Modularity Hypothesis:
Presentation and Analysis

Abbas H. Jassim*

ABSTRACT
The project of this paper is to present a detailed description of modularity hypothesis, its versions, its major schools of thought, its evolutionary aspects, and inherent problems. This hypothesis suggests that the human mind is compartmentalized into components or modules, which are specialized on certain types of information. This is the gist of strong version of modularity hypothesis, which is a direct hypothesis on mind and comprehension. The weak version is concerned with the descriptive aspects of discourse organization. The paper also reviews the major research studies relevant to the occurrence of pragmatic module. This has been supported by pieces of evidence from aphasia, right hemisphere damage, autism, Theory of Mind, and developmental pathology. With this survey of literature as a backdrop, we have suggested a bus-oriented modular system of mind from a semantic-pragmatic perspective.

1. INTRODUCTION

In general, there are two main approaches to discourse structure. First, there is a multi-dimensional or multi-level approach which attempts at combining eclectically the results and findings of studies on different dimensions of discourse organization for the sake of achieving a more comprehensive picture. The representative work in this respect is the one carried out by Kerbart-Orecchioni (1997). Secondly, linguists generally agree that human language capacity entains a modular structure. As such, it consists of subcomponents whose interior organization can be described independent of the organization of other subcomponents. However, there is much less agreement on how these modules are compartmentalized, and on how the final interaction of these modules are described (Motsch, 1992:66). This represents the essential starting point of the modular approach to discourse structure. The essence of modularity hypothesis is that different components and subcomponents of discourse knowledge can be described as cognitive modules at different levels (Roulet, 1997:125). As obvious, modular approach helps the discourse analyst to break down the different dimensions of discourse structures into their simplest primitive elements and to describe the complexity and diversity of discourse (Roulet, 1997: 127)(1).

The concepts of module and coupling are the most important concepts in modularity hypothesis. A module can be defined as an autonomous system of knowledge or as minimal set of specific concepts, principles, constraints or structures which can be accounted for independently. Coupling of different modules offers the opportunity of combining the different types of information coming from those modules. The process of coupling characterizes the different aspects of the organization of discourse. It takes place by applying certain meta-rules. Meta-rules are simply defined as “pieces of information coming from specific modules” (Roulet, 1997:127)(2).

2. VERSIONS OF MODULARITY HYPOTHESIS

There are two principal versions of modularity hypothesis. First, there is the strong version which is a direct hypothesis on brain processes. Mind is composed of distinct, special-purpose, autonomous system. Second, there is the weak version of modularity hypothesis. This version is only a methodological principle for the description of discourse structures. The differences between the two versions are summarized in Table (1).

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* English Department, Faculty of Arts, Irbid Private University. Received on 17/1/2002 and Accepted for Publication on 30/5/2004.
Table (1): Versions of Modularity Hypothesis\(^{(3)}\).

<table>
<thead>
<tr>
<th>Strong Version</th>
<th>Weak Version</th>
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<tbody>
<tr>
<td>Cognitive</td>
<td>Methodological</td>
</tr>
<tr>
<td>Describes mental processes such as discourse comprehension.</td>
<td>Describes discourse processes or structure.</td>
</tr>
<tr>
<td>It is restricted to the field of grammar.</td>
<td>It is extended beyond the boundary of grammar to the description of discourse (Roulet 1997), to the description of language (Nolke, 1994).</td>
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</table>

2.1. The Strong Version:

In the literature relevant to the cognitive pragmatics, there are two mentalist approaches to the pragmatics of utterance comprehension. First, comprehension system consists of processes carried out by a non-Modular or unencapsulated central inferencing system. Mind, in this sense, is a homogeneous general intelligence system. Second, the comprehension system is considered an autonomous processor within the overall cognitive system. This pragmatic approach claims to involve modular subsystems in understanding utterance. The strong version of modularity hypothesis, which is a direct cognitive hypothesis on brain processes, is formulated by Jerry Fodor (1983:1985). Within the Fodorian view of mind (or mental architecture), the cognitive account of pragmatics is partly modular and partly non-modular. Modular mechanisms are said to be responsible for processing perceptual input, including linguistic input and some types of motor output. Modular mechanisms are dedicated, algorithmic, and automatic systems. Relevant to the Fodorian views of the mind is the perspectives entertained by Chomsky (1980, 1992). The key concept, in the Chomskyan view of mind, is competence. Linguistic competence is conceived of as an autonomous and internally modular system of knowledge, which is supposed to grow in the mind of every mentally intact human being. In both Fodorian and Chomskyan perspectives, mind is, at least partly, composed of distinct, special purpose, autonomous systems. They also strongly agree on the nativist position concerning the development of these systems in the individual (Carston, 1997: 29).

2.1.a. Fodorian Modularity

The modularity proposed by Fodor (1983) is sometimes referred to by Harnish (1994) as Classical Modularity. In Fodor’s view of mind, our cognition consists of the following two components:

1. The Modular Component

The fast working of modular input system is constrained to certain pre-arranged types of information. This component has a limited capacity for inferences. Table (2) may summarize some basic features modular system outlined by Fodor (1983).

2. The GPS Component

This component has a large knowledge base and is characterized by massive inferences (general loose mechanisms). On the basis of its organizational properties, this system is usually referred to as the General Problem Solver component, or GPS that has an unlimited knowledge base, and thus its constraints are unclear.

This architectural model pack pragmatic aspects of language use under the rubric of the mushy GPS component of the architecture, thus extracting it from considerations of modularity together. In other words, our mental architecture is partly modular and partly non-modular. A modular system is activated by a specific narrow stimulus domain. A modular system does not, and cannot, take account of information from source external to itself. Besides, it does not and cannot, take account of higher level of beliefs, expectations, and wishes currently being entertained in wider cognitive system. In general, modular system is characterized by domain-specificity, informational encapsulation, mandatoriness and speed\(^{(4)}\).

Non-modular (or central) system is involved in belief-fixation. In principle, there is no limit to the sources and types of information the non-modular systems might consult. Non-modular (or central) systems are generally characterized by domain-neutrality and informational un-encapsulation (Carston, 1997:29-30)\(^{(5)}\).

However, there is a radical shift in Fodder’s view concerning the central systems of mental architecture. Fodor (1992) argues for the central system module for the theory of mind. Therefore, it is a central system module.

<table>
<thead>
<tr>
<th>Basic Features</th>
<th>Arguments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic, Mandatory Processing</td>
<td>Ambiguity: activation of irrelevant meanings.</td>
</tr>
<tr>
<td>Fast, reflex-like</td>
<td>Early activation, shortcuts, garden path effects.</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>Modules are insensitive to other processors: only interact on the output level.</td>
</tr>
<tr>
<td>Domain specificity</td>
<td>Only process relevant information.</td>
</tr>
<tr>
<td>Innateness</td>
<td>They are activated early on.</td>
</tr>
</tbody>
</table>

Table (3): Differences between Fodorian Modularity and Chomskyan Modularity.

<table>
<thead>
<tr>
<th></th>
<th>Fodorian Modularity</th>
<th>Chomskyan Modularity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fodor is concerned with the actual performance (or processing systems) of the mind.</td>
<td>Chomsky is concerned with the competence systems (or knowledge system) of the mind.</td>
</tr>
<tr>
<td>2.</td>
<td>His module consists essentially of modular mechanisms.</td>
<td>His module consists of modular (autonomous) competence systems.</td>
</tr>
<tr>
<td>3.</td>
<td>Modular mechanisms are algorithmic and automatic systems.</td>
<td>Modular competence systems are resolutely functional and architectural.</td>
</tr>
<tr>
<td>4.</td>
<td>Pragmatics is concerned with performance system, or the actual language use.</td>
<td>Pragmatics is a component of the ideal speaker-hearer’s knowledge of language. It is concerned with the appropriateness relations between sentences and context of their use.</td>
</tr>
</tbody>
</table>

Chomskyan Modularity

Perceptual system

Mathematical pragmatic competence

Principles of grammar

Musical

Scientific hypothesis building

Moral

A great number of other competences (e.g.)

Fig. (1) : Components of Chomskyan Modularity.

The outproduct of the procedure is the capacity to ascribe mental states of various orders of complexity to other individuals. Besides, it yields the capacity to use these mental states to explain and predict behavior (Carston, 1997:30).
2.1. b. Chomskyan Modularity

According to Chomsky (1980:54-9,224-5), the mental state of “knowing a language” or competence consists of the following components:

(i) Grammatical competence (knowledge of form and meaning; the computational aspect of language).

(ii) Conceptual capacity (granting the faculties of perception, categorization, symbolization and reasoning).

(iii) Pragmatic competence (knowledge of appropriateness conditions of language use, knowledge of how to use grammatical and conceptual resources to achieve certain desired goals) (Carston, 1997:38).7

Chomskyan modularity consists of the modules shown in Figure (1) (Carston, 1997:30).

Differences between the Fodorian modularity and Chomskyan modularity are summarized in Table (3).

2.2. The Weak Version

Following Motsch (1989), Roulet (1997) adopts the descriptive, methodological, version of the modularity hypothesis. However, the difference between the two proposals is in the nature of the relationships between modules. Whereas Motsch’s architecture of the modular system is serial, Roulet’s (1997) modular system is hierarchical. The advantage of the hierarchical architecture over the serial one is that it allows the couplings between the outputs of any modules9. The global architecture of discourse module proposed by Roulet (1997) distinguishes three necessary components, each of which consists of specific modules. Certain modules occupy central position in the architecture because they determine the infra-structure of discourse. Central model is also responsible for the recursivity of the system. In other words, they can generate an infinite number of sentences, texts and mental representations of discourse structure (Roulet, 1997: 129; 1998:1)10. Figure (2) summarizes Roulet’s (1997) model. (See Fig.6).

3. The Place of Waste-Basket in the Room of Mind

3.1. The Extended Interpretation of Modularity: Dan Sperber (2000)

The approach proposed by Sperber (2000) treats pragmatics as a crucial module in the general architecture, implying modularity all over the place. This is in line with the developments in the modularist group over the past two decades: To overcome the looseness of systems of General Cognition put forward by Jerry Fodor (1983), the field moved towards interpreting higher order thought processes in a modular way especially in psychology. This is an application to the pragmatics of the approach that would deal with all of the human cognition in a modular way. This has been referred to as MM, or the thesis of Massive Modularity by Fodor (2000). In Sperber’s perspective (2000), the key to understand the workings of old time General Problem Solvers or General Cognitive Mechanisms is to propose an entire meta – cognitive field that would be responsible for the Representation of Representations. He holds the concept that two dedicated mental mechanisms exist, one for language and the other for meta – representations. In his view, it seems reasonable to assume these two mental mechanisms have co – evolved in humans (cf. Sperber, 2000: 2).

In his modular approach to pragmatics (the pragmatic domain as a meta – domain), Sperber states that the core ability for pragmatics is a meta – representational ability. Table (4 ) outlines the sub – systems of meta – representational ability and their main functions:

In this view, reconstructing the intentional world of the other, the module of a Theory of Mind is a key aspect of this deconstruction of the formerly unspecified General Knowledge.

Sperber (2000) also states that the inferential procedures involved in communication might constitute an additional separate sub–system, as well as the logical processes involved in argumentation. Both are related to the intentionality–based metapsychological system, but this latter one by and in itself does not necessarily entail communication and logical coherence (cf. Pleh, 2000: 423).

3.2. Modularity as a Result of Modularization

3.2.a. Script-Like Knowledge is Connected to Prefrontal Cortical Areas

The survey presented in this section gives us an accurate picture of a relatively straightforward distinction between the strictly linguistic processes and the higher order information integration. Here, I will simply abide by classifying the analysis proposed by Pleh (2000).

<table>
<thead>
<tr>
<th>Proposed Modules</th>
<th>Main Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta – psychology</td>
<td>Theory of Mind : thought attribution</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Finding out communicative intentions</td>
</tr>
<tr>
<td>Logical Module</td>
<td>Checking Arguments.</td>
</tr>
</tbody>
</table>

Table (5): The Percentage of Sentence and Story Sequencing Errors in Broca and Prefrontal Patients.

<table>
<thead>
<tr>
<th></th>
<th>Sentence Sequencing Errors</th>
<th>Story Sequencing Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broca Patients</td>
<td>64%</td>
<td>6%</td>
</tr>
<tr>
<td>Prefrontal Patients</td>
<td>4%</td>
<td>62%</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th>Hemispheres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
</tr>
<tr>
<td>Role in Normals</td>
<td>Parsing and access: literal language</td>
</tr>
<tr>
<td>Impairments in Damage</td>
<td>Aphasia : problems with classical language layers</td>
</tr>
<tr>
<td>If it works alone</td>
<td>Discourse Organization is Impaired</td>
</tr>
</tbody>
</table>


In a series of studies, Luria has pointed out that the role of prefrontal areas in human beings is to create “Plans of Plans” or “Super- plans”. The prefrontal areas are responsible for regulatory role (i.e. a meta-cognitive regulation over behavior). He has extended this finding (The role of prefrontal areas in cognition) to the level of discourse or text organization. He has discovered the presence of specific modular effects of text processing in prefrontal patients. These patients were unable to deal with texts as holistic units, and thus being unaware of the order of elements and uncertain about the significance of different parts. This took place hand in hand with a general loss of overall meaning with the preservation of linguistic form. Nevertheless, patients with traditional aphasic disorders demonstrated deep troubles with linguistic form, yet they had a relatively intact ability to deal with the overall meaning. It clearly stands out the occurrence of double dissociation in A.R. Luria’s conceptualization despite the fact that he has not used the conventional terminologies.


The survey of the studies of traumatic brain injuries by McDonald (1998) suggests that (pre)frontal damages cause a tendency in the affected patients to adhere to the literal meanings of expressions, and an inability to entertain multiple readings. They generally have difficulties in activating dual meanings of the same expression (e.g. verbal puns).

a. Sirigu, Zalla et al. (1996)

This group has shown that the managerial knowledge [-i.e. “the information base used for representing goal hierarchies, temporal order of events, causal links between actions, rules, etc” (Sirigu, Zalla et al. 1996: 298)] has a separate representation in the brain.

b. Sirigu, Cohen et al. (1998)

This research group asked Broca patients (traditional agrammatic aphasics) and prefrontal patients to make up sentences from 20 cards naming actions into four Script types like, GOING TO THE MOVIES, MAKING A PHONE CALL, FIXING COFFEE, PREPARING A TOAST. Table (5) summarizes the results obtained from this study.

These results imply that prefrontal areas deal with a wider time window and with natural causality and social reasons that are different from the sequencing issues involved in syntax and grammar in general and related to Broca areas. This is a clear index of the presence of double dissociation. In their own words, this has clearly been stated by Sirigu, Cohen et al. (1998: 771-2):

“Complex goal-directed actions may require specific mechanisms to cope with the long-range temporal frame within which they typically unfold, while assembling words to form a sentence takes place in a comparatively much smaller time frame” (Sirigu, Cohen et al. 1998: 771-2).

c. Crozier, Sirigu et al. (1999)

Relying on a meta-cognitive task (-i.e. Judging the grammaticality of sentences or the properness of action sequences), the research group has discovered that the script-like processing is correlated to bi-lateral activation of the mediofrontal-prefrontal areas and the grammaticality judgments regarding syntax are associated to the activation of Broca area and left prefrontal areas.


Starting with the logic that Parkinson syndrome involves sequencing, this group has pointed out that Parkinson patients make mistakes related to the relative importance of certain partial actions in relation to a given complex function. Patients with prefrontal damage make category boundary errors and sequencing errors.

3.2.b. Traditional Dissociationist View can be Applied to Pragmatics

A strictly analytic grammar-like strategy is localized in the left hemisphere. The holistic and General Problem Solver-like compensatory component is localized in the right hemisphere. This line of reasoning is summarized by Pleh (2000) as shown in Table (6).

Ivasko (2000) has pointed out that right hemisphere damage causes characteristic impairments of strategies at discourse level. She has also demonstrated that patients with right hemisphere damage are unable to process hints in conversation.

In their survey of the literature, Dressler and Stark (2000) have noted that in the right hemisphere damage there is a characteristic disruption of coherence. Patients with right hemisphere damage are unable to exercise control over the activated inferences despite the fact that they have the ability to mobilize previous knowledge and show signs of inferencing. Therefore, their problem has been that of maintaining a proper perspective.

3.2.3. Developmental Pathology can Support the Pragmatic Module

Present day modular theories consider social understanding and self-interpretation the result of social modules which have roots in evolution. Our Theory of Mind is the consequence of the working of a domain-specific system of naïve or folk psychology. Thus, we have not only task-specific systems for recognizing speech sounds, or faces or other highly complex cognitive patterns, but for interpreting each other as agents (cf. Gergely et al., 1995). The following is a survey of some data relevant to the decomposition of the pragmatic module put forward by Pleh (2000: 429-434).


According to these authors, autistic subjects have special difficulties in using context to disambiguate information. They also face characteristic problems in integrating script-based stories both in cases when the coherence of the stories is rooted in social scripts and when it is rooted in mental plans. The following quote makes clear how these authors relate inferential ability and pragmatics:

“Information processing in real life almost always involves the interpretation of individual stimuli in terms of overall context. If these clinical groups
[autistic and Asperger syndrome] have a decreased ability to interpret information in context, then comprehension and discourse coherence will suffer. [It has become increasingly clear in recent years, that pragmatics, which is the use of language in context, is the area of language that is seriously impaired in autism” (Jolliffe and Baron-Cohn, 1999: 177).


In Gyori’s (2000) point of view, the literature relevant to autism supports dissociation between pragmatics and formal aspects of language. Thus, in his words:

“Autism is a developmental proof to the effect that formal language can be dissociated from communicative/pragmatic function and it can operate without the latter. The cause for this dissociation is related to the theory of mind, it is a disturbance of recognizing communicative intentions. In some people living with autism, there is a language without a Theory of Mind. This is, however, a non-communicative language that is always literal, and pragmatically very weak” (Gyori, 2000).

According to Gyori et al. (2000), there is a general impairment of cognitive architecture in autistic groups. This impairment suggests the significant role of a Theory of Mind in language processing as well as in tasks of second order representation, such as in attributing false beliefs and a sophisticated Belief-Intention system to others. In Pleh’s view (2000: 429), these data can be interpreted in a way as to postulate a module of social and psychological cognition as a driving source of language use.

3.4. Paleopsychology: The Crosstalk and Fluidity of Modules

Steven Mithen (1996) has put a proposal pertaining the relation between pragmatics and meta-cognition. In his view, human language can actually be resulted from a loosening of boundaries between / among encapsulated modules. This suggestion clearly supports the key concept that “human language emerges by necessity as the result of an interaction between different intelligences, and together with elementary societal organization and a social mind” (cf. Pleh, 2000:434). Mithen’s view regarding the crosstalk and fluidity of modules resembles the image of Tomasello’s (1999) hominid development. The fundamental feature of this evolution is not an accumulation of many modular adaptations, but an essential modular change involving Theory of Mind, social interpretation, and social learning. The most interesting and essential point that came up by Pleh (2000: 434) seemed to be the following: metaphor, humor, creativity which are usually associated to pragmatic competence are the reflection of crosstalk and fluidity of modules.

4. The Evolution of Modularity

According to Fodor (1983:43), modular organizations seem to be evolutionarily prior to the non-modular central systems. General problem-solving or belief-fixation systems occur as a relatively late phylogenetic achievement. In this process, certain types of problem-solving systems are gradually freed from the constraints under which the input analyzer works.

Similar observation is stressed by Cosmides and Tooby (1987: 294-9) who suggest that the cognitive programs (or Darwinian algorithms) which have been selected must be specialized and domain-specific. On the contrary, domain – general and content – independent inferential mechanisms are trial – and – error systems and therefore they cannot promote the overall fitness of the species.

Sperber (1994) also adopts an evolutionary and ethological view of modularity. He suggests that human cognition or central thought processes are generally modular. It is generally agreed-upon truism that natural selection is a piecemeal process. Each adaptation provides a solution to a problem caused by the environment (cf. Carston, 1997:45).

5. The Problem of Modularity

The above mentioned evolutionary argument can be taken as a solid piece of evidence for the modularity of cognition. Given this state of affairs, there emerges the problem of reconciling “informational encapsulation” and “information integration”.

The only solution to this problem, hitherto given is the one offered by Sperber (1994). He suggests that any particular conceptual module performs inferences on its own concepts. Besides, any piece of information (i.e. a structured string of concepts) is passed from one module to another module until all concepts in the string are
processed. The final outcome of all these activities will be integration of concepts of each of the relevant modules. Conceptual modules are autonomous computational devices which work on representations in which the right concept occurs. So they are domain-specific. All in all, the Sperberian concept of modularity seems to miss the distinction between domain-specific competences and encapsulated, hard-wired processors. This leads Carston (1997:46) to suggest a continuum for modularity. The continuum will range from peripheral perceptual system (which is rigidly encapsulated) through a hierarchy of conceptual modules (whose encapsulation reduces gradually at each level of the hierarchy as the correlation of domain-specific processor increase).

6. A New Outlook

In this section, we propose a bus-oriented modular system of knowledge in mind. This system is radically different from previous ones in that it suggests a bus-like, dynamic and active apparatus instead of non-modular central processing systems.

Much of the research on the pragmatics of discourse is based on an attempt to separate it into distinct components that can be studied independently. We therefore have socio-pragmatics, pragmalinguistics, cognitive pragmatics, socio-semantics, psycho-semantics, procedural semantics, institutional pragmatics, and organizational semantics and pragmatics. However, this theoretical distinction does not presuppose or denote the presence of any solid, realistic and down-to-earth boundaries. This distinction may only find its roots in our perception and intuition as scholars in the field.

In order to put forward our system of knowledge in mind, we start hypothesizing that all types of talk-in-interaction, whether monologic or dialogic, are based on question-and-answer patterns. As such we suggest the presence of two types of interpretation. The first type is concerned with the interpretation of questions. The second type is based on, and related to, the first type. It is concerned with answering questions. This distinction seems also to be theoretical and only psychologically realistic. This divergence necessitates, nonetheless, the presence of a bus-like apparatus, which is responsible for making various types of fittings, couplings, identifications, selections and elaboration of knowledge. It is also responsible for thinking, reasoning, imagining, planing or decision-making. This apparatus can be similar to the processing unit in computers. Hence, module is a pool in which human beings organize their internal representations of the outside and inside worlds. And it is the task of the mental bus to adopt the appropriate strategy for classifying as rigidly as possible the things in its mental environment, for this mental bus cannot be a tool but a (homeostatic) system trying to regulate (and self-regulate) an environment filled with (unreliable) information. This seems to be in conformity with the axiom that humans are pattern-generating systems.

In this sense, it must have some tendency towards benefit/cybernetic-maximization. Therefore, it is necessarily a goal-directed system, i.e. takes decisions which have high probabilities of leading towards the desired goals. However, this bus needs environmental information about the context of situation (of the message) and an internal information about the interaction and integration of modules.

When a message gets in, the bus-like apparatus tries to find out the nature of the interface between the verbal and concomitant strategies in the intergrammar module. It will figure out whether the two channels contrast or support each other. Then, it may enter any module so as to make new connections. Besides, it can make use of the general storage of the gestalt-profile.

At the present state of our knowledge, we do not know sufficiently about the semantic and pragmatic nature of a particular piece of the information. For this reason, we encapsulate both types of information in the same modules as shown in Figure (3).

The cognitive pragmatic/semantic modules are responsible for accounting for intentions, meta-pragmatic awareness, pragmatic inferences, logical inferences, propositions (which denote states or events, and denote facts about states or events. They also qualify parts of other propositions). These two modules also account for various cognitively-based norms, values and attitudes.

The socio-pragmatic/semantic modules are responsible for accounting for socio-cultural contexts and meanings, norms, values, attitudes, beliefs, institutional knowledge (i.e. system of knowledge of language-use, system of knowledge of social institutions, and system of knowledge of institutional principles), and knowledge of various socio-cultural conventions. Procedure within procedural pragmatic/semantic modules, are related to the modification of structures of inferences, intentions and propositions. They also account for the principles or conventions of strategy-utilization, and the regulation of sequences of questions, answers, assessments, and
Modularity Hypothesis:..

A basic hypothesis: Organizational pragmatic/semantic modules account for organizational principles, relations, and hierarchies. We believe that placing modules in this fashion in the mind map is central to the mental activities of thinking, inferencing, reasoning, imagining and creativity.

It is worth mentioning that not all messages have the same interpretations or meanings across individuals and cross cultures. Therefore, the bus-oriented modular system is person- and culture-specific. Besides, this system, albeit more realistic discursively and pragmatically, remains theoretical like all other modules and systems germane to the strong version of modular hypothesis.

7. A Final Remark
This paper is an attempt to demonstrate the present states of modularity hypothesis within the general theory of pragmatics. It should be noted that a comprehensive pragmatic theorization must focus attention on both the study of cognitive pragmatic processes (the strong version of modularity hypothesis) and the study of pragmatic principles of social use (the weak version). Hence, the two versions, in our view complement each other and future research must achieve this rapprochement.

NOTES
(1) For a range of advantage of modularity hypothesis, the reader is referred to Roulet (1997:127-8).
(2) Roulet (1996, 1997, 1998) does not make clear the nature of meta-rules, their grammar, how they apply, and how they can be represented.
(3) For more about the version of modularity hypothesis, the reader can see Mann and Moore (1982), Harnish and Farmer (1984) and Carston (1998).
(4) Genetic specification, as an additional parameter of modularity, has received a thorough treatment in Carston (1997:48-50) who refers to various pioneering studies.
(5) Sperber and Wilson (1986:69) claim that there is a necessary connection between the modularity of the linguistic system and the fact that this modularity includes a grammar or code. Therefore, if pragmatics is a module, then pragmatic code does exist. There is a necessary connection between a module and a code. More generally, to call a particular system modular is equivalent to the assumption that it involves a code.
(6) For more about this argument, see Levinson (1989).
(7) This assumption stands in contradiction with Levinson’s (1998) proposal of “default inference rules”, which governs the use of particular lexical items. The default inference rule attached to the quantifier “some” in “some of the x” often gives rise to an inference to the effect that it entails “not all of the x”, despite the fact that the first does not entail the second (Carston 1997:51).
(8) In addition to the correlation between these two macro-modules, the intricate (internal) pathways between/among the micro-modules of each macro-module (cf Carston 1997:45).
(9) The output from several inferential conceptual modules may operate an input for a particular conceptual module. A case in point is the faculty of moral judgment (cf Carston 1997:45).
(10) Nolke (1994) also makes use of the methodological (descriptive) version of
modularity hypothesis. He applies it to the description of langue of modularity. In his view, there are two constraints which govern modular systems.

(i) Each module must yield a description which is exhaustive, coherent, maximally economical and notionally independent of the subsystems it deals with: and

(ii) Each module must admit a maximal compatibility with other modules in order to formulate a maximal number of meta-rules. (Nolke 1994:77; Roulet 1997:126-7).

(11) Polyphony in discourse analysis and pragmatics describes an important dimension of discoursal organization. It refers to a speaker who consciously expresses and combines different voices in his discourse. The reader can see Roulet (1996) for a review of early work on polyphony.

REFERENCES


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