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**BEYOND ‘THE BLOOMING BUZZING CONFUSION’:
A SEMI-CENTENNIAL APPRAISAL OF ‘MINDFUL’ TRENDS IN
PSYCHOLINGUISTICS**

Summary

Psycholinguistics in its present advanced guise has been concerned with the ‘language-mind interface’ ever since it has turned mentalist. The present overview is organized around the central and general question: ”Has psycholinguistics helped the linguists and cognitive psychologists alike to find out more about the nature of language and mind in the language-mind interface, or has the paradigm applied been too fuzzy and too broad to help analyze the interface in any revealing way?”. The well-known phrasing originally used by William James with regard to the inner world of the child as ”the blooming, buzzing confusion” in this case does not refer to the problem of child cognition and child development but has been used to describe the innards of psycholinguistic research coping with the task of describing, both in the past half century and as an on-going endeavour, in some sensible way what may perhaps appear ‘uncapturable’, namely the ever-blooming and ever-buzzing confusion present in the awe-inspiring dynamics of the said language-mind interface operating in every human individual and properly reflected in psycholinguistic research. As can be noticed, the interface is built by two autonomous elements, language, and the mind, each characterized by a set of unique properties and each being a subject of studies by fully autonomous disciplines, linguistics and psychology. The postulated language-mind interface has thus turned out to constitute a most proper framework for the field of psycholinguistics which, by virtue of this liaison, has, on the one hand, turned into a typical interdisciplinary research area in which two (or more) autonomous and collaborating disciplines have melted into each other, and, on the other hand, has succeeded in providing a definitely more comprehensive perspective on language, with necessarily no clear boundaries between (and among) the collaborating disciplines. In this way, owing to a fuzzy and broad frame of reference, psycholinguistics has over the past half century managed to provide a penetrating insight into the totality of

language and the totality of the human mind, respectively, while allowing the two to meet within the confines of the discipline where their permeability has been properly envisaged and most amply demonstrated.

1. Introduction

Let me start by saying that the present paper is by no means a programmatic paper but is, instead, a summational and a very general account designed to accomplish a modest goal of providing a brief semi-centennial and anniversary appraisal of the sub-discipline of psycholinguistics within an easily recognizable organizational schema. A paper of this kind is difficult to write but it is also well deserved, for psycholinguistics has not only managed to develop into a very successful area of linguistic research since its formal nascency in the mid '50s of the last century but has also become very successful in penetrating deeply into the phenomenon of language and, subsequently, into the science of language thus nourishing the latter abundantly and changing its research perspectives overwhelmingly. So much so that today, one cannot imagine a professional linguist in pursuit of things linguistic without at least colouring his/her research work with a delicate but easily discernible psycholinguistic scent. Let me also start by stating the obvious, namely that psycholinguistics in the proper sense of the word began to flourish after Osgood and Sebeok's (1954) programmatic and edited publication and after Noam Chomsky's publication of **Syntactic structures** (1957), followed by his famous assault against the premises of ripe linguistic behaviourism, as articulated by Skinner in his **Verbal behavior** (1957). With Chomsky's seminal review of Skinner's book published in 1959, psycholinguistics established itself as the sub-part of the science of language whose major research work focused firmly on what may be collectively referred to as the 'language-mind interface' thus turning this interface into the keystone of psycholinguistic research. An additional claim is made here that the establishment of the said interface has been preceded in the early phases of psycholinguistic studies by unbalanced though fully understandable focus either on language alone, which most naturally coincided with the heavily structuralist-functionalist orientation in language studies flourishing during the decades 1920-1950, or on the psychology of language as one of man's faculties, which, in turn, coincided with the heavily experimental psychological orientation flourishing at the turn of the XIXth and XXth centuries, mostly owing its reductionist-mechanicist-physiologist bend to the great Pavlovian tradition. It should immediately be added at this point that the Pavlovian perspective has kept psycholinguistics away from the concept of the mind as an impenetrable and therefore scientifically useless term. One may therefore refer to the

Pavlovian perspective, properly embedded within the ‘Stimulus-Response’ mechanism, as prompting ‘mindless’ psycholinguistics in contradistinction to what may be called ‘mindful’ psycholinguistics because, although it is not until 1954, when the two autonomous sciences of man formally met, we may start making reference to a truly psycholinguistic orientation in language studies not until the other two, previously mentioned pivotal dates, 1957 and 1959, when psycholinguistics finally became saturated with strong mentalism, that is, when psycholinguistics decided to impregnate the ‘Stimulus-Response’ mechanism by introducing between the two components the mediating component of the ‘Mind’ thus yielding the ‘Stimulus-Mind-Response’ mechanism. More properly, we may start referring to the language-mind interface, introduced into psycholinguistics precisely at that time, as the most appropriate and fully established framework of psycholinguistic studies that has emerged as a result of the inevitable conflation of linguistics and psychology in its cognitive guise. Since that time, psycholinguistics has become strongly mentalist and mentalism has become the predominant framework of research in the sense that language as a phenomenon has been viewed as the mentally encapsulated ‘tool’, as it were, and the mind has been viewed as the central and dominating cognitive machinery responsible for a number of higher mental functions, such as:

- (a) collecting incoming information (the problem of the input),
- (b) initiating and guiding most (if not all) action (the problem of information processing and the question of problem solving against and with the assistance of mental content and within the confines of the mind),
- (c) one of the most complex of all observable activities, that is, language use (the problem of the outcome, or the problem of expression).

In what follows, I shall make an attempt to review the framework of psycholinguistic research referred to as ‘classical mentalist psycholinguistics’ by briefly examining the contribution that the sub-discipline of psycholinguistics has made into the science of language, present a typology of psycholinguistics with regard to the said interface and propose some conclusions concerning possible future developments within the sub-discipline.

2. Classical mentalist psycholinguistics

What is referred to here as classical mentalist psycholinguistics is based on the paradigm of natural cognitivism and its central premise expressed by the following statement:

the human (natural) mind cognizes itself.

2.a. The three distinct levels of interest of classical mentalist psycholinguistics: the blooming of language, the buzzing of speech (and non-speech), and the confusion of the mind

Within the above delineated psycholinguistic perspective, that is, in the research framework of the language-mind interface, the component of language appears to be a phenomenon which, on the one hand, may best be defined as an abstract code, this being in accordance with a long structuralist tradition (*vide*: de Saussurean ‘langue’), where it appears more appropriate to analyze language in terms of operations performed on the language code, such as those proposed in the transformational-generative model, on the one hand, protruding in a Janus-like fashion down to the dynamic physical-temporal dimension of language use/language execution (*vide*: de Saussurean ‘parole’), where it appears more appropriate to analyze language in purely dynamic and temporally marked terms such as ‘becoming, emerging, changing, maturing, being put to different uses, producing, perceiving, weakening, disappearing’, etc., rather than as a static phenomenon simply expressed by the timeless and phenomenological ‘being’, and, on the other hand, protruding up to the complex machinery of the mind and its properties. In the present account, the blooming and the buzzing aspects of language are thus seen here as separate and as clearly contributing to its overwhelmingly dynamic nature, both developmental and comprising language use by a given individual at a given point of time, however, distinctly opposed to the overriding level of what may be and will be referred to as the ‘confusion of the mind’. It is thus reasonable at this point to postulate the following tripartite and hierarchically organized system of levels which properly defines the core of the sub-discipline of psycholinguistics:

- the **supra-linguistic level** of the mind
- the **linguistic level** of the language code
- the **sub-linguistic level** of speech (and non-speech).

Over the past fifty years, psycholinguistics has been taking a more than vivid interest in this tripartite and interlocking system of levels while trying to capture and account for the nature and functioning of these levels via a complex interplay of criteria which have been worked out by the sub-discipline in question and which may be divided into three distinct though tightly integrated groups. This is where James’ dictum comes in handy, for I propose the following group of criteria:

- (a) the ‘blooming of language’ criteria properly belonging to the linguistic level (B¹),

(b) the ‘buzzing of speech (and non-speech)’ criteria properly belonging to the sub-linguistic level (B²), and

(c) the ‘confusion of the mind’ criteria properly assigned to the supra-linguistic level (C).

All the three groups of criteria constitute what may for convenience be referred to as the ‘**B¹B²C complex**’ which underlies the ultimate power of human **expression** as the ultimate subject matter of classical mentalist psycholinguistics. The complex will be briefly discussed in the respective sections referring to the afore mentioned aspects of psycholinguistic research, necessarily in the order postulated by William James’ famous phrasing.

2.b. B¹: The blooming of language: the expression potential contained in the language code

The dynamic notion of ‘the blooming of language’ belongs to the linguistic level and is understood here as referring to the phenomenon of human language as undergoing the inevitable changes from its ‘installation’ (i.e. acquisition) in the human individual in a period of growth, through a long period of relative stability (the so-called steady state) to the individually diversified withering of the language capacity in the individual’s decline period of senility. Thus, the concept of the blooming of language, as naturally opposed to the phenomenon of the withering of language, is used here with reference to what may be called the individual’s **developmental curve** (or life cycle) and which comprises the following distinct phases: growth, steady-state, and decline. As has been stated before, psycholinguistics has over the past half century been trying to account for the phenomenon of language as such by means of a number of criteria. The ‘blooming of language’ criteria comprise the following:

- **the criterion of language competence** which, owing to Chomsky’s pioneering studies from the 1960’s, has become the most significant ‘trade mark’ of the sub-discipline of psycholinguistics, typically for mentalism ‘tangled up’, as it were, in both the supra-linguistic and linguistic levels, and which has thus been assigned the function of the prime mover of all the buzzing of language. Subsequently, it has, on the one hand, become the primary target of the processes of first language installation in every maturing human individual, and, most naturally, of psycholinguistic research focused on first and second language acquisition and language use, on the other,
- **the criterion of language dynamics** which combines the perspectives of descriptive, theoretical and applied linguistics with those of cognitive psychology. The criterion has provided psycholinguistics with a suitable basis for proposing a rich variety of dynamic approaches within the language-mind interface and has allowed to look at the two components of the interface as interactively interlocked and as leading to and accounting

for different kinds of language behaviour under a multitude of external and internal impacts. The different kinds of language behaviour which psycholinguistics has focused upon and pursued as governed by the criterion comprise the following major problems: second language learning (with problems of negative and positive transfer; see the paper by Arabski in this volume), language storage and language recall (retrieval), language (dialect and idiolect) awareness, awareness of context in language use, awareness of style and register,

- **the criterion of first language acquisition** (or first language ‘installation’) which refers to the blooming of language proper and which has provided a broad foundation for multivariate psycholinguistic research on a plethora of acquisition processes. These processes that have been postulated and observed in a myriad of contributions, both theoretical and experimental, have at the same time been conjectured to lead to the establishment and maturation of a natural language as a tool of communication in every growing and healthy human agent from some preconceived and inborn physical-mental basis which has been assumed by psycholinguists and bio-linguists alike to characterize the biological-genetic makeup of the genus *Homo*,
- **the criterion of language change** which is closely related to the previous criteria, in particular to the criterion of language dynamics, and which has likewise provided a very broad foundation for research on the various manifestations of language change, as demonstrated by and attested in human agents, both in the ontogenetic and phylogenetic sense of the word. This criterion, in particular, has attracted the attention of scores of psycholinguists, for it not only encompasses the most fascinating problem of the emergence of first language in young humans according to some internal scenario and in a temporally protracted manner, but it also comprises the equally interesting phenomena of weakening of the language faculty in aging individuals as well as the various deficient manifestations of language, including its most radical variant, that is, language loss, owing to a multitude of congenital and acquired defects as regards the functioning of the mental faculties and of the physical-cerebral hardware. The criterion of language change has prompted a really massive surge of psycholinguistic research on the developmental aspects of language,
- **the criterion of hierarchical structure of language and heterarchic dependencies and controls between language structure levels** (also referred to as the criterion of ‘bidirectional traffic’) which dovetails closely to the rest of the linguistic criteria mentioned above and which together with them constitutes one of several

psycholinguistics' truly original contribution to the science of language. On the one hand, the criterion has allowed for the treatment (i.e. description and analysis) of language structure sub-levels as being autonomous, and, on the other, it has allowed to approach these sub-levels as being highly interdependent. The view of language as an interlocking structure of sub-levels has had far reaching consequences for psycholinguistic research in the sense that the holistic nature of the above postulated language-mind interface has been properly matched by the hierarchy-heterarchy dynamic linkages within language alone thus allowing to view language basically as movement, that is, as a multitude of bidirectional processes running in a top-down and bottom-up fashion and determining the entire dynamics of language as a mentally determined entity. More specifically, the notions of feedback and feedforward ought to be recalled in connection with the above criterion.

2.c. B²: The buzzing of speech (and non-speech): the expression potential externalized

The dynamic notion of 'the buzzing of speech (and non-speech)' belongs to the sub-linguistic level and is understood here as referring to the phenomenon of speech generation and speech perception as constituting the material (i.e. physical) side of language. Psycholinguistics has taken an extremely deep interest in the buzzing of human speech (external to the language code), assumed to be accomplished and best expressed by means of the following sub-linguistic criterion:

- **the criterion of speech (and non-speech) performance** which is a derivative of the aforementioned supra-linguistic and linguistic levels and which psycholinguistics has duly undertaken in completion of (or as a sequel to) the criterion of language competence and which has thus become one of the central themes in mentalist-oriented psycholinguistic research. The inclusion of the criterion of performance has allowed psycholinguistics to develop a rich picture of language in two major areas of research: speech production and speech perception. The research work conducted in these areas has, subsequently, allowed to provide an extremely solid foundation for the proper reflection upon the overall significance of the performance criterion for psycholinguistic research. The criterion has comprised the essential elements of 'Input' and 'Output' which have been included in the list of most relevant concepts in psycholinguistic research, in particular in connection with the general problem of linguistic expression. Production-wise, that is, in output-oriented studies, psycholinguistics has penetrated the various aspects of speech production in monolingual, bilingual and multilingual contexts (i.e. environments) as well as in the context of the language-mind interface thus delineating a rather complex picture of the

production processes governed by rules operating on different-sized entities and across all the levels of language structure, including pure language elements (such as those used in verbal communication) and non-language elements (such as a whole set of elements used in non-verbal communication). Whereas perception-wise, that is, in input-oriented studies, psycholinguistics has penetrated the complex confines of the human auditing process, thus focusing on the various aspects of linguistically relevant audition and postulating, as a result, the existence of the internal mechanism of categorical perception as responsible for the overall clusterings of physical sensations into categorically perceived different-sized canonical entities. The above criterion has been used by psycholinguistics to comprise and single out problems relating to the major area of speech production and speech perception under a set of conditions within the boundaries of one language as well as problems relating to the area of speech production and speech perception under a set of conditions applying within the boundaries of two (and more) languages. In this way, psycholinguistics has also developed in a sophisticated and non-trivial manner the monolingual versus bilingual and multilingual perspectives concerning the nature of language as such and concerning the nature of language use and language learning, with the elements of input and output serving to indicate that the mind-centered psycholinguistics has not severed itself completely from the environment and thus showing that there exists within psycholinguistics some concern for its presence both in error-free and erroneous forms of speech production and perception.

On aggregate, the entirety of psycholinguistic research within the **B¹-B²** complex has comprised the levels of the **blooming of language and the buzzing of speech (and non-speech)** and has resulted in establishing a rich and diversified research platform as well as it has allowed for the identification of the following set of problems:

- language is a dynamic (i.e. processual) phenomenon in the sense that it is subjected to an inborn and individually modified natural-computational mechanism capable of generating an infinite number of utterances consisting of highly variable strings of entities
- as a dynamic phenomenon, language changes ontogenetically (that is, throughout one's individual life cycle) and not only phylogenetically (that is, throughout the duration of the human phylum)
- language should always be placed in the mental-physical (i.e. mental-physiological) confines of the speaker-hearer rather than viewed as a completely isolated and abstract construct which would suggest that it may be located outside the human organism

- language is a phenomenon/system which can only be installed (i.e. established) in every human being against and generated/activated with the assistance of a whole set of constraints referred to as the criterion of 'language competence' which may be viewed both within a singular and social dimension, that is, as located in an individual human agent as well as in a society (or network) of interacting human agents
- language generation is directly proportional to the completeness and normalcy (understood as the statistically prevalent tendencies in the genetic make-up and functioning of the entire human population) of the speaker-hearer's linguistic competence and his/her understanding of the necessary semantic and universal bond 'I-the world'. The bond is assumed to allow for a flawless (i.e. error-free) reflection of the properties of the world outside the human mind
- language generation requires the presence (or availability), activation and participation of a large number of mental-physical (i.e. mental-physiological) processes whose nature has been the subject of continuing psycholinguistic research, supported by a number of more or less closely collaborating disciplines (such as cognitive psychology, the neurosciences, biology, sociology, sociolinguistics, pragmalinguistics, ecology, ecolinguistics, and artificial intelligence studies)
- the key processes of language generation/activation and language comprehension may be characterized as an individual human being's manifestations of the degree of normalcy established and maintained between the 'hard' and physical machinery of the brain and the 'soft' programs of the mind, but also of the efficiency with which an individual human being is able to control the various parameters of the environment as well as of the individual agent's sensitivity to the environment,
- 'the blooming of language' and 'the buzzing of speech' are the necessary prerequisites to the entire psycholinguistic paradigm in the sense that they are the robust indicators of the dynamic nature of the supra-linguistic level of the mind; or, in other words, the silent ways of the mind can only be penetrated by making recourse to and examining the blooming of language and the buzzing of speech, including the processes of the withering of language
- 'the blooming of language' and 'the buzzing of speech' may be further defined as providing tangent information on how intact and how healthy the various manifestations of the language-mind interface are, on the one hand, and/or as indicating more or less precisely the various types of deficiencies generated by the interface, with some being congenital and some of an acquired nature, on the other

- the various language deficiencies (or forms of language breakdown/language deficits) in which psycholinguistics has been taking such a vivid interest are strong indicators of the following: the balanced mental-physical (i.e. mental-physiological) nature of the language-mind interface, the componentiality of language structure, and the dynamism permeating the language-mind interface so clearly demonstrated on the linguistic and sub-linguistic levels. For this reason, language deficits have always been and will remain to be of utmost importance to the studies of language structure and language use in the psycholinguistic perspective.

2.d. C: The seeming ‘confusion’ of the mind, or, what the mind is, what is in the mind, and what the mind is doing: the expression potential looked over by the stewarding mind

The inclusion of the supra-linguistic level of the mind into psycholinguistic research has had an ever-lasting and ever-embracing impact on the sub-discipline’s identity in that the language-mind interface established in the psycholinguistic paradigm had to concentrate, of necessity, on the premeditated dynamics of the otherwise inseparable dyad of language and mind. In this way, the phenomena of ‘the blooming of language’ and ‘the buzzing of speech (and non-speech)’ in observable linguistic performance, as demonstrated by and researched with the assistance of the above mentioned criteria, had to be supplemented by way of matching them with the seeming ‘confusion’ of the extremely sophisticated but, unfortunately, unobservable innards of the mind, that is, the tacit content and workings of the human mental machinery. In this way, whichever problem psycholinguistics has taken up within the component of language, the problem has automatically and inescapably ‘landed up’ within the confines of the second component of the above mentioned interface, that is, the timeless mind which has been assumed to incessantly seek expression, more precisely, incessantly seek linguistic expression, by means of all the available supra-linguistic (i.e. mental), linguistic and sub-linguistic resources. It is thus assumed here that the component of the mind, which one is tempted to call the **basic mind** within the **B¹B²C** complex, may best be expressed by the following supra-linguistic (i.e. mental) criteria:

- **the criterion of primary organismic singleness and cross-generational species-specific propagation of mind content** which is one of the central criteria of psycholinguistics owing its presence to the mentalist doctrine and which has narrowed down its concern with the processes and products of the human mind to its workings primarily within the confines of a single and abstract organismic entity, rather than within a host of cooperating and interactive, that is, properly socialized, human agents. The criterion of

primary organismic singleness and cross-generational species-specific propagation of mind content emphasizes the primary significance of a single and abstract MIND, on the one hand, and views it against the species-determined concrete minds of the physically constrained representatives of the genus *Homo* understood as a population of individual human agents subjected to the forces of evolution and heredity which influence the individual minds of the individual representatives of the genus in a phylogenetic manner, on the other. In this way, psycholinguistics has been concerned with the primacy of the universal content of the abstract and generic (therefore universal) human mind, assumed to be capable of generating and maintaining a whole set of language universals, versus the specific (or idiosyncratic) properties of an individual mind, located in an individual human agent and capable, in turn, of generating a whole set of language-specific properties on the linguistic level and human agent-specific properties under changing environmental (that is, both societal and individual) conditions on the sub-linguistic level,

- **the criterion of the mind-brain dichotomy** which has basically centered around two major questions of

- (1) whether it is the mind that ‘rides’, as it were, on the hardware of the human brain, and,
- (2) whether it is the hardware of the brain that ‘harnesses’ the cognitive confines of the mind.

The question of which comes first summarizes the gist of the ‘mind-body’ problem which has been deeply rooted in psycholinguistic research in its nativist guise. Obviously, it has also contributed to tremendous confusion within classical mentalist psycholinguistics. It should be added at this point that the presence of the above criterion has resulted in admitting that the mind can be observed via performing observations of the functioning of the material substrate of the brain. The presence of the mind-body problem (dualism) has also resulted in a great number of studies conducted by scores of researchers such as psycholinguists, cognitive psychologists, bio- and neuro-linguists who have either emphasized the significance of the mind or of the body and who have also emphasized that the brain has a modular structure resulting in modular functioning. Moreover, the findings on the modular nature of the hardware of the brain has prompted the view that the mind, in analogy to the modular structure of its vehicle, may also be treated as exhibiting some kind of modular architecture. This fact, in turn, has been regarded as a necessary and sufficient condition for its modular workings which, however, produce holistic outputs

(outcomes), including the maintenance of language as a code and the generation/activation of speech for the purpose of human inter-agent and intra-agent communication,

- **the criterion of the brain as the biological substrate of the mind** which obviously is a reductionist criterion and which follows smoothly from the afore mentioned mind-brain dichotomy. It may be recapitulated in the following statement: whatever is attested to happen in the brain has its corresponding aspects in the mind. As a result of this criterion, classical mentalist psycholinguistics has allied its forces with a surge of supporting neurolinguistic research and has contributed rather amply to the articulation of the view that the mind definitely has a material substrate in the form of the machinery of the brain,
- **the criterion of the brain as the material analogue of the mind** which is a consequence and an automatic extension of the previous criterion. It has allowed classical mentalist psycholinguistics to focus on studying the brain within the more narrow confines of the closely collaborating discipline of neurolinguistics via such technologically advanced research techniques as magnetic resonance brain imaging (the so-called MRI), computer tomography (the so-called CT scan), positron emission tomography (the so-called PET scan), or the single proton emission computed tomography (the so-called SPECT) and has allowed to inspect the hard bodily substance of the brain. In this way, psycholinguistics has demonstrated its desire to break the mind-body predicament towards the dominance of the body-oriented (i.e. of the 'hard' wired and physical) machinery of the brain and definitely join forces with the more 'expensive' type of psycholinguistics, both in terms of the technological equipment involved and in terms of the undeniably experimental nature of the evidence thus amassed, as opposed to the more traditional and certainly less experimental and thus less costly (i.e. 'cheap') way of doing psycholinguistic research,
- **the criterion of the theory of mind** which seems to be more an outgrowth of cognitive psychology than of psycholinguistics proper. However, it needs to be emphasized that the joint and intensive psycholinguistic and cognitive psychology's research into the nature of animal and human cognition, also as regards the comparative aspects of language acquisition and language use, have led to the formulation of the view that, looking at the problem in the evolutionary perspective, humans have managed to develop a **complete theory of mind** thus allowing to treat other humans as having a clearly recognizable basis formed of communicative intentions versus a less complete theory of mind on the part of, say, our closest relatives on the evolutionary ladder, the chimpanzees (and other great apes, such as the gorillas, the orangutans, and the bonobos), who have been shown to demonstrate limited intentionality, at least with regard to their possible language

generation potential and their limited capacity to use the fully developed linguistic forms of communication, as attested in numerous experiments conducted with them thus far. It should, however, be pointed out that intentionality forms the basis for all communication among the representatives of a given species as supporting any form of expression. One should, therefore, postulate two varieties of intentionality; one holding within a given species (instantiated by Nagel's famous question: "what is it like to be a bat?", or by Cheney and Seyfarth's brilliant account of "how monkeys see the world"), and which may be regarded as satisfying the ecological conditions of sustainability holding within a given species, and one across different species which is certainly flawed by being anthropocentric, that is, man-centered and naturally language-centered. Despite the difficulties encountered in this area of research, the discussion of the problem that has been developed in psycholinguistic literature has not been completely futile, for it has helped psycholinguistics to articulate in psycholinguistic terms its serious interest in the social-environmental underpinnings of the language-mind interface, both in the specifically human and comparative perspectives (see, for example, the paper by Kurcz in this volume),

- **the criterion of the mind as container** which is understood as approaching the mind in terms of some kind of a cognitive and perceptual closure, or accumulator designed to accumulate and contain all that is needed for the mind in order to maintain its character of a container-operator which, in turn, allows the mind to operate smoothly and completely in accordance with the properties of the outer world. The container metaphor that has been applied to the mind by cognitive psychologists has turned out to be very efficient in psycholinguistics in the sense that it has been widely discussed in psycholinguistic literature under the rubric of the representational mind and has, in general, led to the formulation of a view that humans are cognitively closed (or finite), whereby the mental representations which 'reside' in the container and which comprise all of human so-called 'declarative knowledge' at the same time constitute the cognitive limits of the genus *Homo* also allowing the individual minds to maintain their uncolliding immersion in the outside world by securing the job of proper reflection of the propensities of the outer world. It is also in the mind understood as container that classical mentalist psycholinguistics has placed the elusive phenomenon of memory in the static sense of the word, that is, memory meant as a general repository contributing decisively to any human organism's being in the ontological sense and crucially supporting the mind's activities,

- **the criterion of the mind as processor** which has allowed for approaching the mind's dynamics as expressed by the concept of so-called 'procedural knowledge'. Within this view, the silent and timeless mind has been analyzed as being capable of receiving input and as being capable of 'pushing', the human agent's thinking, as it were, via an intricate system of internal processes driven by rules (or algorithms) towards **expression** (i.e. conceptually, temporally and spatially constrained, socially controlled and socially received and physically implemented output) by means of activating, above all, the combined surface modalities of voice-hearing, vision and touch, which have always been regarded as the primary sensory modalities taking part in the communication process. More precisely, it is through the criterion of the mind as processor that psycholinguistics has been able to propose to account for all of the mind's complex dynamics with reference to the problem of language processing, including memory as both a dynamic device in the sense of being able to hold and retrieve information and as a developmental device in the sense of its dependence on the organism's processing potential clearly demonstrated in the developmental curve mentioned earlier,
- **the criterion of learnability/teachability** which characterizes humans as the species that has demonstrated in the highest degree its capability to learn and to teach. Learnability may be treated as the individual human mind's potential for acquiring new information both in universal and species-specific ways. On the other hand, teachability has been regarded as the individual human mind's potential for engaging in transmitting new information to and exchanging it with other human agents as based on the species-specific cognitive constraints. In psycholinguistic literature, both have been approached as broken down into the following five intertwined sub-components: simplicity-complexity, predictability, consistency, familiarity, and generalizability. In addition, the criterion of learnability/teachability may be regarded as having a direct bearing on the functioning of the linguistic and sub-linguistic criteria mentioned above. It may also be regarded, in particular together with the criterion of the theory of mind, as properly encompassing the mind's inevitable social (i.e. environmental) predicament, for the processes of learning and teaching necessarily require the presence of other human agents and their ability to engage in the acts of expression, including linguistic expression.

Compared to the overall volume of research within the levels of 'the blooming of language' and 'the buzzing of speech', the entirety of classical mentalist psycholinguistic research within the level of **C**, that is, **the confusion of the mind**, has also resulted in establishing a

rich research platform and has allowed specifically for the identification of the following set of major problems within the above postulated **B¹B²C** complex:

- the mind is a dynamic phenomenon in the sense that it is capable of performing complex, though unobservable, processes which are fundamental to the functioning of the linguistic and sub-linguistic levels. In this sense we may call the mind ‘the engine of thought’
- the mind seeks expression via different sensory modalities, especially the modalities of voice-hearing (the vocal-auditory modality), and vision-touch (the visual-tactile modality), being the most important ones
- the mind occupies the central and clearly dominant and thus overriding supra-linguistic level
- the mind may be viewed as both a container, a foundation, and a support for the abstract faculty of language as a code and for the physical manifestations of speech (and non-speech) which constitute the performance level; simply, the mind and its properties thoroughly permeate the linguistic and sub-linguistic levels
- the mind is a universal device containing a modular program which is genetically inherited (i.e. cross-generationally propagated) as some kind of a blueprint and which is socially modified and purposefully maintained in the genus *Homo* to result in a whole array of intricately integrated behaviours, such as the most complex human behaviour, communicative behaviour.

3. ‘Extended’ mentalist psycholinguistics

3a. Going beyond the blooming, buzzing confusion complex: the extending and supporting character of the culture complex which happens to be the second major complex of problems discussed by mentalist psycholinguistics. While the **B¹B²C** complex briefly discussed above has allowed classical mentalist psycholinguistics to ‘wander’ through the confines of the basic mind, the culture complex is, in turn, one which has permitted psycholinguistics to focus upon the mind as being co-determined by the social factor of human culture (frequently also referred to as ‘nurture’) in reply to the simple question whether we can go beyond the basic mind. With the answer in the affirmative, based on the premise of natural cognitivism that the mind is also capable of cognizing itself in the socio-cultural context, thus, with the culture factor involved in psycholinguistic research, we may propose to talk about the **extended mind**, or more precisely, the **culture-extended mind**. Having developed this type of extension, psycholinguistics has expressed its strong interest in

what may be called the **culture complex**. The culture complex focuses on the extended mind with the assistance of the following extended mind criterion/landmark:

the criterion of culture as the collective/social analogue of the mind

which maintains that human culture may be regarded as an extension of the basic mind postulated above. We may say that the criterion has been introduced in completion of the criterion of the mind-brain dichotomy, whereby the major questions asked in connection with the criterion have been whether:

- (1) it is culture that determines the mind, or
- (2) it is the mind that determines human culture.

Again, as could easily be predicted, the problem of which comes first has not been resolved in psycholinguistic research and it now, as a result, properly contributes, together with the other unresolved issues, to the overall confusion existing within the mind component of the language-mind interface. However, on the other hand, the inclusion of the above criterion has enriched psycholinguistics with the possibility of extending its interest into linguistic relativism and has thus enabled the extended psycholinguistic paradigm to focus upon the power of an individual's linguistic expression as co-determined by culture.

Overall, the psycholinguistic research on the basic and extended mind has comprised the human communicating agent. In this sense, both strands of psycholinguistic research may additionally be termed **natural psycholinguistics**, for it may be opposed to a newly emerging stream of psycholinguistic research which is basically confounded to the questions relating to the emerging 'psychology' of artificial agents. Those entities are human artifacts; it is therefore legitimate to postulate the third type of psycholinguistics which may be referred to as 'derived' mentalist psycholinguistics.

4. 'Derived' mentalist psycholinguistics

4a. Going beyond the B¹B²C complex and the culture complex: replicating the mind in artificial agents has been a growing concern of the most recent trends in 'mindful' psycholinguistic research, preoccupied with questions relating to agents constructed by humans and properties which they might possess and demonstrate. The major question that seems to be emerging is whether it is possible to construct a new genus, some kind of *Cyber sapiens*, which could possess all the traits of the natural genus *Homo sapiens*. Prompted by this question, psycholinguistics is obviously at the beginning of a new and a very promising and fascinating research paradigm which we may term the 'derived' mentalist

psycholinguistic paradigm and which, as a variant of ‘mindful’ type of psycholinguistics, has most obviously inherited all the questions and problems posed by natural psycholinguistics. In particular, it has inherited all the problems connected with the properties and functioning of the mind. We may, therefore, state at this point that derived mentalist psycholinguistics has focused on the **derived mind** as the engine of action/performance in man-constructed agents. Subsequently, derived psycholinguistics has from its outcome concentrated on the following derived mind criterion:

the criterion of the derived (artificial) mind as a computational device which emphasizes the view that computations determine the nature of the artificial minds as basically computational devices.

5. Going beyond natural and derived psycholinguistics: the ultimate cognitive-linguistic-communicative orchestrations within the language-mind interface which has clearly allowed to define the mind as some kind of ‘vehicle’ and language as simply ‘riding’ on it. This assumption may best be expressed by the ‘Centered Riding Principle’ (CRP) which comprises both the human and artificial agents and which may be formulated tentatively as follows:

proper language structure and proper language use are the result of harmony existing within the components and processes of the mind and, more generally, of harmony maintained within the language-mind interface. The major outcome of the harmony maintained within the component of the mind is shown in the form of the interactivity of minds which contributes to a uniquely human ‘society of natural minds’ and, subsequently, of the society of ‘constructed minds’. The human minds and their artificial analogues simply seek each other in their respective domains in order to exercise the power of inevitable expression, including the most important type of expression, the linguistic expression. In turn, the major outcome of the harmony maintained within the component of language exists in different forms of linguistic expression generated in necessary agreement with the properties of the outside world and supported by the individual human (and artificial) agent’s actual cognitive and linguistic potential and the agent’s overall ability to control the agent’s linguistic outcomes.

Obviously, further research on the nature of the assumed harmony as well as on detecting any possible deviations from this harmony is required on the supra-linguistic, linguistic, and sub-linguistic levels, respectively, and - subsequently - on the basic, extended and derived levels of psycholinguistic research.

6. Data generation potential in psycholinguistics

Although psycholinguistics has been mentalist since the Chomskyan revolution, it must also be admitted that psycholinguistics has always taken a strong stand on recognizing the need to remain an experimental science and thus on emphasizing the necessity to accumulate and provide data on the various aspects of the dynamic nature of the language-mind interface. In this way, psycholinguistics has always attempted to go beyond being 'cheap' (i.e. armchair) type of linguistics and favour a more 'expensive' type of scientific endeavour by basing research work on expensive latest technological advances and providing hard evidence on what could otherwise have been regarded by its outside observers as mere conjecture, that is, on the observable and thus experimentally measurable consequences of the nature and functioning of the language-mind interface. As has been shown above, the interface is capable of generating linguistic expressions and involves a number of impenetrable cognitive mechanisms in the service of language behaviour. In the course of the fully autonomous existence as a sub-discipline of the science of language, psycholinguistics, especially in its classical mentalist version, has over the past half century managed to build up an almost insurmountable, unimaginably rich and still growing bank of data of all kinds presented and discussed in countless many papers and monographs that have reported on a myriad of both rigid scholarly experiments and natural observations. This extremely vivid stream of psycholinguistic research has kept psycholinguistics well within the empirical-experimental paradigm and has not allowed it to break out into the territory of exclusively deductive analysis which by its very nature is the territory of mere conjecture and sheer hypothesis making. Thus, it should be admitted that throughout its semi-centennial brilliant and laborious existence, psycholinguistics has managed to keep a more or less healthy balance between theory and the empirical side thus allowing for the maintenance of the sound methodological architecture which involves, among others, the principle of induction, the criterion of falsifiability, the principle of deduction and the principle of parsimony.

7. Theory generating potential in psycholinguistics

One may easily recognize the zest of a given discipline by observing how powerful it happens or has happened to be with respect to its potential for theory generation. The sub-discipline of psycholinguistics appears very strong and unchallenged in this respect, for during the period of its semi-centennial existence and due to the vast body of experimental findings, its theory generating power has been kept on a very high level indeed. This fact is amply documented in any comprehensive bibliography on psycholinguistic research. On this basis, we may easily

brand psycholinguistics a ‘robust’ discipline. One is thus compelled to admit that the language-mind interface has served psycholinguistics extremely well, for it has provided this particular sub-discipline of the science of language with a rich theory generating and modeling framework.

8. Some final conclusions and some prospects

As a very general conclusion let me state that in the foregoing discussion I have made an attempt to present the sub-discipline of psycholinguistics as determined basically by its core, that is, by the **B¹B²C** complex, kept and developed under the heavy influence of the basic mind, also fed by the supporting culture complex kept and developed within the extended mind concept, as well as the derived AI complex being most recently developed under the challenging infrastructure of the derived mind. It seems that this grouping into three distinctly different domains of research has been combined together into an abundantly rich research arena under the organizing rubric of present-day psycholinguistics that has been flourishing within the language-mind interface. It is therefore the present author’s conviction that this particular kind of interface, with the three afore mentioned ‘mindful’ strands, the basic mind, the extended mind, and the derived mind, will determine psycholinguistic research in the years to come as an autonomous but inevitably interdisciplinary sub-discipline, necessarily locked in a prolific confrontation with other sub-disciplines of the science of language teaming with the other collaborating sciences. Thus, the very tentative sketch of the prognostic and final part of the paper should emphasize the significance of psycholinguistic research with respect to its classical ‘natural’ domain, namely the core **B¹B²C** complex of the language-mind interface described above, as well as to the growing tide of studies concerning the more applied domain of interest which concerns the role of the culture complex combined with the application of psycholinguistic research to artificial agents, their ‘minds’, their ‘language codes’ and their ‘linguistic behaviours’ (collectively referred to as the Artificial Intelligence (AI) complex).

The classical and extended (natural) domains of psycholinguistic studies have been focused on:

- natural language
- the ‘natural’ human mind in a comparative perspective
- the ‘extended’ human mind in a comparative perspective.

In addition, the ‘derived’ (i.e. referring to artificial intelligence) domain of psycholinguistic studies has been focused on:

- artificial language(s)
- the artificial mind as an analog of the natural mind
- the hard wired machinery of artificial neuronal networks and its functioning.

In this way, psycholinguistic research has shown in the past half century a well designed symmetry necessarily within the language-mind interface. Whether this symmetry will be maintained and developed any further is for us all to see.

SELECTED BIBLIOGRAPHY

Addis, L. 1989. **Natural signs: a theory of intentionality**. Philadelphia: Temple University Press.

Anderson, J.R. 1983. **The architecture of cognition**. Cambridge, Mass.: Harvard University Press.

Arabski, J. (ed.). 1996. **Foreign language acquisition studies**. Katowice: Wydawnictwo Uniwersytetu Śląskiego.

Arabski, J. (ed.). 1998. **Studies in foreign language learning and teaching**. Katowice: Prace Naukowe Uniwersytetu Śląskiego nr 1666.

Arabski, J. "General trends in language transfer studies". **Proceedings of the 7th Congress of International Society for Applied Psycholinguistics**. (Forthcoming).

Baddeley, A.D. 1976. **The psychology of human memory**. New York: Basic Books.

Baddeley, A.D. 1990. **Human memory**. Boston: Allyn and Bacon.

Baddeley, A.D. 1999. **Essentials of human memory**. Hove, England: Psychology Press.

Barkow, J., L. Cosmides and J. Tooby. (eds.). 1992. **The adapted mind: evolutionary psychology and the generation of culture**. Oxford: Oxford University Press.

Baron-Cohen, S. 1995. **Mindblindness**. Cambridge, Mass.: The MIT Press.

Borden, G.J. and K.S. Harris. 1984. **Speech science primer: physiology, acoustics, and perception**. Baltimore: Williams and Wilkins.

Caplan, D. 1988. "The biological basis for language". In Newmeyer, F.J. (ed.). **Linguistics: the Cambridge survey**. Vol. 3: 237-255.

Caplan, D. 1992. **Language: structure, processing, and disorders**. Cambridge, Mass.: The MIT Press.

Cheney, D.L. and R.M. Seyfarth. 1990. **How monkeys see the world: inside the mind of another species**. Chicago: The University of Chicago Press.

Chomsky, N. 1957. **Syntactic structures**. The Hague: Mouton.

- Chomsky, N. 1959. "A review of B. F. Skinner's *Verbal behavior*". **Language** 35: 26-58.
- Chomsky, N. 1965. **Aspects of the theory of syntax**. Cambridge, Mass.: The MIT Press.
- Chomsky, N. 1966. **Cartesian linguistics: a chapter in the history of rationalist thought**. New York: Harper and Row.
- Chomsky, N. 1968. **Language and mind**. New York: Harcourt, Brace and World.
- Churchland, P.M. 1996. **The engine of reason, the seat of the soul**. Cambridge, Mass.: A Bradford Book/The MIT Press.
- Dale, R., C. Mellish and M. Zock. (eds.). 1990. **Current research in natural language generation**. New York: Academic Press.
- Deacon, T. 1992. "Brain-language co-evolution". In Hawkins, J.A. (ed.). 629-705.
- De Groot, A.M.B. and J.F. Kroll. (eds.). 1997. **Tutorials in bilingualism: psycholinguistic perspectives**. Mahwah, N.J.: Lawrence Erlbaum Associates.
- Dennett, D.C. 1991. **Consciousness explained**. New York: Little Brown.
- Fodor, J.A. 1983. **The modularity of mind**. Cambridge, Mass.: The MIT Press.
- Fodor, J.A., T.G. Bever and M.F. Garrett. 1974. **The psychology of language: an introduction to psycholinguistics and generative grammar**. New York: McGraw-Hill.
- Grossmann, R. 1965. **The structure of mind**. Madison: University of Wisconsin Press.
- Harnad, S.R. 1987. **Categorical perception: the groundwork of cognition**. Cambridge: Cambridge University Press.
- Harnad, S.R. 1990. "The symbol grounding problem". **Physica D** 42: 335-346.
- Hawkins, J.A. (ed.). 1992. **The evolution of human language**. Redwood City, CA: Addison-Wesley.
- Hirschfeld, L.A. and S.A. Gelman. (eds.). 1994. **Mapping the mind: domain specificity in cognition and culture**. Cambridge: Cambridge University Press.
- James, W. 1890. **The principles of psychology**. New York: Holt.
- Johnson, M.H. (ed.). 1993. **Brain development and cognition**. Oxford: Blackwell.
- Johnson-Laird, P.N. 1988. **The computer and the mind: an introduction to cognitive science**. Cambridge, Mass.: Harvard University Press.
- Kess, J.F. and T. Miyamoto. 2003. **Japanese psycholinguistics: a classified and annotated research bibliography**. Amsterdam: John Benjamins.
- Kroll, J.F. and N. Tokowicz. 2001. "The development of conceptual representation for words in a second language". In: Nicol, J.L. (ed.). **One mind, two languages: bilingual language processing**. Oxford: Blackwell. 49-71.
- Kurcz, I. 1976. **Psycholingwistyka**. Warszawa: Państwowe Wydawnictwo Naukowe.

- Kurcz, I. 1987. **Język a reprezentacja świata w umyśle**. Warszawa: Państwowe Wydawnictwo Naukowe.
- Kurcz, I. 1992. **Język a psychologia**. Warszawa: Wydawnictwa Szkolne i Pedagogiczne.
- Kurcz, I. 2000. **Psychologia języka i komunikacji**. Warszawa: Wydawnictwo Naukowe „Scholar”.
- Kurcz, I. ”Communicative competence and the theory of mind”. **Proceedings of the 7th Congress of International Society for Applied Psycholinguistics**. (Forthcoming).
- Lenneberg, E.H. 1967. **Biological foundations of language**. New York: Wiley and Sons.
- Levelt, W.J.M. 1989. **Speaking: from intention to articulation**. Cambridge, Mass.: The MIT Press.
- Levy, Y. and G. Kahé. 1999. ”Language breakdown and linguistic theory: a tutorial overview”. **Lingua** 107: 95-143.
- Lieberman, A.M. 1970. ”The grammars of speech and language”. **Cognitive Psychology** 1. 301-323.
- Lieberman, A.M., I.G. Mattingly and M.T. Turvey. 1972. ”Language codes and memory codes”. In: Melton, A.W. and E. Martin. (eds.). **Coding processes in human memory**. Washington, D.C.: Winston and Sons.
- MacWhinney, B. 1984. ”Where do categories come from?”. In: Sophian, C. (ed.). **Child categorization: the origins of cognitive skills**. Hillsdale, N.J.: Lawrence Erlbaum Associates. 407-418.
- MacWhinney, B. (ed.). 1998. **The emergence of language**. Mahwah, N.J.: Lawrence Erlbaum Associates.
- Madell, G. 1988. **The mind and materialism**. Edinburgh: Edinburgh University Press.
- Mattingly, I.G. and A.M. Liberman. 1990. ”Speech and other auditory modules”. In: Edelman, G.M., W.E. Gall and W.M. Cowan. (eds.). **Signal and sense: local and global order in perceptual maps**. New York: Wiley and Sons.
- Mehler, J. and R. Fox. (eds.). 1985. **Neonate cognition: beyond the blooming, buzzing confusion**. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Mervis, C., C. Morris, J. Bertrand and B. Robinson. 1999. ”Williams Syndrome: findings from an integrated research program”. In: Tager-Flusberg, H. (ed.). **Neurodevelopmental disorders**. Cambridge, Mass.: The MIT Press. 65-110.
- Minsky, M.L. 1986. **The society of mind**. New York: Simon and Schuster.
- Murry, T. and J. Murry. (eds.). 1980. **Infant communication: cry and early speech**. Houston: College-Hill Press.

- Nagel, T. 1974. "What is it like to be a bat?". **Philosophical Review** 83: 435-450.
- Neisser, U. 1967. **Cognitive psychology**. New York: Appleton-Century-Crofts.
- Neisser, U. 1976. **Cognition and reality: principles and implications of cognitive psychology**. San Francisco: W. H. Freeman.
- Neisser, U. (ed.). **Concepts and conceptual development: ecological and intellectual bases of categories**. Cambridge: Cambridge University Press.
- Osgood, C.E. and T.A. Sebeok. (eds.). 1954. **Psycholinguistics: a survey of theory and research problems**. Supplement to the International Journal of American Linguistics. 20(4): Baltimore.
- Parker, S.T. and K.R. Gibson. (eds.). 1990. **'Language' and intelligence in monkeys and apes: comparative developmental perspectives**. Cambridge: Cambridge University Press.
- Perner, J. 1991. **Understanding the representational mind**. Cambridge, Mass.: The MIT Press.
- Pinker, S. 1994. **The language instinct: how the mind creates language**. New York: Morrow.
- Pinker, S. 1997. **How the mind works**. New York: Norton.
- Pinker, S. 1999. **Words and rules**. New York: Basic Books.
- Premack, D. and G. Woodruff. 1978. "Does the chimpanzee have a theory of mind?". **Behavioral and Brain Sciences** 4: 515-526.
- Puppel, S. 1988. **Aspects of the psychomechanics of speech production**. Poznań: Wydawnictwo Naukowe UAM.
- Puppel, S. 1992. **The dynamics of speech production**. Frankfurt: Peter Lang Verlag.
- Puppel, S. 1998. "Psycholingwistyka: przypadek konwergencji pozytywnej dwóch nauk szczegółowych o człowieku". In: Puppel, S. (ed.). **Scripta manent**. Poznań: Motivex. 183-192.
- Puppel, S. 1999. "Psycholinguistics and the foreign language teacher". **Acta Neophilologica** I: 73-83.
- Puppel, S. 2000. "Psycholingwistyka a nauczanie języków obcych: próba krótkiego podsumowania". In: Puppel, S. and K. Dziubalska-Kolaczyk. (eds.). **Multis vocibus de lingua**. Poznań: Motivex. 129-141.
- Puppel, S. 2001. **A bibliography of writings on the acquisition of first language**. Poznań: Wydawnictwo Naukowe UAM.
- Puppel, S. 2001. **A concise guide to psycholinguistics**. Poznań: Wydawnictwo Poznańskie.

- Puppel, S. 2003. "Psycholinguistics". In: Stekauer, P. and S. Kavka. (eds.). **Rudiments of English linguistics II**. Presov: Acta Facultatis Philosophicae Presoviensis. 121-148.
- Puppel, S. 2004. "An outline of a domain-resource-agent-access-management (DRAAM) model of human communication: towards an ecology of human communication". **Oikeios Logos** 1: 1-26.
- Redy, M.J. 1979. "The conduit metaphor: a case of frame conflict in our language about language". In: Ortony, A. (ed.). **Metaphor and thought**. Cambridge: Cambridge University Press. 164-201.
- Rolls, E.T. 1997. "Consciousness in neural networks?". **Neural Networks** 10: 1227-1240.
- Rosch, E. 1973. "On the internal structure of perceptual and semantic categories". In: Moore, T.E. (ed.). **Cognitive development and the acquisition of language**. New York: Academic Press. 111-144.
- Rosch, E. and B.B. Lloyd. (eds.). 1978. **Cognition and categorization**. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Rumelhart, D.E. and J.L. McClelland. (eds.). 1986. **Parallel distributed processing: explorations in the microstructure of cognition**. Cambridge, Mass.: The MIT Press.
- Ryle, G. 1949. **The concept of mind**. London: Hutchinson.
- Searle, J.R. 1992. **The rediscovery of the mind**. Cambridge, Mass.: The MIT Press.
- Shear, J. (ed.). 1997. **Explaining consciousness: the hard problem**. Cambridge, Mass.: The MIT Press.
- Smith, M.D. and J.L. Locke. (eds.). 1988. **The emergent lexicon: the child's development of a linguistic vocabulary**. New York: Academic Press.
- Skinner, B.F. 1957. **Verbal behavior**. New York: Appleton-Century-Crofts.
- Skinner, B.F. 1963. "Behaviorism at fifty". **Science** 140: 951-958.
- Slama-Cazacu, T. (ed.). 1968. **Introducere in psiholingvistică**. București: Academiei București.
- Slama-Cazacu, T. 1972. **La psycholinguistique. Lectures**. Paris: Klincksieck.
- Slama-Cazacu, T. 1972. "The study of child language in Europe". In: Sebeok, T.A. (ed.). **Current trends in linguistics**. The Hague: Mouton. 512-590.
- Smith, E. and D. Medin. 1981. **Categories and concepts**. Cambridge, Mass.: Harvard University Press.
- Steels, L. 1998. "The origins of syntax in visually grounded robotic agents". **Artificial Intelligence** 103: 1-24.

- Steels, L. and F. Kaplan. 2002. "AIBO's first words: the social learning of language and meaning". **Evolution of Communication** 4(1): 3-32.
- Thelen, E. and L.B. Smith.(eds.). 1994. **A dynamic systems approach to the development of cognition and action**. Cambridge, Mass.: The MIT Press.
- Tooby, J. and L. Cosmides. 1992. **Ecological rationality and the multimodular mind**. Santa Barbara, CA: University of California, Center for Evolutionary Psychology.
- Tooby, J. and L. Cosmides. 1992. "The psychological foundations of culture". In Barkow, J.H. et al. (eds.).
- Tye, M. 1995. **Ten problems of consciousness: a representational theory of the phenomenal mind**. Cambridge, Mass.: The MIT Press.
- Walsh, K. 1978/1987/1994. **Neuropsychology: a clinical approach**. London: Churchill Livingstone.
- Wang, P. and U. Bellugi. 1994. "Evidence from two genetic syndromes for a dissociation between verbal and visual-spatial short-term memory". **Journal of Clinical and Experimental Neuropsychology** 16: 317-322.
- Wellman, H. 1990. **The child's theory of mind**. Cambridge, Mass.: The MIT Press.
- Whiten, A. (ed.). 1991. **Natural theories of mind: evolution, development and simulation of everyday mindreading**. Oxford: Blackwell.
- Wilson, R.A. and F.C. Keil. (eds.). 1999. **The MIT encyclopedia of cognitive sciences**. Cambridge, Mass.: The MIT Press.