

MODULARITY AND PRAGMATICS: SOME SIMPLE AND SOME COMPLICATED WAYS¹

Csaba Pléh

University of Szeged, Hungary

pleh@edpsy.u-szeged.hu

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The modular approach to language in its career of 30 years had alternating and rivaling views regarding the place of pragmatics. A first approach basically is the one outlined by Fodor (1983) that would pack pragmatic aspects of language use under the rubric of the mushy General Problem Solver component of the architecture, thus extracting it from considerations of modularity altogether. The rival Massive Modular approaches such as Dan Sperber's would be willing to treat pragmatic aspects as one crucial module as part of a general architecture with modularity all over the place.

The paper after summarizing the theoretical interpretations calls for a less dedicated distributed processing and representation system where modularity rather than a simple starting point might be seen as the result of a process of modularization. Three types of empirical data are surveyed. First, studies that seem to support a specialized pragmatic module are discussed, namely from right hemisphere damaged populations and brain imaging data that imply a strong involvement of right hemisphere in a variety of pragmatic aspects from emotional stress to understanding non-literal language. A second line of data comes from developmental neuroscience considerations. Studies with autistic and other cognitively challenged populations suffering from a presupposed overall architectural deficit indicate the crucial role of a Theory of Mind not only in tasks of second order representation, in attributing a sophisticated Belief-Intention system to others, but in language processing as well. One interpretation of these data is to postulate a module of social and psychological cognition, that would be a driving source of language use. The primacy of language use should be left open as an option. It is possible that language use itself and thus language pragmatics in different intentional contexts is partly responsible for the development of the seemingly encapsulated system of mentalization. This would correspond to the general idea of early prepared systems being modified during an interface buildup process in development that roughly corresponds to an overall use of language for metacognitive purposes.

A third line evidence calling for a balanced treatment of the modularity issue comes from theories of Paleobiology. Theories like the ones proposed by Donald, Mithen, Wilkins and Wakefield should also be considered in this regard. According to

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these theories human language may actually have resulted from a loosening of boundaries between encapsulated modules, rather than from strengthening them. This line of reasoning is especially interesting since it supports the idea that human language emerges by necessity as the result of an interaction between different "intelligences", together with elementary societal organization and a social mind.

Keywords: modularity, theory of mind, dissociation, prefrontal lobes, autism.

We have a parliament of little men together, of whom, as also happens in real parliaments, each possesses only one single idea.

Lange (1880, III. p. 124).

During the last thirty years a rather basic approach to the mental organization of language has been the modular one. It basically proposes that most of the human mind is organized into specific systems that specialized on certain types of information. This is a mental extension of the idea that vision deals with light, hearing with sound etc. Thus a picture of the mind is proposed where specialized systems would deal with language, faces, melodies etc. (Fodor, 1983). This attitude has led to several different proposals regarding the possible role of pragmatics, depending on whether it would treat pragmatic type of knowledge as a special kind, or as a part of General Cognition that would not be organized in any modular way.

In the treatment of the relationships between pragmatic aspects and the rest of language, all sorts of information sources are referred to as being pragmatic in a rather undifferentiated eclectic way, as summarized in (1).

(1) Supplementary interpretations of pragmatics as used in interpreting the pragmatics-modularity relationship

KNOWLEDGE EFFECTS

(1a) The impact of categorial information. E.g. grammatical subjects is ANIMATE.

(1b) Impact of idiosyncretic information. E.g. knowing of SPARROWS highlights certain types of propositions such as „Sparrows are grey”, „Sparrows are flying”..

(1c) The extralinguistic context supports understanding. The knowledge of the geography of Paris supports understanding of a Maigret novel by Simenon.

(1d) Whatever was said earlier supports understanding through the construction of linguistic context (DISCOURSE MODELS).

CONVERSATION EFFECTS

(1e) Whatever was said earlier also creates models in the partners (RELEVANCE THEORY).

With this multitude of interpreting pragmatics as a background, Table 1. presents as a preview three different conceptions for the possible attitudes between a modular architecture and pragmatics.

A simple approach, indicated in Line 1 is basically the model outlined already by Fodor (1983) in his first characterization of modularity. In this view of the mind, our cognition has two characteristic stages. The fast working of modular input systems is constrained to certain prearranged types of information. This component has a limited capacity for inference. The modular systems feed information into the component that has a large knowledge base and is characterized by massive inferences. 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 would pack pragmatic aspects of language use under the rubric of the mushy General Problem Solver component of the architecture, thus extracting it from considerations of modularity altogether. Connectionist solutions (Line 2) ignore the issue of pragmatics in the sense that in their microfeature based solutions all processing is assumed to be of an opportunistic pragmatic nature (Clark, 1989, 1992). Line 3 shows the attitude that would try to interpret general cognition as having a modular organization as well. For our considerations, it would treat pragmatic aspects as corresponding to a peculiar type of information, thus having itself a modular organization.

Table 2 summarizes the details for modular systems as proposed by Fodor (1983), the “classical modularity” thesis so to say, as analyzed by Harnish (1994).

Table 1 Three different conceptions regarding the relationships between modularity and pragmatics GPS = General Problem Solver

Table 2. Some features of modular systems as outlined by Fodor (1983)

It is a matter of a long debate whether all of these features are of equal importance (Pléh, 1985). In a way, many discussions in empirical studies of cognition, like developmental revisions of modular theses (Karmiloff-Smith, 1992), and the debates about how to treat the impact of knowledge on processing in a modular frame are also relevant for the issue whether the factors are of equal importance. Coltheart (1999) in a recent survey proposed that they are not. In his view, the original

modular proposal is considered to be restrictive. The ongoing debates concentrate on whether something is under a top-down influence or not showing signs of an innate organization, and in the case of top-down effects and effects of experience the processes involved should be excluded from the prestigious status of being modular. Coltheart proposes a rethinking, where not all aspects should be treated equally: the definitive feature of modularity would be domain specificity: “a cognitive system is domain specific if it only responds to stimuli of a particular class” (Coltheart, 199, p. 118.). All the other features would be considered to be secondary compared to this core one. Mandatory processing and encapsulation e.g. would not mean an exclusion of all top down effects from modular systems. It would only imply that a module based processing is impossible to disconnect. In the same way, following Coltheart the issue of innateness and “rigid” cerebral localization would not be crucial to modularity: one could very well imagine as Karmiloff-Smith (1992) did, to arrive to modules as the result of a process of modularization rather than to start off with them. In the same way, one could very well imagine, according to Coltheart to have modular systems with more distributed processing assumptions rather than with a strictly and narrowly localized way. The central issue remains domain specificity.

Interestingly enough, this would satisfy many of the proponents of an overall modular approach (referred to by Fodor as massive modularity) as exemplified by volumes like the one edited by Hirshfeld and Gelman (1994) where even the title identifies modularity as *Domain Specificity*. It would not satisfy, however, Fodor, who claims that domain specificity tends to circular when it talks about „reactions to a stimulus class” (Fodor, 2000, p. 113.), or else, it navigates on uncertain waters when it tries to exchange the notion of modularity related to types of information with a notion of processing modularity (*ibid.*, pp. 55-62.). Miklós Győri (2000) in his unpublished manuscript

gives a thorough analysis of the issue whether domain specificity could be regarded as a satisfying explanatory concept. In the view referred to by him as macromodular specificity would refer to the content domain concerned (faces, sounds, plants etc.) it would thus be of a semantic nature, further refined by experience down to the level of automobile recognition systems. At the same time micromodularity would concern different processing modes: object recognition e.g. would be characterized by holistic integration, while speech analysis by sequential integration. Relying on this useful typology we could claim that the dissatisfaction of Fodor (2000) is related to the absence of choice between micro and macro modularity.

Most naturally, domain specificity would not satisfy theories inspired by connectionism that question most of all the domain specificity aspect of modular theories (Elman, Bates, Johnson, Karmiloff-Smith, Parisi and Plunkett, 1996, Müller, 1996).

It is worthy to point out—Miklós Gyóri pointed this out to me—that there is a separation into another direction. There are nine modular approaches that at the same time allow or even take up domain specificity. Gopnik and Meltzoff (1996) consider theory of mind for example to be domain specific, but in its unfolding non modular. Thus, domain specificity would be a too loose criterion with no consequence regarding other features modularity. For Coltheart (1999), however, this is the essential point: modularity (understood as domain specificity) would stand even without claiming innateness.

Thus domain specificity stands out as a key dividing issue, and we shall see how do some people attempt to apply it to pragmatic type of processing and knowledge as well.

Table 3 shows how the classical modular view became interpreted regarding language, involving both strong processing and developmental commitments. One of its basic claims is that context and frequency have no immediate effects on word recognition. All the

classical data to the contrary effect should be treated as the results of postperceptual guessing strategies., they only have a *post hoc* effect modulating the ease of word use. Similarly, in this view there is no interaction between the lexical, syntactic and semantic components of understanding (Forster and Olbrei, 1973). All of them operate as self-contained systems. Interactions only appear on the level of their outputs, on the results of their computations (Pylyshyn, 1984).

Table 3. Some proposed features of modular linguistic representation

Proposals	Arguments
Independent components	Independent timings and impairments
Encapsulated shallow processing	Ambiguity, delayed context effects
Species specific and domain specific	Only in humans, and does not transfer to other domains
Innately specified	Double dissociation, critical periods

Some authors like Dan Sperber (1996, 2000) use an extended interpretation of modularity. This approach would be willing to treat pragmatic aspects 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 suggested by Fodor (1983) the field moved towards trying to interpret higher order thought processes in a modular way as well, especially in psychology. This is an application to pragmatics of the approach that would treat all of human cognition in a modular way. This is referred to by Fodor (2000) as MM, or the thesis of Massive Modularity. This has strong evolutionary implications as well: as Cosmides and Tooby (1992) would

claim, different neural circuitries would specialize for different adaptational problems. Sperber (2000) in his newest formulation proposes that a key to understand the workings of old time General Cognitive Mechanisms or General Problem Solvers is to postulate an entire metacognitive field that is responsible for the *representation of representations*. He further assumes that this cognitive field has coevolved with language. “<I accept> the existence of two dedicated mental mechanisms, one for language the other for metarepresentations, it seems reasonable to assume that, in humans, they have coevolved” (Sperber, 2000, p. 2). We shall see how this view can help us to understand the mental organization of pragmatics.

Some trivial issues in a new light: World knowledge and semantic knowledge

Table 3: Some trends in treating the relationships between knowledge and linguistic understanding

One classical testing issue regarding these matters is the problem of ambiguity. It is related to modular processing by considering whether individualized knowledge about possible propositions connected to an item are activated and used in interpreting sentences (*interactionist view*) or whether they are only activated later on (*modularist view*). Whether the contingent fact that *bugs* are used in listening devices should help to disambiguate sentence (2).

(2) *John listened to the music coming from the bug through the big earphones.*

Sentence processing research in the modularist traditions suggests that this is not the case. In a rather counterintuitive way, we entertain for a short period both meanings of an ambiguous word. After listening to this sentence, both meanings of *bug* are active for a short time. This effect is rather resistant to all sorts of antecedent contexts. Work in our laboratory (Gergely and Pléh, 1994, Thuma and Pléh, 1995, 1999) showed that in some situations even extremely strong grammatical contexts are unable to immediately disambiguate multiple meanings on the basis of grammar alone. Thus, word stems that are ambiguous between a nominal and a verbal reading such as *dob* [1. N: drum ; 2. V: throw] do have a priming effect for meanings that are related to the irrelevant meaning following disambiguated sentences like (3) where the *-sz* ‘s’ suffix disambiguates the critical word to be a verb since it is an unambiguous verb suffix.

	Relevant target	Irrelevant target
(3) <i>Te mindig jobb kézzel dob-sz.</i>	HIT	VIOLIN
‘You always with your right hand throw’		

Compared to control words, there was a priming facilitation of 49 ms for irrelevant words, and 44 for relevant ones.

Multiple meanings thus are active even if the sentence context would disambiguate between a noun and verb reading. This suggests a processing model where mandatory activation of all meanings, i.e. multiple access is followed by consideration of pragmatic factors as indicated in Table 4. This can also be interpreted specifically in an agglutinative language with rich morphology to imply that morphological parsing has no immediate feedback to the associative spreading of activation set up by lexical representations. Both processes go on their own way: all meanings of a form are first activated, and due to the automatic processes, there is even enough time for the associates

being mobilized. The results of form parsing would only be considered at a later stage, and the multiple ambiguities would only be disambiguated at this later stage of discourse relevance computations.

All of this implies not only a model of delays in the use of certain types of information but also a model of consciousness: in the 200-400 ms long time-window irrelevant meanings are active because integration and conscious selection with reference to the background information base have not taken place yet. This interpretation would connect the two stage models with the broader issue of conscious integration so central to present day cognitive science (Dennett, 1991, Dennett and Kinsbourne, 1992).

Table 4: A modular processing followed by pragmatics model to account for multiple access phenomena

Things are not as straightforward, however. In the literature many experiments and models question this “pragmatics last” model of ambiguity resolution. Specifically, regarding Hungarian morphological processing our more recent studies (Thuma and Pléh, 1999) indicate that the activation of irrelevant meanings is only true for the nominal readings. There is an overall noun bias in the use of these ambiguous words, and the irrelevant meanings are only activated, as indicated in line 2 of Table 5, if nouns are the non-preferred reading in the sentence. If the noun reading is the contextually appropriate one, than the verb meaning is not activated. This is a reminder about the complexity of the timing relations involved in straightforward models that would put search for relevance in the center of a second round. Processing related spreading activation does seem to be sensitive to word class, for example, but in other ways than usually suggested. It sets the scene for

a relatively longer activation of contextually irrelevant meanings if they are prototypically the more relevant ones.

Table 5. Activation of irrelevant meanings is only present if the context makes the noun reading irrelevant (Thuma and Pléh, 1999)

DECOMPOSING PRAGMATICS ITSELF

One could approach the study of the possible modular organization of pragmatics by trying to do a task analysis of the domain itself. This would be a task to try to decompose the entire loosely defined domain into cognitive subdomains. The first division might be the impact of knowledge on processing, as contrasted with the metacognitive organization of knowledge and/or pragmatic and inferential skills. We have seen some example regarding the first one. Concerning pragmatic „metaknowledge” one of the repeated aspects relates it to the ability to attribute mental contents.

Tomasello (1999) in his model of the origin of culture claims that intentional mentalization and the attribution of mental contents is a key feature of human thought. This would be the central organizing core of pragmatic knowledge. (Incidentally, this view is rather similar to the intentionality based coherence proposals of Dennett, 1987, 1990, 1991). Table 6 summarizes this view based on intentional mentalization outlined by Tomasello. Elementary social activities presented in the second column become specifically human, cultural activities through the reconstruction of the intentional system of others.

Table 6 : Transformation of social activity into cultural activity based on understanding conspecifics (Tomasello,1999, p.210)

Though in the following I shall start from this view that considers mentalization attribution to be crucial in pragmatics. However, it is worthy to keep in mind that there are more complex approaches that would further decompose even that assumed „pragmatic module”. An analysis of the pragmatic domain as a “metadomain” was proposed recently by Dan Sperber (2000). In his modular proposal for pragmatics he goes on to claim that the core ability for what would be called pragmatics is a *metarepresentational ability*. This might be divided on its own turn into several further subsystems, as outlined in Table 7.

Table 7 Sperber’s proposal for a multiple modular system for pragmatic aspects of language: metarepresentational modules (Sperber, 2000)

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. It is, however, not the only one, as more or less clearly accepted by Tomasello (1999) in his evolutionary model of the origin of culture and by Dennett (1987, 1991) in his intentional view of the human mind. Sperber (2000) claims, that the inferential procedures involved in communication might constitute an additional separate subsystem, 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.

Rather than following Sperber literally, I shall propose in the following a summary of those empirical researches that analyze the

organization of pragmatic knowledge relying on mentalization and its cousin, „metaplanning”.

A (social) inferential module?

The problem of inferences, including the issue of how to classify inferences both on the basis of their knowledge sources (overall knowledge, world view, specific familiarity etc.) and the organization of these sources (schemata, scripts), as well as the mechanisms of their activation (reasoning, invited inferences, Gricean Maxims, and bridging inferences in case they seemingly do not hold) has been with us for three decades in psycholinguistics as well (Clark and Clark, 1974, Clark and Haviland, 1977). The last decade has brought some new insights into how to organize this field by an unlikely combination of classical cognitive approaches with neuroscience and developmental studies.

The particular relevance of stories

For someone trained in classical cognitive psychology it is remarkable that many of these researches in “new pragmatics” have rediscovered some findings of “pure” experimental and social psychology on story organization. The large amount of research of the seventies on story grammars and formal organizations at large, following the initial insights of Rumelhart (1975) regarding a “grammar for stories”, has led in the eighties to the conclusion that stories only have an apparent “syntax”. The seemingly formal structure relies on an action based pragmatic-semantic model. Content based models of story organization were formed that started from a reconsideration of the apparently “grammatical” relationships between events and actions in a narrative. They started to claim that the motivational relationships

supporting narrative coherence are valid between 'naive psychological categories'. 'Who Done What Why' is the organizing principle as it was phrased most clearly in the Causal Chain model of Roger Schank (Schank and Abelson, 1977).

Using these content based models, higher recall of the main causal chain (compared to subordinate and dead end chains) was observed as well as a heightened recall of CAUSES in physical actions, and higher recall of REASONS regarding interpersonal scripts (László, 1986). Several bottom-up and top-down models were competing to explain recall patterns observed in experiments, while a real test came when predictions of the different models were compared over the same experimental material. Black and Bower (1980) and Pléh (1987) used multiple regression models for recall patterns where the predictions were based on the different proposals for story structure. A comparison of the predictions showed that the models based on the action system of the hero in assigning structure to the stories had a higher predictive value than the ones relying on an apparently formal story grammar based model. Narrative research based on this naive social psychology has been flourishing ever since. Graesser (1992, 1996, Graesser and Clark, 1986) even developed a special on line questioning model to analyze how immediate is the construction of causal chains during reading texts.

For the pragmatic domain these results coming from cognitive psychology imply that the key explanatory aspect regarding the simplicity of simple stories should be looked for in the *naive psychology of human action*. In understanding stories, we mobilize our naive social psychology about the structure of human action and about the usual motives for action. Coherence is found by the hearer-reader through the projection of these motivated action schemata into the story. The specificity of traditional simple stories lies in the fact that due to the prototypical motivations in a given culture, and due to the

simple, visible narrative point of view this action organization can be revealed easily and unequivocally on the part of listeners and readers (see about this László, 1986, Halász, László and Pléh, 1988).

The intentional attribution that underlies story organization seems to be a modular feature of the human mind developing very early on (Gergely, Nádasdy, Csibra, and Bíró, 1995, School and Tremoulet, 2000). A search for coherence relying on causal attribution and intention attribution, thus on naïve physics and naïve social psychology underlies our schematization of stories. The causal chain constructed for stories consists of causes and reasons that lead to the event sequence in the story. Dennett (1990, 1991) even claims that this narrative intentionality is the basis of our feeling of personal continuity and identity.

Breakdowns of intentional attribution

A new turning point in this line of research came with the realization that these attribution patterns (Theory of Mind) can break down, causing remarkable dissolutions in the linguistic coherence system that is so crucial for pragmatics. Many of those organizational features that seemed to be interesting but loose twenty years ago now find their place through the use of dissociative research methods practiced with developmental disorders and brain damaged populations usually followed by the use of sophisticated brain scans or other methods to separate processing stages. I shall try to summarize what could be learned about these pragmatic inferential processes, or as Fodor (2000) puts them, processes of abduction, especially regarding the integration of stories.

1. Language form and script like knowledge are two separate systems (modules, if you like): script like knowledge is connected to prefrontal cortical areas

Present day research has obtained evidence from several sources that imply a relatively straightforward distinction between strictly linguistic processes and higher order information integration. McDonald (1998) surveyed studies of traumatic brain injuries. The survey suggested that (pre)frontal damages cause a tendency in the affected patients to stick to the literal meanings of expression, and an inability to entertain multiple readings. They have particular difficulties of activating two meanings of the same form like in verbal puns.

In a new series of studies a particularly active group of researchers at the Salpêtrière in Paris has shown with several different methods that what they call *managerial knowledge* has a separate representation in the brain. Regarding its mental role, this managerial knowledge is “the information base used for representing goal hierarchies, temporal order of events, causal links between actions, rules etc.” (Sirigu, Zalla et al., 1996, p. 298). In one study they used a card sorting method relying on information organized into scripts. Subjects with prefrontal and posterior brain lesions as well as normal controls had to sort 20 cards naming actions into four given Script types like GOING TO THE MOVIES, MAKING A PHONE CALL, FIXING COFFEE, PREPARING A TOAST. Sometimes the tasks were made more difficult by introducing distractor cards. On the whole, prefrontal patients were slower, and they made subtle ordering and boundary mistakes. They switched the sequence of choosing the *phone number* and *picking up the receiver*, or *switching on the toaster* was also included in the script of FIXING COFFEE. In another study (Sirigu, Cohen et al., 1998) clear indices of a double dissociation were obtained. When required to make up sentences from cards, Broca patients (traditional agrammatic aphasics) made 64 % sequencing errors, and only 6 % story sequencing

errors. Prefrontal patients, on the other hand, made only 4 % sentence sequencing errors, while 62 % story sequencing errors. Thus, it seems that there is something more specific than a general sequencing system involved here located in the anterior cortical areas. The 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's area. "[C]omplex 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, pp. 771-772).

An fMRI study made by the same group (Crozier, Sirigu et al, 1999) using a metacognitive task (judging the grammaticality of sentences, or the properness of action sequences like GET DRESSED, TAKE A SHOWER etc.) indicated that script-like processing is related to bilateral activation of the mediofrontal prefrontal areas. At the same time grammaticality judgments regarding syntax were related to activation of the Broca area and left prefrontal regions.

The same group did studies on Parkinson disease patients as well (Zalla, Sirigu, *et al*, 1998, Zalda, Sirigu, *et al*, in press) relying on the logic that Parkinson syndrome due to the impairment of skill organization also involves sequencing. These studies using similar methods indicated that Parkinson patients unlike patients with prefrontal damage do not make category boundary errors, and they rarely make sequencing errors either. Rather, they make mistakes pertaining to the relative importance of certain partial actions in relation to a given complex function. Thus, they may think that in decisions regarding personal a promotion campaign is more important than a job talk.

For those of us who had been in the field for a longer time, some of this might sound familiar. From the sixties on, the

neurolinguistic conception of A.R. Luria (1966, 1969, 1973) also emphasized that the role of prefrontal areas in humans is to create “plans of plans” or “superplans”. In general, Luria sees this to be related to the regulatory role of language over behavior in general: the prefrontal areas would be responsible for this regulatory role, for what we would be willing to call today a metacognitive regulation over behavior (Luria, 1961). In the beginning, words would exert an influence on behavior from without, from the direction of the adult towards the child, and would gradually become directives from within, commands delivered to ourselves (Luria, 1961, 1981). This development taking place during the preschool years would largely correspond to the relative late maturation of prefrontal cortical areas. In line with this disorders relating to the regulatory role of language would characterize mentally retarded children and (pre)frontal patients as well (Luria, 1961).

Luria (1969, 1974) also extended this consideration of the role of prefrontal areas in cognition to the level of discourse or text organization. He and his coworkers observed specific modular effects of text processing in prefrontal patients. While these patients were more or less able to treat individual sentences, they were unable at the same time to treat texts as holistic units, messing up the order of elements and being uncertain about the importance of different parts. This was accompanied in similar disorders in interpreting complex pictorial informations depicting several protagonists and complicated human actions (Luria, 1973). There was a general loss of overall meaning with preservation of linguistic form. At the same time, patients with traditional aphasic disorders had deep troubles with linguistic form, while they had a relatively intact ability to deal with the overall meaning. Thus, there seemed to be a clear double dissociation, not unlike the ones emphasized today. Lurija, however, has not had yet a clear conception about the articulation of the ‘metaorganization’

involved in prefrontal functions. He used rather general notions, like a lack of selectivity in mental processes, or a loss of ‘sense’ and the like to describe what one would interpret today as a problem with intentional attributions.

2. Right hemisphere pragmatics (?): Pragmatic aspects tend to be localized in the right hemisphere

One line of reasoning that tries to see the place of pragmatics in a modularist vision of the world tries to apply the traditional dissociationist view to pragmatics. A simple proposal would claim a dissociation between the language processing capacities of the two hemispheres, by allocating a strictly analytic grammar like strategy to the left hemisphere, and at the same time postulating a more holistic and General Problem Solver-like compensatory component in the right hemisphere. Table 8. Summarizes this line of reasoning.

Table 8. Dissociating the role of the two hemispheres in language as grammar versus pragmatics

If we survey data obtained using the classical dissociation approach to language and we are trying to look for what is preserved in aphasics and what is impaired in right hemisphere damage regarding discourse organization, we find an even clearer image, as Table 9 indicates it based on the survey of Chantraine, Joannette, and Carbedat (1998).

Table 9. A contrast of discourse level organization in left hemisphere damaged aphasics and right hemisphere damaged patients

Newer studies start off from a clearer conception of pragmatics itself. Among several other authors, Ivaskó (2000), for example, pointed out characteristic impairments of discourse level strategies following right hemisphere damage. In particular, she showed that patients with right hemisphere damage are unable to process hints in conversations, like the one illustrated in the following dialogue:

Therapist: *Kleenex?* [to the crying patient]

Patient: *Yeee...yeee.*

Therapist: *Please* [hands over kleenex]

Patient: *I do have some.*

Dressler and Stark (2000) based on their own studies and on a survey of the literature, also pointed out that in general, in right hemisphere damage there is a characteristic disruption of coherence. However, as their picture interpretation tasks showed, this damage to coherence and pragmatic organization was by far not a simple inability to mobilize previous knowledge in linguistic tasks. Patients with a right hemisphere damage, showing signs of disturbed pragmatic competence, indicated a specific problem with the proper level of selection: why they were able to mobilize previous knowledge and showed signs of inferencing, they were not able to exercise control over the activated inferences. Thus, instead of a simple lack of inferences, their problem is that of maintaining a proper perspective.

3. Gender related differences and the language module

Gender related differences are relevant regarding the organization of pragmatics. Among other things, remaining gender differences in patients with similar brain damage may indicate that a

given cortical structure is not related to pragmatics. This view would at least partially interpret gender differences in language use to be of a pragmatic nature. We used this kind of argument in interpreting gender differences in some of our previous studies. Wodak, Dressler, and Pléh (1984, Dressler, Wodak, and Pléh, 1990) showed that in severe damage to the *faculté de langage* there is still some indication of gender differences of a pragmatic nature being relatively spared. Males used more descriptive sentences even in story retelling tasks (Figure 1). On the other hand, female patients had a strong tendency to use partner related tags (of the type *you know*) and connectives (*and, but, etc.*) even when the propositional structure of their speech was much impaired (Figure 2). At the same time, while being aphasic, they still had less disturbances than male patients (Figure 3). Thus, gender related partner orientation and coding style differences in language use seem to be connected to other brain areas than the representation of language per se. This was of course shown in many other studies as well.

Figure 1: Men use more descriptive sentences

Figure 2: Use of conjunctions in aphasic women and men

Figure 3: Women have less disturbances in discourse planning

4. The intimate relations between pragmatics and the Theory of Mind

Another important line of data regarding the nature of pragmatic knowledge comes from developmental pathology. Present day modular

theories treat social understanding and self-interpretation as the result of social modules rooted in evolution. Our theory of mind, i.e., our naïve theory of social behavior as being mediated by an internal conscious agent would be the result of the working of a domain specific system of naive or folk psychology. We would be equipped not only be task specific systems for the recognition of speech sounds, or faces and other highly complex cognitive patterns, but for the interpretation of each other as agents (Gergely, Nádasdy, Csibra, and Bíró, 1995) end even of attributing consciousness (Leslie, 1987). The basic forms of sociality would originate in biologically organized modules (Csibra and Gergely 1998).

The most interesting aspect where this can be brought to bear on the decomposition of the pragmatic module has to do with *developmental pathology*. In autistic groups a general impairment of cognitive architecture is supposed. This overall architectural deficit indicates the crucial role of a Theory of Mind not only in tasks of second order representation, such as attributing false beliefs, in attributing a sophisticated Belief-Intention system to others, but in the processing of language itself (Győri, Kanizsai-Nagy, and Stefanik, 2000). One interpretation of these data is to postulate a module of social and psychological cognition (what Sperber, 2000 calls metapsychology), that would be a driving source of language use. Language would presuppose an ability to entertain intentions in others, and it would be a main form of coding intentions. This is the standard view, taken up by Sperber as well: intentional psychology preceeds language. Basically the same is claimed by Tomasello (1999). Social learning is based on intentional and goal attributing systems, and their complec makes human language and human culture possible.

According to Győri (2000) the entire literature of autism supports a dissociation between pragmatic and formal aspects of language. „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 language without a Theory of Mind. This is, however, a non-communicative language that is always literal, and pragmatically very weak.”

Tager-Flusberg (2000) gives a review of the many works done on linguistically well functioning autistic children. Their most remarkable impairments are a difficulty in non-literal discourse, failure to view conversations as intending to modify attitudes. Regarding narratives, they have difficulties in identifying the goal structure of protagonists. It seems to be that the primary problem of these subjects is of a pragmatic nature, and their other linguistic problems such as problems in dealing with propositional attitude markers such as *know* and *believe* all go back to this primary pragmatic problem. Jolliffe and Baron-Cohen (1999) also showed that in line with the Central Coherence theory of autism (Frith, 1989) autistic subjects have special difficulties in using context to disambiguate information – thus they act exactly as if when attending to ambiguous inputs they would never reach Phase 2, the phase of selection. They also have 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. These authors relate inferential ability and pragmatics in a clear way: “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-Cohen, 1999, p. 177.)

This is the standard story. Another option should be, left, however, open as well. Namely the possibility that language use itself and thus linguistic pragmatics in different intentional contexts is at least partially responsible for the development of the seemingly encapsulated system of a Theory of Mind. This is proposed by de Villiers (2000). This proposal would correspond to the general idea of early prepared systems being modified during an interface buildup process in development that roughly corresponds to an overall use of language for metacognitive purposes. This attitude appears in dissociative pathology as well. Quoting again the overview provided by Györi (2000), there are data to the effect that sometimes there is a positive correlation between the level of linguistic form and pragmatics in children living with autism. „A comparison of IQ, performance on Theory of Mind Tasks, and the level of linguistic proficiency indicates that with higher scores in linguistic form a higher level of Theory of Mind performance and – according to clinical observations – a higher level of pragmatics is obtained.” Thus, the originally proposed dissociation is not as clear as it was first suggested.

Interestingly enough, some complex proposals regarding pragmatics and relating the to metacognition are made in the field of paleopsychology as well. According to a recent theory proposed by Steven Mithen (1996) human language may actually have resulted from a loosening of boundaries between encapsulated modules, rather than from strengthening them. This line of development is especially interesting since it supports the idea 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. The same complex image that is proposed for the decomposition of a pragmatic module is suggested here for the entire human mind: the multiplicity of modules is followed by a new age of fluidity that would correspond in the developmental domain to the idea

of a metacognitive turn, or to representational redescription (Karmiloff-Smith, 1992)

The view of Mithen regarding crosstalk between modules is in line with the imaga of hominid development prosed by Tomasello (1999). According to him the crucial aspect of this evolution is not an accumulatiöon of many small modular adatatations, but a a central modular change involving Theory of Mind, sociaol interpretation, and social learning. This would correspond to the idea of luidity among the great modules proposed by Mithen. Metphore, humor, creativity that ar regularly connected to pragmatic comptenece, would be the result of this crosstalk and fluidity.

Thus, we have all reasons to believe that there are non-trivial connections between pragmatic competence, the workings of a social interpretive module that differentiates between reasons and causes (Csibra and Gergely, 1998, Scholl és Tremoulet, 2000). On the one hand, this creates the entire notion of human agenthood, on the , and on the other, the possession of pragmatic competencies. Whether this is best interpreted as a modular approach to pragmatics is another issue. Table 9 summarizes the pros and cons for a pragmatic module as one can see it today.

Table 9. Some arguments for and against a modular conception of pragmatics

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Autobiographical note Csaba Pléh, b. 1945 is a psycholinguist and cognitive scientist in Hungary working at the University of Szeged. He has mainly published on sentence processing in Hungarian and the theory of cognition, in journals like *Cognition*, *Behavior and Brain Sciences*, *Cognitive Psychology*, *Semiotica*. He is a corresponding member of the *Hungarian Academy of Sciences*.