★ FORUM ★

The Character of Mind

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Even if the human species is not the only one that has a mind, it may be the only one that knows that it does. Fascination with our own mind, with what we feel, sense, and think, lies at the heart of human nature and has unsurprisingly become a major part of scientific inquiry itself. Rigorous scientific inquiry into the character of mind has been a part of all major traditions in scientific thought, but the character of these inquiries varied across different traditions, some of which have also been essentially separate for millennia and are only being rediscovered now. Thus, the formal study of grammar was an essential ingredient in the Indian Classical tradition, leading to more than a thousand years of rich and intense discussions in linguistics and philosophy of language in the hands of *Vyakaranvadis* (grammarians) such as Pāṇini, Tolkappiyar, and other authors in their traditions respectively in northern and southern India (Matilal 1990). There is essentially no parallel to this in the Ancient Greek tradition, where not grammar but geometry was the entry point to science. And although Aristotle developed a model of the sentence that has proved relatively stable for two thousand years of linguistic theory (Moro 1997), the first tradition of Universal Grammar in the Western world emerged not before the 1200s in Paris (Covington 2009), where Modistic grammarians viewed grammar as a formatting principle for a species-unique kind of thought. Flourishing across much of Northern Europe by the end of the 13th century, it eclipsed after less than a hundred years when nominalist doctrines entered the scene and logic took pride over grammar again as a meta-theoretic framework. Interestingly, a similar eclipse happened with the grammarian tradition in India as the logico-empiricist framework of the *Nyayaikas* (logicians) became dominant. The next tradition in scientific thinking about human grammar, namely Port Royal, emerged within Cartesian rationalism in the 17th century, and was taken up by Noam Chomsky in the 20th (Chomsky 1966).

With this last tradition we associate the term 'second cognitive revolution', which now is little more than 50 years old. To review it was part of the goals of an international conference convened by Nirmalangshu Mukherji, Wolfram Hinzen,

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and Bijoy Boruah, on 'The Character of Mind'. It was held at the Indian Institute of Advanced Studies in Shimla (Northern India) from 18–20 March 2011, with the generous financial support of the Institute and the Indian Council of Philosophical Research. Bringing together eminent scholars and scientists from India, Canada, Italy, the UK, and the US — coming from disciplines such as philosophy, psychology, linguistics, law, biology, and physics — the following questions were asked: What has been achieved in half a century of study of the cognitive mind? How does it connect with millennia of human effort to bring light to the structure of our mind, in different traditions with radically different emphases and cultural conditions? Are there lasting insights unifying these traditions? Is the evidential basis clear on which claims about the character of mind can rest?

A look at the history of the science of cognition reveals both essential continuities and discontinuities. The fragility of the enterprise at large impresses itself on the observer: Progress in the study of mind has been very far from linear. Continuities cannot be overlooked, on the other hand. Thus as **Amita Chatterjee**'s (Calcutta/Kolkata) presentation illustrated, the 20th century debate on whether the representational resources of our mind track a mind-independent external reality, or whether our representational access to the world is rather linguistically mediated, is as well-articulated in the Classical Indian tradition of the *Navya-Naiyāyika*'s (new logicians) as it is in the 20th century Western analytic tradition. A characteristic conflict between the viewpoint of the logicians and the grammarians is to be found in the Indian tradition as noted, as much as it is a leading theme in the downfall of Modistic grammar (Covington 2009), mentioned above, in the turn of 19th century grammarians against the Port Royal tradition of logic (Graffi 2007), or in the turn of 20th century logicians such as Russell against the structure of human language as a valid source of philosophical insight. The persistence of this somewhat uneasy partnership between grammar and logic as possible frameworks for philosophy throughout the course of human scientific rationality marks it as a particularly important focus of further historical and systematic study.

Inquiry into which mental structure is 'innate' to the mind is also a defining feature of scientific rationality as constructed by Plato which, despite numerous attempts to contravene it, is no less alive today, as the contribution of **Susan Carey** (Harvard) on the origin of concepts at the conference exemplified. Interestingly, on the other hand, the epistemology of innateness does not appear to play the same paradigmatic role in the study of grammar in the Indian tradition. Not only is the epistemology different, but also there was a more definite focus on the grammatical mind, as noted, such that grammar was viewed as playing a role in the structuring of both thought and reality. As **Probal Dasgupta** (Kolkata) put it in his contribution, formal grammar in the wake of the Chomskyan framework has 'focused on the grammatical rule as the austere formal object of rigorous statement', thereby ignoring an essential turn that Indian formal linguistics took in the 7th century with the work of Bhartrihari, whose seminal work *Vaakyapadiiya* (On Words and Sentences) inaugurates what we may call a 'substantivist' approach, in which the whole cycle

from sentence composition through speaking, hearing, and understanding to fresh composition is identified as the proper object and domain of linguistic inquiry.

As **Godavarish Mishra**'s (Delhi) presentation made clear in this connection, this inquiry into the structure of the cognitive mind naturally points beyond itself even further. While metaphysics has been banned from modern science, it would be naive to conclude that cognitive science has no bearing on deeper and wider questions of a philosophical nature even today. Bhartrihari exemplifies this point, too, when he not only rejects the familiar view of language as mere 'vehicle' of thought (or its 'conveyer-belt', as when language is merely expressive), but maintains that for something to count as knowledge, it has to be given a linguistic form. In this sense, what we know as the world is a creation of language. A world or mind placed outside of language, Bhartrihari maintains, would be inscrutable.

In Bhartrihari's case, these wider epistemological and metaphysical contentions are woven into an intricate fabric of more specific empirical and methodological hypotheses about language that bear on it, such as the question whether meaning is compositional (exhibits a part–whole structure), whether lexical items have an independent meaning, and whether the organization of the word is fundamentally distinct from the organization of the sentence. Dasgupta, arguing for the latter view, exemplifying it with restrictions on recursion in the domain of morphology, was here contradicted by **Anna Maria Di Sciullo** (Montréal), who argued that human language is characterized by a small set of basic operations — a toolkit, including the operation Merge — which can be used to various degrees in different domains, but is implied in morphology as well. Yet the recursions are different, with morphology reflecting arithmetical recursion somewhat more closely than syntax. The question why human language clearly distinguishes these two domains of grammatical organization — the word and the sentence — remains.

While all of these issues are focused around the role of grammar in human cognition, it is abundantly clear that mind is not exhausted by language. In fact, if one takes the Shimla event as any indication, it may be useful to see the human mind as characterized by three broad domains:

(A) (self-)knowledge
(B) grammar
(C) experience

Knowledge, including self-knowledge, has been at the heart of the Western tradition, particularly since Descartes' re-centering of knowledge around the Self and its cogitations, which formed the subject of **Bijoy Boruah**'s (Delhi) presentation discussed below. The same is true of the Indian tradition, such as the *Vedanta* — with an alternative tradition too denying the Self, such as the *Carvakas* ('materialists') and the Buddhists. Grammar is clearly central to knowledge, for it appears that we can obtain no know-ledge in the relevant sense in domains of cognition where the relevant structural formats don't exist: associative cognition, say, or emotional

cognition. One of the most crucial questions in the study of cognition thus is what difference grammar, which is species-unique, makes to the character of mind, and perhaps even to the origin of our species. Yet, as **Ned Block** (New York) put it in his presentation, reason is not the essence of the mental; or, to put this around, the mental — in the sense of awareness of phenomenal experience — is not the essence of reason. Hence, there is a distinct and crucially different third domain of experience, which confronts us with explanatory problems distinct from either those posed by knowledge or by gram-mar.

Block's topic — phenomenal richness of experience, which is often unlike what we take it or report it to be — illustrated how fascinating and difficult the question becomes what we really experience when language is not there to structure that experience and to report it, or when such reports are seen always to be a function, not only of conscious experience, but cognitive and affective responses to task-specific demands as well. Somewhat similar problems keep arising in comparative cognition. As Block notes, 'even our interpretations of animal research must ultimately be based on human first person reports'. Evidence for the richness of the non-linguistic animal mind is rich and undeniable, yet what it is exactly that an animal is thinking at a particular moment (which concept, in which structural arrangement), has proved to be an elusive question. Is an animal thinking at all if it has no concept of a thought (Davidson 1984)? If it has no words, are its 'concepts' like the meanings that words have when they occur in sentences (where, in particular, they all have a grammatical *category*, which no concepts as such have)? These questions came up in discussions on several papers in the conference.

When language gives out, in short (and by consequence there is no space of shared words linked to entities in the external world that we can use to tap into a hearer's mind), it may be that reality becomes harder to delineate. Ingenious methods now have to be devised to get a glimpse of this non-grammatical reality; neuroimaging, say. Yet the continuous neural activity imaged with today's technologies proves not to be of the right grain to capture experience where it has a content that is discrete. The situation gets more complicated still when we realize, as **Barry Smith** (London) argued, human 'conscious experience' itself — in traditional terms, the experience of a Kantian or Cartesian 'subject' — is not the unified phenomenon it has long been taken to be in at least the Western modern philosophical tradition. A look at 'abnormal' experience in mental illness after brain damage reveals that a 'normal' subject's experience may also not be as normal as we thought. Hidden beneath something as simple, familiar and basic as a feeling of 'agency' lie myriad interacting systems in the brain that sustain the illusion of unity where none exists. While some of the 'abnormal' experiences are traceable to aspects of language impairment, some are not. As with Block, Smith left it open as to how much of the structure of human experience can be traced to nonhuman organisms.

This essential *fragility* of the construct we call the 'Self' is a notable new topic for systematic inquiry. In contrast, Bijoy Boruah's talk served to remind participants of the undeniable intuitive force of traditional Cartesian intuitions on the ultimate

simplicity and unity of the way in which the Self is presented to itself. Any way of objectifying the content of the experience of the Self indicates that we have missed the target of our inquiry, the subject. Here we enter a world of reflection of the human mind on itself that is more structured, and in particular strictly distinguishes the 'I' from any 'you' (including the you into which the I turns itself when addressing or scrutinizing itself), and both of these from any 'it'. For this move, relevant structural resources are required which may well be grammatical: It it is not clear whether any such form of self-reference can be sustained in the absence of a system of grammatical person, which we know plays a crucial role in the convergence of syntactic derivations (see e.g. Sigurðsson 2008, Longobardi 2010). Also, we need to explain that much of the grammaticality of 'I' and 'you', such as agreement structures, go through without assuming self-reference; otherwise, it will be impossible to deny the Self, à la David Hume or the Buddhists.

It appears, then, that some cognition is pre-grammatical, existing in pre-verbal infants and non-human animals, some is post-grammatical, or at least stands in some inherent relation to grammar. As Carey illustrated, before human beings create scientific theories, mathematics, literature, moral systems, and complex technology, all of which are culturally constructed and require grammar among other things, there is a rich world of concepts characterized by inferential roles and representational functions. How they are structured — given that they are not structured grammatically — is an open question. In the case of a concept such as number, the intrusion of grammar and a public language in the development of the infant may boost innate representational resources in a way that is not innately pre-specified. The richer a pre-linguistic world of concepts becomes, the more astounding and mystifying is the transition from pre-human hominins to our early African ancestors. Why, if the conceptual world of the Neanderthal and its immediate predecessors (let alone the chimpanzee) is so rich, is their culture so poor, and so un-suggestive of the innovation and creativity that marks a modern human culture in the Aurignacian as much as it marks the language faculty that supports it? And what is the nature of the major transition in infant development that happens around the 4th year of age, as Carey argued for with a range of examples?

As Carey suggests, it may make sense to think of the matter in terms of a hierarchy of increasingly abstract representations, which may set out with percepts, continues with concepts and their inferential roles, and at some stage includes images. This was the topic of **Mohan Matthen**'s (Toronto) presentation, who attributed propositional content as well as 'force' to such imagic representations (since one can anticipate, recollect, expect them, for example), thereby foreshadowing formats of cognition normally reserved for an illocutionary format of representation, i.e. the linguistic case. The entire hierarchy seems to obtain even before there are any *words*. At this junction a crucial question arises: What difference do words actually make?

Addressing this very question, **Wolfram Hinzen** (Durham) noted that the move from concepts to words marks a difference in grammaticality — every word

has a grammatical category — which in turn accounts for the fact that words can occur in sentences: They are parts of speech. Importantly, most words with a substantive lexical content can be re-categorized, moreover: For example, the root concept KILL can be grammaticalized as a noun (*a quick kill*) or as a verb (*kill Bill*), with mixed forms in between, such as nominalizations of the verbal form (*the killing of Bill*). These occurrences of the same lexical concept KILL clearly have nothing to do with a difference in semantic content, which remains the same throughout. What differs, rather, is ontology: whether this concept is referred to as an object (nominal case), as an event (verbal case), or as both. The external world, however, has little if anything to do with these differences in ontology: It could be exactly the same, and yet a speaker will refer to it with the nominal form on one occasion and the verbal one on another. The difference, thus, is a difference, not in semantic content, but deixis: The way of referring (the *modus significandi*, in traditional terminology). The relevant forms of deixis are inherently grammatical, moreover, and thus not to be found in non-grammatical beings. Grammar, in short, is a device of extended deixis: We use language to point hearers to objects, facts, and truths, which no creature that merely has concepts can do.

Hinzen's take reflects a certain departure from the viewpoint of grammar as a purely formal object, even though the formality of generative grammar in the past has reflected a methodological decision, rather than an empirical claim, about the substantive nature of the object under study. Nonetheless, the formal treatment of the computational system underlying language is a crucial move within Minimalism, when it attempts to see the computations in the language faculty as an instance of computations in a wide range of species, or indeed in physical nature as such. Di Sciullo's presentation precisely raised this question: How far the most fundamental computational operations reflect generic processes in nature that can be found in, say, cell division or organic growth as well. Universal constraints on linguistic computations, too, may be generic in the sense of reducing derivational complexity or avoiding the number of choices in a derivation. If so, a central question for the linguist is which language-specific operations need to be added to the fundamental principles of computation and recursion. Neurophysiological experiments suggest that the brain is specifically sensitive to crucial asymmetries arising derivationally, like between complements and non-complements or between mono- and bi-phasal structures. Even at this level of specificity the question arises whether the constraints in question are generic in nature, or else linguistically specific.

How much, then, is the grammatical mind really part of the physical world, as opposed to a joint of nature that cannot be conceptualized in other than grammatical terms? The question arises if one accepts, with Katz & Pesetsky (2009) and Mukherji (2010), that the joint of nature includes more than language, namely music and arithmetic as well. This peculiar triad and related domains may represent a unique configuration in nature that is simply not found anywhere else than in the grammatical mind itself, where they are used to compute sound and meanings. Looking for generic operations in the language faculty and regarding the latter as

arising from biological processes not specific to the human mind is a well-motivated recent path which resists this conclusion. Yet, as **Nirmalangshu Mukherji** (Delhi) argued, the conclusion may nonetheless be right. To put the conclusion differently, talk of 'computational systems' outside of the human species — as when desert ants and foraging bees are said to have it when computing paths of motion— may be a move guilty of equivocation in the very term 'computational system'. As is worth noting in this regard, the best evidence for relevant computations does not come from the non-human primate lineage, which forms the most relevant comparison class: Chimpanzees don't vocalize, and their thought system appears to be radically different from ours. The grammaticalization of sound and meaning may thus — consistent with Hinzen's story — *create* the very meanings that sentences encode and the very sounds that externalize them. Outside of a grammaticalized world, they would simply not be found, and where a computational system in the ant or bee brain has been posited, either a more biological story or a specific non-symbolic story (Bickerton 2009) may have to be sought that makes sense of the data.

Coming back to our earlier thoughts about 'hierarchies', it is clear that when we have moved from percepts to concepts to images, and from there on to words and sentences, we are nowhere near the end of the hierarchy of mental complexity. Thus, while a moral mind is surely necessarily a linguistic one, the naturalistic analysis of its grammaticality tells us relatively little about its moral content. As **John Mikhail** (Washington) discussed with reference to a rich tradition of inquiry lasting several centuries, however, the moral mind is nonetheless crucially a generative one as well: A moral being is capable to compute, on the spot, a potential infinity of complex moral judgements appropriate to an occasion, whose perceptual and physical feature will typically radically underdetermine the judgements in question. The rationality of these judgements is furthermore clearly not rational in the sense of consciously rationalizable by the subject in question, creating an analogy with a major insight in regards to the grammatical mind associated with the second cognitive revolution in the 1950s. The generative principles of moral judgment may thus be as inaccessible to conscious introspection as the principles of grammaticality. Yet, as was discussed at length, differences between the moral and the linguistic faculty nonetheless abound, with the former for example being subject to learning, instruction, and moral conflict in a way that linguistic judgements are not. Morality may also not allow for the methodology of individualism, in the way that grammar has at least been thought to do (though Hinzen's story in regards to the deictic significance of grammar suggests reasons for skepticism in this regard). An account of the moral mind that appropriately identifies both the overlap and the differences between the two kinds of computations needs to predict these differences, so that talk of a 'moral grammar' in the brain is able to avoid the danger of involving a metaphorical extension of the term 'grammar' — much as, on Mukherji's account, talk about grammar in ants and bees may involve such metaphorical extensions.

Difficulties with an understanding the moral mind in grammatical terms again illustrate conceptual obstacles when attempts are made to transcend the naturalistic

study of the grammatical mind as pioneered by Chomsky half a century ago. As noted above, opening up cognitive science to the realm of the phenomenal and the Self moves us well to the boundaries of scientific inquiry, and perhaps in part beyond. Yet, it is noteworthy that the scientific study of consciousness has been burgeoning for many years, and much insight has been obtained. Where the moral mind is our topic, on the other hand, naturalistic inquiry will now confront normative issues that the generative approach to grammar has sought and managed to avoid.

That said, it is surprising which aspects of the mind this approach has now succeeded to illuminate. As **Giuseppe Longobardi** (Trieste) illustrated, the history and distribution among these is an excellent example, to an extent that the study of the history of human languages becomes a domain of inquiry from which to obtain a novel argument in favor of a computational approach to the mind in the sense of the generative program and its study of language from a mentalist point of view. Reconstructing linguistic phylogenies has until recently operated at a relatively 'surface' (or phenotypic) level of linguistic description, often focusing on words and their histories or relatively superficial structural patterns, at the expense of the 'I-linguistic' mechanisms studied for many decades in generative linguistics. As such it has certainly not been able to take us beyond the threshold of 10,000 years of human history. Yet, even before that date, major human and linguistic diversity must have existed. As Longobardi explained and illustrated, just as genetics has introduced genetic and molecular markers (cf. Cavalli Sforza *et al*. 1994) which are more abstract and only indirectly connected to external phenotypical traits, historical linguistics can now make a similar move using the resources of parametric analyses of grammatical diversity, leading to more stable and reliable historical indicators of phylogenies, with a potential to reach further back into the human past (Longobardi & Guardiano 2011). None of this is in any conflict with the fact that grammatical structure reflects cultural history to some extent (Dunn *et al*. 2011).

Much of the discussion thus indicated the need for a closer study of origins of human language. Specifically, was there a relatively recent speciation event that definitively separated the humans from the rest of the post-chimpanzee hominid line to lead to the emergence of language and its wide effects on human cognition? **Timothy Crow** (Oxford) could not attend the conference unfortunately. But his work, including the extended abstract submitted for the conference, was frequently mentioned. Given that human cognitive capacities far exceed those of our primate relatives, Crow asks, if the transition was saltational what was the mechanism? Following the characteristic asymmetry of the human brain, Crow (2010) notes that the human brain is four-chambered (right and left, anterior and posterior) and circuitous with respect to heteromodal association cortex by contrast with the bilateral equality (anterior and posterior) of the chambers of the generalized mammalian brain. This suggests that a discrete speciation event took place about 160KYA, that perhaps the ProtocadherinXY gene pair was involved, and that the effect was to render the human brain 4-chambered with respect to heteromodal association cortex. From this arose the capacity for language. According to Crow, the

compartments of the human mind are identified sequentially with speech perception, meaning, thought and speech production, or more technically, with perceptual, conceptual, intentional and articulatory capacities. It is interesting that this is exactly how the 'external systems' of language, the sensorimotor and the conceptual-intentional systems, are conceptualized in biolinguistics. This still leaves open the crucial issue of how the combinatorial system of Merge itself emerged.

Overall, it is thus clear that the study of the grammatical mind over the last half-century has raised deep issues in regards to both the unity and the diversity of the human mind. It has not only pointed to the epistemological significance of grammar but also to other inquiries into the cognitive mind that are at the frontier of inquiry today. Very clearly, the issues of linguistic theory point beyond the empirical properties of human languages, to the origins of our species and of human variation as such.

The conference concluded with a talk by the physicist **Partha Ghose** (Kolkata) focusing on the famous discussion between the poet–artist–philosopher Rabindranath Tagore and the physicist Albert Einstein on the character of scientific truth (Marianoff 1930). While Tagore held that all truths, including truths of physics, can only be human truths, Einstein urged that physics will be impossible unless we entertain an external reality independent of the human mind. Ghose suggested that this classic realism/antirealism debate is also reflected in two apparently conflicting directions in contemporary cognitive science. According to Ghose, proponents of 'embodied cognition' such as Fransisco Varela (Varela *et al*. 1992) hold a view closer to Tagore, while formalists/computationalists such as Chomsky perhaps hold an Einsteinian view. Ghose held that the measurement problem in quantum theory is a test case for physics. If quantum theory is a general theory of the Universe and the measurement problem its inevitable consequence, then even quantum theory could be viewed as 'embodied' in the sense that it necessarily incorporates the effects of human perception. This is precisely the reason why Einstein denied that quantum theory is a 'complete' theory. The issue obviously touches the very heart of cognitive science, including biolinguistics, since cognitive science attempts to use the human mind to study itself.

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