant, *The Critique of Practical Reason*, trans. T.K. Abbott (Dover Publications, INC, New York, 2004) for a discussion on the moral self and freedom.
  29. Cf. Hegel, *Phenomenology of Spirit*, op. cit. for the evolution of consciousness from the individual to the social stages on the way to absolute consciousness.
  30. Ibid.
  31. See Henry Bergson, *Creative Evolution*, trans. Arthur Mitchell (Dover Publications, New York, 1998) for the idea of evolution of consciousness as a ceaseless duration.
  32. Ibid.
  33. The idea of transcendence is present in the writings of Sartre and Heidegger. See Jean-Paul Sartre, *Being and Nothingness: A Phenomenological Essay on Ontology*, trans. Hazel E. Barnes (Washington Square Press, New York, 1992. See also Martin Heidegger, *Being and Time*, trans. John Macquarrie and Edward Robinson ( Harper and Row, New York, 1962).
  34. Cf. Heidegger, *The Essence of Human Freedom* ( Continuum, London and New York, 2002).
  35. Cf. Wittgenstein, *Tractatus Logico-Philosophicus* , 5.633 for the idea of a transcendental self.
  36. Ibid.
  37. Cf. McDowell, op.cit.
  38. There is no external teleology which is form inverted mechanism. See Bergson, *Creative Evolution*, op.cit.
  39. See Thomas Nagel, *Mind and Cosmos: Why The Materialist Neo-Darwinian Conception of Nature is Almost False* ( Oxford University Press, Oxford and New York, 2012) for a discussion on the possibility of a teleological explanation of the universe.
  40. Cf. McDowell, op.cit.
  41. Nagel, op.cit.
  42. See Kant, *The Critique of Judgement*, trans. Werner S. Pluhar ( Hackett Publishing Company, Indianapolis/Cambridge, 2002), Part II, sections 66-68.
  43. Ibid.

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## CORE SELVES AND DYNAMIC ATTENTIONAL CENTRING: BETWEEN BUDDHAGHOSA AND BRIAN O'SHAUGHNESSY

Jonardon Ganeri

Buddhist philosophy of mind is fascinating because it denies that there is a self in either of the two ways that have traditionally seemed best to make sense of that idea: the idea that the self is the owner of experience, and the idea that the self is the agent of actions including the thinking of thoughts. It is in one or both of these senses that experience might be said to have a subject. In Buddhaghosa's philosophy of mind, neither agency nor ownership is permitted any role; what does the explanatory work is, instead, attention. Attention replaces self in the explanation of cognition's grounding in perception and action; attention replaces self in the knowledge we have of our own minds and the awareness we have of the minds of others. Buddhaghosa is emphatic that there is no self as normally conceived: "The self of the sectarians does not intrinsically (*sabhāvato*) exist" (Vibh-a. 77). Again, "[the Wheel of Existence] is devoid of any self as an experiencer of pleasure and pain conceived as 'this self or mind which speaks and feels' (M.i.8). This is how it should be understood to be without any maker or experiencer" (Vibh-a. 190); and, "For this is said with reference to such feel as is accompanied by clear comprehension of [the question]: 'Who feels? Whose feel it is? For what reason do these feels come to be?' Herein, who feels? No being or person feels. Whose feel is it? Not the feel of any being or person." (Vibh-a. 263). Instead of the self there is only the "minded body" (*nāma-rūpa*):

In many hundred *suttas* it is only minded body that is illustrated, not a being (*satta*), not a person (*puggala*). Therefore, just as when the component parts such as axles, wheels, frame poles, etc., are arranged in a certain way, there comes to be the mere term of common usage 'chariot', yet in the ultimate sense when each part is examined there is no chariot,—and just as when the component parts of a house such as wattles, etc., are placed so that they enclose a space in a certain way, there



comes to be the mere term of common usage ‘house’, yet in the ultimate sense there is no house,—[similarly for ‘fist’, ‘city’, ‘tree’ etc],—so too, when there are the five aggregates [as objects] of clinging, there comes to be the mere term of common usage ‘a being’, ‘a person’, yet in the ultimate sense, when each component is examined, there is no being as a basis for the assumption ‘I am’ or ‘I’; in the ultimate sense there is only minded body (Vism. 593–4 [xviii.28]).

The self being denied here is “[the self] that speaks, that experiences’ and so on again are modes of firm adherence to the eternalist view itself. There it is the speaker (*vado*) because it speaks. It is said that it is the doer of verbal action. It is the experiencer (*vedeyyo*) because it experiences: it is said that it becomes aware of and experiences” (Ps 71; Jayawickrama 2009, para. 35). The argument from grammar is swiftly refuted: “It was also asked: ‘Since there is no experiencer of it, whose is that fruit?’ Herein: ‘For mere arising of the fruit/The common term ‘experiencer’ is used,/Just as one says ‘It fruits’/when a fruit arises on a tree.’ For just as it is simply owing to the arising of tree, fruits which are one part of the states called a tree, that it is said that ‘the tree fruits’ or ‘has fruited’, so it is simply owing to the arising of the fruit consisting of the pleasure and pain called experience, which is one part of the aggregates called ‘deities’ and ‘humans’, that it is said that ‘a deity or a human being experiences or feels pleasure or pain.’ There is therefore no need at all for another [i.e., separate] experiencer” (Vibh-a. 164; Vism. 555 [xvii.171–2]). “[The words] ‘I feel’ are merely a conventional expression [used] with regard to the occurrence of that feeling. In this way it should be understood that ‘he knows: I feel a pleasant feeling’ while discerning thus that ‘it is feeling that feels by making the basis its object’.” (Vibh-a. 264). The basic idea here is that a sentence containing a non-agentive active verb (as in “The door was banging in the wind”) replaces a sentence with an agent (“The postman banged the door”) (for discussion, see Ganeri 2012, chapter 15).

What concept of self is rejected when self is rejected? We should understand this to be a rejection of any concept of personal or psychological identity based on agency or ownership: there is no “doer”, as an agent of speech; and there is no “owner”, a possessor of feelings and experiences. The “self of the sectarian” is a self that owns experience and that performs actions. Although the only actions mentioned here explicitly are speech and bodily movement, presumably they stand in for the standard Buddhist triplet of words, deed, and thought: the self denied is neither a speaker of words, nor an agent of acts, nor a thinker of thoughts. Buddhaghosa does



not clarify how these two dimensions in the concept of self—agency and ownership—are related to one another. Can one have an owner of experience that is not an agent of actions, or an agent of actions that is not an owner of experience? Is the analysis of that self which we call a “being” (*satta*) or a “person” intended to be a conjunction or a disjunction of the two defining features? The first quotation suggests, but only barely, that agency is due to ownership; but the idea is not expanded upon.

Rune Johansson, nevertheless, has proposed that we can see *citta* as a sort of “core self”. He says that “*citta*, generally translated ‘mind’ [is] the core of personality, the centre of purposiveness, activity, continuity and emotionality. It is not a ‘soul’ (*atta*), but it is the empirical, functional self. It is mainly conscious but not restricted to the momentary conscious contents and processes. On the contrary, it includes all the layers of consciousness, even the unconscious: by it the continuity and identity are safeguarded. It has a distinctly individual form” (1969: 30). It “is by nature a centre of emotions, desires and moral defilements. It is partly conscious, partly unconscious. It has also intellectual capacities and is capable of being transformed” (ibid. 107). It is “not simply the mind and also not simply personality but something of both: the organizing centre, the conscious core of personality, often described as an empirical and functional self (but not *atta*), perhaps ultimately analysable into processes” (ibid. 131). In his earlier 1965 article, *citta* is “a centre within personality, a conscious centre for activity, purposiveness, continuity and emotionality” (1965: 179); insofar as it is not “an inner core...very much similar to all individuals” but rather “an individually formed centre” (ibid. 174), it “comes very close to the psychological concept of personality” (ibid. 178). Johansson notes that “only once is it explicitly denied that *citta* is the self (S.ii.94), while it is very often denied that *viññāṇa* and the other *khandhā* are the self” (ibid. 168).

The concept *citta* is certainly not that of “being” or “person” (*satta*). Is the redescription of *citta* as “core self” consistent with the evident denial of self? It could be, as long as *citta* is neither the owner of feelings and experiences nor the agent of acts of speech, deed, or thought. It does seem right that *citta* does not own the *cetasikas*: they are concomitants, not properties, of *citta*. It seems right too that *citta* is not an agent cause, for although it is a cause, it is itself causally conditioned, so it is not the “uncaused causer” that the idea of an agent cause implies. Its claim on selfhood consists simply in its being a “centre”. Harvey agrees with much of Johansson’s description,

but corrects him on two points: neglecting to emphasize that *citta* is “not only active but also acted upon” and suggesting that *citta* is a “basis” for the aggregates, when in fact “it is equivalent to one of those components, namely discernment, in its aspect as deployed, directed and directing in various ways” (1995: 114–5). Yet Johansson does say that *citta* is capable of being transformed, and although it may not be the “basis” of the concomitants, it is nevertheless not itself a concomitant but a part of the “*citta-cetasika*” complex; it is not itself mindedness (*nāma*).

Is it then nothing more than the *cetasikas* “arranged in a certain way”, a point of reference in common usage alone? Certainly aware of the chariot metaphor and of general Buddhist rhetoric against self, Johansson must have had more in mind than this in what he surely intended as a provocative claim. What function or aspect of *citta* might one point to as source of entitlement to describe it as self? It is not Zahavi’s “minimal self”, because the minimal self experiences and feels, indeed experiences and feels with a sense of “mineness” (Zahavi 2005). Yet is anything even more minimal than the minimal self rightly described as a self? In fact, in what Johansson himself describes as the “dynamic psychology of early Buddhism”, it is far from clear that there is anything properly described as an “organizing centre”, as opposed to an ever-evolving organization in which various components exercise various sorts of control. The main justification for this claim seems to be that *citta* is held apart from the concomitants individually, and neither can it simply be identified with the second-order property which is their organizational structure.

The most promising way to understand the idea is by appeal to the idea that attention consists in the systematicity or structuring of the stream of consciousness (O’Shaughnessy 2002; Wazl 2011). Specifically, Wazl says that “consciously attending to something consists in the conscious mental processes of structuring one’s stream of consciousness so that some parts of it are more central than others” (2011: 158). The claim that *citta* is a core self might now be rephrased as being that *citta* consists of those parts of one’s stream of consciousness (*santāna*) that have been made more central in the course of consciously attending. So, then, *citta* is not a mere collection, nor is it the mere totality, but rather it is, at any given moment, those specific elements which attention centralizes. We need not endorse Wazl’s claim to have identified the essence of attention in order to agree with him that in attention there is a structuring of the stream of consciousness; and insofar as what is distinctive of attentional

structuring is that it enables a centre/periphery distinction to be drawn in relation to the stream of consciousness, we can use that distinction to explicate the idea that *citta* is a core self. In this case, what is meant by “self” is “those aspects of the structure of the stream of consciousness which dynamically take centre stage when there is attention”. The core self is the way attention shows up in the organization of the stream of consciousness. So the notion of self as agent of actions and owner of experiences is replaced with a notion of self as attentional centring. This fits nicely with the prominent idea, in early Buddhism, that *citta* can be modified and transformed in the training and cultivation of skills of attention. The reason it is possible to modify *citta* by training one’s attention is simply that *citta* consists in the way attention structures the stream of consciousness. And it fits nicely too with the central claim of this book, that attention replaces self in the grounding of cognition. The “core self”, *citta*, is a surrogate self, something that performs many of the principal cognitive tasks of the “self of the sectarians” but has none of the metaphysical baggage, and cannot properly be called “self” if it is fundamental to the functional role of that concept that it provides experience with ownership and agency.

Jennings (2012) has argued that many aspects of attention can be unified under the rubric “attention is a process of mental selection that is within the control of the subject”, that it is “subject-directed mental selection”, where a subject is “that to which we attribute such capacities as consciously experiencing, knowing, thinking, planning, and perceiving” (2012: 537). Let us ignore the possibility that our attribution practices might themselves be what produce the “subject”, and take it that she is simply articulating the concept of the “self of the sectarians”, the experiencer and the doer. The claim is then that the subject directs the selection processes in attention. This is the heart of the disagreement between the two concepts of “self” in play: one claims that the centre/periphery distinction within the structure of the stream of consciousness is directed by a subject external to itself; the other identifies the centre with the self. In the second view, attention is itself intentional, not requiring direction from the outside. It contains its goals and plans within itself, as it were. As restricted to the case of selective attention, then, a first element in the claim that attention replaces self in the grounding of cognition is that dynamic attentional centring is sufficient for action-planning, perception, and other cognitive tasks.

Let me turn to reflect on the very important discussion in O’Shaughnessy’s *Consciousness and the World* (O’Shaughnessy 2002).

O'Shaughnessy begins by arguing that attention is necessary for consciousness, or, more precisely, that consciousness "necessitates the accessibility of the perceptual attention" (2002: 10). Attention is necessary for consciousness because consciousness has a necessary truth-orientation; it is a "reality-detector", and indeed that is what it means to say that consciousness puts us in contact with reality, that "whereas dreams merely putatively are of Reality, consciousness is 'in touch with' Reality" (ibid., 12). There are already echoes here of two claims Buddhaghosa has made, that engagement (*phassa*) and attention (*manasikāra*) are concomitants (O'Shaughnessy speaks rather of *commitments*) of consciousness. As for the nature of attention, O'Shaughnessy says that a natural and appropriate imagery can easily turn into a myth. The natural imagery is of attention as mental 'life-blood', as "a sort of mental 'space' of awareness present in the mind, which is occupied exclusively by the experiences it enables to exist" (ibid., 285), for "if (say) emotion or thought or perception are to so much as *exist*, attention needs to be available" (277). The point of the imagery is that it captures that sense in which attention is limited ("occupied"), a sense that O'Shaughnessy illustrates with the example of driving a car through a narrow pass, one's attention to the driving precluding one from attending to a difficult conversation at the same time. O'Shaughnessy cautions that this imagery can easily be misunderstood, for it may lead to the impression that the experiences which attention enables to exist are one thing and the "mental space" of awareness is something else:

The myth in question takes the following form. It is of a mental existent (which I shall call S), a particular mental 'space' that is of type awareness (in some sense), which coexists with and is distinct from contemporaneous experiences. Those experiences relate to that awareness-space, not as its objects, but as its occupants, and that property enables them to exist (285).

Or again:

That to which these various expressions refer ["the attention", "awareness"] is something that is closely akin to a psychic space. And yet as we have just seen in the recent discussion of the mythical S, it cannot be something that, like the space of a canvas or stage, precedes and outlives its occupants (288).

Instead of falling into the myth, O'Shaughnessy says that we should realize that "what we have in mind in speaking of 'The Attention' ... is nothing less than Experiential Consciousness itself... To repeat, it is

what we frequently refer to as ‘the stream of consciousness’ (of literary fame)” (288). ‘Experiential Consciousness’ is O’Shaughnessy’s term for the stream of consciousness (15). His idea is that to find our attention occupied by a certain given experience is for the experience to partly constitute the attention, much as a single piece does a jigsaw puzzle; what is occupied by experiences is, as he puts it, a *system* of those experiences, the system being the network of interrelationships which experiences need in order to exist (288). He concludes:

Denuded of the above of array of [systemic] properties, they [sc. experiences] would be like so many psychological atoms wandering in a void. Endowed with them, they constitute a continuous ongoing phenomenon which is a sort of circle or centre of awareness. This awareness is the Attention (289–90).

I need hardly add that “the mythical S”—this unspeakable nothing whose possible existence is acknowledged not even in the index of *Consciousness and the World*—is the self. For O’Shaughnessy, as for Buddhaghosa, attention replaces self in the explanation of perception, thought, and emotion. What O’Shaughnessy does brilliantly is to demonstrate how the natural imagery of attention is what itself gives rise to the Myth of Self as Detached from Experience; the “self of the sectarians” is a bad attempt to formulate a good insight about attention. Of course nothing can prevent us, should we so wish, from stipulatively *defining* the word “self” to mean the attention, and this I think is just what the claim that *citta* is “core self” ultimately comes to.

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## MEANING: AN APPROACH FROM ALTERNATIVE STANDPOINTS

Amitabha Das Gupta

Philosophers widely differ on their conception of meaning. To say this is to imply that there are alternative ways of conceptualizing meaning which gives rise to alternative conceptions of meaning. This important fact regarding meaning shows, first, that meaning may not be perceived as a homogenous concept and, second, that there are alternative philosophical or linguistic standpoints due to which we have these alternative conceptualizations of meaning.

Elaborating these two points, to say that meaning is not homogenous implies that there is a fundamental dichotomy between the two basic constituents—the subjective and the objective dimensions of meaning. These two mutually opposing dimensions or constituents ultimately form the two standpoints in meaning. These two standpoints are the two alternative conceptualizations of meaning where each seeks to explain from its respective standpoint the nature of meaning and the meaning—relationship that is involved between a word and the object. These two standpoints give rise to the subsequent standpoints, namely, the speaker's standpoint and the hearer's standpoint. To put it in philosophical terms, the former standpoint is followed by idealism whereas the latter is followed by realism. These two standpoints themselves indicate the two alternative ways of viewing meaning.

However, at this stage, a question arises: Is meaning not a unitary concept? This, indeed, sounds paradoxical particularly in view of my statement supporting the alternative standpoints in meaning. At a logico-linguistic level, the subjective and the objective dimensions pose a sharp dichotomy leading to the formulation of two clear-cut standpoints in meaning. Meaning in this sense is not a unitary concept. But at a deeper level, meaning exhibits unity which is often unnoticed. This is where we come to the metaphysics of language. At this level, the subject/object dichotomy is viewed in a different

way. Accordingly, a person who is asserting a particular dimension of meaning is not, thereby, rejecting the other dimension. The reason is that what he is rejecting is already implicitly presupposed by him. This presupposed dimension, though largely unnoticed, is necessarily present whenever we are engaged in linguistic activity.

Finally, this paper is based on Professor Kalidas Bhattacharyya's<sup>1</sup> work on meaning. His work on meaning, though neglected, is remarkably original in terms of its insights and approach. The two places, where he made a special study on meaning, was his book, *Philosophy, Logic and Language* and his paper, "Some Problems Concerning, Meaning", which was a contribution to the volume entitled, *Analytical Philosophy in Comparative Perspective*. The latter work was one of his last works where he made a full-length study on meaning. In a certain sense this work on meaning is not totally unrelated to his earlier work where he had developed his own system called alternative standpoints in philosophy. It may be noted in this connection that his work on meaning has been influenced both by the Nyāya theory of meaning and Kant's transcendental idealism.

In my paper, I have presented his ideas in the way I have understood it. This involves both reinterpretation and extension of his ideas. Bhattacharyya offers a framework of analysis which has explicated a structure in terms of which we can understand the meaning — relationship that is involved between a work and the object.

This paper has three sections. In the first section, I shall briefly present Bhattacharyya's view on meaning as a system of convention having both the subjective and the objective sides. In the second section, I shall discuss Bhattacharyya's formulation of the alternative standpoints in meaning. In the third section, following Bhattacharyya's suggestion, my attempt will be to show that at a deeper metaphysical level the subjective/objective dimensions are not in opposition to each other. Rather, they form a unity which makes unitary conception of meaning possible.

## I

### *Meaning as Conventional Relations*

The starting point of Bhattacharyya's analysis is the common sense notion of meaning i.e., the notion of meaning that we ordinarily take it to be when we are engaged in everyday conversation. The common sense notion of meaning is not only the starting point but it is also the basis of his analysis. That is why we find that Bhattacharyya is coming again and again to common sense notion of meaning.



For him, whatever abstraction we make, be it linguistic or logical or metaphysical, it cannot be totally unrelated to the common sense conception of meaning.

Bhattacharyya sets a context in which he tries to understand and identify the notion of meaning. The context is the language/reality relationship. We use words to refer to things or objects. But how do these words get their meanings? The relation between words and objects is, thus, vitally important for us to know how words get their meanings. Things or objects in the world necessarily have features or properties. We distinguish them and specify them individually on the basis of these features. These features may be, thus, regarded as that which define the nature of the thing concern. But what is then meaning? Meaning consists in stating these features. These features taken together form a complex. Thus, for example, the meaning of a word, say, lemon can be given by specifying the constituent features of lemon. This way of defining meaning has an obvious danger—a logical danger. Bhattacharyya is well aware of this danger. Some of his remarks, though brief, express his deep concern. Let me try to interpret his line of thinking. The danger involved in this perspective on meaning comes from the side of objects or things. To say that a lemon has these following features, say *x*, *y*, *z*, is to say that there is an analytic connection existing between these features and a lemon. Considering this analytic connection between a lemon and its features, the definition of a lemon will be likewise analytic. Thus, the definition stating that anything having these features will be called a lemon is an analytic truth. Meaning in this sense is given in terms of analytic definitions expressing truths which are both necessary and knowable *a priori*. But to hold this will be to rule out the possibility that lemons can ever lack any of these features as mentioned in the meaning statement. However, the fact is that we can always think of the presence of abnormal members in the class that we are describing. This may happen due to some changes in the environment. As a result some of the earlier-mentioned features of the object may be dropped and, instead, some new features may be included in its definition. But such a revision is not possible because the features associated with the object are taken to be analytically tied to the object concerned. Thus, incorporating the new change will involve a contradiction. But this is simply untenable. It is untenable on the ground that change is a fact and in view of this fact it must be maintained that the sentences expressing meaning can never be analytic.

In view of this difficulty, the constructive suggestion of Bhattacharyya is that to say that something is a lemon or a tiger is not to say that it

necessarily must have all those features that we normally associate with that term. It is due to this loose connection that a three-legged tiger is still called a tiger and a blue lemon is still called a lemon. Thus, the proposal that the meaning of a term consists in stating the features of a thing does not make meaning fit into an analytic definition. Bhattacharyya has openly questioned this move when he said why one should be so fastidious about linguistic precision even at the cost of forgetting the empirical reality? Perhaps, the best way to reconstruct Bhattacharyya's thesis that meaning consists in stating the features of a thing will be to identify meaning with what Hilary Putnam calls stereotype. Features of a thing taken together form a stereotype. Thus, to give the meaning of a term is not to offer an analytic definition but to spell out the associated stereotype.

The above discussion shows that meaning is largely a matter of convention. A word getting its meaning is the result of the convention that we develop. In the same way, a stereotype which constitutes the meaning of an expression is also a convention developed by a particular linguistic community.

On the basis of his interpretation of meaning as conventional relations, Bhattacharyya introduced the two aspects or dimensions of meaning. A particular meaning-convention, when it continues for a long time, acquires an objective status. As a result, the relation between the symbol and the symbolized is taken as objective. However, as Bhattacharyya points out, treating meaning and meaning-relation as objective does not deny its subjective origin. It is due to its inherent subjectivity that meaning is still viewed as a matter of convention. Meaning is, thus, what Bhattacharyya calls an amalgam of both subjectivity and objectivity. The task before us is to find out the nature of this amalgam. It is because of this amalgam that we find meaning to be a unitary phenomenon.

## II

### *Meaning in Alternative Standpoints*

Everything in this world is distinguished in terms of their respective features. We refer to a thing through these features and this is how we make the hearer recognize the thing that we are referring to. We are essentially trying to draw the hearer's attention to it through these features. These features, thus, play the key role in determining the meaning of an object or a thing. Bhattacharyya considers these features as the objective determinant of the meaning of a word.

In Bhattacharyya's submission the distinction between meaning and its determinants corresponds to the same as *Śākya* and *Śakyatāvachedaka* of Nyāya and connotation and denotation of J.S. Mill. With this clarification, he explains the distinction. To do this, he takes the example of the term 'man'. Its meaning, that is denotation, consists of individual men, such as, Ram, Rahim, David and so on. But, on their own account, these individual men do not constitute the denotation. As such, they are only living creatures, and as living creatures, they possess certain features which are the distinguishing features of 'man', such as, rationality, ability to speak, laugh, etc. In this sense, they constitute the meaning of the term 'man' solely by virtue of possessing these features. To put it in Bhattacharyya's terminology, these features constitute the connotation *Śakyatāvachedaka* of the term 'man'. The same is true of the classic example – *The Morning Star and The Evening Star*. The star that is called by both these names is the denotation of each of the terms, whereas Morning Star-hood and Evening Star-hood may be viewed as determinants or *Śakyatāvachedaka*. Bhattacharyya thinks that they may be rightly called connotations since they constitute the distinguishing marks of the denotation.

#### *Analysis of Demonstrative from Alternative Standpoints*

In the light of the distinction between meaning and its determinants or *Śākya* and *Śakyatāvachedaka*, Bhattacharyya analysed the demonstrative expressions, like 'this' or 'that'. Apparently, these demonstratives do not come under this distinction. Bhattacharyya, on the contrary, claims that this distinction can be most significantly noticeable in the context of demonstratives, such as, 'this'. He offered his own method of analysis which led him to arrive at certain important conclusions regarding language and meaning. It should be made clear that Bhattacharyya takes the expression 'this' to have enormous significance. For him, it symbolizes the world of objects. It may be relevant to mention here that on this issue, Bhattacharyya has been clearly influenced by K.C. Bhattacharyya's analysis of indexicals. According to K.C. Bhattacharyya, the word 'this', unlike 'I', expresses a general meaning because 'this' can be used by two different persons while referring to the same object having the same sense. It is a part of the semantic demand of language that whenever a word is used to refer to an individual thing it is identified as 'this'.

The speaker uses the expression 'this' or 'that' in order to draw the hearer's attention to the particular thing which he is referring

to. The use of ‘this’ or ‘that’ is meant to convey the precise nature of the thing that the speaker is talking about. Considering from this perspective, ‘thisness’ or ‘thatness’ is certainly a determinant in all the cases where the word ‘this’ or ‘that’ is used by the speaker. But now there is a problem which Bhattacharyya himself has recognized. How can ‘thisness/thatness’ be a determinant or connotation? The reason is that it does not constitute the property or the feature of the thing concerned. The use of the word ‘this’ by the speaker functions as pointing to the thing. It is the same as pointing to a thing by a finger post. Beyond this, the demonstrative expression ‘this’ does not have any more semantic information to contain. There are, of course, exceptions to this – where a speaker may be using the word ‘this’ to intend the property of a thing. This happens on an occasion where a *class* of things is meant or in a context where a particular is meant on the basis of some additional property, such as, ‘this red flower’. Apart from these exceptions, the word ‘this’ is not concerned with a property of the thing meant. Hence, it may be proper to say that what we call as a determinant may not have anything to do with properties of the things meant. The word ‘this’ may not be, thus, qualified as a meaning-determinant.

But accepting this will have a serious consequence, leading to the distortion of some vital facts regarding linguistic communication. Bhattacharyya, thus, comes forward with his own system of explanation narrating the semantic significance of demonstratives in the context of the speaker-hearer communication.

To view it from the point of view of the speaker-hearer communication, it may be said that the demonstrative ‘this’/‘that’ may not have the same role to play across the contexts. Thus, for example, from the speaker’s point of view, the role that it plays is different from the role that ‘this/that’ assumes in the hearer’s point of view. Accordingly, as Bhattacharyya brings out, ‘this’/‘that’ is “intelligible primarily as spoken and secondarily as heard”. As a result, the same expression ‘this’ is meant in two different ways. ‘This’ means the thing as spoken and it also alternatively means the thing as pointed out by the speaker. Now to approach it from the hearer’s point of view, the hearer understands the thing necessarily as that which is spoken out to him as ‘this’ which is distinguished from what he—the hearer speaks of as ‘this’. In this sense, the hearer, as Bhattacharyya points out, is in a perfect realistic attitude because he comes to know the existence of a thing over there with all its individuality through the word ‘this’ as spoken out to him. It plays the role of an indicator. Consequently, for the hearer, the word that

is heard means the real thing lying over there in front of the speaker. It is assumed as if there is a necessary relationship existing between the speaker and the thing situated in front of him. But to assume this, as Bhattacharyya claims, is not to embrace idealism. The reason is that the speaker is only a 'he' to the hearer having the same status with other things of the world. However, with the difference that this 'he' is a living conscious item of the world.

Now to approach it from the speaker's point of view, the expression 'this' is not related in the same way as it is to the hearer. The main point of difference is that the speaker here is 'I', and 'I' is not an item of the world to be placed along with the other things of the world. This remark is not meant to mystify the description of 'I', rather, it is meant to show the uniqueness of 'I'. It is this uniqueness which distinguishes 'I' from the rest of the world, including 'he'. Given this conception of 'I', its relationship with 'this' is understood by the speaker. Whereas, the same is not true of the hearer. The hearer takes 'this' as used by the speaker to be in a necessary relation with someone whom he calls 'he' and, accordingly, he holds that the expression 'this' in question is what the speaker called 'this'<sup>2</sup>.

There are two clearly demarcated attitudes revealed here. The one is of speaking and the other is of hearing. Bhattacharyya thinks that unfortunately these attitudes are not properly recognized in philosophy. These two attitudes express the respective philosophical standpoints here. The attitude of speaking expresses the speaker's standpoint where we find the predominance of 'I'. The dependence on 'I', philosophically, leads to idealism. Whereas, the attitude of hearing which expresses the hearer's standpoint does not subscribe to such idealism, because of its dependence on 'he'.

In Bhattacharyya's reading, these attitudes expressing the two standpoints are revealed in the Western Philosophy and in the Indian Philosophy respectively. In their concern for languages, western philosophers, commonly assume the speaker's standpoint. As a result, the meaning of a verbal expression is understood from the point of view of the speaker. This is the same as to find out what the speaker means when he uses that expression. But the scenario is different when we come to the Indian Philosophy where the meaning of an expression is mostly understood from the point of view of the hearer. These two standpoints mark the two approaches to the philosophy of language or to the study of meaning. The former leads to an idealistic approach emphasizing the subjective aspect of meaning, whereas, the latter leads to a realistic approach emphasizing the objective aspect of meaning. As Bhattacharyya claims, both in

philosophy of language and in epistemology, Indian philosophers (the only exception being Buddhism) are thus consistently found to be realists. Following this classification, the question on meaning may thus be approached in alternative ways. The alternatives are: either it is we that mean objects outside or it is words themselves that do so. To say that it is we who do it means that it is we who use words to refer to objects. Or, alternatively, it is words themselves that refer to objects. As pointed out earlier, due to their adherence to the hearer's standpoint, Indian philosophers largely accept the second alternative, that is words themselves denote objects. But how does it constitute the hearer's standpoint? This takes us to the Nyāya doctrine called *Śābdabodha*, a doctrine that Bimal Matilal<sup>3</sup> particularly highlighted in his work. The present essay follows Matilal's account closely.

### *Śābdabodha: The Hearer's Standpoint*

Language generates awareness. It is the awareness of meaning of an utterance—the *Śābdabodha*. It is the awareness of the hearer who acquires it from the utterance of words and sentences. The basic presupposition of this theory is that there must be a linguistic community consisting of speakers and hearers. Speakers utter words and sentences to convey their thought, intentions, commands, etc., and hearers, on the other hand, try to understand what these speakers are saying on the basis of the knowledge that they derive from such utterances. It is this knowledge, which is derived from speaker's utterances, that is called *Śābdabodha*. It is distinguished from perception, etc.

The knowledge that is acquired assumes a process involving three stages. First, utterance of words results in producing knowledge about these words. Second, this knowledge of words makes the hearer aware of the objects meant by these words. Third, this process culminates in producing knowledge of meaning. As we can see, if language is conceived as the instrumental cause producing a certain cognition in the hearer, the concept of meaning is accordingly formulated only from the hearer's point of view giving a very minor importance to the speaker's point of view.

The second important element involved in this perspective on meaning is the notion of meaning – linkage holding between the word and its meaning. We have said that the hearer comes to know of the object meant from the knowledge of words. But this will not be possible unless we establish that there is a special meaning-linkage holding between the word and its meaning. This linkage should be

known to the hearer in each case. This meaning linkage is called the denoting power of the word, i.e., *Śakti*. Apart from denoting power, the word may have another power which may help in generating the knowledge of its meaning of the object meant. This specific power of word is called metaphor or *lakṣaṇā*.

The next important point to be raised in this connection is: how do words get their denotative power? According to some interpretations, a word having a denotative power is natural to the word. However, Nyāya offers a different interpretation to this. The word acquires its denotative power either through the will of God, called *Śakti* or through the intention of a particular human being, called *paribhāṣā*. One should note that in both cases the relationship stipulated between the word and the object it denotes is conventional.

A competent hearer will be one who will be able to collect information about such stipulations. How do hearers learn these stipulations embodying the knowledge of the denotative power of words? The hearer acquires this knowledge from the speaker or his fellow hearers by watching them – their actions, responses, etc. It is through instruction also that he acquires this knowledge.

We now come to the form and the structure comprising the internal constituents of the knowledge of the denotative power. The knowledge of the denotative power, as Matilal puts it, may be expressed in the following form: “The word X is empowered to present...” The element that fills the gap here is called *Sakya* – the object meant. We now come to a very specific question concerning the nature of the object that is meant by such words as ‘cow’. Is it the individual ‘cow’ or ‘cowness’? The word ‘cow’, as J.L. Shaw<sup>4</sup> puts it, means a complex consisting of three elements. First, the particular or the individual cows; second, the configuration or *ākṛti* of particular cows; and third, the class-character of the universal called ‘cowness’. *Ākṛti* is the relation called ‘inherence’ in the Nyāya system which relates the universal character to individual as the instance of it. The first one in the complex (particular, cows) is the referent *Śakya* of the word ‘cow’. The third one, that is the universal, is the limiter or the distinguisher of the object meant by the word ‘cow’, *Śakyatāvachedaka*. The second one is the relation of inherence which relates the third with the first.

The above constitutes the structure of hearer’s knowledge of the denotative power of the word. The complex consisting of three elements presented here is constructed from the hearer’s standpoint. It essentially conveys the structure that is already contained in the meaning awareness of the hearer.



A question may be raised: why there is no much of importance given to the hearer's standpoint? The reason is that language as a means of communication to be successful must ensure that the hearer understands what the speaker intends to convey. It is assumed that the speaker already has the knowledge of what to communicate to the hearer. Thus, for example, in the case of making inference for oneself, the person does it without using any word. But this is not possible when he wants to communicate his inference. To do this he uses sentence. It is the hearer who has to understand the meaning of the sentences. Considering from this perspective, meaning is thus defined as *Sakti* producing a certain cognition (or, awareness) in the hearer on hearing the word uttered by the speaker. The concept of meaning, so conceived, ignores completely the speaker's point of view.

Finally is the realism assumed in this account? In this connection, Bhattacharyya mainly refers to universals, such as, elephanthood or cowness. These universals are understood in Nyaya as wholly objective and even observable in the context of particulars instantiating these universals. Thus, as he argues, when a child sees an elephant for the second time in his life speaks out loudly 'elephant'. He has no time to compare the present instance with the previous instance. The only option left is that the child must be directly perceived the elephanthood. The elephanthood is the determinant *avachedka* providing the ground for applying the word to the object to which it applies. These are the ways through which one can probably see the significance of the hearer's standpoint in relation to language and meaning. With this, we may now try to understand the speaker's standpoint as exemplified in the Western philosophical tradition.

### *The Speaker's Standpoint*

As pointed out earlier, according to Bhattacharyya, in Western Philosophy, the meaning of an expression is understood from the speaker's point of view, that is what the speaker means when he uses that expression. This standpoint is posed against the hearer's standpoint exemplified in Indian Philosophy, particularly, in Nyaya, which expresses realism. The speaker's standpoint in meaning adopted in Western Philosophy, on the other hand, leads to idealism. Here we find distinctively the predominance of 'I' or the subject in the formulation of meaning. It is undeniable that in Western Philosophy and, particularly, in the analytic tradition, meaning is mostly understood as the speaker's meaning. But to claim on the



basis of this fact that the Western philosopher's approach to language and meaning is thereby idealistic is, indeed, an over exaggeration. Certainly, they have conceptualized meaning from the speaker's point of view but they have not always opted for idealism. Bhattacharyya is not unaware of this feature. In fact, he made it explicit that the contemporary Western Philosophy is not idealistic though it subscribes to the speaker's point of view in its stand on meaning<sup>5</sup>. It is important to note that the idealism that Bhattacharyya is talking about is Kant's transcendental idealism which offered a structure of thinking that influenced the subsequent course of development in Western Philosophy. The prominence of 'I' —the subject —is thus noticeable in the Western philosophical thinking throughout. In this connection, Bhattacharyya particularly mentions Kant's well-known phrase "**I think**" which Kant used it while discussing transcendental unity of apperception. To recapitulate the Kantian context of the use of phrase, **I think** we know that through sensibility we are given only a manifold of impressions. This manifold is combined by the self as thinking or understanding. It essentially means that combination is, thus, done by me. But I cannot combine my representations if I am not conscious of them. All representations must be, thus, accompanied by the phrase "**I think**". To show the relevance of the Kantian phrase **I think** in this context of the present inquiry, Bhattacharyya suggests that **I think** can be reconstructed as **I speak** on the ground that speaking and thinking are one and the same activity. Conceived in this way, when a speaker uses the word 'this', it is necessarily prefixed by the phrase **I speak**. It is not suggested here that the thing which the speaker indicates through his utterance of the word 'this' can be reduced to mere pointing. Certainly, something is pointed out. But more than that what primarily interests the speaker is its thisness which functions as the determinant here. The expression 'this' is constitutionally a referring expression. As he says, it is a forward-looking expression which is always ready to refer. To see it in the Kantian framework, the word 'this', as Bhattacharyya says, functions as "the apriari anticipation of anything in nature". Further, ('this' or such class names as cow, elephant, red) "coalesces" with a thing presented in Nature.

Bhattacharyya's analysis of the word 'this' may not be acceptable to all. But it offers a perspective which explains why adopting the speaker's standpoint involves idealism. In this standpoint 'I' becomes the necessary presupposition of any linguistic activity which is also a cognitive activity. This is the way how the subjective dimension of meaning becomes important.

## III

*Alternative Descriptions as Complementary Descriptions*

We are, thus, having two alternative standpoints —the speaker's standpoint and the hearer's standpoints. These standpoints are followed by the subjective and the objective conceptions of meaning and by idealism and realism. This situation results into a distorted picture of language and meaning. True, there are alternative standpoints, but at the same it is also true that meaning is a unitary concept. Meaning has both subjective and objective aspects and one cannot see one aspect at the exclusion of the other. In the context of meaning the subjective and the objective become complementary. Bhattacharyya did not rule out this possibility. He, on the other hand, talks about the amalgam of the subjective and the objective.

The two aspects of meaning may be described as, following J.N. Mohanty<sup>6</sup>, 'I mean' and 'It means'. These two are not rivals; on the contrary, they are complementary to each other forming an intimate relationship between them. In view of this relationship, it may not be proper to say that they are alternative ways of describing meaning. The expression 'it means' leads to the ontological hypostatization of meaning. It needs to be supplemented by including the subjective and the linguistic backgrounds in mind. In a similar way the expression 'I mean' leads to subjectivism and linguistic relativism. This can be overcome only by admitting the ideality and the objectivity of meanings. Since meaning is a unitary phenomenon, these two dimensions of meaning cannot be taken to be alternative but complementary descriptions of meaning.

## Notes

1. Bhattacharyya, K. "Some Problems Concerning Meaning" in *Analytical Philosophy in Comparative Perspective: Exploratory Essays in Current Theories and Classical Theories of Meaning and Reference*, ed. by Bimal Motilal and J.L. Shaw, D. Reidel Publishing Company, 1985.  
—, *Philosophy, Logic and Language*, Allied Publishing House, 1965.
2. In connection to this point, one can find the influence of K.C. Bhattacharyya's analysis of the indexical expression 'I' on Bhattacharyya's thought. He assumes here implicitly K.C. Bhattacharyya's reflection on 'I'. In K.C. Bhattacharyya's analysis, 'I' as used by the speaker is never understood by the hearer "to convey what he would himself convey by the use of it. (K.C. Bhattacharyya, *The Subject as Freedom*, p.2). However, the hearer understands the word 'I' as one which stands for the speaker. Note the understanding achieved here is not in terms of the meaning of the word 'I' that itself carries the significance, that is, the

intention of the speaker is expressing through the utterance of the word 'I'. Thus, as K.C. Bhattacharyya holds, the 'I' itself does not have any meaning. It has only a meaning function, that is, it has only "the function of speaking" (Ibid, p.175). The I and the speaker are not distinguishable. It is not that the speaker is someone who comes first and then utters 'I'. The two are one and the same. See in this connection the paper entitled 'Krishna Chandra Bhattacharyya's Theory of Meaning', by J.N. Mohanty in his book, *Explorations in Philosophy: Essays in Philosophy*, by J.N. Mohanty, Vol 1 and 2, Oxford Univ. Press 2002.

3. Motilal, B.K. "Awareness and Meaning in Navya-Nyaya" in B.K. Motilal and J.L. Shaw, eds., *Analytical Philosophy in Comparative Perspective*.
4. J.L. Shaw "Proper Names: Contemporary Philosophy and he Nyaya" in B.K. Motilal and J.L. Shaw, eds., *Analytical Philosophy in Comparative Perspective*.
5. In Bhattacharyya's own observation there has been a deviation in Western Philosophy from its original position which is distinctively characterized by the phrase 'I think'. As a result, Western Philosophy, instead of taking a turn towards transcendentalism takes recourse to empiricism. How does this deviation take place? In Bhattacharyya's analysis, the notion of speaking is the central characteristic of western philosophical thought; the notion of freedom comes as a natural corollary. But, then freedom instead of being utilized for achieving higher ends has been used to dominate and to exploit nature to gain materialistic end. This gives rise to a culture which is far away from its original idealistic mooring. The attitude of speaking is thus replaced by the attitude of hearing or what he calls "a form of aggressive hearing". See, in this connection the paper entitled, 'From Language to Metaphysics', by Nirmalya Narayan Chakraborty in Madhumita Chattopadhyay ed., *Alternative Standpoints: Tribute to Kalidas Bhattacharyya*, Centre for Advanced Study in Philosophy Jadavpur University, 2015.
6. Mohanty, J.N. *Phenomenology and Ontology*, Martinus Nijhoff, 1970.

## A NOTE ON UNDERSTANDING

Syed A. Sayeed

### I

This article is an attempt to draw attention to a fundamental, obvious yet elusive distinction that has largely remained insufficiently noticed throughout the history of western thought. It is the distinction between 'knowledge' and 'understanding'. Owing to this failure to notice this fundamental distinction, 'understanding' has never been recognized as a distinct, autonomous, epistemic category. I think the consequences of this oversight have been far-reaching. To put it in broad terms, this failure to recognize that understanding is different from knowledge has distorted our perception of entire areas of civilized life. To cite a specific instance, it has blinded most of us from seeing the meaning and *raison d'être* of the entire domain of disciplines called the Humanities and has left us making futile efforts to justify philosophy, literature and history in terms of pursuit of *knowledge*, whereas in actual fact, they are all efforts towards *understanding*. The object of literary and human studies is to refine understanding in the sense of refining our understanding of certain particular things as well as in the sense of refining our capacity to understand. Unless we grasp this fact and free understanding from the shackles of knowledge-centred epistemology, these studies will continue to be consigned to a cognitive limbo. For these and several other reasons, it is necessary to restore conceptual autonomy to the notion of 'understanding' to restore it to its proper place in epistemology. Or, if we must use the term epistemology in the narrow sense of a concern with 'knowledge', it is necessary to clear the space for hermeneutics by resisting the dominance of epistemology.

But, all this rhetoric aside, what precisely is this distinction between knowledge and understanding? And how plausible is the claim that so basic a distinction has remained obscured for so long? To answer these questions in straightforward terms is not easy. To even begin to articulate this distinction we have to turn thought and

language inside out, so to speak, since this is one of those issues like the question of Being that we cannot express in language because they are so close to thought and speech that it would be correct to say that we think and speak *through* them. They are dissolved in the very medium of our thought, woven into the very fabric of language. Consequently, it is very difficult to objectify them and draw attention to them, the reason being that our language is continuous with our senses and our consciousness, and therefore our view of the world and our concepts are co-ordinated. As a result, it is nearly impossible to transcend them, and any articulation of these matters necessarily sounds simultaneously trivial, tautological as well as nonsensical. But the matter, in my view, is important enough to be worth the vexation.

At the outset it would be helpful to take note of a purely linguistic fact so as to prevent avoidable confusion. In the case of knowledge, there is a clear distinction between the act or process of knowing and the goal or product of that process. We use the verb form 'knowing' to refer to the act or process and the word 'knowledge' to the product of that process. Some people do not find the distinction important (though they should, since it is not without consequences), but it is there for those who wish to take note of it. But in the case of understanding, the word 'understanding' denotes both the process and the product. Understanding is a state. The process leading to it can, perhaps, be distinguished from it. We may call it 'reflection'. But it is better to adhere to common usage. Therefore, the reader must be advised to be alert to the sense in which the term 'understanding' is variously used on different occasions throughout this article.

The most general statement we can make about understanding is that *to understand is to make sense of what is presented to consciousness, and understanding is the state of attainment of a sense of what is presented to consciousness*. But this is, unsurprisingly enough, question-begging, which, as we all know, is the fate of any attempt to define primitive concepts. In any case, the question is not merely whether understanding should be treated as an irreducible concept. The entire idea of incorrigible concepts that cannot be reduced to more basic concepts is, as has been pointed out, particularly by Donald Davidson, a little misleading. When we try to trace concepts to their ground, what we find is not a collection of unrelated, irreducible concepts, but a structure comprising interrelated concepts, none of which can be understood or defined except in terms of each other. So, our ambition should not be to discover some basic, intuitively more obvious or more self-evident concept that can illuminate the nature of what we call 'understanding', but to find some way of grasping

the conceptual structure of which the concept of understanding is a central element. Given the fact that such grasping of structures is itself one mode of understanding, this attempt to ‘understand’ the structure of understanding would not only be a difficult and elusive enterprise but also, as I stated above, the result is likely to appear disappointingly circular. In this sense, at this level, genuine analysis in terms of conceptual reduction is not possible. Any attempted analysis would be rather a horizontal movement between concepts which belong to the same categorial level. The value of making this movement can only be assessed in terms of the ‘sense of illumination’ it offers.

The approach we need to adopt here, therefore, is to use historical distance to see how the clear yet complex distinction between understanding and knowledge has been elided, and intersperse it with a look at contexts of common usage in which the term ‘understanding’ provides a sharper denotation through contrast with ‘knowing’.<sup>1</sup> The latter too, as I warned above, will be a rather unsatisfactory affair since the distinction between knowledge and understanding is rather problematic in ordinary usage.<sup>2</sup> As we shall see, at one level, there is an intuitive distinction between knowing and understanding that is too obvious to be noticed, whereas in some contexts, understanding is used as a synonym for knowledge and again in some other cases, understanding is contrasted with other capabilities,<sup>3</sup> and so on. As a result, at the level of ordinary usage as such, we will have to negotiate the ambiguous relation between knowledge and understanding, sometimes going along with common usage and sometimes going against its grain.

## II

Let me begin by giving a few instances where we intuitively recognize the distinction between knowledge/knowing and understanding.

- To know a joke is different from understanding the joke. In principle I may know a joke such that I can narrate it without however understanding it myself.
- More significantly, to know a certain poem is one thing; to understand the poem is a different thing. I may know the poem and even everything about it and may be able to recite the poem—all this without understanding it.
- I know truth but I understand meaning.
- I understand situations, patterns, structures and forms; it would be odd to use the term ‘know’ in these cases.

- Making a hazardous leap, keeping in mind all the risks of this ontological dichotomy and its fundamentally unstable character, we might say that we know entities and understand relations.<sup>4</sup>

Continuing the last point above, for all its attendant risks, it seems to me that the entity-relation distinction serves as a good point of departure to contrast knowing with understanding. To reiterate, entities are the objects of knowing while relations, forms and structures are the objects of understanding. We know objects but we understand a poem, a joke, or an epigram or a metaphor. The same can be said of a mathematical theorem or any theory for that matter. It is tempting to capture this distinction through the notion of meaning by saying that truth is known while meaning is understood.<sup>5</sup> This is a very useful way of looking at the matter, provided that we are careful about how we use the term 'meaning'. If we use the term meaning in the narrow sense of linguistic meaning, it would be incorrect since understanding cannot be reduced to linguistic understanding. The scope of understanding is larger than linguistic understanding and although the relation of understanding to language is a fundamental relation, we cannot reduce all understanding to linguistic understanding. We understand persons, situations, patterns and feelings. We can certainly associate the term 'meaning' with these things but it would be in a wider sense.

Before proceeding further, it might be helpful to clear one particular misunderstanding: I am not suggesting that knowledge and understanding are necessarily parallel, non-convergent phenomena. There are complex relations between knowledge and understanding including relations of interdependence. For instance, it seems correct to say that to know the intention of a person is to understand his action. This would seem to imply that knowledge is a necessary but not a sufficient condition of understanding. The task then would be to find out that feature whose absence makes knowledge an insufficient condition of understanding. In the final analysis, my insistence is that there is a cognitive phenomenon that is distinct from knowledge – a phenomenon that is not reducible to some species of knowing (a less rational, less logical or more intuitive mode of knowing), but is a totally different cognitive relation with reality, constituting an irreducible category.

But what precisely characterizes understanding? As I cautioned earlier, it is difficult to give the answer in a simple way. We could tentatively begin by suggesting, as I hinted above, that understanding is primarily the apprehension of relations, more specifically

the integrative relations.<sup>6</sup> Understanding is concerned with the organisation of awareness into a unity (which could be another way of saying that understanding is related to structurality). Continuing with the framework of entity-relations, entities are simple objects and are, therefore, not amenable to plurality of perception. But networks of relations are complex objects and are amenable to plurality of perception – in other words, they are amenable to interpretation. To invoke once again the distinction between truth and meaning, there cannot be multiplicity of truths. However, there can be multiple understandings or interpretations.<sup>7</sup> This means that there is no single ‘correct’ unity. While it is certainly not absurd to speak of a ‘true’ understanding, it would be a mistake to imagine that the notion of truth that we use in the context of knowledge can be applied here. The truth of knowledge is objective, singular truth while the ‘truth’ of understanding is a subjective truth in the sense of a truth in relation to the self. The better way out of this ambiguous formulation is, as I suggested above, to avoid the concept of truth altogether in the context of understanding and confine it to the domain of knowledge. In that case, the alternative formulation would be to state it in terms of interpretation and say that understanding is that cognitive satisfaction in which interpretation terminates. By interpretation here we must understand not the narrowly understood textual activity which overlaps with exegesis but the fundamental inclination of consciousness to constantly make sense of the co-existence of all its objects, which is in fact the very essence of consciousness.<sup>8</sup>

Another way to grasp the nature of understanding might be to focus on those occasions when there is failure of understanding: Occasions such as when someone just cannot see the point of a story, or see the significance of a certain action in spite of having all the relevant information; when someone is unable to *see* the picture even though the full picture is in front of him. However, we must realize that since understanding itself is a type of object suitable for understanding, it will not be possible to describe in definite terms the insight one gets into it by observing cases of its failure. This fact, I think, has partly been responsible for the reluctance to use understanding as a cognitive category. It is not possible to give a positivist account of understanding and it is undeniable that, although as a movement logical positivism might have disappeared, we still live under the epistemological pressure of positivism everywhere. All branches of the Human sciences must constantly resist this pressure. Unfortunately, more often than not, the Human sciences have not negotiated this



pressure well. In most cases, the response to this pressure has been either to retreat into a discourse of poetic impressionism that refuses to engage in analysis and argument, or to strive to mould one's discourse into a form amenable to a positivistic treatment. Since the notion of understanding is clearly not amenable to a positivistic treatment, one finds a tacit refusal to invoke understanding as the telos of these disciplines. It is essentially an academic mind game and I think that if we can resist the positivistic pressure, we can assert that understanding represents a valid and important epistemic category.

### III

When we begin to look at understanding in this way, we discover that our understanding of the notion of knowledge, too, is far from perspicuous. In most of the philosophical literature, we find discussions on the conditions and limits of knowledge, and very little on the nature of knowledge itself. The famous definition of knowledge in terms of belief, truth and justification is actually a statement of the conditions for knowledge claims and is not a statement about the nature or structure of knowledge itself.<sup>9</sup> Therefore, it is necessary to go back and ask what knowledge is. However, our concern is not with knowledge but with understanding. I mentioned the above fact only to suggest that any attempt to have a clearer notion of knowledge will enable a better understanding of understanding itself.

On this point, we may begin with Plato himself since he was the first philosopher in the west to engage with this question of knowledge frontally, particularly in his dialogue, the *Theaetetus*. A reading of this dialogue is particularly rewarding since in a very interesting way it illustrates my point about the way understanding has been hiding in plain sight in the entire history of philosophy. In this dialogue, there are many points where, in his struggle to find an adequate definition of knowledge, Plato stumbles upon 'understanding', but moves on without noticing it. A careful reading of it (which I have attempted elsewhere), in fact, alerts us to the distinction between knowledge and understanding, although the participants in the dialogue do not appear to be aware of it.

The dialogue begins by asking what knowledge is. Different instances or kinds of knowledge are enumerated but it is agreed that such an inventory does not amount to a definition. One must identify the factor that connects all those different kinds. An answer is suggested that knowledge is essentially sense-perception. But this answer is rejected on the grounds that given the unreliability

of the conditions of sense-perception, the certitude associated with knowledge cannot be expected. Another answer is offered to the effect that knowledge consists of 'true judgment'. However, this immediately raises the question whether there can be such a thing as 'false judgment', without which the notion of true judgment would be incomplete. It is at this point—when Plato deals with the puzzling question of false judgement—that we get the first glimpse of the phenomenon of understanding lurking obscurely in the background. It is suggested that for false judgment to be possible, a person should at the same time know and not know the object of the judgment. To resolve this paradox Plato introduces the somewhat elusive distinction between 'possessing knowledge' and 'having knowledge'. After this, the dialogue moves on to making distinctions between knowing the difference between two things and knowing how they are different. The least unsatisfactory definition appears to be that knowledge is true judgement with an account. Socrates, with his usual, complacent agnosticism, concludes that the interlocutors failed to finally know what knowledge is.<sup>10</sup> But this latter part is not very relevant for our purposes. What is salient for us is the seemingly glib distinction between possessing knowledge and having knowledge. Possession of knowledge here does not mean possession of a source or repository of knowledge. It refers to possession of knowledge in the mind. How, then, can it preclude 'having' that knowledge, whatever that may mean? To answer this question, I suggest, we must invoke the distinction between knowledge and understanding. Possessing knowledge refers to knowledge whereas having knowledge refers to understanding. The simplest example we could give to illustrate this point is to imagine a situation where someone knows all the facts but does not understand what they mean. The notion of 'judgment' takes us to the other great philosopher Kant whose life project was to illuminate the landscape of epistemology in its most comprehensive sense.

We come across one variant of the distinction between knowledge and understanding in Kant's *Critique of Pure Reason* in the form of the distinction between 'Reason' and 'Intellect'.<sup>11</sup> According to Kant, the Intellect concerns the domain of sensation whereas Reason is the source as well as vehicle of concepts. The problem here is that this distinction quickly gets attached to the empirical-transcendental distinction, which is useful for Kant's own project of tempering rationalism with empiricism but does not help clarify the distinction we are discussing here. However, a related point in his thought comes very close to illuminating the knowledge-understanding distinction,

though only in a tangential way. Kant makes a distinction between 'Concept' and 'Idea'. To put it simplistically, a Concept is a singular entity whereas an Idea is a configuration of concepts. The notion of Idea comes closest to 'understanding', but Kant does not properly clarify the relation between Reason and Idea, which could have helped in delineating how knowledge as perception of sensations or entities is distinct from understanding which is related to configuration of concepts. He relegates Ideas to the domain of regulative principles, refusing to grant them the status of constitutive principles, and thereby does not give the formation of 'Ideas' a proper epistemic status. However, in his later work *Critique of Practical Reason*, Kant comes close to delineating the notion of understanding through his concept of 'judgment'. Judgment bridges the gap between Reason and Intellect, and provides an epistemic product he does not name but to which we can safely attach the label 'understanding'. But in the final analysis, it cannot be said that Kant succeeds in offering a clear notion of understanding as distinct from knowledge.<sup>12</sup>The only reason we can imagine is that these philosophers were totally concentrating on knowledge and could not see that there is another epistemic entity called understanding, or did not regard it as significant enough to require separate engagement. The culprit, as it turns out, is the enthralling grip of the notion of 'truth', the sanctity we attach to it. Of course, the sanctity of truth can never be overstated. But ultimately, truth is a matter of just facts. It is a question of whether or not something is so. Our relation to the world, in fact, the orientation of our consciousness to the world is not exhausted by facts. We may know some facts. But we must understand what they mean. This is not always a matter of logical implication. It is to do with organising the facts into a structure and see what they mean. This is understanding. And as I have tried to point out, it is different from knowing truth or fact. If I may take recourse to an analogy, the significant move that Wittgenstein made when he said that the world is not a collection of things but a collection of facts, needs to be understood more fully and extended further. *Things* or entities are *perceived* in the narrow sense of sense-perception. *Facts* or relations of things are *known*. But there is a next step—which is in fact implicit in Wittgenstein's thinking right from the *Tractatus*—where the relation or network of facts is not a matter of knowledge but of understanding. Starting from his metaphor for philosophy as showing the fly the way out of the fly-bottle, to his notion of philosophy as a sort of therapy, Wittgenstein's conception of the function of philosophy is that its aim is 'understanding'. One could go to the extent of suggesting

that if we re-read Wittgenstein through the lens of ‘understanding’ as a central concept in his view of the practice of philosophy, we will get a better sense of the depth of his insights. But the fact remains that he too did not explicitly delineate the knowledge-understanding distinction, and ‘understanding’ remains a central but unarticulated idea in his thought. What is it about understanding that eluded these extremely perspicacious thinkers? As I suggested at the beginning, it seems to be the case that in a strange way it did not occur to them to *state* it because that is what they were *doing*. If anyone were to point it to them, their reaction probably would have been something like, ‘Of course! What else do you think I have been going on about?’

Gadamer says somewhere that ‘Being that can be understood is language’. This is a statement simultaneously both about language and understanding. As a statement about language, this assertion, essentially Heideggerian in spirit, is correct as far as it goes. But there are two points worth noting about this statement. In terms of what it implies about understanding as such, it is wrong since the circle of understanding is much larger than the circle of language. If we understand the statement to mean that Being becomes understood only in language, again wrong, for this formula in effect reduces all understanding to linguistic understanding, since it is not evident that there is any understanding other than that of Being. On the other hand, if we take this assertion to mean that understanding has a structural relation with Being, this seems incorrect since it is not Being but Becoming that constitutes understanding.

There is, however, a second point which has to do with the proximity Gadamer posits between language and understanding. To speak essentially is to exhibit understanding. In other words, language embodies understanding. One conjecture we can hazard for the elusiveness of understanding is that it is this fact which makes it nearly impossible to distance understanding from language and speak about it. Another point – though this would be to stretch the import of Gadamer’s statement – is that the posited relation between Being and understanding is also open to question since, while the epistemological aspect of understanding is constituted by being, its ontological aspect is constituted by Becoming. Understanding is necessarily self-transformational in its ground as well as in its function. In order to counter the reduction of understanding to its linguistic component, we could focus on the process of understanding and say that:

*Within language, poetry represents the ideal object of understanding.*

*Within thought, philosophy represents the ideal object of understanding.*

*Within consciousness, emotion represents the ideal object of understanding.*

Michael Polanyi has pointed out<sup>13</sup> that there is a tacit component to knowing (of all kinds, but particularly the knowing-how kind, which, for Polanyi is the paradigmatic category). This component is essential to learning a skill. No amount of discursive interaction or regimented methodology can facilitate learning without the tacit, inarticulable component, which is beyond method and which functions as a catalyst. We could say that there is no method of teaching but, nevertheless, learning happens. In this sense this component is marked by spontaneity. A boy struggles in vain to balance his bicycle and then suddenly, he doesn't know how, he discovers with delight that he can ride! As I have already pointed out, the nearest we can bring understanding to knowledge is in knowing-how. What Polanyi points out about skills can be extended to the process of understanding: You strive to make someone understand something, but there is no particular method you could adopt; at some point understanding happens. The precise relation between your efforts and the event of understanding can be hardly analysed. Understanding just has to *happen*. There is no set of rules or methods that we can employ to make it happen.<sup>14</sup> But when it happens, it is transformative. It is like suddenly seeing a pattern in what seems random. Once you see it, you cannot undo your perception. It is as if your consciousness is forever transformed and cannot go back to the pre-understanding stage. To extend the same point further, what is called wisdom is understanding in matters of life, and, as we all know, there is no methodology to wisdom. We cannot ever make a *science* of wisdom; nor can wisdom be unlearned.

#### IV

Let me now put together some more stray thoughts and try to convey my sense of the category of understanding.

Experientially, understanding is fundamentally distinct from knowing. In fact, when we look at the conceptual structure of which 'understanding' is an element, we see that the closest concept is that of experience in the sense of a centred awareness of consciousness and all its contents. In other words, understanding is an experiential event. We can make machines that can 'know' and recognize. But it would be difficult to say what it is for a machine to *understand*. Unless, that is, we can meaningfully talk about machines capable of experience. The latter notion is even more difficult to comprehend since, in a strict sense, understanding is self-transformative but does not necessarily translate into a particular behaviour. People often talk about how we are now able to make a machine that could compose

a poem or a piece of music. The understandable technological sense of achievement aside, all this talk is totally misguided since it is of no significance that a computer can compose a poem. What distinguishes a computer or a robot from a human being is that the former cannot understand a poem. Machines would be human-like not when they equal or surpass the computing or cognitive or even creative capabilities of humans, but when they acquire the capacity for experience. The question is not whether a robot can create a poem. The question is whether it can understand a poem and/or enjoy it.

In this sense, understanding is a singularly human phenomenon. This is not to say that only human beings (as opposed to other animals) can understand. It means that we cannot understand what it means to understand without humanizing the being that understands. Another way of saying this is to say that we can only understand a human understanding. This is what Wittgenstein must have meant when he said that if a lion could speak, we could not understand him. This, as most analytic philosophers have tended to interpret, has nothing to do with language as such. It is not a matter of untranslatability. We cannot understand what the lion is saying because we cannot grasp his mode of understanding which would be integral to his experiencing of the world (which Wittgenstein calls 'form of life'). That is why, as I said earlier, although Heidegger's idea of thinking (as expounded in his *What is called Thinking*) runs parallel to the act of understanding, it diverges ultimately because Heidegger does not take into account the fact that understanding occurs *in* experience. In saying this I do not wish to imply that in that work, Heidegger was trying to articulate the notion of understanding and failed to do it. His aim is to clarify the nature of thinking as a necessarily unstructured, rule-free, algorithm-transcendent, open-ended activity. Understanding, on the other hand, is teleological in the sense that it has a terminus. We could say more precisely about the relation between Heidegger's notion of thinking and our idea of understanding that understanding is a mode of thinking that occurs in the field of experience.

Understanding is the dissolution of a puzzle into a state of equilibrium. I use the notion of 'equilibrium' because it represents this structure better than any other notion. An object presents itself to understanding only by assuming the form of a puzzle. In taking the form of a puzzle, it induces a disturbance, a disharmony, it creates a space. The sense of turbulence so caused provides the motive for the movement towards understanding. And the

movement from the puzzle to the understanding is structurally a movement towards equilibrium in which the space that was created is filled and the incongruities find their resolution. It is a movement from restlessness to stillness. But, one may ask, why we should give primacy to this notion of equilibrium? The answer is that it is, at any rate in my view, ontologically a primary notion. In fact, if we can see understanding in terms of equilibrium in this fashion, we can see how consciousness is itself an incessant movement towards equilibrium. Without some such notion it would be impossible to coherently describe the dynamics of the psyche: we should be able to understand the dynamics of neither cognition nor emotion. Next, understanding is always in relation to the self. *Any understanding is always my understanding.* This is the meaning of Gadamer's insight about 'horizons': the fusion of horizons is *my* singular fusion, resulting in a synthesis of understanding that is unique to myself. This also implies that understanding is a function of subjectivity in the Kierkegaardian sense when he stated that subjectivity is truth. This brings us to the relation between understanding and truth. I suggested at the beginning that truth is the telos of knowing whereas meaning is the object of understanding. However, to leave it at that would be to leave out the important question as to whether there is any such thing as 'true' understanding. If we have grasped the notion of understanding correctly, we can see that a heterogeneous concept of truth is necessary. The 'truth' of facts is different from the 'truth' of meaning. Although it is misleading, we could say that the truth of understanding is that of coherence whereas the truth of facts or knowledge of facts is that of correspondence. The two theories of truth are not rival theories but cover different facets of truth or rather different kinds of truth. The truth of knowledge relates to the relation between proposition and fact that are both outside the self, whereas the truth of understanding relates to the relation between the object of understanding and the self.

Let me conclude with a few remarks reiterating the importance of recognising understanding as a distinct epistemic category in contrast to knowledge.

Knowledge is a necessarily positivist idea. However, there is no harm in this being so. Problem arises when we mistakenly try to enlarge the idea of knowledge to include what it cannot cohere with – we end up in confusion. Knowing pertains to the realm of things and facts. But there is a domain outside it where knowledge is not pertinent. To repeat an example I gave earlier, to know a poem is to know the facts about the poem and to remember the lines of the poem. If this is all



my relation with the poem amounts to, then the poem has in effect completely escaped me. I have not seen the poem at all. I cannot know the poem as a poem because a poem is not an inventory of facts. If there are any facts at all in the poem, there are integrated into a structure that constitutes the poem and have been transmuted into something else. There is nothing to know there. There is only an object to be understood. Must injustice has been done to literature by those among the practitioners of literary studies who have tried to claim that literature is a repository of knowledge. They have tried to convince generations of young scholars that a novel is a source of knowledge—geographical, cultural, social, psychological or historical, or of whatever kind. But the simple fact is that a novel *qua* novel, *qua* literature is not in the business of providing knowledge. It is an object for understanding. I have conflated two related facts here. To put them separately, first, you understand a poem or a novel or a work of art in general. You do not try to know it. Second, the poem or the novel in turn provides you with understanding—of life or whatever. In other words, a work of literature as a work of literature is neither an object of knowledge nor a source of knowledge. I think this clarity would help restore their proper objective to arts and literature. The same is true of philosophy too. All the talk about whether and why not there is progress in philosophy is based on the assumption that philosophy is a vehicle of knowledge. That is simply not the case. Philosophy, to reiterate what I said earlier, enables understanding. Whatever refinements philosophers make to their theories, each generation has to attain understanding on its own terms. There is no accumulation since understanding does not consist of facts or truths that can be accumulated into a larger and larger corpus. In a slightly different but essentially similar way, the telos of history is not really knowledge of the past. The value of history lies in the enhancement of understanding it provides through knowledge of the past. That is primarily why history represents a middle ground between social sciences and humanities. It pursues knowledge but ultimately to use it as a frame for understanding. The entire spectrum of Humanities is concerned with understanding. The misguided imitation of social sciences under the pressure of a positivist ethos and the resultant striving to pursue truth and knowledge have all but destroyed the spirit that animates the intellectual adventure they represent.

Further, it is not a matter of academic pursuits or intellectual life. It is, more importantly a matter of living itself. The central but implicit question of the Humanities is as to what constitutes a good life—for the individual and the community. Each discipline within that ambit



tries to contribute some strands to the full fabric of understanding as to how we should live in order to do justice to the spirit of human existence. Society today, as we proudly proclaim, has become a knowledge-driven society. Knowledge can provide some of the means for a good life. It can guide us towards it. But what humankind needs is not more knowledge as much as a greater, more refined capacity for understanding. For our own individual and collective sakes, we must understand the importance of understanding. If we do not, we will all end up destroying ourselves or sink into a dark night of barbarism—the latter being the infinitely worse fate to befall any race of sentient beings.

### Notes

1. This approach—of imbricating the two strands of historical account and examination of current usage, and intertwining the historical elision of ‘understanding’ with the ambiguous relation between knowledge and understanding we find in common usage—is certainly not the best strategy. But given the peculiar nature of the issue I am trying to present here, I do not know how to produce a sequential or linear narrative. I am afraid the reader just has to bear with me.
2. In any case, the point of any analysis is not to elucidate common usage but to use it as a point of departure for refining the concepts such that they can be forged into useful tools in more rigorous descriptions.
3. For instance, ‘Bose understands Assamese’ and ‘Bose knows Assamese’ may seem to convey the same meaning but it will be noticed that in the former case it means that Bose can only comprehend Assamese but is not necessarily capable of speaking or writing in Assamese.
4. There are cases where we use the term ‘know’, but a moment’s reflection would make it clear that we mean ‘understand’: I *know* the meaning of a word but I *understand* the meaning of a statement. Even when we use the term ‘know’ in the latter case, we are using it in the sense of understanding. Similarly, I may say to someone, ‘I know how you feel.’ But, what I mean is that I *understand* how he feels. In the same way, when I say to someone, ‘I don’t know what you mean’, I actually mean that I don’t *understand* what she means. In all these cases, the difference is conceptual. Casual usage may allow it but if we wish to be precise, we have to take note of the fundamental character of this difference. Now, it is not the case that the distinction between knowledge and understanding implies necessary separation between them. There are situations where they are separate, but there are also situations where understanding is quite distinct from knowledge but requires the latter as a prerequisite. In other words, you need to know certain things before you can understand them.
5. Hannah Arendt makes this observation in her *Life of the Mind*, though in the context of what she, and Heidegger before her, call ‘thinking’. My own understanding is that what these thinkers call thinking is broadly the act or process of understanding. I shall try to explain my view in a while.
6. Things—as entities—can be perceived but cannot be understood. In other words, things *qua* entities are opaque. Understanding requires the dissolution

of content into form: in the sense that—in Aristotelian terms—matter can only be sensed while form alone can be understood.

7. One could also say that truth has no multiplicity whereas ‘meaning’ can be plural. However, this needs a caveat. Understood in the narrow sense, meaning, too, is singular like truth, and therefore the idea of multiple meanings is, strictly speaking, incoherent. The relation between meaning and interpretation is complex and in a sense the two are incommensurable. If we use the term meaning to imply objectivity, for instance, by saying, ‘this is the meaning of this passage’, there is no scope for interpretation. We must dispense with the objective notion of meaning if we want to do hermeneutics.
8. Here, a remark or two regarding the relation between understanding and language might be in order. It is easy to be misled into positing too close a relation between language and understanding and reduce all understanding to linguistic understanding. As a matter of fact, Gadamer and, to some extent, Heidegger before him think of understanding almost exclusively in terms of language. However, it is doubtful how far such a view is tenable. Understanding is not limited to/by language. Therefore, language cannot be the ground of understanding. It is doubtful whether language even has an ontological priority in the context of understanding. It can, however, from a heuristic point of view serve as a *model* for understanding and can provide a point of departure to get a sense of the essential nature of understanding. That is to say, the importance of language lies in the fact that we can begin to get a grasp of understanding only in terms of language. It is in this sense that I maintain that language has only heuristic priority in the context of understanding.
9. Similarly, in the case of understanding also, most discussions centre on the conditions of the possibility of understanding rather than with understanding itself. For example, Gadamer is interested in the question of what is needed for understanding of a text or a person to be possible, whereas our interest here is in the more basic question of the nature of what we call understanding.
10. There is, at any rate as per my reading, a delicious irony there which sheds light on the entire Socratic project, in particular about what has been called the Socratic irony. Great scholars have contended on the question of how exactly we are to understand the fact that Socrates claims that he does not know anything and yet goes about trying to prove everyone ignorant as if he himself knew everything. Opinions have ranged from the suggestion that it is a discursive strategy to the idea that it denotes a sort of dishonesty on Socrates’ part. The truth, I believe, is different and will become clear once we look at the entire matter from the perspective of the distinction between knowledge and understanding. Socrates is perfectly serious when he claims that he is the most ignorant of men. There is no irony in that admission. But the point where we go astray is in assuming that Socrates’ quest is knowledge. It is not. The thing that Socrates keeps seeking everywhere is *understanding*. Once we begin to look through this lens, we find confirmation in many dialogues including dialogues such as *Protagoras*, where the latter hints to the young Socrates that he will realize the actual nature of his quest gradually. The fact that understanding is the telos of Socrates should really come as no surprise to us since, although almost the entire history of western thought appears to have had a blind spot towards the notion of ‘understanding’ as a distinctive epistemic category, some of the pre-Socratic thinkers such as Protagoras seem to have had a fairly perspicuous grasp of this notion. In fact, we can go so far as to say that they were quite clear about

the difference between their factual/scientific/knowledge-oriented enquiries and their quest for understanding. Insofar as they practised was philosophy they pursued understanding. This becomes fairly obvious when we look at philosophers like Parmenides, Heraclitus and Pythagoras. Their interest was not to add to the corpus of knowledge but enlarge the scope of understanding. Philosophical practice at the point of its origin was identical with the practice of understanding: *to philosophise was to understand*. It is an elementary, positivist mistake to conceive of entire pre-Socratic thought as primitive science whose telos was knowledge. For that matter, it is not a historical but essential fact that philosophy is not a clumsy, anachronistic attempt at science but is a practice of understanding. The goal of philosophy has always been not knowledge but understanding. These thinkers were very clear in their minds about the distinction between understanding and knowledge, and they were also aware that what they were pursuing was not knowledge but understanding. It was this distinction, fundamental and blindingly obvious that got blurred since the time of Plato till now, barring a few thinkers who dimly sensed the distinction but, for some strange reason, brushed past it. Socrates, we can confidently say, was never interested in knowledge. When he asked his interlocutors to define their terms, from that point itself, he was moving in the direction of understanding. That is also one of the reasons why he was not interested in cosmological questions. It is in Aristotle that we first see a serious quest for knowledge, although he never abandons his primary activity of pursuit of understanding. In Socrates, the key function is 'reflection' whose product can only be understanding. We must interpret his famous statement about the worthlessness of an unexamined life in this light.

11. Kant's term 'vernunft' translated as 'Reason' here is sometimes translated as 'understanding'. But Kant uses the term 'verstand' which comes closer to the English term 'understanding'. However, as will presently become clear, the latter term does not denote 'understanding' in the sense in which we are discussing here. Rather it comes close to what we call 'knowledge'.
12. The classification of judgment as 'determinative' and 'reflective', as important as it is, does not give us a picture of 'understanding' as the object, although it is valuable insofar as it makes a crucial distinction within the act or process of understanding. The influence of this distinction can be seen clearly in Heidegger's question about thinking, where his notion of 'thinking' comes very close to Kant's reflective judgment. In his book, *What is called Thinking*, Heidegger claims—without any deprecatory intent—that science does not represent thinking. His meaning can be understood better when we relate it to Kant's distinction. The process of 'thought' involved in science is the structured, sequential, reasoned, determinative thinking, whereas the kind of thinking Heidegger is trying to emphasise is not structured, does not follow any set rules of reasoning and is characterised by spontaneity. The latter comes close to Kant's concept of regulative judgment.
13. Polanyi's book *Personal Knowledge* is extremely relevant in this context.
14. This point has far-reaching implications for Humanities pedagogy. Polanyi, of course, points them out with reference to the sciences, but for the Humanities, they are absolutely vital. For instance, take the teaching of Literature, say teaching a poem. What is it to teach a poem? Are we imparting 'knowledge'? if so, what kind of knowledge? If we realise that what we are striving for is not knowledge for there is no significant knowledge to be sought in a poem, we see

that we are striving to generate understanding in the student. But how do you do that? There is no method, technique or approach for it. To put it bluntly, a teacher of poetry must just perform a ritual dance around the poem, incanting some magical phrases and hope that somehow suddenly understanding dawns on the student and her face lights up with delight of that understanding. Most of the Humanities pedagogy is yet to come to terms with this fact. This in itself is perhaps not such a calamity, but more unfortunately, this failure to come to terms with the centrality of understanding and the elusiveness of the methods to catch it have prompted the practitioners in the Humanities to desperately cling to the pretence that the Humanities primarily constitute the quest for knowledge, that for instance, Literature is a knowledge system, and that there is a 'methodology' that can be mastered and deployed to find the knowledge hidden somewhere in the interstices of Literature or philosophy.

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## CAPTIVE CONSCIOUSNESS AND THE NEW JABBERWOCKY

Probal Dasgupta

### I

#### *Preliminaries*

Citing semi-public jokes is not an enterprise for which one can easily find bibliographic support. One must, therefore, appeal to the memory of linguists who used to work or study at American universities in the 1970s for corroboration when one recalls a conference, held either in Chicago or in some other Midwestern university, which purported dealt with *the languages of the Soviet Union* but was informally called 'the captive languages conference'.

In one direction, this joke hand-waved at the belief, consensually held by the overwhelming majority of western scholars throughout the cold war, that to live under communism was to live in captivity. This *aspect* of the joke (pardon my pun on the salient presence of a grammatical phenomenon called 'aspect' in the structure of Russian) targeted the Soviet intelligentsia and their foreign conversation partners for acquiescing in the existing arrangements. Apparently, these arrangements did not empower speakers of non-Slavic languages in the Asiatic republics to critically comment on views expressed about their languages by experts speaking for them. In the other direction, the joke alluded to a term frequently used at that time for listeners who, for institutional reasons, did not have the option of walking away from a lecture they found boring – the term 'captive audience'. This second *aspect* of the joke suggested that ideas based on unverifiable claims about the languages of shackled speech communities were bound to be boring; they would not be presented in interesting ways that could possibly contest or modify anybody's views about language phenomena or linguistic theories.

In the present paper, the point of revisiting that old joke is to help place some classical notions at the heart of the democratic imagination – such as freedom of speech, freedom of inquiry,

possibilities for criticism and debate – in the context of questions of consciousness. Linguists who circulate a ‘captive languages’ joke imply that discourse coming from a captive consciousness is a not fully self-aware controlled discourse, therefore boringly predictable, and thus incapable of stimulating new thinking in an open society. In contrast, if your consciousness is free, then you enjoy the privileges of an unfettered imagination and are likely to come up with new and interesting thoughts.

What is attempted in this paper could in principle have been rendered irrelevant by some coherent and compelling body of scientific or other systematic writing that uses ‘conscious’ or ‘consciousness’ as a technical term. But psycho-analytic writings that contrast conscious phenomena with preconscious and unconscious phenomena never became defining texts on which ordinary uses of these terms crucially depend. The more recent body of publications, sometimes called consciousness studies, also represents a bit of an enclave, whose ways of using the term ‘consciousness’ are anaphoric to ordinary public usage rather than the other way round. Even such an outlier as Jaynes (1976), in the relatively recent past, even a systematic philosopher like Whitehead (1929: 184ff, 274) in an earlier period, and other authors who come to mind, keep the term ‘consciousness’ anchored in its ordinary usage when they exercise their right to deploy it at crucial points in their terminological geometry. We dare not do otherwise.

Many influential writings dealing with consciousness – far too many for bibliographic gestures to serve any purpose – tend to focus on a particular, episodic moment, to ask whether you or I are paying *conscious* attention to a rabbit, say, darting across our path, and to note that it makes sense to ask such a question only if you or I or some other sentient being is paying attention to that rabbit. Well, not all sentient beings are you or I, and this is not a reference to a second rabbit who might be paying attention to the aforementioned rabbit. It makes sense to ask a seven-year-old child this question, for instance, and the answer might even be *Yes*. But the child is not going to remember paying that attention to that rabbit of ours.

Why should remembering or not remembering make any difference? Well, there are contexts in which it matters whether the consciousness in question has some continuity to it. Consciousness at age seven undoubtedly exists. But it is ephemeral. Discourse by that child at later stages of her life cannot retrieve that consciousness, unless some external factor steps in – like an adult who takes the responsibility of preserving the memory, or like technological aids that produce an auditory or visual or written record.

Is the child-adult difference here a contrast between what we regard as the not-fully-attentive childish quality and the wide-awake adult quality of the consciousness directed at the rabbit? By claiming that the child's ephemeral awareness of that rabbit becomes a matter of record if an adult takes charge (or if, equivalently, adult-built recording systems produce and store some long-term record), just what kind of move are we making?

Children as young as that are unable to sustain a thread of continuous attention over a span of months and years. That they hand over the task of sustaining such threads to the adults who take care of them reflects the social distribution of ability. But one expects children to grow into responsible and capable adults. In situations where adult populations are infantilized – where some imperial community M (as in Master) colonizes some population S (as in Slave) and claims that these poor benighted heathens have a childish mentality and that their thoughtful and enlightened M society must generously do all the thinking and serious record-keeping for them – exactly what type of picture is being presented to us? Are we only being told that society S is subjugated, that there is a cultural *power* differential connected to other consequences of military conquest? Or do M's culture managers claim a demonstrable *ability* contrast between S and M?<sup>1</sup> What type of claim (and here we are talking only about the claims, not about their truth or falsity) would appear to endow the predicate 'childlike' with specifiable content when M's 'intellectuals' apply it to an entire population S? Is a restricted language, of the sort that M's managers routinely attribute to population S, inherently incapable of bearing the weight of 'free' or 'imaginative' discourse at a level that can be identified with precision?

It is in the context of these questions that I invite you to take a rigorous look at the Ascian thought-experiment. Readers who routinely refuse such invitations, applying the hermeneutics of suspicion across the board, are likely to refuse this particular invitation on the grounds that thought-experiments are a priori useless and that only pulling 'real' examples into the picture will help by sharpening the issues. They are welcome to their churlishness, but the few (if any) readers who are serious about this defence of their attitude will perhaps eventually take on the task of demonstrating that the putative 'reality' of their favourite mode of projecting from empirical data can possibly make a difference to the terms of the debate. Surely projecting and imagining are closely related enterprises. Thought-experimentation is an empirical activity.

## II

*Gene Wolfe's Thought-Experiment*

The Ascian thought-experiment was conducted by Wolfe (1983), who in a work of fiction imagines a person from 'Ascia', a country where adults utter only quotations from an authorized body of official texts. Wolfe imagines an Ascian encountering 'non-Ascians', whose language use is 'normal', is as untutored as ours. It is evident from Wolfe's text that his point is to show what happens if a language community, due to cultural domination of an extreme kind, systematically flouts the principle that sentences are in principle assembled on line rather than stored. I shall first present Wolfe's portrait of 'Ascia' and then return to the main thread of our reasoning. I am focusing on this concrete example of the coercive mode of cultural (and discursive) domination because the persuasive form is a derivative of it that dresses itself up in claims of epistemic and ethical-political superiority – replacing Wolfe's oligarchic 'group of seventeen' with a mega-oligarchic 'group of seventeen million'. Their numbers and entrenchment enable mega-oligarchic rulers to convince themselves and their adherents that they are benevolent, but a conceptually literate theory of language must diagnose their rule too as a version of dictatorship. Structural violence, while bloodless, is nevertheless a system that violates fundamental rights at all times.

Wolfe opens the relevant scene in his novel by showing the protagonist, Severian, amidst his fellow prisoners, trapped in a captivity whose details need not detain us. On his 'right lay a man' with a 'close-cropped scalp' – the speaker of that restricted 'Ascian' language we wish to focus on. Severian calls to him, and is shocked when he looks up: "His eyes were emptier than any human eyes I had ever seen[...]. 'Glory to the Group of Seventeen,' he said" (1983: 31).

Severian tries to start a conversation, but finds there is something deeply wrong: "'Good morning. Do you know anything about the way this place is run?' A shadow appeared to cross his face [...] He answered, 'All endeavours are conducted well or ill precisely in so far as they conform to Correct Thought'" (1983: 31-2).

Severian persists, and is stonewalled again. Seeing his predicament, a 'normal' prisoner to his left intervenes: "'You won't get anything out of him. He's a prisoner. [...] He talks like that all the time. Never any other way. *Hey, you!* We're going to beat you!' The other



answered, 'For the Armies of the Populace, defeat is the springboard of victory, and victory the ladder to further victory'"s (1983: 32).

This 'normal' neighbour, Melito, informs Severian that the man is an Ascian, and that it is only because he is an interpreter that he has learnt the language used by Melito and Severian. Another prisoner, Foila, indicates that she has had some experience with Ascians and understands their restricted discourse. Severian asks, "if the Ascian [is] composing his remarks or quoting some literary source with which [Severian] was unfamiliar." Foila explains: "Just making it up, you mean? [...] No. They never do that. Everything they say has to be taken from an approved text. Some of them don't talk at all. The rest have thousands – I suppose actually tens or hundreds of thousands – of those tags memorized. [...] **Where they come from, only the smallest children ever talk the way we do**" (emphasis mine – PD) (1983: 34).

Wolfe then sets the stage for the exercise of showing us how the Ascian, in his restricted instrument of discourse, can nevertheless tell a story, with Foila interpreting into ordinary discourse for the others. I now quote some passages from this uniquely important text of linguistic science fiction, which deserves to be as celebrated in our period of inquiry as Lewis Carroll's word play had been for the word-focused period that preceded ours (hence the term 'new Jabberwocky' in the title of this study).

[T]he Ascian began to speak: 'In times past, loyalty to the cause of the populace was to be found everywhere. The will of the Group of Seventeen was the will of everyone.'

Foila interpreted: '*Once upon a time...*'

'Let no one be idle. If one is idle, let him band together with others who are idle too, and let them look for idle land. Let everyone they meet direct them. It is better to walk a thousand leagues than to sit in the House of Starvation.'

*'There was a remote farm worked in partnership by people who were not related.'*

'One is strong, another beautiful, a third a cunning artificer. Which is best? He who serves the populace.'

*'On this farm lived a good man.'*

'Let the work be divided by a wise divider of work. Let the food be divided by a just divider of food. Let the pigs grow fat. Let rats starve.'

*'The others cheated him of his share.'* [...]

*'The just man did not give up. He returned to the capital once more.'*

'The citizen renders to the populace what is due to the populace. What is due to the populace? Everything.'

*'He was very tired. His clothes were in rags and his shoes worn out. He had no food and nothing to trade.'*

‘It is better to be just than to be kind, but only good judges can be just; let those who cannot be just be kind.’

*‘In the capital he lived by begging.’* (1983: 79-81).

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[...]At this point I could not help but interrupt. I told Foila that I [...] could not understand how she [...] knew, for example, that the phrase about kindness and justice meant that the hero had become a beggar.

‘Well, suppose that someone else – Melito, perhaps – were telling a story, and at some point in it he thrust out his hand and began to ask for alms. You’d know what that meant, wouldn’t you?’

I agreed that I would.

‘It’s just the same here. Sometimes we find Ascian soldiers who are too hungry or too sick to keep up with the rest, and after they understand we aren’t going to kill them, that business about kindness and justice is what they say. In Ascian, of course. It’s what beggars say in Ascia’ (81-82).

The narrative continues: the Group of Seventeen hear the good man out and promise to put the bad men in prison. He goes home and tells them. They beat him again. Then:

‘Behind our efforts, let there be found our efforts.’

*‘But he did not give up. Once more he set off for the capital to complain.’*

‘Those who fight for the populace fight with a thousand hearts. Those who fight against them with none.’

*‘Now the bad men were afraid.’*

‘Let no one oppose the decisions of the Group of Seventeen.’

*‘They said to themselves, “He has gone to the palace again and again, and each time he must have told the rulers that we did not obey their earlier commands. Surely, this time they will send soldiers to kill us.”’*

‘If their wounds are in their backs, who shall stanch their blood?’

*‘The bad men ran away.’*

‘Where are those who in times past have opposed the decisions of the Group of Seventeen?’

*‘They were never seen again.’*

‘Let there be clean water for those who toil. Let there be hot food for them, and a clean bed. Then they will sing at their work, and their work will be light to them. Then they will sing at the harvest, and the harvest will be heavy.’

*‘The just man returned home and lived happily ever after.’*

Everyone applauded this story[...].

From this story [...] I feel that I learned [...], first of all, how much of our speech, which we think freshly minted in our own mouths, consists of set locutions. [...] Second, I learned how difficult it is to eliminate the urge for expression. The people of Ascia were reduced to speaking

only with their masters' voice; but they had made of it a new tongue, and I had no doubt, after hearing the Ascian, that by it he could express whatever thought he wished (82-84).

This is a sad, sensitively staged caricature; Wolfe asks us to note that we, who overestimate the novelty of our utterances, are not as un-Ascian as we think. The coercive **dictatorship** run by the Group of Seventeen, whose **writings** control the **speaking** of every mature Ascian, invites careful reflection on persuasive versions of such power, in the context of a take on writing/ speaking we do not have the space to explore here (see Dasgupta 2011 for such an exploration).

### III

#### *Some Reflections*

The caricature is painted from a viewpoint that assumes that any thinking that deserves to be regarded as thinking is nourished by a 'normal', 'free', uncoerced imagination that is not even clouded by heavy persuasion verging on coercion. In contrast to that norm, the Ascian population is held captive by an imposed discourse. Wolfe's text invites us to view, and to be fascinated by, individuals who can creatively wriggle around in that prison cell and who, thus, manifest the indomitable yearning for freedom that characterizes the human spirit.

Formal linguists will, no doubt, use Wolfe's Ascian thought-experiment as a point of departure for a reexamination of recursion on the syntagmatic and paradigmatic axes. This is not the best place to stage that discussion; I am merely noting its inevitability.

Equally inevitable, in this day and age, is the following way of taking off on a tangent. Someone who is committed to a censorious public space – like, no doubt, some of my conservative readers, looking around and hoping to find an unpatriotic remark on two in my writing so that they can, with pious horror, set it aside as yet another product of the devil's ubiquitous workshop – will surely resist Wolfe. One such reader, called CPSA (Censorious Public Space Aficionado), will draw on the classical insights of information theory. *Choice and information are colligated*, he or she will argue. *If Ascian discourse has well-defined limits, so much the better for thoughtful and informative exchanges among Ascian's fortunate citizens. If one has grown into a finite but suitably large set of discourses to assemble one's utterances from, wonderful, one is then able to make determinate choices, which ipso facto carry specifiable information.*

CPSA will go on to pontificate that *Absolute freedom of speech is meaningless, as one cannot meaningfully choose from an infinite space. Speakers who imagine that they are doing so are suffering from an optical illusion. They tacitly presuppose a large but finite array that they actually choose from: only so can their utterances in fact convey information. In other words, so-called free speech is drawn from an unconsciously designed Ascia-like domain of limited discourse. Unconscious design is always worse than conscious design: any engineer will tell you this: surely you know that brightest brains of our country go to IITs to become engineers, and you should listen respectfully when they're talking to you and telling you how things really are. They know stuff that you don't, so stop piping up with your uninformed and incoherent talk. Wolfe has misunderstood the point that comes out of his thought-experiment, and he has designed it as a caricature because he doesn't get the point. In fact, that's the way discourse should in fact be designed, though of course the designing should be done by real experts who deliberate and work things out with the necessary mix of formal disciplined work and informal brainstorming, not by some oligarchic 'group of seventeen'. So designed, discourse should be translated into teachable skills and taught to citizens of a responsible republic, so that they learn how to think correctly and become assets rather than liabilities of a proud and growing nation. True freedom is wedded to discipline, not to formless anarchy.*

Readers not committed to a CSP who imagine that they can have a reasonable conversation with our CSPA are welcome to try, especially if they have found a technically formalizable way around our IITian's argument from information theory and choice. As my mild caricature of CSPA's mode of reasoning may suggest, I find this framework of debate not just stultifying in some informal sense but *demonstrably* inadequate, for reasons that I will be happy to unpack for interlocutors who actually ask me what they are.

My purpose here is neither to kickstart a formal linguistic debate about recursion, not to talk to trolls like CSPA, but to draw the reader's attention to the inadequacy of any approach to the study of consciousness – and to the study of the verbal vehicle of many expressions of human awareness – that forgets about the diachronic dimension.

People who engage in serious, so-called 'free', discourse thereby exercise a rationality that both *makes* its own history, projecting into the future, and *carries* its own history, inheriting various lines of remembrance of things past. We have been accustomed to ways of talking about rationality and history-making that emphasize the sovereignty and independence of the rational fashioner of one's own fate. But real histories involve living with others, and living with the

inequalities and subordinations that we find in the package. Many internal and external ‘colonizations’ are part of our lot, and it is wishful thinking to imagine that they can be *eliminated*, even if the attempt to *oppose* them and to *minimize* their effects sometimes brings out what ‘we’ come to regard as ‘the best in us’. The sense of ‘we’ is far more parametric than one is willing to admit: people draw and redraw these community boundaries for pedagogic reasons that keep shifting.

My purpose in showcasing the Ascian thought-experiment is to draw attention to the anti-historical terms of reference of the framework within which Wolfe and his obvious sequels (people who can be easily imagined as his cheerleaders and as his opponents) contextualize the enterprise. To my ear, the thought-experiment sounds like a passage most fruitfully construed as a demonstration of what happens if some regime tries to freeze history and fit humans into a purely synchronic Procrustean bed. What I gather after listening to Wolfe’s story-fragment is that discourse – with all the baggage about freedom of speech, freedom of inquiry and all that – is essentially history-laden, that the democratic imagination is really all about history-making, and that anything that deprives discourse of this vital essence makes it shrink, even if there is some token retention of the capability to mean (a retention that Wolfe highlights). Subordination per se is, to my mind, a red herring here (although one does understand why Wolfe diagnoses the problem in those terms). I would be grateful for the opportunity to engage in debate with colleagues who think otherwise.

#### Note

1. Anglophone readers with a taste for perverse word-play are welcome to hear this *S and M* as a ludic reversal of ‘us and dem’ or even as a reversal of S[adist] and M[asochist].

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## DEVELOPMENT OF KNOWLEDGE IN PRE-COLONIAL INDIA: A PEEP THROUGH THE LENS OF HISTORICAL EPISTEMOLOGY

Rajan Gurukkal

Knowledge is a term semantically so entrenched that nobody feels like asking what it means. Let us define it as awareness of what, when, where, who, how and why with or without confirmation. Possession of the skill or craft to perform an act or produce an artefact is also a kind of knowledge.<sup>1</sup> It is impossible to delineate the sequential development of knowledge in time, even out of its orally or literally articulated and codified type. Tracing the skill/craft component of knowledge, never articulated or codified, is all the more eluding. What was knowledge in early India, who decided that and how: these are the questions engaging us in the essay at the outset. They lead to a consideration of forms of knowledge; their social historical context, epistemic structure, composition, function and reliability. All this comes under what one calls historical epistemology. Leaving the inexorably hidden beginnings of knowledge, we start with Vedic eschatology, Upanishadic metaphysics, aphoristic *Vedāṅga*-s and perceptions of truth. An attempt to discern traces of epistemology in *Anvikṣiki* follows. This is followed by a discussion of grammatical aphorism, epistemic properties of speculative thoughts, healthcare knowledge, mathematical astronomy and theorisation. Finally, the practice of producing proof in the language of mathematical formalism as manifested in astronomy is shown as the watermark of methodological height ensuring knowledge of its maximum reliability.

### Vedic Knowledge

In Indian knowledge tradition, the *trayi* (the three Veda-s: *Ṛk*, *Yajur* and *Sāma*) is the feasible starting point, which renders eschatology, as exemplified by the *nāsatiya sūkta* of the tenth *maṇḍala* (relatively

late) of the *R̥g Veda*, seeking the meaning of self against the metaphysical cosmology. This is elaborated in the *Upaniṣad-s*, the pedagogic texts generated and maintained by *upādhyāya-s* or *ācārya-s* (teachers) over a long period, presumably between c.800 and c.200 BCE, for their pupils (*brahmacāri-s*). Vedic knowledge is self-evident, unquestionable and foundational defying epistemological scrutiny.

The *Upaniṣad-s* represent, perhaps, the earliest mode of abstract knowledge production in northern India. It pertains to the eschatology of the self (*ātma*) and the metaphysics of the universe as the supreme consciousness (*brahma*), known as *Vedānta* (the terminal of the Veda-s) and *Brahmajñāna* (knowledge about *brahma*) disclosed as *sūtra-s* (threads) of thoughts. They formulate knowledge about the self through a series of eschatological interrogations and reach out the metaphysical knowledge about the ultimate or the absolute consciousness. Its metaphysics maintains that while the whole universe is subject to the objective categories such as space, time, and causation, *brahma* transcends all this and remain spaceless, timeless and beyond causality. *Brahma* is the inaudible that exists in audibility, the unseen that exists in seeing, and the inexplicable that enables explanation. Eternal, infinite and unconditioned,<sup>2</sup> *Brahma* is everything (*sarvam khalvidam brahma*), the cause and the result – the absolute combine that precludes the need for a creator.<sup>3</sup> What most *Upaniṣad-s* underscore as the ultimate knowledge (*brahmajñāna*) is the ontological unity between the individual self (*ātma*) and the universal consciousness (*brahma*). This knowledge is meant to empower every individual with the deepest self-awareness: “I am *brahma* (*aham brahmāsmi*),”<sup>4</sup> that is the supreme consciousness or the universe (*prajñānam brahma*).<sup>5</sup> With the acquisition of ultimate knowledge an individual is emancipated out of ignorance, desire, selfishness and misery. The most profoundly metaphysical aspect about this knowledge is the realisation that the multiplicity of external manifestations in the material universe is only the apparent.

### Beginnings of Specialization

Systematized production of specialized knowledge in India goes back to the *Vedāṅga-s* (c.600–c.200 BCE), literally limbs of the Veda, which consist of six fields of knowledge viz., *śikṣa* (phonetics), *kalpa* (ritual), *nirukta* (etymology), *chandas* (metrics), *jyōtiṣa* (astronomy) and *vyākaraṇa* (grammar) enunciated on the basis of the detailed analysis of the Vedic hymns. This specialized knowledge had its beginnings in the *Brāhmaṇa* and *Āraṇyaka* portions of the *R̥g Veda* long before its being structured into aphorisms (*stūra-s*) and classified



into six branches. It is reasonable to presume that these specialised studies owe their origins to normative pressure for ensuring perfect pronunciation of sounds, metrical chanting of hymns, meaningful use of terms, and flawless articulation of expressions as well as faultless observance of rituals with necessary knowledge in astronomy exactly as construed in the Veda-s. Naturally they must have been developed and transmitted as part of the content of contemporary instructional tradition.

What makes this knowledge methodologically distinct is its aphoristic structure of stating truth in the most condensed and memorable form. It is the method of articulating knowledge as terse announcements of universal validity. Astute observations formulated as principles of self-validation, they preclude the need for logical procedures. Their validity is what they provide to themselves. This is like mathematical equations or formulas that present descriptive relationships precisely by using symbols for making a self-evident truth. In both the cases, the purpose of brevity, its logic and the outcome are the same. Nevertheless, the marked difference between the two is that aphorisms attain their goal through the brevity achieved in the real language while equations or formulas reach their goal through the brevity secured in a language of symbols. One thing that makes the mode of knowledge production in India unique is this dependence on natural language for the exposition of even the most abstract concepts in eschatology and metaphysics.

It may be noted that heterodox perceptions of truth represented by the Jain, Buddhist, Ājīvika, Bāṛhaspatya and Cārvāka schools denied the infallibility of Vedic knowledge. Of the various ascetic groups (*parivṛājaka-s*) like the Jain and Ājīvika, the Buddhists were best admirers of new knowledge. Buddha located new knowledge not in existence but in transcendence, and related knowledge to suffering and not to the sufferer. He argued that suffering ceased in people overcoming ignorance about existence and attaining deeper knowledge about transcendence, for it relieved them from the fetters of worldliness.

Heterodox worldviews brought about an alternative epistemic stream called the *śramaṇa* as opposed to the *brāhmaṇa*. Historical epistemology of both the sramaṇic and brahmaṇical forms of knowledge would show that they were socio-economically and culturally determined. For instance, the changing material milieu and the entailing social power relations in time and space had their impositions on the Vedic, Itihāsic, Śāstric, Purāṇic categories of the brahmaṇical knowledge as well as the *Piṭaka*, *Nikāya* and *Mahāvagga*



categories of the Buddhist knowledge.<sup>6</sup> The knowledge produced and preserved by the *śramaṇa*-s was primarily of a didactic kind with a pragmatic dimension due to the obvious factors related to their worldview of differing degrees of austerity. Healthcare, a prominent field wherein they generated knowledge was driven by the purpose of *dhamma* according to which treatment (*cikica*) of illness (*vāṭi*) was an important means to resolve the sorrow (*āṭi*) of the devoted people (*upāsaka*-s). It was more ontological in nature. However, that there was politico-ritual imposition on scholars would not mean that it precluded adherence to epistemological principles such as rationality, objectivity, verifiability, proof and notion of truth in their enterprise of knowledge production.<sup>7</sup>

### Epistemological Traces

Though an exact counterpart of epistemology may not be identifiable among the knowledge fields of early India, there is plenty of evidence of certain logical procedures evolved and applied to ensure the reliability of knowledge. Traces of treating knowledge as object of knowledge and constituting knowledge about the nature and proof of knowledge are seen in the *Āraṇyaka* and *Brāhamāṇa* parts of the *Veda*-s and increasingly in the *Upaniṣad*-s. Being traces of knowledge about methods to be used for establishing the reliability of knowledge, they are indications of philosophy of knowledge or epistemology, and therefore of vital significance to the context. This embedded subject matter gradually becomes a specialized and codified branch of learning called *Anvikṣiki* that deals with logical procedures and exegesis.<sup>8</sup> It is considered as one of the four fields of knowledge (*vidyā*) along with the rest viz., *trayī* (the three *Veda*-s), *daṇḍanīti* (knowledge of governance), *vāṛtta* (practical arts). According to tradition, Medhātithi Gautama of sixth century BCE was the scholar who codified this field of knowledge.

Other scholars known as experts in *Anvikṣiki* are Ajita-Keśakambali, Bṛhaspati, Cārvāka, Kapila, Dattātreyā, Punarvasu Atreya, Sulabha Maitreyi, and Aṣṭāvakra, presumably of c. sixth –fifth centuries, who figure as sages of *Upaniṣadic* wisdom, and hence largely critical insiders of the Vedic tradition. Ajita-Keśakambali, the first known materialistic thinker, is believed to have founded an explanatory framework for understanding natural phenomena without resorting to super-natural powers. Bṛhaspati codifies it in a set of aphorisms (*Bāṛhaspatya-sūtra*) that Cārvāka expands through interpretation. Epistemological questions acquire remarkable significance in the

Bārhaspatya – Cārṣvāka materialistic thoughts, popularly known as *Lōkāyata* according to which perception (*pratyakṣa*) is the only primary and reliable source of knowledge. They maintain that inference having no means to establish its reliability is uncertain and hence invalid as a means of knowledge. For instance, smoke need not be universally and always the reliable source of inference for the presence of fire. According to them inference is not suitable to be used to ascertain metaphysical truth. Truth is merely an accident of inference rather than its unfailing character. The epistemological position here is that as long as the observation remains not proved as unconditional, it is a matter of uncertainty. Truth is the complete and final knowledge that becomes explicit on the unconditional establishment of observations and premises. These epistemological traits continue to influence the ways and means of validating knowledge. A significant aspect of the Cārṣvāka-Bārhaspatya epistemology is theorization using the possible minimum of *pramāṇas* (evidences). The mode of exposition of final knowledge has been fundamentally in the aphoristic structure and confined entirely to the use of natural language. It is not accidental that the first instance of the deepest and complete type of knowledge production pertained to the language itself.

### Aphoristic Perfection

Production of knowledge about the Sanskrit language marks the first ever accomplished state of Indian epistemology that is distinguishable for its aphoristic structure of theorization, algorithmic nature of computation and amazing perfection. Pāṇini's *Aṣṭādhyāyī* (c.500 BCE) is the finest example of this. It occupies the most prominent position in the world map of classical linguistic studies for analytical completeness, observational exactness and theoretical rigour.<sup>9</sup> Pāṇini's work makes an exhaustive and systematic characterization of the Sanskrit language in terms of its grammatical rules coming to about 4000, phonological segments, verbal roots of about 2000 words and many lexical items, together with the description of rules regarding deviational strings that mark the linguistic change since the Vedic Age down to his own times. In short, Pāṇini's aphorisms (*sūtras*) provide the grammatical principle behind each correct utterance possible in Sanskrit.

Pāṇini might have thought under normative pressure, primarily about the easiest method of ensuring correct expressions in Sanskrit and hence described the rules in the most condensed form. However, *Aṣṭādhyāyī* is not just a rule-ordering based on the principle that the

more specific rule applies prior to the more general rule and the 'elsewhere condition', as some linguists think in the absence of explicit theorisation about how the rules apply.<sup>10</sup> The thoroughness of analytical comprehension that the text exhibits about the structure, composition and functional contexts of the language is astounding. It is natural that such a meticulous work embodies discoveries of fundamental linguistic factors, the pattern of their relationships and deeper correlations across them, tantamount to theorisation. Pāṇini discovers the logic of grammatical rules, which enables him to compress them. There are rules within rules, rules over-riding rules and rules that need to be read along with other rules. At the outset, Pāṇini theorizes on the basis of the basic assumption that the ultimate truth about rules rests in people's utterances. This is a clear indication of his philosophical perspective that the ultimate truth in its diversity and complexity resides in the real world. A striking feature of his theorization is that it involves only the smallest possible number of devices but generates the largest possible empirical data.

Pāṇini's *Aṣṭādhyāyī* has to be seen as the first known work that lays down the foundation of Indian epistemology not only for linguistics but also for all profound fields of knowledge, viz., astronomy, mathematics, healthcare, logic and philosophy. The fundamental property of knowledge according to Pāṇini is the theoretical generalisation of the ideal, made inevitably at the instance of the empirically given reality, if possible after checking each specific instance. He holds that indeed the ideal is real, but some part of it always escapes theorization. Hence, the epistemological position is that the fundamental knowledge is not with the theory based on the ideal with which one explains reality relatively. This position shows a leavening influence across all profound fields of knowledge in India. The *sūtra* mode of exposition of knowledge in its perfect form as exemplified by Pāṇini seems to have set the epistemological stance for all the knowledge systems in India. This is comparable to how Euclidian axiomatic logic of mathematics set the epistemological foundation for the post-classical European knowledge.

The Jain and Buddhist knowledge tradition that goes back to the turn of the CE is largely in the same epistemic tradition. Although basically aphoristic in the mode of exposition, the logic of Nāgārjuna (between c.150-c.250 CE) namely, *tetralema* or (*catuṣkoṭī*), the fourfold negation (viz., affirmation, negation, equivalence and neither) and *prajñāpāramitā-sūtra* (aphorism regarding the perfected way of understanding the nature of reality) relating to the reliable basis of knowledge (*pramāṇa*) is considered

to be a major epistemological landmark. With this logic Nagarjuna theorizes reality as emptiness and interprets the Buddha's middle path in his *Mūlamadhyamakakārikā*. In this work, he sets down certain new epistemic properties of knowledge and propounds a new hermeneutic model that has been a significant influence on the interpreters of the underlying meanings of the *Upaniṣad*-s. Several pervasive fields of knowledge emerged following the same epistemological parameters. Astronomical mathematics, thoughts, theatre and healthcare are examples of analytically constituted and aphoristically articulated systems of knowledge.

As extending from the same epistemic tradition of rational investigation, several fields of knowledge such as mathematical astronomy, logic, healthcare (*Āyurveda*), phonology (*Prātisākhya*), agriculture (*Kṛṣiśāstra*), Law (*Dharma-śāstra*) and statecraft (*Arthaśāstra*) developed by c. fifth century CE. In *Āyurveda*, *Suśruta-Saṃhita* (Suśruta's collection) and *Caraka-saṃhitā* (*Caraka's collection*) were composed during this period.

### Mathematical Astronomy

Another important field of knowledge that expressed itself in aphoristic form is astronomical mathematics that had its beginnings in the *Sulbasūtra*-s of the Vedic times. What is called Vedic mathematics comprised the geometrical techniques to facilitate how different types of altars of Vedic sacrifices are built. The *Sulbasūtra*-s containing geometrical prescriptions and rules of triangle, rectangle, rhombus, and circle, lay down the foundation of the knowledge in Indian astronomy. Out of it developed the *Jyōtiṣa-sūtra*-s, astronomical aphorisms constituting one of the six branches of the Vedic knowledge. Knowledge in astronomy has been advancing over the centuries along the epistemological track of Pāṇinian linguistic exegesis by accommodating mathematical procedures within the Sanskrit language. It is in *Āryabhaṭīyam*, the first landmark classic text by Āryabhaṭa (476-550 CE), we see astronomical knowledge presented with the Pāṇinian classificatory rigour and aphoristic brevity. In 121 *sūtra*-s it provides the basic astronomical concepts, arithmetic procedures, geometrical techniques, algebraic calculation and uses of trigonometric functions in determining the positions of the planets at a particular time, describing their motions and computing eclipses.

Several scholars had sustained engagements with this master text by way of interpretation (*vyākhyā*), commentary (*bhāṣyā*), compilation

(*saṃhitā*) and analytical comprehension (*saṅgrahā*). Although every *vyākhyā* or *bhāṣyā* was apparently an interpretative commentary of a previous text, in reality it was addition of fresh knowledge, sometimes even strikingly original. Although often stated as part of the original proposition, most of the elaborations and expansions made in the *vyākhyā*-s, *bhāṣyā*-s, *saṃhitā*-s and *saṅgrahā*-s were fresh. Each of them proved to be a corrective exercise, of course in varying degrees from text to text, and each analytical comprehension an integrative function upon the extant corpus of knowledge. Any of the taxa like *vyākhyā* or *bhāṣyā* or *saṃhitā* or *saṅgrahā* of disparate ages and regions in traditional India would vouch for this fundamental feature of knowledge production and transmission. Mathematical astronomy in India shows a systematic exponential growth through the formulation of new theorems for higher trigonometric functions and through the enunciation of new theories of numbers, efficient enough to resolve complicated problems. It is purely a necessity-driven advancement of mathematical knowledge rather than the result of mathematicians' pursuance to the ultimate axiomatic truth. Hence, the explicit epistemic distinction of Indian mathematical knowledge is its dependence on algorithmic and computational methods of solving issues specific to contingent astronomic needs. Mathematicians first attempted to solve the practical problem through algorithmic approximation and eventually perfected it by evolving theories of error and recursive procedures.<sup>11</sup>

### Systems of Thoughts

Early Indian systems of thought (*darśana*-s), six in number, well-known as *śad-darśana*, are *Sāṅkhya*, *Yoga*, *Nyāya*, *Vaiśeṣika*, *Mīmāṃsā* and *Vedānta*, often divided into the *āstikā* (theistic) and *nāstikā* (atheistic) categories.<sup>12</sup> Although the exact chronology is not known, it is generally accepted that most of them had their beginnings between c.600 BCE and c.100 CE, and as evolved thoughts with scholarly following they belonged to disparate periods. Vedic knowledge constitutes the undeniable foundational knowledge for all these systems of thought. All of them owe their metaphysical fundamentals and cosmology largely to the *Upaniṣad*-s, and the aphoristic mode of exposition to the *sūtra*-s, of course with degrees of difference in the overall worldview. Some of them are more or less like twins with the same metaphysics and cosmology. What matters to the context is the *Anvikṣiki*, or epistemology of these thoughts rather than their content. What these systems of thought accepted as their means of

knowing and the methods of making the known reliable constitute the subject matter of discussion. Initially their epistemology seems to have insisted upon *pratyakṣa* (perception), *anumāna* (inference) and *śabda* (verbal testimony), as the only reliable means of knowledge (*pramāṇa-s*). As the thoughts develop through the works of *ācārya-s* (teachers), new means of knowledge and methods of establishing the reliability are identified and differently prioritized. Though the exponential growth of these systems of thought is of a relatively brief period, they persisted through generations, obviously as part of the corpus of knowledge transmitted through the institutions of learning.

The *Sāṅkhya* thought is based on the *sūtra-s* of Kapila (c. sixth century BCE) and its commentary, the *Sāṅkhya-kārikā* of Aśvarakrishna (c. 350 BCE). *Sāṅkhya* epistemology insists upon *pratyakṣa* and *anumāna* as the two reliable sources of knowledge. *Yōga* is linked to this system of thought as the frequent allusion of *Sāṅkhya-yōga* suggests. *Nyāya* is the system of thought that had a longer period of exponential growth and better epistemological advancement.<sup>13</sup> A system of thought exclusively pertaining to logic, rules of reasoning and epistemology far more than to metaphysics, the crucial importance of *Nyāya* in the discussion of knowledge production is explicit. Its foundational text is the *Nyāya-sūtra* by Akṣapāda Gautama, probably of the period between c. 200 BCE and 2nd-century CE. The text, consisting of five chapters and 528 aphorisms (*sūtra-s*), is believed to have been expanded over a few centuries by several authors. *Nyāya* defines knowledge (*jñāna*) as consciousness (*anubhava*) rendered plausible as apprehension (*upalabdhi*) subsequently turned into a logically confirmed formal output through the process of cognition (*buddhi*). Syllogistic deductive reasoning, in which the inference gets established as conclusion on the basis of two or more empirically given or intellectually assumed premises, is central to the *Nyāya*.<sup>14</sup> Similarly *Vaiśeṣika*, another independent thought with its own metaphysics, ethics, soteriology and logic, bases itself on the *sūtra-s* (*Vaiśeṣika-sūtra*) of Kaṇāda Kaśyapa (c. 200 BCE). Like Buddhism, it accepts perception and inference as the only two reliable means of knowledge. Over time, the *Vaiśeṣika* system became similar in its philosophical procedures, ethics and soteriology to the *Nyāya*. Its cosmology is based on the deeper realization that all material objects in the physical universe are reducible to the particle or *paramāṇu*, the irreducible.

*Mīmāṃsā* is, perhaps, the earliest among the six systems of thoughts, for it relates to the rituals. *Mīmāṃsā* deals with the faculty



of close perusal and analytical reflection of the literary text in Sanskrit. It is the early Indian counterpart of hermeneutics. Its first detailed exposition in the form of *sūtra*-s seems to have been made by Jaimini (c. 300-200 BCE). Relegating the hermeneutics of the Vedic ritual (*Karma-Mīmāṃsā*) as the initial form (*Pūrva-Mīmāṃsā*), a more intellectually challenging version namely, *Jñāna-Mīmāṃsā* acquired prominence during the later period. It is this version of *Mīmāṃsā*, which subsequently becomes *Vedāntā* as an independent system of thought with a longer duration of exponential growth in metaphysics and logic. This is not to mean that *Pūrva-Mīmāṃsā* phased out or dissolved itself into *Uttaramīmāṃsa*. In fact, through the later interpretations of *Jaiminīya-sūtra*, by Prabhākara and Kumārila Bhaṭṭa (c. seventh century CE), *Pūrva-Mīmāṃsā* did make significant epistemological advancement through the logical assertion of *pratyakṣa*, *anumāna*, *upamāna*, *arthāpatti*, *śabda* and *anupalabdhi* (non-perception or negative proof).

At the most evolved state, the epistemology of the *darśana* holds *pramāṇa* (proof) as the most established property of knowledge that is about itself as well as about others. It validates itself and illumines other objects in *pratyakṣa*. The *darśana* epistemology recognizes two types of *pramāṇa*-s: *pratyakṣa* and *parōkṣa*. It does a meticulous detailing of the properties of *pratyakṣa* in contra-distinction with the *parōkṣa* that consists of varieties *smṛti* (memory), *pratyabhijñā* (direct knowledge), *tarka* (a test of knowledge's universal concomitance), *anumāna* (inference) and *āgama* (textual testimony). *Pratyabhijñā* is direct knowledge deductively drawn following the means and methods of *darśana*. In its standardised form the *darśana* epistemology insists on resorting to six reliable means of knowledge, viz., *pratyakṣa* (perception), *anumāna* (inference), *upamāna* (comparison), *arthāpatti* (postulation) *anupalabdhi* (apprehension), and *śabda* (verbal testimony). *Anumāna* is defined as *sādhyā* (possible knowledge) out of *sādhana* or *hetu* (causality), the fixed-in concomitance with *sādhyā*. It considers memory (*smṛti*), doubt (*saṃśaya*), error (*viparyaya*) and hypothetical reasoning (*tarka*) as invalid means of knowledge.

At its final stage of exponential growth the epistemology of *darśana* is what the *Nyāya* system of thought has debated and established over the years. Perfecting it as a rigorously self-reflexive and critical method of ascertaining the status of the knowledge first based on each of the four means of knowledge individually, and then collectively, to arrive at the relatively final form, the *Nyāya* sets the standard for testing the reliability of the means and methods

of knowledge for every system of thought and field of knowledge. This rigorous epistemology apart, Vedic knowledge was regarded as indisputable, every epistemological strategy for establishing reliability of knowledge is rendered infructuous, for it is the ultimate *pramāṇa* that needs no extraneous confirmation.<sup>15</sup> This is true of the Jains and the Buddhists too for whom the ultimate *pramāṇa* being their canons. Scholars in different fields like materialistic metaphysics, astronomy, healthcare, *Vedānta* etc., had special interest in the nature, logic and authenticity of the knowledge of their respective fields.

### Methodological Development

Knowledge production in early India, which was an individualistic meditative enterprise (*tapas*), improved upon through dialectics (*tarkā*), and hermeneutics (*mīmāṃsā*) advanced through textualization of interpretation (*vyākhyā*), commentary (*bhāṣyā*), compilation (*saṃhitā*) and analytical comprehension (*saṅgrahā*). Although every *vyākhyā* or *bhāṣyā* was apparently an interpretative commentary of a previous text, in reality it was addition of fresh knowledge, sometimes even strikingly original. Although often stated as part of the original proposition, most of the elaborations and expansions made in the *vyākhyā*-s, *bhāṣyā*-s, *saṃhitā*-s and *saṅgrahā*-s were fresh. Each of them proved to be a corrective exercise, of course in varying degrees from text to text, and each analytical comprehension an integrative function upon the extant corpus of knowledge. Any of the taxa like *vyākhyā* or *bhāṣyā* or *saṃhitā* or *saṅgrahā* of disparate ages and regions in traditional India would vouch for this fundamental feature of knowledge production and transmission. The textualization of knowledge, primarily in Sanskrit, was part of the pedagogic purpose of storing knowledge for learners (*brahmacārī*-s and *śramaṇā* monks) as well as practitioners (*ācāryā*-s and *parivrajaka*-s). There is no such tradition of specialized subject-specific textualization of knowledge in the *śramaṇa* tradition, and hence in Pāli no similar taxa are seen. Further, due to the scriptural sanctity of the *Piṭaka*, *Nikāya* and *Mahāvagga* texts, hermeneutic exegesis on their knowledge components, could not take on. Subsequently, when under the *Mahāyāna* order monks began textualization of specialised knowledge, they did it in Sanskrit.

Most knowledge areas reached a plateau stage due to the profound depth already attained at the early phase itself as *Vyākaraṇa* and *Āyurveda* exemplify, leaving little scope for further epistemic advances. One area wherein knowledge production consistently advanced over centuries is Astronomy. It was the beliefs around the



Vedic sacrificial ritual that necessitated advancement of knowledge in astronomy, the seeds of which are present in the *R̥gveda* itself.

An inquiry into the aspects of historical epistemology such as premises, inferential logic, proof, concept of truth, and method of confirmation of knowledge is feasible here for visualising the development of methodological pre-occupation in terms of the concept of objectivity, rationality, and methodology at distinct stages of the formulation of knowledge.<sup>16</sup> An important epistemic property of the traditional Indian astronomical knowledge is its theoretical situation beyond the empirically given and articulation of the premises and conclusions in the language of mathematics. The integrated nature of production of knowledge, essentially addressed to the extant corpus, necessitating every scholar to be thorough with the master texts, was another significant epistemic feature that ensured linearity about the intellectual progress through fresh contributions. Long-term direct observation as guided by the extant knowledge, and regular and systematic recording and reckoning by means of mathematical tools had been the features of heuristics related to contemporary knowledge production. Mathematics was the object of understanding, tool of analysis, field of hermeneutics, subject of discovery and medium of articulation. However, insistence on production of proofs as an epistemic property began only at a later stage.

### *Āyurvedic* Knowledge

Knowledge of healthcare as part of survival needs is one of the very ancient fields of knowledge, the earliest form of which exists in the *Veda*-s with indications of classification of illnesses (*jvara*) and medicines (*ouśadha*). For instance, the *Atharvaveda* mentions a kind of classification of medicines depending on wherefrom it is sourced into *prākṛtika* (*pancabhūta* or the five natural elements), *khanija* (excavated minerals), *samudraja* (marine objects), *prāṇija* (creatures) and *udbhija* (herbs) with some references to their properties.<sup>17</sup> An expanded form of the knowledge is there in the Jain and Buddhist (*śramaṇa*-s) canonical texts in Pāli and its codified and systematized form called *Āyurveda* in the *saṃhita* texts in Sanskrit. As accumulated, inherited and preserved through oral transmission over centuries, the knowledge base of *Āyurveda* becomes profoundly enunciated in the *saṃhita*-s of Suśruta (c. sixth century BCE) and Caraka (c. 200 BCE - 200 CE).

Buddhist monks who had set in the tradition of systematic recording of knowledge and treatment practices seem to have made

a lot of fresh additions to the corpus of knowledge about healthcare practices by way of rules pertaining to drugs and treatments for specific ailments as provided for in the *nikāyas* and the *piṭakas*. The contribution of the Buddhist monasteries to the development of medicine by way of regularization of rules regarding the treatment of specific illnesses is remarkable. According to traditions, a rational causation of illness was offered by the Buddha against the brahmanical belief of *karma-phalā*, that is, the consequence of deeds in the previous life. It sought to explain illness as the consequence of imbalance in the combination (*sannipāta*) of *pitta* (bile), *sehma* (phlegm) and *vāta* (wind). This theory of *tridōṣa* or humoral imbalance is central to the *Āyurveda*.

*Dīghanikāya* shows how monks acquired knowledge of the human anatomy through the observation of animal body dissected by the butcher, exposing internal organs and structures.<sup>18</sup> Another method of acquiring knowledge about the human body was through direct observation of the decaying cadavers left on the charnel ground. Monks are advised to engage in continuous observation of the dead body until it is completely decomposed, all bones exposed, the skeleton become white and eventually begin to turn into dust. This is a clear indication of the conscious production of concrete knowledge on the basis of firsthand visual experience (*pratyakṣa*), experimentalist learning (*anumāna*) and reflective postulation (*arthāpatti*) of truth. It was not possible for those under the control of the brahmanical notion of impurity and pollution to generate anatomical knowledge through direct observation and reflection *in situ*. *Āyurveda* owes its knowledge in human anatomy, external structures and internal organs to the painstaking and patient observations made by the Buddhist monks. Monks' engagement in the production of healthcare knowledge presupposes the monastery's institutional involvement in the activity. It is natural that healthcare, the most vital field of service to the ailing, received significant attention in monastic establishments that were seats of learning, where monks engaged in the production and transmission of knowledge in different fields. Some of the monasteries like Takṣaśīla were universities where legendary physician sages Atreya and Agniveśa taught and great physicians like Jīvaka studied healthcare. They not only collected, redacted and codified the available knowledge in healthcare, but also generated new knowledge in the field and treated the sick people by moving from place to place.<sup>19</sup> In short, what came to be called *Āyurveda* had its codification and systematization with a lot of addition done by the Buddhist monks in their monasteries.

Efforts of codification and classification continued at the level of

individual physicians and teachers among whom Suśruta and Caraka rank the foremost. They made comprehensive texts (*saṃhita-s*) that obviously helped as manuals for learners and practitioners in healthcare. *Suśruta-saṃhita* that deals with surgery (*śalya-kriya*) and *Caraka-saṃhita* that deals with the treatment (*kāya-cikitsa*) are the two major texts of this tradition. Their method of exposition follows the sequence of fundamental aphorisms, etiology, theoretical knowledge about the body, taxonomy of illnesses and treatment practice. Metaphysics of the humoral equilibrium is what prevails in *Āyurveda*, as its overarching framework of comprehension, explanation and practice.

*Suśrutasaṃhita* provides in detail, type of instruments, methods of handling them, types of surgery, consequences, remedial and preventive strategies. Its explanation of the eight different procedures of surgery, viz., excision (*chedyā*), incision (*bhedyā*), scrapping (*lekhyā*), puncturing (*vedhya*), probing (*eśya*), extraction (*āhāryā*), draining (*viśrāvya*) and suturing (*sīvyā*), exemplifies the meticulous nature of the *saṃhitā*. Quite similar is the approach of Caraka to the discussion of medical treatment in his *saṃhitā*.<sup>20</sup> According to the textual tradition, the *Caraka-saṃhita* seeks to redact the teachings of Atreya, the legendary author of the master text in *Āyurveda*. However, there are clear in-text indications to believe it to be strikingly original, especially in Caraka's declarations of his sources of knowledge other than the teachers of the past or the pieces of advice of the wise (*āptōpadeśā*) that constitutes the *a-priori* component. For a specific example, he acknowledges how he acquainted himself with the wisdom flowing from the remote past, by observing what the shepherds, cowherds and forest dwellers practised.<sup>21</sup> Both Suśruta and Caraka, great physicians themselves with amazing proficiency in theory and practice of medicine, show that *Āyurveda* had already become a well-expounded domain of healthcare wisdom enabling its practitioners to command enormous respect and ranking.<sup>22</sup>

Although the *Atharva-veda* mentions about the classification of medicines with some references to their properties, the level of knowledge at that stage must have been relatively elementary. Nevertheless, the knowledge level of the theory and practice of *Āyurveda* is fairly high by the time of the *saṃhita-s*. They contain an elaborate list of herbs, medicinal properties of their roots, stem, flower and fruit; the procedures of preparing the medicine out of them; and the ways of administering them when to whom, how and against what illness. Among the *khanija* objects, they mention minerals, salts and metals as elements of medicinal preparation. Some of the medicinal preparations, namely *rasāyana*, using metals

even of toxicity, are mentioned in the *saṃhitha-s* along with detailed procedures of their preparation based on principles of *rasa-śāstra* (metallurgy). It is evident that the processing involved the ways and means to turn the metal into its nano-particles ensuring that the metallic medicines are free of side effects and toxicity. This is not to suggest that the texts vouch for the existence of knowledge about nano-particles. Indeed, through trial and error they had learnt about the side effects and found out the ways to overcome them. Further, they indicate the existence of the knowledge about medicinal properties of various other substances such as coral, seashells, and feathers, processed and administered to cure illnesses.

### *Tantra-Yukti*

*Samhitha-s* are largely aphoristic in structuring their exposition and self-reflexively realist about their epistemological traits, indicative of the explicit influence of the *Nyāyasūtra-s*.<sup>23</sup> These texts consciously articulate the methodology of knowledge production, which makes clear that the *Āyurveda* is a profoundly enunciated system of knowledge, conscious and reflexive about the epistemic procedures of its theorization and validation. *Tantra-yukti* or the way of doing and its logical plan, established by the *Nyāya* thought, is what the *saṃhitha* texts state as their methodology. It lays down the method of constitution and authentication of knowledge. According to *tantra-yukti* the concept of truth (*darśana*), proof of knowledge (*pramāṇa*) and logical procedure (*yukti*) are the three fundamental elements of knowledge production.<sup>24</sup> These are of crucial importance even in the present-day epistemic principles.<sup>25</sup> The *Āyurveda* follows the critical reflexive method to reconfirm the *pramāṇa* by reviewing the causal basis of its constitution (*pramā-kāraṇa*), the logical procedures of its authentication (*yukti*) and the precepts of its argument (*vāda-vidhāna*), as enunciated in the *Nyāyasūtra-s*.<sup>26</sup> What it seeks to reassure is the indisputability of the logical sequential connection between *pramāṇa* and the explanation or theory (*sidhāntā*). *Tantra-yukti* insists upon transparency about the ontological unity of *pramāṇa* and theorization. At the same time, as in the case of *Nyāya*, the divinely ordained (*deva-vipāśraya*) is the ultimate truth rather than the logically sustained (*yukti-vipāśraya*).

Of the various steps in the logical procedures (*tantra-yukti*) of knowledge production articulated in the *saṃhitā-s*, the starting point is *anubhavā* (experience). It triggers *jījnāsa* or curiosity about *saṃbhava* (source) and leads to *anuyōgā* and *pratyanuyōga*, that is

questions and counter questions. This state engenders *anumāna* (inference) generating *saṃśaya* (doubt) and necessitating *vāda* (debate) that involves discrimination of a series of binaries such as, *pratyakṣā* >< *parōkṣā* (direct perception >< indirect perception), *hetu* >< *ahetu* (reason >< fallacy), and as *pramā* >< *apramā* (valid >< invalid) about the basis of *anumāna*. Consequently the process ends with *parihārā* (amendment) to the *anumāna* and formulation of the *sidhāntā* (theory), the acceptance or rejection of which depends on the logical success in establishing its ontological unity with *pramāṇā* (proof).

There was always curiosity to discover the analytically accessible rules or principles and an effort to theorise them explicitly, discretely and systematically with universal application along with a capability to be predict the effects. Knowledge of this kind was made up of context-free elements, transcending subjectivity and with amazing completeness that commands the whole domain.<sup>27</sup> *Spōṭavāda*, *Hetuvīdyā*, *Vyaktiviveka* and *Dhvanyālōka* are some of the well-known examples. *Spōṭa* ('bursting, opening, or spurt') is an important concept in the Indian linguistic and grammatical tradition called of *Vyākaraṇa*, relating to the problem of speech production, how the mind orders linguistic units into coherent discourse and meaning.

It was Patañjali (c. second century BCE) who formulated the theory of *Spōṭa* (bursting out), which refers to the instant occurrence of meaning at the utterance of the word or the sentence. Bhartṛhari (c. fifth century CE) expanded the theory and elevated grammar to the level of a *darśana*.<sup>28</sup> This theory is hailed as a holistic theory of grammar, semantics and philosophy.<sup>29</sup>

*Hetuvīdyā* is the Buddhist logic in its advanced form developed by the Mahāyāna monks in the seventh century CE imbibing the sceptical perception and rigour in ensuring the reliability of knowledge.<sup>30</sup> Diṅnāga, who propounded the theory of exclusion (*apohasiddhānta*), represents the first major hermeneutic turn in the history of Buddhist logic. His theory established the validity of cognitive confirmation through a systematic logical negation of every possible alternative. Diṅnāga shifted the emphasis from dialectical logic to epistemological exclusion through his theoretical propositions in the *Pramāṇasamuccaya*.<sup>31</sup> He maintained that a valid theoretical proposition is the one grounded in causality and that alone would best establish reliability of knowledge. Dharmakīrti, roughly of the same period, was the most prominent among the Buddhist epistemologists, who advanced the Buddhist logic further. Dharmakīrti argued that perception is causality-bound and is

concept-free knowing, distinguished from linguistic and conceptual cognition based on reasoning. It was Dharmakīrti's *Pramāṇavārttika* acted as a major transforming influence among contemporary scholars engaging in logic and the question of reliability of knowledge.<sup>32</sup> According to Dharmakīrti, scriptural knowledge is not reliable, for its source (*pramāṇa*) hardly has any epistemological claim to certainty. A major issue that his epistemology had to tackle was the contradictory position of the Buddhists towards the authority of scriptures. Buddhists had been accepting the infallibility of their own scriptural knowledge while they had been rejecting the infallibility of the Vedic knowledge. Dharmakīrti resolved this self-contradictory approach by establishing scriptural knowledge as reliable only in dealing with eschatological and metaphysical concepts like *ātma*, *karma* etc.<sup>33</sup> He maintained the *pratyakṣa* of a *yogī* as the *pramāṇa* for such soteriological ideas. A distinct feature of his epistemology which contrasts with the *Nyāya* is the acceptance of the transient particularity (*svalakṣaṇa*) as real and the rejection of the universal (*sāmānyalakṣaṇa*) as unreal. A significant position that the Buddhist epistemology sought to establish was the precedence of perception and inference over comparative reasoning and testimony.

Speculative theories were influenced more by the epistemological parameters of the *Nyāya*. For instance, the *Dhvanyāloka* of Anandavardhana provided the most profound theory of literary criticism showing that the most successful poetry is the one that excites aesthetic pleasure sustained after all its linguistic tropes withdraw from the consciousness. This is rendered plausible by the rare semantic power of words transcending denotation and connotation by way of suggestion. *Vyaktiviveka* of Mahimabhaṭṭa, another instance, also deals with poetics developing an alternative theory of grammar and aesthetics as the anti-thesis of *Dhvanyāloka*.<sup>34</sup> Navya-Nyāya developed a sophisticated language and conceptual scheme that allowed it to raise, analyse, and solve problems in logic and epistemology. Theoretical exercises in their turn led to a rigorous systematisation of *Nyāya* concepts. However, the four fundamental epistemic categories of the old school, viz., *pratyakṣa*, *anumāna*, *upamāna* and *śabda* remained.<sup>35</sup>

### Production of Proof

It was in mathematical astronomy that real attempts at production of proof were made. Initially strong traditions were resorted to for establishing statements of precursors. However, traditions were not to be accepted as *pratyakṣa*. No tradition was valid without *pramāṇā*



or a rule of thumb. A *pramāṇā* is an all-inclusive abstraction stated in verse (*ślokā*), almost like a formula or an equation, but with a prescriptive tone. It is a statement of observational results but often without disclosing the cognitive strategies followed to arrive at them. Sometimes, a precursor's statement was adopted and sustained as *pramāṇā* for the reason that he had stated it affirmatively. Initially in mathematical astronomy, theorems were stated explicitly but without proof. It began to be routine for a *vyākhyā* or *bhāṣyā* to delve seriously into an earlier claim, made as a *pramāṇā* by a precursor and to try and make explicit the basic premises of the claim and to develop on the inferences thereof.

*Āryabhaṭīyam*, the most widely-cited text of authority on time and space, had acquired empirical base and proof for its theoretical propositions only during the successive ages, through scholarly interpretations and elaborations.<sup>36</sup> However, something culturally significant about the tradition of reinterpretation in Indian astronomy is the retention of Āryabhaṭa's authority as the highest in spite of corrections, additions and improvements on his findings by others through independent perception. In the perspective of historical epistemology, when the previous claims are explained in the light of new perceptions, variations occur even at the level of the basic structure as a result of historical changes. In fact, this text was subjected to the greatest number of reinterpretations and additions, of which probably the first known case that improved Āryabhaṭa's results was by Haridattan who is said to have added graded tables of the sines of arcs of anomaly and of conjugation at intervals of 3° 45' to determine the correct planetary positions. Similarly Nārāyaṇa Paṇḍita's *Gaṇitakaumudī* and an algebraic treatise called *Bijagaṇitāvataṃsā* are said to have added a methodological discussion of mathematical operation to Āryabhaṭa's theory of planetary positions.

There is a perceptible epistemic shift in traditional Indian knowledge production in general, and astronomy in particular, since the time of Madhava of Sangamagrāma (c.1340-1425 CE) in Kerala. It has been shown that Madhava's discoveries include the Taylor series for the sine, cosine, tangent and arctangent functions, the second-order Taylor series approximations of the sine and cosine functions and the third-order Taylor series approximation of the sine function, the power series of  $p$  (usually attributed to Leibniz), the solution of transcendental equations by iteration, and the approximation of transcendental numbers by continued fractions.<sup>37</sup> Unfortunately, Madhava's texts have not survived except in the form of references to the main findings in them by scholars who followed him. Madhava



began extending certain results found in earlier works, including those of Bhaskara and Aryabhata.<sup>38</sup> He is said to have significantly improved Aryabhata's model for Mercury and Venus. Working on all the inferential items of *Āryabhaṭīyam* to see whether they could be developed into reliable knowledge, Madhava had made several new discoveries such as a better approximation of the value of  $\pi$ , theory of certain transcendental equations, concept of infinity, the sine-cosine infinite series, their various trigonometric functions, and strange relations in geometry. He is said to have correctly computed the value of  $\pi$  to nine decimal places and thirteen decimal places, and produced sine and cosine tables to nine decimal places of accuracy. Of all the contributions what is most commendable is his estimate of an error term, which presupposes his deeper insights into the limit nature of the infinite series. It is clear today that Madhava had discovered the fundamental principle behind the infinite power series, their rational approximations and trigonometric functions. Who invented Calculus was a matter of controversy until recently – Gregory, Leibniz or Newton? It is a settled fact today that the concept of infinity and knowledge of power series goes back to Madhava of Sangamagrāma.<sup>39</sup>

Madhava's method was improved upon by Paramesvaran (c.1380-1460 CE), Puthumana Somayaji (c.1410-1490 CE) and Nilakantha Somayaji (c.1444-1544 CE). Inferences drawn from Madhava were subjected to scrutiny and correction by Paramesvaran, his pupil, in the light of the results of his long-sustained observations. He seems to have done direct astronomical observations for 55 years, systematically recorded the results, and wrote a treatise on *Dyṅgaṇitā*, a mathematical model of astronomy, an example *par excellence* of the epistemic tradition. His mastery over the extant knowledge and sizeable contribution to it in the form of new theorems are embodied by the *bhāṣyā*-s he wrote on *Mahābhāskarīyā*, *Āryabhaṭīyā* and *Līlāvati* of Bhaskara II. The mean value theorem propounded by him is considered to be quite crucial and essential subsequently in proving the fundamental theorem of calculus. Similarly, his mean value type formula for inverse interpolation of the sine function, a one-point iterative technique for calculating the sine of a given angle, and a more efficient approximation that works using a two-point iterative algorithm, is now understood as identical to the modern secant method.<sup>40</sup> He is said to be the first mathematician to provide the radius of a circle with an inscribed cyclic quadrilateral.

Likewise Nilakantha Somayaji in his *Tantrāsāṅgrahā* carried the process further producing more clarity in pre-existing theories,

particularly expansion of the sine cosine series of Madhava.<sup>41</sup> He is acclaimed for expanding the methods and theories of Madhava, particularly by elaborating his derivation, improving proofs for his series of the arctangent trigonometric function, and other infinite series. *Tantrāsāṅgrahā* is in 432 *ślōkā*-s in Sanskrit and in eight chapters, generally on the epicyclical and eccentric models of planetary motion, but specifically dealing with the motions and longitudes of the planets, various problems related with the sun's position on the celestial sphere, including the relationships of its expressions in the three systems of coordinates, namely ecliptic, equatorial and horizontal coordinates, the lunar and the solar eclipses, the deviation of the longitudes of the sun and the moon, the rising and setting of the moon and planets, and a graphical representation of the size of the sun-shine part of the moon.

Nilakantha's study is a clear indication of how new knowledge is created lineally by developing on the results of the previous studies. He is an example worth citing in the context of epistemic universals about knowledge production in traditional Indian, such as rationality, analytical comprehension of the extant knowledge, new tools of observations, methodological modifications, systematic recording of observational results, mustering of inductive mathematical proofs for previous theorems, hermeneutic additions and scholarly integration. The *Tantrāsāṅgrahā* embodies these epistemic distinctions, which one of its contemporary *bhāṣya*-s, namely *Yuktiḍīpika*, is said to have highlighted.<sup>42</sup> His *Graha-parīkṣā-kramā* is a methodological manual of observations in astronomy and the use of observational tools. *Siddhāntadarpaṇā* is Nilakantha's another significant work, often noted for the interest he exhibited in methodological instructions. Nilakantha's *Āryabhaṭīya-bhāṣyā*, his masterpiece, provides a heliocentric model of the solar system and many results on calculus. Nilakantha attributes the series to Madhava, although it is not possible to ascertain whether Madhava discovered all the series. Nilakantha's equation of the centre for these planets remained the most accurate until the time of Johannes Kepler in the seventeenth century. It was C.M. Whish, a civil servant of East India Company, who brought to the attention of the western scholarship the existence of *Karaṇa-paddhatī* of Puthumana Sōmayāji, *Sadratnamālā* of Sankara Varman (1774-1839 CE) and *Yuktibhāṣā* of Jyēṣṭadēva (c.1500-1610 CE).<sup>43</sup>

Insistence of the production of proof as a primary epistemic requirement is best manifest perhaps for the first time in the work of Jyēṣṭadēva, namely *Yuktibhāṣā*, a Malayalam text.<sup>44</sup> It is interesting to note that proofs for Madhava's series expanded by

Nilakantha into sine, cosine and inverse tangent series were given only after a century by Jyēṣṭadēva in his *Yuktibhāṣā*, a Malayalam text.<sup>45</sup> Jyēṣṭadēva's *Yuktibhāṣā*, which is in a way his *bhāṣyā* of *Tantrasaṅgrahā*, embodies mathematical proofs of the theorems of Madhava and Nilakantha. Nilakantha's methodological rationality is best highlighted and pursued further by Jyēṣṭadēva who has given many rational approximations based on continued fractions, which scholars have not made out as yet. What has been shown totally new is a convergent infinite process capable of attributing the value of  $\pi$  to arbitrary accuracy. Jyēṣṭadēva shows that several such processes were known to the astronomers of Kerala. *Yuktibhāṣā* gives two methods for the calculation of the circumference: The first gives an algebraic recursion relation involving a square-root that converges to the exact value, and the second starts as a way to avoid square-roots in the calculation. What turns out as a matter of epistemic significance in *Yuktibhāṣā*, is the onset of the practice of providing proofs rather than just statements of results.<sup>46</sup> Another significance of the text is its use of the regional language (Malayalam) instead of Sanskrit and replacement of the poetic *genre* with prose. In short, it goes quite evident that the basic epistemic concept called objectivity was the cognitive motor in traditional Indian knowledge production and it progressively persisted as the central string of control across every *vyākhyā* or *bhāṣyā*.

### Role of Social Matrix

As discussed above, with several centuries of persistent efforts and systematic progress in mathematical astronomy, the fundamental theorisation of calculus was achieved in Kerala during the fourteenth-sixteenth century CE. Nampūtiri-s had socio-economic as well as ritual reasons for acquiring knowledge in astronomy for predicting seasons and eclipses. Prediction of eclipse had greater importance because there was the strong belief that the conduct of Vedic sacrificial rituals would be futile with the incidence of lunar or solar eclipse during their performance. Being elaborate, long lasting, and expensive in terms of goods, services and rewards, the Vedic sacrificial rituals, once commenced, should proceed to their successful completion. Having to terminate a sacrifice on the incidence of an eclipse was ignominious to the priest who officiated and the king who patronized its performance. Therefore, ability to predict the eclipse was crucial for both the priest and the king. Mathematics began to grow as the most fundamental tool

of astronomy under the ritual pressure for generating predictive knowledge about planetary positions and movements. It cannot be altogether accidental that the great mathematicians of Kerala had written manual-like texts on the calculation of the planetary motion, obviously in order to enable prediction of lunar and solar eclipses. Interestingly, most of them were Nampūtiri-brāhmaṇa-s of the Vedic tradition as well. Their association with the Vedic tradition is evident from the honorific suffix *somayājī*, indicative of the priestly status of the Soma Sacrifice, appended to their names.

Further, Nampūtiri-brāhmaṇa-s had strong belief in the auspicious time (*muhūrttam*) for the various observances of the daily life as well. Naturally, these beliefs became contemporary social obsession and *brāhmaṇa-s* set the calendar, *pañcāṅgaganītam* based on *nakṣatra-tithi-vārayogakaraṇa-s*, for the whole society, not only for economic practices but also for rituals. This accounted for the growth of knowledge in astronomy and arithmetic functions. Arithmetical competency enabled the landlords to be precise about the measuring of the productive lands and their yields. Inscriptions of the temples that were the headquarters of the agrarian settlements of Nampūtiri-brāhmaṇa-s, and a few copper plate charters vouch for the precise measurements of dues in terms of decimals. There was a preponderance of the cult of devotion to Āgamic gods and the entailing irrational beliefs. Naturally, this brought about a marked shift from astronomy to astrology at the popular level knowledge practices, quite explicable in relation to contemporary social compulsions on the one side and the declining critical intelligence of the scholarly generation on the other. Viewing in the perspective of historical epistemology, the process was that of an uncritical return to the axiomatic and the traditionally given, from the threshold of proof construction shown by Jyeṣṭhadeva in calculus.

### Across Cultures

Circulation and progressive accretion of knowledge in Indian regions had always gone beyond the sub-continent to Persia and the Arab world in the west and to China and the larger Asia in the east, thanks to the long-distance itinerant traders. Long-distance trade hardly meant mere exchange of material goods. It inevitably involved exchange of cultures to which transaction of knowledge was integral. Production of new knowledge in a region was often catalysed by elements drawn from the knowledge of another region. Cultural transactions during the fifteenth and sixteenth centuries

that marked extensive and frequent overseas voyages by merchants and missionaries were of an unprecedented dimension. Often, regional sharing carried knowledge forward to higher phases, the accomplishment of which would normally be within a larger geographical entity with a knowledge-language of intra-regional use for sustained scholarly enterprises, unless socio-economic and politico-cultural changes become totally unsuitable.

A very significant factor was the unprecedented possibility of overseas transmission of the knowledge from the Kerala region to the Persian world and Europe through maritime traders and Jesuit missionaries.<sup>47</sup> Moreover, Europe after Renaissance was witnessing a phenomenal techno-economic, socio-cultural and politico-intellectual development, providing an ideal environment for the production of new knowledge, thanks to the primacy of reason, critical intelligence and curiosity of the age. Nilakantha's model of the planetary motion was identical to what Tycho Brahe (1546-1601 CE) presented subsequently. Jyeṣṭhadeva's formula showing a passage to infinity, which facilitates calculation of areas under parabolas, is an essential constituent of the theory of calculus.<sup>48</sup> It is the same formula that the seventeenth century CE European scholars like Pierre Fermat (1607-1665 CE), John Wallis (1616-1703 CE), and Blaise Pascal (1623-1662 CE) had used. Similarly, what Wallis obtained as his results on continued fractions are identical to those obtained by Bhāskara II.<sup>49</sup>

There exists a running thread of the same epistemological control across the cognitive exercises involving empirical scrutiny, rational analysis and theorization in Jyēṣṭadēva's constitution of proofs for the power series and in Leibniz's or Newton's formulation of the fundamental theorem of calculus enabling higher trigonometric applications. Between the East and the West, there was no paradigm shift in terms of epistemic parameters regarding the production of astronomical knowledge in the seventeenth century. Actually what Europe developed subsequently was a linear advancement of the same epistemic tradition with additions enabling improvement of knowledge as well as cognitive means to go further. Their mathematical approach through the development of infinite series for understanding and reckoning planetary positions and movements were epistemologically the same. That there exists no linearity but instead an epistemic rupture about the progress of mathematics between India and Europe is a matter taken for granted under the influence of the long-sustained belief about the East as the opposite of the West, in all respects. The West had built up this

contrast through the historical process of representing the East on the basis of unfounded ideas, imaginary notions and prejudices, which subsequently gave rise to the myriad of discursive strategies of Eurocentrism for distinguishing the West from the East in every aspect of culture.<sup>50</sup>

### Afterword

As in other cultures, in the Indian too, it is metaphysics first and then the systems of thought. This is not to mean that the latter were invariably in epistemic conflict with the former. Some of them were, while others either co-existed or synthesized. The theistic and the atheistic conflicted with each other, while the abstract and concrete among the rest synthesized. Nevertheless, they show the scene of conflicts witnessing the atheistic sometimes turning to theistic and theistic to meta-theistic. At some point of time knowledge becomes an object of analysis, discussing its nature, structure, composition, concept of truth, proof and techniques of validation. Scepticism was central to the process. Ways and means of strengthening the reliability of knowledge through critical methodology have been a major scholarly preoccupation in pre-modern India. It culminated in the practice of producing proof in the language of mathematical formalism, the highest watermark of methodological progress, as exemplified by the progress in astronomy during fourteenth-sixteenth centuries CE.

Scholars were engaged in addressing intellectual issues in the domain of knowledge of their choice, a process that inevitably transcended the region and Sanskrit, the language of specialized traditional scholarship, which facilitated their sub-continental convergence. It becomes clear that intellectual perception comes into being out of interaction with the community of scholars and their scholarship on the one side and under socio-cultural compulsions. The long-protracted and persistent *vyākhyā/bhāṣyā* tradition demonstrates a clear linearity about the progress of methodological pre-occupation in knowledge production of pre-colonial India from the axiomatic, through proof creation to the scientific, over centuries. What emerges is the universality of epistemic properties that make deeper knowledge distinct irrespective of its geography. Now we realize that there existed a single cognitive thread of epistemic control in the production of knowledge. There was no rupture in the process, although the next higher phases were manifested not in regions across India but in Europe.

## Notes

1. For a detailed discussion of the meaning of knowledge, see D. Prichard, *What is This Thing Called Knowledge?* New York: Routledge Tylor & Francis Group, 2006, pp. 1-11. Also, see K. Lehrer, *Theory of Knowledge*, Boulder and San Francisco: University of Arizona, Westview Press, 2000, pp. 3-5.
2. *Kenōpaniṣad*, 1:5-8. For the text, English translation and commentaries, see Sri Aurobindo, *The Upanishads*, New York: Lotus Press, 2015.
3. *Chandōgyōpaniṣad* 3:14.1. For the text, translation and commentaries, see Sri Aurobindo, *The Upanishads*, Op. cit.
4. *Bṛihadāraṇyakōpaniṣad* 1:4.10. For the text, translation and commentaries, see Sri Aurobindo, *The Upanishads*, Op. cit.
5. *Aitareyōpaniṣad* 3:1.3. For the text, translation and commentaries, see Sri Aurobindo, *The Upanishads*, Op. cit.
6. See Kosambi, D.D. *Introduction to the Study of History*, Popular Prakashan, Bombay, 1958. Also his *Myth and Reality: Study in the Formation of Indian Culture*, Popular Prakashan, Bombay, 1962 and; *Culture and Civilisation in Ancient India in historical Outline*, New Delhi: Vikas Publishing House, 1964.
7. See B.K. Matilal, *Perception: An Essay on Classical Indian Theories of Knowledge*, Oxford: Oxford University Press, 1986.
8. See B.K. Matilal, *Epistemology, Logic, and Grammar in Indian Philosophical Analysis*, Mouton Publishers, The Hague, 1971. Also, see J.N. Mohanty, *Reason and Tradition in Indian Thought*, Oxford: Clarendon, 1992.
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10. *Ibid.*, p. 2920.
11. For a comprehensive history of Indian Mathematics, see G.G. Joseph, *Indian Mathematics: Engaging with the World from Ancient to Modern Times*, Munich: World Scientific Publishing Europe Ltd; 2016.
12. See Radhakrishnan S. and Charles Moore, A., Ed. *A Source Book in Indian Philosophy*, Princeton: Princeton University Press, rpt., 1989.
13. See H.N. Randle, *Indian Logic in the Early Schools: A Study of the Nyāyadarśana in Its Relation to the Early Logic of Other Schools*, Oxford: Oxford University Press, 1930. Also, see S.H. Phillips, *Epistemology in Classical India: The Knowledge Sources of the Nyāya School*, London: Routledge, 2012.
14. For a detailed appreciation of the system of thought, see Sundar Sarukkai, *Indian Philosophy and Philosophy of Science*, Motilal Banarsidass Publishers Pvt. Ltd., New Delhi, second edn. 2008.
15. See the discussion in P. Wilson, *Second-hand Knowledge. An Inquiry into Cognitive Authority*, Westport, CT: Greenwood, 1983.
16. See, J. Renn, "Historical Epistemology and the Advancement of Science", Max Planck Institute for the *History of Science* Preprint 36, 1996, p. 4. I. Hacking, *The Social Construction of What*, Harvard University Press, 1999, pp. 5-35. There is a clear exposition of it in L. Daston, 'Historical Epistemology' in J. Chandler, A.I. Davidson and H.D. Harootunian eds., *Questions of Evidence, Proof, Practice, and Persuasion across the Disciplines*, Chicago: The University of Chicago Press, 1994, pp. 275-83.



17. For details, see M.R.R. Varier, "Origins and Growth of Āyurvedic Knowledge," in *Indian Journal of History of Science*, Vol.51, No.1, INSA, New Delhi, 2016, pp. 40-47.
18. See *Dīghanikāya* 22. 6.
19. See Kenneth Zysk, *Medicine in the Veda*, Delhi: Motilal Banarsidass, 1998 (rpt.), 2000, pp. 38-43.
20. For a brief discussion, see M.S. Valiathan, "Caraka's Approach to Knowledge," *Indian Journal of History of Science*, Vol.51, No.1, INSA, New Delhi, 2016, pp. 33-39.
21. The verse from *Caraka samhitha Sutrasthānam*, Chapter I, *Dīrghamjīvitīyam*, 121. *Oṣadhīr nāmarūpābhyām jānāte hy'ajapā vane | aviṣāścaiva goṣāśca ye cānye vanavāsinah || 1.1.121 ||*  
Shepherds and other pastoral groups (*ajapa-s* and *gopa-s*) of the forest areas are well versed in the knowledge of herbs.
22. See the discussion in D. Chattopadhyaya, *Science and Society in Ancient India*, Calcutta: Research India Publications, 1977.
23. For a detailed discussion, see S. Saha, *Meaning, Truth and Predication: A Reconstruction of Nyāya Semantics*, Calcutta: Jadavpur University and K.P. Bagchi and Company, 1991. Also, see S.H. Phillips, *Classical Indian Metaphysics: Refutations of Realism and the Emergence of New Logic*, Chicago: Open Court, 1995.
24. For a detailed discussion, see A. Singh, "Tantra-yukti: Method of Theorization in Āyurveda," in *Ancient Science of Life*, Vol. XXII, (3), 2003, pp. 64-74. Also see V. Nair & D. Sankar, "Knowledge Generation in Āyurveda: Methodological Aspects," *Indian Journal of History of Science*, Vol.51, No.1, INSA, New Delhi, 2016, pp. 49-55.
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29. For details, see G. Cordona, *Pāṇini: A Survey of Research*, New Delhi: Motilal Banarsidass, 1998, pp. 335-38.
30. See the discussion in G. Tucci, Giuseppe, *Pre-Dinnāga Texts on Logic from Chinese Sources*, Baroda: Oriental Institute (*Gaekwad's Oriental Series*: 49), 1929. Also, see K.N. Jayatilleke, *Early Buddhist Theory of Knowledge*, London: George Allen and Unwin Ltd., 1963.
31. For translation and commentary of Dignāga's text, see H.N. Randle, *The Nyāyamukha of Dignāga: The Oldest Buddhist Text on Logic, Materialien sur Kunde des Buddhismus*, Vol. 15, Heidelberg: Otto Harrasowitch, 1930. Also, see S.Y.R. Chi, *Buddhist Formal Logic: A Study of Dignāga's Hetucakra and K'uei-chi's Great Commentary on the Nyāyapraveśa*, London: The Royal Asiatic Society of Great Britain, 1969. Also, see R.P. Hayes, "Dignāga's Views on Reasoning

- (*svārthānumāna*),” *Journal of Indian Philosophy*, 1980, Vol. 8, pp. 219–277.
32. For a detailed discussion, see R.P. Hayes and S.G. Brendan (trans.), “Introduction to Dharmakīrti’s Theory of Inference as Presented in *Pramāṇa-vārttika Svopaj navṛtti 1–10*”, *Journal of Indian Philosophy*, Vol. 19, 1991, pp. 1–73. Also, see J.D. Dunne, *Foundations of Dharmakīrti’s Philosophy*, Somerville, Mass: Wisdom Publications, 2004.
  33. See discussions in T.J.F. Tillemans, *Scripture, Logic, Language: Essays on Dharmakīrti and his Tibetan Successors*, Boston: Wisdom Publications, 1999.
  34. See C. Rajendran, *Vyaktiviveka: A Critical Study*, Delhi: New Bharatiya Book Corporation, 2003.
  35. For details, see D.H.H. Ingalls, *Materials for the Study of Navya-Nyāya Logic*, Cambridge: Harvard University Press, 1951.
  36. For details, see K.S. Shukla and K.V. Sarma, *Āryabhaṭīya of Āryabhaṭa*, New Delhi: Indian National Science Academy, 1976.
  37. See Rajagopal, C.T. and A. Venkataraman, ‘The Sine and Cosine Power Series in Hindu Mathematics,’ *Journal of the Royal Asiatic Society of Bengal*, Vol. 15, Calcutta, 1949, pp. 1-13; Rajagopal, C.T. and T.V. Iyer, ‘On the Hindu Proof of Gregory’s Series,’ in *Scripta Mathematica: A Quarterly Journal Devoted to the Philosophy, History, and Expository Treatment of Mathematics*, Vol. 18, Yeshiva University, New York, 1952, pp. 65-74.
  38. See G.G. Joseph, *A Passage to Infinity: Medieval Indian Mathematics from Kerala and its Impact*, New Delhi: Sage Publications, 2009. Also, see his *Crest of the Peacock: Non-European Routes of Indian Mathematics*, London: Princeton University Press, paperback, 2010. Mallayya, V.M. and G.G. Joseph, ‘Indian Mathematical Tradition: The Kerala Dimension,’ in G.G. Joseph ed. *Kerala Mathematics: History and Its Possible Transmission to Europe*, Delhi: B.R. Publishing Corporation, , 2009.
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  40. See J.L.E. Dreyer, *Tycho Brahe, a Picture of Scientific Life and Work in the Seventeenth Century*, Edinburgh: Adam and Charles Black, 1890.
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  43. See, Wish, C, “On the Hindu Quadrature of the Circle and the Infinite Series of the Proportion of the Circumference to the Diameter Exhibited in the Four *Shāstras*, *Tantrasamgraham*, *Yuktibhāshā*, *Caraṇa Padhati* and *Sadratnamālā*,” in *Transactions of the Royal Asiatic Society of Great Britain and Ireland*, vol. 3, 1835, pp. 509-523. Raju, C.K. ‘Computers, Mathematics Education, and the Alternative Epistemology of the Calculus in the *Yuktibhaṣa*,’ in *Philosophy East and West*, Vol.51 (3), University of Hawaii Press, Hawaii, 2001, pp. 325-61. Joseph, G.G. *A Passage to Infinity: Medieval Indian Mathematics from Kerala and its Impact*, Sage Publications, New Delhi, 2009. G.G. Joseph, ‘Kerala Mathematics: Motivation,

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44. The first attempt to be mentioned is that of Rajaraja Varma, A.R. *Jyotiprakāśakam*, originally published in 1896, rpt., Kerala University Press, Trivandrum, 1990. Later Ramavarma and A.R. AkhilesvaraIyer, *Yuktibhasha*, Trissur: Mangalodayam, 1928.
  45. See Ramavarma and Akhilesvara Iyer. 1928. *yukti bhāsha*. Thrissur: Mangalodayam Press. Also see K. V. Sarma, K. Ramasubramanian, M. D. Srinivas, and M. S. Sriram. *Ganita yukti bhāsha (Rationals in Mathematical Astronomy) of Jyestadeva, Vol I: Mathematics and Vol II: Astronomy*. National Science Academy, New Delhi: Springer-Verlag, jointly with Hindustan Book Agency (HBA).
  46. See, C.K. Raju, ‘Computers, Mathematics Education, and the Alternative Epistemology of the Calculus in the *Yuktibhasa*,’ in *Philosophy East and West*, vol.51 (3), 2001, pp. 325-61.
  47. See discussion in Mallayya, V.M. and G.G. Joseph, “Indian Mathematical Tradition: The Kerala Dimension”, in G.G. Joseph ed. *Kerala Mathematics: History and Its Possible Transmission to Europe*, B.R. Publishing Corporation, Delhi, 2009.
  48. For a scholarly analysis of the question of transmission, see V.M. Mallayya and G.G. Joseph, “Indian Mathematical Tradition: The Kerala Dimension”, in G.G. Joseph ed. *Kerala Mathematics: History and Its Possible Transmission to Europe*, Delhi: B.R. Publishing Corporation, 2009, pp. 35-58. See details in G.G. Joseph, *A Passage to Infinity: Medieval Indian Mathematics from Kerala and its Impact*, New Delhi: Sage Publications, 2009.
  49. For a detailed discussion, see Dennis F. Almeida and George G. Joseph, ‘Eurocentrism in the History of Mathematics: The Case of the Kerala School’, in *Race and Class Series*: 45 (4), Institute of Race Relations, London: Sage Publications, 2004, pp. 53-54.
  50. For conceptual details see, Michel Foucault, *Archaeology of Knowledge*, London: Routledge, 1972. See application of the concept of discourse in Edward Said, *Orientalism*, London: Vintage Books, 1979.

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