Apresentando um instrumento de avaliação da comunicação à Fonoaudiologia Brasileira: Bateria MAC******

Introducing a communication assessment tool to Brazilian speech therapists: the MAC Battery

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Abstract

Background: an assessment instrument to evaluate communication impairment after right brain damage: the Montreal Communication Evaluation Battery, an adapted brazilian version of the original canadian instrument - *Protocole Montréal d'Évaluation de la Communication.* Instruments that evaluate discursive, pragmatic, lexical-semantic and prosodic impairments are important for the diagnosis of communication disorders which are present in approximately 50% of the individuals with right brain damage. Systematic studies of the communication profile after lesions on this side of the brain have been carried out only during the last two decades. Aim: to present the Montreal Communication Evaluation Battery to brazilian speech therapists. Conclusion: the described instrument is an useful tool in the clinic for assessing four processes related to the communicative and linguistic abilities: discursive, pragmatic-inferential, lexical-semantic and prosodic components. It is has been normalized, validated and its reliability has been confirmed. Although this instrument was developed and adapted for diagnosing communication disorders in individuals with right brain damage people, it can also be helpful in investigating communication sequels in traumatic brain injury, dementia, bilateral frontal lesions, left-brain damage, psychopathologies, such as schizophrenia, among others.

Key Words: Communication; Evaluation; Stroke; Neuropsychological Tests.

Resumo

Tema: um instrumento de avaliação de déficits comunicativos após lesão de hemisfério direito: Bateria Montreal de Avaliação da Comunicação, versão brasileira adaptada do instrumento original canadense *Protocole Montréal d'Évaluation de la Communication*. Ferramentas de avaliação dos déficits discursivos, pragmáticos, léxico-semânticos e prosódicos são necessárias para o diagnóstico dos distúrbios da comunicação presentes em aproximadamente 50% dos indivíduos lesados de hemisfério direito. O quadro comunicativo após acometimento desse lado do cérebro vem sendo estudado sistematicamente há apenas duas décadas. Objetivo: apresentar a Bateria Montreal de Avaliação da Comunicação aos fonoaudiólogos brasileiros. Conclusão: o instrumento apresentado mostra-se uma ferramenta clínica útil no exame das habilidades lingüísticas e comunicativas relacionadas a quatro processamentos: discursivo, pragmático-inferencial, léxico-semântico e prosódico. Está normatizado, validado e sua fidedignidade foi confirmada. Embora tenha sido construído e adaptado para o exame dos distúrbios comunicativos em pacientes lesados de hemisfério direito, também pode auxiliar na investigação de seqüelas na comunicação em quadros de traumatismo crânio-encefálico, demência, lesões frontais bilaterais, lesões de hemisfério esquerdo, psicopatologias como a esquizofrenia, entre outros.

Palavras-Chave: Comunicação; Avaliação; Acidente Vascular Cerebral; Testes Neuropsicológicos.

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Introduction

The left brain hemisphere (LH) is no longer considered unique in linguistic processing. This exclusivity was based on the cerebral dominance notion, which proposes a hemispheric tendency for information processing control of a determined function1. The importance of right hemisphere (RH) integrity for several linguistic components is nowadays acknowledged 2.

Left hemisphere exclusivity was preponderant until 1959, when Eisenson suggested that a RH lesion could justify communicative impairment3. However, only from the late 1980s on there was a considerable increase in publications on the role of the RH in language processing3-5. Since the 1990s, the brain decade6, neuroimaging techniques experienced an important advance7. With this technical and methodological support, several investigations were developed with neuroimaging examinations of linguistic processing, in corpus-callotomized, hemispheroctomized and brain-damaged individuals, as well as in neurologically healthy individuals.

Such studies have greatly contributed to promote a review on the language neurobiological correlates. Accordingly to the initial notion proposed in the XIX century, the classical language regions are Broca and Wernicke's areas and the arcuate fasciculus. Nowadays, studies refer to associative cortical areas (regions adjacent to the classic language areas), subcortical structures (thalamus, caudate nucleus, putamen, cingulated gyrus), cerebellum and RH regions, some of them analogous to Broca and Wernicke's regions8-9. It is acknowledgeable, thus, that an inter- and an intra-hemispheric contribution takes place in order to promote effective communication.

To sum up, since the 1950s, besides the classic association between LH lesion and aphasia, studies on the correlates of RH lesion and communicative deficits have been more and more frequent in the literature10-11. More systematically in the two past decades, specific symptoms of communicative abilities' impairment have been referred to as the RH "syndrome"12-13.

Post RH lesion communication deficits may involve four communicative processes: discursive, pragmatic-inferential, lexical-semantic, and prosodic3, in production and comprehension levels. Changes in discourse production include absence of coherence, reduction in informative content and difficulty in changing topics. Discourse is tangential and unclear. Regarding discourse comprehension, RH brain-damaged individuals may present important difficulties in synthesize or infer information which has not been explicited14-15.

Changes in pragmatic-inferential abilities in RH brain-damaged population seem to be the most emphasized16: difficulty in following conversational rules, such as communicative turn shift and sharing information, difficulty in adequately considering contextual hints for the comprehension of non-literal elocutions, such as indirect speech acts, metaphors, humor or sarcasm10.

Regarding disturbances in lexical-semantic processing, word comprehension and production may be altered, mainly in cases of low frequency and concreteness of the words4. RH brain lesion may as well lead to difficulties in understanding metaphoric words17 and in properly identifying functional or categorical relationships among words18.

Finally, impairments in prosodic processing encompass deficits in the comprehension and production of linguistic and emotional intonations11,19. Right-hemisphere-brain-damaged individuals may have their speech with diminished or absent intonation, or do not properly distinguish linguistic intonations (for example, request interrogation) and emotional intonations (for example, happiness as a consequence of surprise).

Approximately 50% of RH brain-damaged people present acquired communicative impairment20-21, resulting in a significant communicative disadvantage. The loss of RH integrity due to a brain vascular lesion and the consequent disturbances in several communicative components affect social interactions and generate a relevant psychosocial and functional impact13,22. These individuals represent, therefore, an important neurological population which must be defined to be referred to rehabilitation centers.

Controversies exist in the literature concerning RH exclusivity in the communicative deficits described above. Some authors report disturbances in non-literal language comprehension in aphasics, both in idiomatic expressions interpretation23, as well as in indirect speech acts24. Two hypotheses may be formulated:

1. Left-hemisphere-brain-damaged individuals may perform less successfully in figurative language tasks as a consequence of not adequately process the formal linguistic components, such as syntactic aspects.
2. Well-succeeded communication occurs by means of an inter-hemispheric cooperation; thus, non-literal language processing should as well depend on the activation of LH regions.

This second hypothesis has been corroborated by findings brought by a magnetic functional imaging study on emotional prosody recognition25. Three stages of activation have been found, the two first ones in the RH and the third, in the LH. Research comparing performance of control participants, RH and LH brain-damaged groups has reported a tendency for LH brain-damaged individuals to perform less accurately than control groups, but superiorly to RH brain-damaged groups26. Thus, a better understanding of the RH brain-damaged individuals' communicative profile is still necessary, including an investigation of possible similarities with the LH brain-lesion population and of inter-hemispheric cooperation in communication.

The only consensus in the literature refers to the impossibility of considering post RH lesion alterations as classic aphasic deficits. Right-hemisphere-brain-damaged population presents preserved phonological, morphological, syntactic and literal semantic aspects.

Having this in mind, traditional tests elaborated for language assessment in aphasia do not present tasks, nor stimuli sensitive enough to detect communicative changes following RH lesion. However, before the 1980s, clinicians evaluated RH brain-lesion with instruments designed to evaluate aphasia, since there were no specific standardized tests to examine specialized cognitive and/or communicative functions of this hemisphere until 1985. The absence of instruments has probably contributed to a delay in the studies on communicative impairments following a RH brain lesion.

From 1985 until de end of the 1990 decade, some instruments have been developed for the assessment of cognitive and/or communicative abilities related to the RH: RICE (Rehabilitation Institute of Chicago Evaluation of Communication Problems in Right Hemisphere Dysfunction), in 1985; RIPA (Ross Information Processing Assessment), in 1986; Pragmatic Protocol, in 1987; MIRBI (Mini Inventory of Right Brain Injury), in 1989; and RHLB (Right Hemisphere Language Battery), in 1989. These batteries evaluate visual perception, corporal perception and schema, visuospatial processing, short term memory, time and spatial orientation, narrative discourse, metaphorical comprehension, among other general neuropsychological abilities. The majority of them, except for the RHLB, include few tasks examining linguistic processing accomplished specifically by the RH, presenting theoretical and/or methodological limitations. The former are represented mainly by the lack of an updated theoretical basis: since all batteries were founded on the literature of the 1980s or previous to that, their development was not guided by important advances brought by cognitive psychology and psycholinguistics. Methodological limitations can be exemplified by the inclusion of few tasks or few stimuli per communicative dimension and by the preponderant presence of visuospatial tasks. A general comment can still be made: the instruments mentioned above have been published in English, with no tests originally edited in Latin languages, which demands higher attention in its adaptation3.

In this way, it is observable that even after the important evolution in the evaluation of RH functions, a clinical demand remains: regarding the quality of the assessments of language impairment following RH lesion and the necessity of adaptations to various languages. This demand may justify, at least partially, the fact of clinical practice with RH brain-damaged populations still remain as an underdeveloped speech therapy activity22. In this context, a Canadian group has developed the Protocole d'Évaluation de la Communication, Protocole MEC, published in French in 20043,22.

In Brazil, to our knowledge, there are no instruments available to assess communicative abilities which may be affected in RH lesion cases. Aphasia is one of the acquired neurological disturbances more widely studied. It is not surprising, then, that it has received a higher focus on tests evaluating LH language abilities in the Brazilian literature and its consequently higher clinical use27-29. Aiming to reduce this demand, this article presents the "Bateria Montreal de Avaliação da Comunicação" - "Bateria MAC", the Protocole MEC version adapted to Brazilian Portuguese30, which is relevant considering the following reasons:

. this is the first instrument for communicative assessment related to the RH adapted for its use in Brazil;
. this battery was launched by Pró-Fono Publishers still in 2008, being very recent;
. clinical descriptions of this neurological population are still very scarce, which indicates a need for the Brazilian speech therapy to more deeply assess communicative changes following RH lesion;
. an increase in clinical descriptions of communicative impairment in RH brain-damaged individuals may lead to a health care professionals' sensitivity and awareness regarding the necessity of sending these patients to rehabilitation;
. specific rehabilitation programs may be formulated with a standardized clinical tool which complements the communicative exam in this case.

The Bateria Montreal de Avaliação da Comunicação - Bateria MAC

The Protocole MEC3,22, has been developed with the aim of assessing four communicative processes: discursive, pragmatic-inferential, lexical-semantic and prosodic processing. It comprises 14 tasks: a questionnaire on the awareness about difficulties; conversational discourse; metaphor interpretation; free lexical recall; linguistic prosody - comprehension; linguistic prosody - repetition; narrative discourse; lexical recall with orthographic criterion; emotional prosody - comprehension; emotional prosody - production; semantic judgment. Figure 1 represents tasks distribution according to the types of processing they assess.

The aim of each subtest is described in Table 1.

The Protocole MEC was standardized with 180 individuals neurologically healthy of different ages (39 to 93) and educational level (0 to 30 years of formal education). It showed good reliability due to precision among raters and adequate content validity22. It was or is being adapted to be applied in several countries: Argentina, France, Iran, Switzerland and the United States of America, among others.

The Brazilian version, the MAC Battery, was standardized with 300 neurologically healthy individuals, from 19 to 75 years of age, with 2 to 35 years of schooling. Its adequate reliability was confirmed, with evidence of content, construct and criteria validity30.

In its rating and application manual, there are detailed norms of how to apply, register and interpret each task. An alert cut off point was established for each normative group: three age groups (19-30, 40, 40-59 and 60-75 years), subdivided in two schooling groups (2-7 years of schooling and 8 or more years). Based on this alert point, a score from which the examiner should suppose that the communicative deficits found are related to RH lesion22, the clinician will be able to diagnose communicative changes. Such diagnose must, obviously, be complemented by a well-detailed anamnesis, by an instrument of functional communication assessment, which verifies the impact of the communicative impairment in daily life and the patients' level of independence, as well as by clinicians' observation and impression. The tasks of the MAC Battery are briefly described in Table 2.

Besides including the norms for quantitative interpretation of each subtest, in the application and rating manual there are as well some suggestions for qualitative analysis. For instance, in the free lexical retrieval task, it is suggested that the presence of errors should be examined, such as word repetition, what could indicate perseveration, and the exploration strategy used, such as orthographic or semantic criterion.

FIGURE 1. Diagram of the distribution of the 14 tasks of the MAC Battery according to communicative processes.

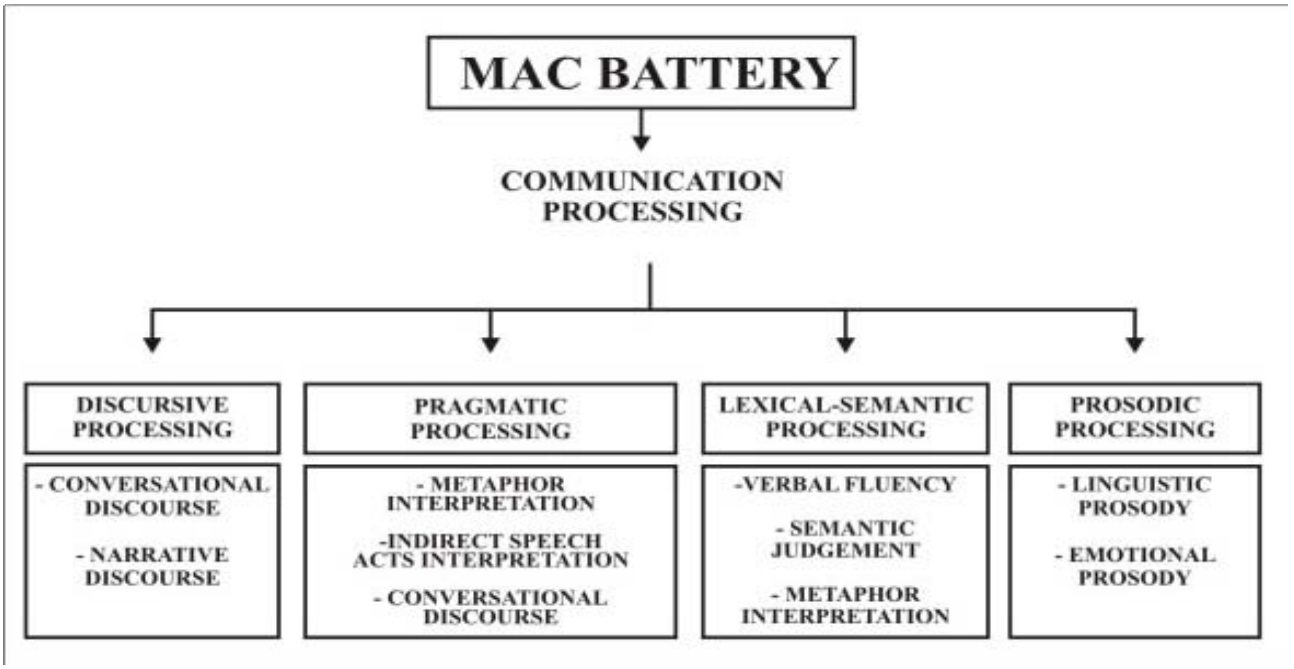

TABLE 1. Aims of the subtests of the MAC Battery.

Subtests	Aims
Questionnaire on the awareness of the impairment	To investigate the awareness of language impairment and its impact in daily life of brain-damaged people, that is, the occurrence of anosognosia (when the patient does not recognize or partially recognize his or her impairment)
Conversational discourse	To examine verbal and non-verbal behavior in conversational situations, including the analyses of pragmatic aspects
Metaphor interpretation	To verify the comprehension of non-literal language present in new metaphorical sentences and in idiomatic expressions
Verbal fluency	To assess the ability of producing vocabulary in three conditions: free or unconstrained, with orthographic criterion and with semantic criterion
Linguistic prosody	To investigate repeated comprehension and production of prosodic characteristics in statements, questions and orders
Emotional prosody	To assess repeated and spontaneous comprehension and production of prosodic characteristics indicating emotions related to anger, happiness and sadness
Narrative discourse	To examine partial and integral narrative retelling, as well as its comprehension
Indirect speech acts interpretation	Verify non-literal comprehension of indirect speech acts, by examining the perception of interlocutors' intentions in communicative situations
Semantic judgment	To analyze the ability of identifying and explaining semantic relationships between two words

TABLE 2. Description of the 14 tasks of the MAC Battery.

Communicative processing	Task		Description
Prosodic	Linguistic prosody	Comprehension	12 sentences pre-registered in audio (4 sentences with neutral content, each one recorded in three different linguistic intonations). The patient identifies the intonation aided by three pictures indicating: 1) statement, 2) question and 3) order. Maximum score: 12 points.
		Repetition	The stimuli were the same as in the previous task. The participant repeats the sentences. Maximum score: 12 points.
	Emotional prosody	Comprehension	12 sentences pre-registered in audio (4 sentences with neutral content, each one recorded in three different linguistic intonations). The patient identifies the intonation aided by the pictures of three faces indicating: 1) sadness, 2) happiness and 3) anger. Maximum score: 12 points
		Repetition	The stimuli were the same as in the previous task. The participant repeats the sentences. Maximum score: 12 points.
		Production	Nine short texts with communicative situations inducin g to an emotion (3 situations – happiness, sadness and anger, with 3 target sentences). The patient produces the target sentence with the appropriate intonation. Maximum score: 18 points.
Lexical-semantic	Verbal fluency	Unconstrained	The patient says the maximum possible number of words in two minutes and a half, without any criterion.
		With orthographic constraint	The patient says the maximum possible number of words starting with the letter "p" for two minutes.
		With semantic constraint	The patient says the maximum possible number of words which represent clothes for two minutes. In the three modalities, one point is attributed to each evoked word.
	Semantic judgment		24 pairs of words, 12 with and 12 without semantic categorical relationship. The pati ent indicates whether there is or not a semantic relationship and, in case there is one, explains this relation. Maximum identification score: 24 points and maximum explanation score: 12 points
Discursive	Conversational discourse		Ten-minute conversation between the patient and the examiner about two different topics; systematic analysis of 17 communicative variables filled in by the examiner. Maximum score: 34 points.
	Narrative discourse		Narrative of five paragraphs, firstly retold by paragraph and later retold in the integral version, with 12 questions of text interpretation, title attribution and analysis of inference processing. Maximum score of partial retelling: 18 points; maximum score of integral retelling: 13 points; maximum score of questions: 12 points; title maximum score: 2; presence or absence of inference.
Pragmatic	Metaphor interpretation		20 metaphors: 10 new metaphors (not lexicalized) and 10 idiomatic expressions (lexicalized). The patient explains each sentence and answers to a multiple choice question (alternative explanation choices). Maximum score: 40 points.
	Indirect speech acts interpretation		20 situations: 10 ending by a direct speech act and 10 by an indirect speech act. The patient explains the interlocutor's intention in the communicative situation and answers to a multiple choice question (alternative explanation choices). Maximum score: 40 points.
Awareness of the impairments	Questionnaire on the awareness of the impairments		7 yes-no questions about the patient's awareness of his/her possible impairment. Maximum score: 7 points.

A screening of communicative deficits accompanies the MAC Battery, complementing the communication assessment of neurological populations. This screening is composed by an open question and 15 yes/no questions which explore the changes in the individuals' communication patterns, by the consultation of a family member, friend and/or caregiver who establishes a comparison between the patients' pre and post-lesion communication ability.

This clinical tool was edited and made available by Pró-Fono Publishers to Brazilian speech therapists and neuropsychologists in 2008. Its material includes an introductory manual - with theoretical background and psychometric data, application and rating manual, registration protocol, stimuli book and cd-rom with prosodic and written stimuli. For the exam with the screening of communicative deficits, two versions are available: one to be filled in by the clinician and the other, directly by a family member, friend or caregiver.

Finally, there is an explanation for the decision on choosing the Protocole MEC, among all the other international tools, to be adapted to Brazilian Portuguese:

. its theoretical support includes the significant advances in the areas of cognitive psychology, psycholinguistics and neuroimaging techniques which occurred since the 1990 decade;
. the Protocole MEC evaluates the four types of communicative processing which may be affected following a RH lesion, differently from the majority of the other batteries, which prioritize one or other component;
. it is the only one published in a Latin-based language, favoring its adaptation to other languages of similar origin;
. task selection of Protocole MEC was founded on the study of clinical manifestations of RH brain-lesion population;
. the protocol is relatively easy to be applied and rated, of pen-paper type, with an average duration of two 45-minute sessions;
. rating norms were developed for each task, allowing the clinician to apply some subtests in isolation.

Despite of the rigorous clinical and scientific quality of Protocole MEC, its authors themselves mention two limitations3. It does not offer an exhausting evaluation of communicative components. Sarcasm and humor comprehension and production, for instance, are only indirectly assessed in conversational discourse, without being the focus of a specific subtest. Moreover, as it does not aim to assess other cognitive deficits which may characterize the RH post-lesion clinical state, like attention, visuospatial perception or working memory deficits, it does not specify the underlying cause of the language impairment. Therefore, it must be complemented by a wider neuropsychological assessment.

Conclusion

The MAC Battery has proven to be a valid and reliable clinical tool in the process of assessing discursive communicative, pragmatic, lexical-semantic and prosodic abilities. The adoption of a validated communication battery, together with neuropsychological tasks, will favor the description of the many communicative changes which may occur following cerebrovascular accidents in the RH, as well as in other neurological disorders.

With the use of the MAC Battery in Brazil, the following aims can be reached in further studies:

. contribute for the description of the different types of communicative changes in RH post-lesion;
. identify the associated lesion sites;
. relate the profiles of the communicative deficits to underlying cognitive changes;
. verify the real difficulties for adaptation to real life of each clinical subgroup;
. provide subsidies for planning adequate strategies for the patient's rehabilitation and adaptation;
. verify rehabilitation programs' efficiency, among others.

The MAC Battery was adapted to assess communicative impairments in RH brain-lesion patients, being able to evaluate communication in cases of closed head injury, dementia, bilateral frontal lesions, LH unilateral lesions, brain tumors, cerebellar lesions, psychopathologies such as schizophrenia and Asperger Syndrome, among others.

It is relevant to observe that the practice of Brazilian speech therapy instruments' construction and of adaptation of international clinical tools to Brazilian Portuguese is still very incipient. In order to improve the arena of language and communication assessment, the use of precise, valid and sensitive tests is extremely important to complement an accurate diagnostic process.

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