

LANGUAGE, MIND AND COMPUTATION (November 12, 2014).
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PRECIS:

Introduction

The Saussurean legacy implicit in the multifaceted relationship between linguistic form (Signifier) and meanings (Signified) has helped build the foundations of our current linguistic theory. It is with the advent of Generative Grammar in the second half of the twentieth century that a discontinuity from the structuralist tradition built on the Saussurean legacy began to appear on the landscape of linguistic theorizing. Generative Grammar posed questions about the nature of language with respect to how it is acquired, known and instantiated in the human mind. Thus the important connection between the language, mind and computation was established, and linguistic phenomena became subject to rigorous formalization. One of the ways of seeing the connection is this: linguistic representations are (internalized) mental representations, and operations on such representations by means of rule systems are computations. This connection between language, mind and computation has helped consolidate the plexus of assumptions underlying a whole gamut of linguistic theories in modern theoretical linguistics. But on the other hand, this connection between language, mind and computation—whatever way it is framed—seems to be the least understood thing ever encountered in linguistic theorizing when juxtaposed with the relations between the signifier and the signified. A glimpse into these problems can be offered by (re)examining some basic examples of *Wh*-questions which can be reckoned to be paradigm cases of displacement.

1. Why did John eat the pie__?
2. Why does she wonder__ [who ate the pie]?

In (1), the *Wh*-element ‘Why’, which is a *Wh*-adjunct, is interpreted in the gap shown above, whereas in (2) it is interpreted in the gap immediately after ‘wonder’. But how does one know this? One may say that the matching or correspondence of the *Wh*-expression with the right gap tells us where the relevant *Wh*-element is interpreted. But how is this matching or correspondence established? The answer comes from our interpretation of what the sentences mean. Now regardless of whether interpretation is taken to be a property of sentences or a psychological process, there does not seem to be any way in which the case in (1) can be distinguished from that in (2) without making any reference to interpretation, and if so, this invites a fiendish dilemma. On the one hand, if we construct syntactic rules that are *intrinsically* computational in character, these syntactic rules cannot be formed without appealing to interpretation, since the lexical contents of the words in (1-2) do not tell us why the *Wh*-element ‘Why’ cannot be interpreted after ‘pie’ in (2), even though it can be so interpreted in (1). On the other hand, if syntactic rules are formed by appealing to interpretation, this goes against the very

character of computations which are formal or meaning-free operations on linguistic representations that are not instantiated by reference to contents or interpretations of linguistic representations.

Language, Mind and Computation probes into the issue of how language, mind and computation mesh or are in disharmony with each other, especially when language, mind and computation are put together in the same context.

Language and Linguistic Theory

The question of what makes a linguistic theory a theory of language is significant when one goes about figuring out how to make sense of linguistic theory. The rudimentary principles underpinning language can help demarcate the territory that linguistic theory is supposed to encompass. In this connection, properties and features of natural language(s) that form the basis of a linguistic theory can tell us what it is about language per se that leads to what a linguistic theory and a linguistic methodology yield to.

In a relevant sense, form-meaning correspondence with all its complexity in various relations constitutes the main ingredient of linguistic theory. For that matter, all possibilities at the boundary of form and meaning mappings may be considered pivotal properties that make a linguistic theory a theory of language.

Even if in rare cases linguistic form is almost segregated from meaning, the relation between linguistic form and linguistic meaning can also be patchy enough. This aspect of the form-meaning mapping is part of many linguistic frameworks including Generative Grammar, Cognitive Grammar, and Construction Grammar. It is to be noted that most of the peculiar and idiosyncratic linguistic phenomena fall under this aspect, and linguistic theories widely differ as to how they incorporate this aspect of the form-meaning mapping. Furthermore, form and meaning can also closely match each other in such a manner that they become almost indistinct or overlap each other. In such a case, a separate ontological level of form or meaning may not be required as they cannot be decoupled from one another. This aspect is clearly reflected in theories such as Montague Grammar or Dynamic Syntax.

Language and the Mind

What makes the connection between language and mind possible may shed light on the relationship between language and the human mind. In fact, many familiar linguistic phenomena can show how and in what ways the extrapolation from language to the mind is feasible and valid.

The distinction between I-language and E-language in the Chomskyan conception constitutes the fulcrum of the issue bearing on the connection between language and

mind. How I- language may realize in psychological mechanisms has its associations with different interpretations of *mentalism*.

But it must be recognized that mere argumentation over the exact form of mentalism required for I-language realization is not enough. Empirical linguistic phenomena (long-distance binding, *Wh*-movement, *tough*-movement) which are familiar enough in the theoretical linguistics literature are scrutinized to see how they illuminate this matter in question. It turns out that rather than illuminating the relevant issue, these phenomena unlock disastrous paradoxes, puzzles and inconsistencies. It may be noted that the abstraction of I-language from psychological mechanisms has to be treated differently from I-language realization in psychological mechanisms as they bear upon different sets of questions. The deeper problem that comes out is that no coherent and consistent notion of abstraction of I-language from psychological mechanisms is possible, since, as the book reveals, grammar makes reference to interpretation at every step and at the same time does not, given the architectural constraints on the organization of grammar in the Generative paradigm. Closer examination of linguistic phenomena like multiple embedding/nesting, raising/control also reveal deeper inconsistencies hidden within.

Language and Computation

The way language relates to computation can be looked at from various perspectives and approaches. What is necessary and what is not about this relation are also linked to these various perspectives. This can also illumine, one may believe, how computation constitutes the substrate underpinning the syntax and semantics of natural language.

The notion of linguistic representations on which linguistic operations operate is tied up with the way one may understand the intrinsic, rather than extrinsic, relation between grammar and computation. This turns out to be significant because such operations are considered to be computations; so what they operate on can project substantial insights into how these operations can be construed as computations. It appears that it is important to clarify the notion of linguistic computation with respect to the general notion of computation in theoretical computer science. Not all linguistic theories can be said to be clear about the notion of linguistic computation. In fact, unification-based grammars or constraint-based formalisms are clearer than Generative Grammar on this matter, although the notion of linguistic computation can be applied to the operations of the architecture of grammar in mainstream Generative Grammar in view of the formalized notions of some of the tenets of the theory.

Beyond that, the problem of how infinite languages are generated by finite grammars represented in finite systems such as the human mind/brain comes apart as this is one of the issues rarely discussed in current debates. This book shows that regardless of whether languages generated by a grammar are infinite or not, the grammar that generates such languages may not be computing at all, given the vagaries of computability that include the halting problem of Turing machines.

The implications for the notion of linguistic computation turn out to be far-reaching. On the basis of the uncovered paradoxes and devastating inconsistencies lying within, the book argues that computation in its intrinsic sense is wholly irrelevant to natural language grammar, given that grammars are thought to be computing systems.

Finally, the book also demonstrates how the theory of computational complexity may and may not apply to linguistic computation. Formal operations as part of linguistic computations are argued to be subject to the restrictions clamped down by computational complexity. And if so, whether linguistic computation is realized in or abstracts away from psychological mechanisms becomes more tenuous and leads to further riddles.

The Puzzling Relation between Language, Mind and Computation

Issues revolving around the relationship between language, mind and computation uncover further conundrums when they are put back into the broader context of the relation between language and cognition. In order to see how language, mind and computation ultimately go together, some specific linguistic phenomena such as *Wh*-movement, gapping, quantifier scope are (re)examined, and it is observed that grammar, mind and computation cannot co-exist in harmony as further paradoxes and inconsistencies destabilize the relationship, however construed, between grammar, mind and computation.

With this in the background, fresh new vistas onto the relationship between language, mind and computation are offered with an eye on how to bring forth transparency in the muddle the relationship between language, mind and computation has engendered. Possible avenues for linguistic theory are also suggested. It is also emphasized that the relation of the architecture of grammar to linguistic formalisms has to be reformulated in order that this can unravel something deep about the language faculty. What is argued is that the architecture of grammar should be kept separate from the axiomatic system of linguistic formalisms. Thus, on this proposal the architecture of grammar should be segregated from the axiomatic system of linguistic formalisms as expressed in the context of a general architecture of the language faculty that aims to project a meta-theoretical or trans-theoretical grounding of this possibility. In this connection, the system of linguistic rules and constraints as part of an axiomatic system is sketched out with an eye on its necessary associations with interpretation and intentionality. It is shown that the emerging view of the relationship that obtains among language, mind and computation offers insights into many of the overlooked problems of current linguistic theory and beyond.

Explanation in Linguistic Theory

The relationship between language, mind and computation that obtains or may obtain has a direct bearing on how to describe linguistic competence, and how such description leads to or falls out of linguistic explanation. And this is placed in the broader context of the re-conceptualized connection between language, mind and computation.

The nature of explanation in linguistic theory is discussed, and it is observed that linguistic explanation is often a species of re-descriptions. This sheds light, as the book shows, on the way linguistic explanations account for the nature and form of linguistic competence. It is found, however, that the connection is not obvious. The ramifications of the new view of the relationship between language, mind and computation help clarify the connection in an explicit manner.

Linguistic Theory and Learnability

The question of how linguistic facts and generalizations bear on the fundamental problems in language learnability can perhaps be rephrased and reanalyzed with a focus on how learnability issues pertain to linguistic computation underlying our cognitive processes. What is necessary and what is sufficient for learnability in making language viable for (cognitive) computation in any plausible way can be appreciated in a better way if the current view of the relationship between language, mind and computation is appraised in the light the present book throws.

Since language learnability constrains all linguistic theories because languages described by linguistic theories are ultimately learnt or acquired, language learnability carries presuppositions about the mind and computation. A careful examination of these presuppositions unpacks notions that chime with the new view of the relationship between language, mind and computation. Mental and computational constraints restrict the bounds of language learnability just as language learnability constrains linguistic theory. This is supported by research in computational learning theory.

Concluding Remarks

Finally, all that has been gained through the whole intellectual exercise is culled from all the running threads in the chapters of the book. It turns out that much of mainstream linguistic theory is grounded in a number of unfounded assumptions. Unacknowledged links lie behind the theoretical apparatus and the technological paraphernalia in such a manner it becomes difficult to see how to tease the truth out.

As things unfold in the present book, what emerges is that it is intentionality that underlies much of the theoretical machinery in mainstream linguistic theorizing, although admittedly a full-bloodied theory of intentional projection even within the present re-

conception of linguistic (meta)theory is absent. Some speculations are offered that provide a useful guide to further research into the association between language, mind, computation, and the brain.