

THE RELEVANCE OF PATIENT INDIVIDUALITY IN THE EVALUATION AND TREATMENT OF APHASIA

CASE REPORT

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ABSTRACT - The usual approach to language disorders relies on standardised evaluations in which pattern-tests characterise the subject's status according to the classical aphasiological typology. Those data are then analysed to support a traditional prevalent criterion for the distinction between "normal" and "pathological" linguistic performance, which is strictly focused on a quantitative approach. In the present study a method for evaluation and treatment of aphasia is proposed in which socio-cultural conditions are emphasised, in order to expand this conventional criterion as to encompass a qualitative (individualised) one. Although the methodology draws the attention, the results here obtained also point to the importance of re-evaluating what is presently considered as the most appropriate criterion for "normal" cognitive processes, particularly those related to language.

KEY WORDS: neuropsychological tests, aphasia, aphasia rehabilitation, conduction aphasia.

Relevância da individualidade do paciente na avaliação e tratamento de afasia: relato do caso

RESUMO - Na literatura relativa à neuropsicologia da linguagem prevalece como modelo de investigação a adoção de testes destinados à avaliação normatizada de indivíduos afásicos, o que permite uma análise padronizada e subsequentemente a classificação do sujeito de acordo com as tipologias afasiológicas clássicas. Neste contexto, tais dados estão sendo considerados à luz do critério atualmente vigente, que propõe uma distinção estritamente quantitativa entre o desempenho linguístico "normal" e o "patológico". Neste estudo desenvolvemos abordagem metodológica para avaliação e tratamento de sujeitos afásicos com o intuito de priorizar suas condições sócio-culturais, incorporando assim ao critério convencional um aspecto eminentemente qualitativo. Ainda que o objeto do estudo seja a metodologia apresentada, os resultados obtidos indicam a importância de debate em torno de reavaliação do que se considera presentemente como critério de "normalidade" para análise dos processos cognitivos, e em particular da linguagem.

PALAVRAS-CHAVE: testes neuropsicológicos, afasia, reabilitação em afasias, afasia de condução.

Language became a part of clinical neurology ever since Broca's studies revealed, as early as 1861, that a specific cortical area was involved in a conspicuous expression of speech¹. Due to its complex character the study of language is an example of how several approaches can be employed in concert and, yet, keep their practical concerns and theoretical aims, ranging from linguistics to clinical neurology.

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Handling an aphasia includes at least three aims: 1) diagnosis of the type of aphasia and, consequently, the most likely lesion localisation; 2) providing a wide-ranging assessment of the initial language impairment, so that its changes over time can be properly detected and evaluated; and 3) analysing the liabilities of the patient, which leads to select an adequate therapy¹⁸. Another aim can be added, namely the potential value of neuropsychological fractionation for the study of "normal language" processing mechanisms and their neural instantiation³⁰.

As to the first aim, although a relatively detailed functional map of the human brain is available, for some authors the spatial resolution and validity of such map are still questionable. It has been suggested that such limitation arose from several factors, mainly the restricted availability of adequate studies of brain-damaged subjects, the anatomically imprecise nature of human brain lesions, and also the confounding effects of compensating mechanisms that could be recruited to counteract the behavioural disruption¹⁹.

However the modern development of neuroimaging techniques, with the advent of computerised tomography (CT) and magnetic resonance scanning (MR), has led to their wide utilisation in humans for investigating functional neuroanatomy, as their results by far exceeds those attainable previously^{7,19,36}. Indeed, the anatomical resolution of the procedures nowadays used have substantially contributed to consolidate the revival of the *lesion method* [The *lesion method* presents as its main purpose the link of neuropsychological features and dimensions, to specific lesion probes, on the basis of theoretically motivated accounts of neural relationships⁹.] as a principal means to investigate the neural basis of human behaviour and cognition, linguistic abilities included⁹. According to this assumption, the lesion method accuracy is taken as a straight consequence of the anatomical resolution of the procedures, as well as of the adequacy of the neuropsychological studies with which they are correlated⁹.

Taking all this into account, it seems that the classical neuropsychological taxonomies, at least those related to language and aphasia, could be reconsidered as they have been almost reduced to a theoretical framework that include multiple typologies as defined by standardised criteria¹². The relevance of a proper evaluation of such a theoretical background has been stressed not only concerning their utilisation in diagnosis and therapy but also as to their adequacy for guiding research on both normal and brain-damaged people^{9-11,24}.

Currently, the studies of neuropsychology related to language and cognitive processes in general express a quantitative perspective as the prevalent paradigm due to historical and epistemological reasons^{2,3,12,22}. The approaches in diagnosing and studying language deficits usually adopt single or short-period evaluations and the criteria are metalinguistic tasks that do not take into account either socio-cultural or correlated epilinguistic parameters but are altogether assembled as the classically adopted written and spoken tests. The results thereby obtained are then submitted to statistical analyses and the aphasic syndrome is finally identified according with the available neuropsychological and topographical classifications^{1,29}. Occasionally these standardised evaluations include the personal components obviously participating in any aphasic clinical pattern. Nevertheless, this individualising approach lacks a real epilinguistic accent whether regarding diagnosis or therapy^{35,37,38}.

By the way, several authors have drawn particular attention to single-case techniques applied to prospective studies, which could disclose reliable information concerning recovery of cognitive functions⁴. A careful collection of clinical data assures the possibility of having comparable natural lesions so that the associations that may be established at a single-case study level can be credibly replicated [According to Damasio & Damasio⁹, the greater degree of precision in the formulation of hypotheses and the statistical power of experiments have increasingly led the clinical studies to rely on small group subjects or even single cases.]. Furthermore, single-case studies may provide an appropriate bridge between neurolinguistics and psycholinguistics^{25,26}.

The present study reports a case and proposes a method in which the patient individual characteristics are given in high priority in both evaluation and therapeutics of aphasia.

CASE REPORT

OPL, a 49 year old right-handed man [For handedness the subject was investigated according to the Edinburgh Inventory³³. The data so obtained pointed out to a very marked right-handed preference (LQ =+71)], was admitted to the emergency room immediately after a sudden impairment of consciousness. He had complained of a severe frontal headache (transient episodes) for about one month and at neurologic examination he presented a confusional state as also jargon speech associated with nuchal stiffness. With regards the major risk factors, OPL had been previously followed up since he had presented arterial hypertension. Yet no changes were detected at the ECG examination at any moment.

Neuroradiological studies supported the clinical hypothesis of a subarachnoid haemorrhagic accident, as the cerebral angiography showed at that moment multiple saccular aneurysms in the right common carotid (at the bifurcation level) and in the right middle cerebral artery (at the trifurcation), as well as in the left middle cerebral artery (also at the trifurcation), which one was then ligated. There are no data concerning CT studies at that time. Four years after surgery the CT evaluation showed an extensive low density area including the left temporal, parietal and occipital lobes, with the equivalent area on the right preserved (Fig 1). The anatomical analysis of all imaging material has been based on the standard procedures set by Damasio & Damasio⁹. The involvement occurred in a large sector of the left middle cerebral artery territory. Actually, it partly attained the areas which

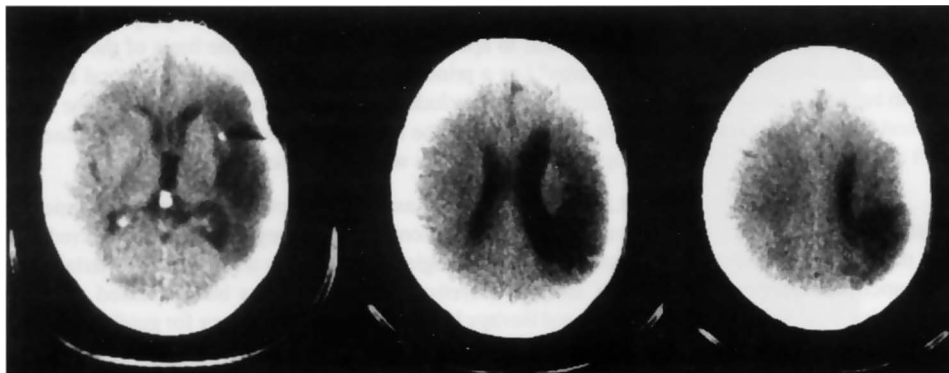


Fig 1. CT evaluation obtained four years after surgery. The CT image (10 mm transverse cuts) shows a well-defined and extensive area of low density in the left temporal, parietal and occipital lobes. Note the size of the left lateral ventricle, which is unequivocally enlarged, especially in the occipital horn (center cut).

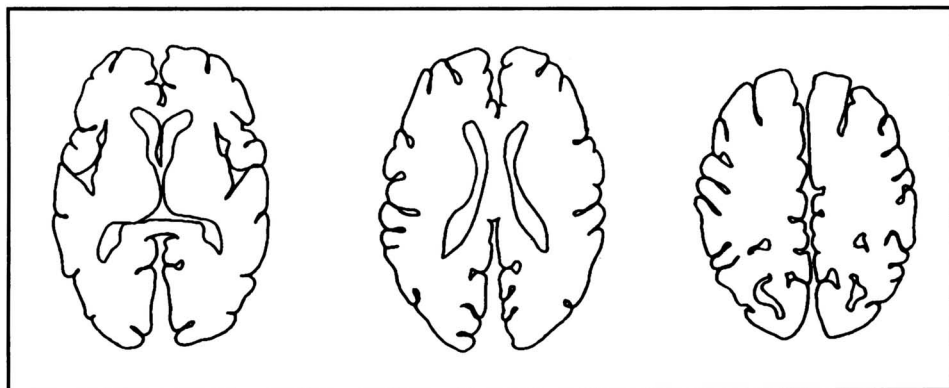


Fig 2. Corresponding templates show the lesion seen in Fig 1 transposed to the best-fitting template set (according to Damasio & Damasio⁹). The area of damage that encompasses all the abnormal images refers to the pre-motor region, the Rolandic region, the auditory region (including its posterior aspect), and the inferior temporal gyrus (posterior aspect). The lesion actually also extends into the paraventricular region (see text for further details).

Table 1. Indices of correct responses recorded in the naming tests (objects and photos).

Period (months after surgery)	Indices of correct responses			
	Without prompting		With prompting	
	objects	photos	objects	photos
27	0.00	0.00	0.10	0.10
29	0.50	0.50	0.80	0.80
31	0.60	0.30	1.00	0.75
32	0.50	0.40	0.90	0.80
34	0.90	0.80	0.90	1.00
35	0.50	0.90	0.90	1.00
36	0.50	0.70	0.80	1.00
37	0.90	0.90	0.90	0.90
38	0.70	0.90	1.00	1.00
41	0.80	0.70	0.90	1.00
45	0.70	0.80	1.00	1.00
47	0.90	0.60	0.90	0.70
48	0.90	1.00	1.00	–
49	0.70	0.90	0.80	1.00
52	0.90	1.00	1.00	–
54	0.50	0.80	1.00	1.00
55	0.60	0.80	1.00	1.00
56	1.00	0.80	–	1.00
60	1.00	0.60	–	1.00
64	1.00	1.00	–	–
68	0.90	0.90	0.90	1.00
72	0.90	0.90	1.00	1.00

have their vascular supply attended by the pre-central and central, the posterior parietal and posterior temporal, the temporo-occipital and the insular and angular branches of this artery. The adoption of the most adequate template system also lead to an appropriate reading of the lesion's location and permitted us the identification of the lesion position in relation to the neuroanatomical landmarks (for more details, see Damasio & Damasio⁹). In this case it falls in the temporal cortices including the auditory region (and its posterior aspect) (areas 41, 42 and 22) [Cytoarchitectonic areas according to the classic cytoarchitectonic maps of Brodmann (1909), as well as to more recent maps of Sarkissow et al. (1955) and Braak (1978)⁹], as well as the inferior temporal gyrus (posterior aspect) (area 37). It extends anteriorly into the pre-motor (area 6) and the Rolandic regions (areas 4, 3, 1, 2) and also into the angular gyrus (area 39) and the paraventricular region (Fig 2).

In the post-surgical period OPL showed a severe right hemiparesis which lasted for three weeks. A mild seventh nerve supranuclear paresis persisted during the whole follow-up. No visual field disturbances (neither hemianopia nor quadrantonopia) have anytime been detected.

The hereby reported evaluation and therapeutic procedures started off only 26 months after the cerebrovascular accident had occurred. OPL had been previously (during 19 months) evaluated and treated by the so-called conventional phonological procedures, without showing any improvement of his linguistic deficits according to his family and to the medical staff in charge of his neurological follow-up. No symptoms of depression reactive to the neurologic disability have appeared during the whole follow-up, even before the present study.

Table 2. Partial results concerning indices of correct responses recorded in the visual gnosia tests*

Period (months after surgery)	Indices of correct responses			
	Without prompting		With prompting	
	cards	objects/photos	cards	objects/photos
28	–	0.70	–	0.80
29	–	0.60	–	1.00
31	0.30	0.80	0.80	1.00
32	0.00	0.60	0.50	0.70
36	0.30	0.60	1.00	1.00
47	0.40	0.70	0.50	0.90
55	0.70	0.80	0.70	1.00
60	0.60	0.80	0.60	1.00
64	0.60	0.80	0.60	1.00

*The results of visual gnosia tests refer to colour gnosia, with evaluation procedures including the identification of both, coloured cards (presented to OPL by the examiners) and objects (present or not at the ambience).

METHODS

In accordance with the approach of this study, concerning the epilinguistic aspects mentioned above, OPL was subjected to a set of procedures tailored to his own interests, which attended for both purposes, language evaluation as well as therapeutics process.

In this sense, a careful inventory of his everyday life activities (previously and after the stroke episode) revealed every aspect in which he was particularly interested and these suggestions were then altogether properly taken into consideration. A far well good example of the relevance of such detailed procedures in planning for all the individualised activities is provided by the several unexpected interests OPL showed, in spite of having linguistic abilities restricted to his mother tongue (Portuguese) and an undergraduate level of education, as a middle class accounting technician working as a civil servant. Indeed, all several personal activities undertaken in order to make up such a contextualized follow-up, such as visiting modern art museums, were scheduled to attend the interests he reported. At those occasions he was also often stimulated by the examiners as far as possible to start new activities regarding to his personal interests.

Those specific activities were included as part of the strategy of an individualised approach which served for both evaluation and therapy plan, during the whole follow-up (53 months). By the way, the themes of such periodic interactions were based on family and personal travelling photo albums (colour photographs of his relatives and sites he had visited with them), international geography (maps, flags and also colour photographs of foreign countries, their most important city views and landscapes), and opera composers (colour photographs as well as their biographical aspects and masterpiece themes).

Besides the hereby proposed approach, he was also submitted to standardised analyses, which included several tasks. OPL was submitted at regular intervals to a set of tasks taken as a representative sample of the usually adopted batteries of standardised tests inasmuch as they are the most commonly present in aphasiological research. It included verbal tasks (like naming tests related to objects and photos, verbal fluency, repetition, oral requests comprehension, metalinguistics tests and reports about texts someone else has read), written tasks (like writing spontaneously or under dictation, reading silent or aloud, reading comprehension, drawing, from memory or under copy, and also calculation), gnosias (tactile and visual) and praxis skills.

Tape transcriptions were made of all weekly sessions when the patient was evaluated regarding both his clinical and neuropsychological conditions.

Whenever possible, his eldest sister took part in the evaluation and therapeutic sessions to collaborate with the individualised trend of the linguistic interactions and also to assure the adoption at home of the most appropriate attitudes prevailing in the therapeutic ambience. Every three months she was also asked to fulfil a very detailed inquiry about the linguistic performance of OPL in everyday life situations.

RESULTS

The patient had a linguistic performance conformed to the category of *conduction aphasia* but the neuropsychological profile was somewhat atypical as the formal language assessment still showed at first a larger clinical syndrome, with a constellation of major neuropsychological signs including other linguistic disorders (a severe grammatical disintegration, a marked word-finding difficulty, as well as alexia and agraphia).

The agrammatism exhibited by OPL was characterised by predominant impairment of verbal fluency, as speech consisted mainly of nouns, transitive verbs and adjective modifiers, with the omission of small words (articles, prepositions, conjunctions) producing the so-called agrammatical or telegraphic style^{20,23,27,28}. He also presented an anomia with respect to any modality of presentation (tactile, visual and auditory), with naming tests related to objects and photos [In these occasions OPL was at once presented to coloured as to black and white photographs of objects, unknown persons and scenes.] showing more stable results just along the last 16 months of follow-up (Table 1). Articulation and prosody were remarkably preserved but his speech was affected by the very often occurrence of paraphasias (phonemic and semantic ones). On these occasions he was fully aware of his errors and frequently produced successive approximations to his intended verbal target ("conduites d'approche"). At the very beginning the patient has benefited from prompting and contextual cues only in some circumstances, as he showed a quite defective syllabic and sentence repetition [It is noteworthy that it turned out to be particularly difficult to evaluate sentence and syllable repetition (as some other standardised tasks) so far as OPL's performance improved in contextualised activities. Actually, from that moment on OPL became very uncooperative for formal language testing and he usually interrupted the standardised tasks (repetition ones, for instance), to ask questions (when, why, where) with the purpose of making the meaning of such interactions somehow clear to him, and often complained about the lack of interest on these interactions.]. Afterwards, from the third month of follow-up on, he presented a gradual improvement of his ability to repeat syllables and also sentences, what made such cues particularly useful in almost all circumstances (Tables 1 and 2). Despite such impairments, there was no apparent abnormality regarding verbal comprehension [Patients with this pattern of linguistic disturbances, defective repetition of words and sentences despite adequate comprehension, are prime subjects for a better knowledge regarding *conduction aphasia*, as this profile is usually considered as its definite hallmark^{1,8,9,21,23,31}.] as OPL could often adequately gesture when attempting to afford explanations in such occasions he could not properly denominate or describe scenes, nor persons (known or unknown), nor objects (as pictures or not) [During this early period, when shown objects (or photos), OPL has frequently told of their use instead of giving their names, or even described the attributes of the item in question so indicating his familiarity with it.].

At the beginning, he could barely write to dictation or even spontaneously due to very frequent paraphasias which became increasingly sporadic after a 24 months follow-up period. The ability to copy has been intact anytime. At first he was almost unable to read aloud sentences and most single words, and sometimes even single letters posed difficulties. Any attempt was compromised by several paralexias (especially for longer or less well-known words), that became less frequent after the same period. From that moment forth, it persisted only a mild degree of dyslexia and dysgraphia. During the whole follow-up OPL was able to understand written material such as newspapers, magazines and popular geographical literature. He was also often evaluated concerning praxis and gnosias skills and the disabilities he presented were definitely assessed as due to the above mentioned naming and fluency impairment (Table 1 in comparison with Table 2).

Owing to the concomitant evaluations OPL was submitted during the whole follow-up, several dissociations between the standardised analysis and the contextualized one became evident. The

dissociation was significant for instance during the first 28 months of follow-up when the naming tests related to objects and photos without prompting did not show stable results (Table 1). In that period, OPL obtained scores that varied randomly between 50% and 90% in naming tests (without prompting). Hardly possible could it be to perceive any regular improvement of OPL's naming abilities during the early two years of follow-up, if those results had been taken all alone.

In that period, the contextualised data had a quite different evolution. In five occasions, when OPL exhibited his lowest degree of 50% of correct responses in the naming tests related to objects (without any prompting), the patient presented at those same sessions a far better verbal fluency in contextualised interactions.

At one such session, after three months of follow-up, he could correctly ask many questions about unknown photographs showed to him and even mention in detail several objects he used to store in the cupboard at home. On another of those occasions, after nine months of follow-up, he could explain how to take care of his birds and of his garden, two of his favourites hobbies.

In a quite similar way, he could describe exactly the very different animals on exhibition at a Zoo he visited with his sister and also indicate everything he should have at hand at the Post Office to send a letter. Both reports referred to the same session he presented an index of only 50% of correct responses in the naming tests related to objects (after ten months of follow-up). Two weeks later, in spite of still presenting such a low degree of correct responses OPL could also describe in detail, without any help, a visit he did to the cathedral downtown.

After twenty-eight months of follow-up, OPL still exhibited those results (50% of correct responses) at the standardised evaluation for naming, for the last time. However, he could at the same session talk with fluency about recent news on the Brazilian football team or even about the political arguments between Libya and United States in which he was very interested at that moment.

Those discrepancies were indeed observed at other standardised tests along the whole follow-up (53 months). Altogether they support the view that standardised evaluations of aphasia may not be able to detect an important dimension of linguistic skill.

After 53 months of follow-up, as the patient have been presenting far stable results for the last 24 months, concerning both the standardised as well as the contextualised procedures, he was excused from regular attendance to sessions and his family were given directions about the most appropriate attitudes to be adopted from that moment forth at home. They were also told to keep in contact with the therapeutic team with view to promptly detect any change for the worse.

DISCUSSION

Clinical results, particularly neuropsychological symptoms, were in accordance with what was expected from the topography of the lesion which resulted of a subarachnoid haemorrhage secondary to a rupture of an aneurysm in the left middle cerebral artery. In order to take into account the totality of the phenomena here described it seems more appropriate to analyse each clinicopathological correlation in detail.

The clinical profile conformed to the category of *conduction aphasia* and the lesion here described was one of two major anatomical loci associated with it, as it involved the temporal cortices including the primary auditory region (and its posterior aspect) (areas 41, 42 and 22) (Figs 1 and 2).

Conduction aphasia, the so-called *Leitungsaphasie* in Wernicke's terminology (1874)¹, had its status as a distinct aphasia type established more recently^{1,9,21}. Nowadays, its classical cardinal sign, the impairment of repetition here also present, is attributed to a damage of one of two areas: the supramarginal gyrus (area 40), with or without extension to the subinsular white matter; or both primary auditory cortices (areas 41 and 42), with extension into the insular cortex and underlying white matter^{1,8,23,31}.

It seems that no evidence supports any more Wernicke's original hypothesis that this aphasia would be caused by a lesion of only the white matter connecting Wernicke's area to Broca's⁹. Actually, the usual anatomical pattern involves some white matter connections, as in any aphasia, and in this

case those connections are part of a complex projection circuitry that extends through temporal, parietal and frontal cortices¹⁶, which one contains the classical *arcuate fasciculus* that was originally linked to conduction aphasia.

It is noteworthy that in this case the lesion extended anteriorly into the pre-motor and the Rolandic regions (areas 6, 4, 3, 1, 2) (Figs 1 and 2), a lesion location usually associated with the neuropsychological picture of nonfluent aphasias^{1,23,31}, what explains the *aggrammatism*, which has also been detected at OPL's evaluation. Actually, in this case the main weight of the lesion had fallen on Sylvian region alone, so producing a surprisingly slight hemiparesis considering its major effect on linguistic abilities.

The neuropsychological findings still comprised marked difficulties in name retrieval, besides the aphasia conduction and aggrammatism symptoms. In fact, the chronic scan of this patient also showed an abnormal signal area in the inferior temporal gyrus (posterior aspect, up to the level of the primary auditory cortices) (area 37) (Figs 1 and 2), a damage signal previously encountered in such *anomia* cases^{1,9,31}. By the way, the area of abnormal low density into the angular gyrus (area 39) and the paraventricular region⁹ [In the present study, the paraventricular region is considered as the zone located beside, beneath, behind and immediately above the occipital horn⁹](Figs 1 and 2), could be both associated according to some authors with the reading and writing disabilities OPL presented^{1,9,23,31}.

It is also noteworthy that during follow-up, OPL exhibited a smooth improvement of his verbal fluency in contextualised interactions even during periods in which his performance in standardised tests showed no regular improvement. In spite of such frequent dissociations between the standardised results and the contextualized ones [Dissociations like that have been previously reported^{32,34}], the adoption of a contextualised approach (for both evaluation and therapeutics) strictly based on his residual abilities and interests has conducted OPL to an increasingly better performance according to both parameters.

In the cognitive model, subjects' behavioural responses are not just linked to the stimuli that eventually triggered them, but are also connected to mind processes and representations that handled the stimulus and generated the responses according to some mechanism⁹. The validity of formulating hypotheses about those mechanisms and indirectly testing their validity is supported by the present data, insofar they suggest the interaction of two different neural levels of multiple components of integrated networks, one assigned to the metalinguistic processes and another to the epilinguistic ones. In this case, it is noteworthy that contextualised assigned neural networks apparently have their plasticity preserved even after the acute postlesion period, contrariwise to the metalinguistic ones. It is also remarkable that both neural levels seem to share in some degree the neural organisation of complex linguistic abilities, with intimate reciprocal influences, what discloses a quite interesting aspect of this cognitive architecture.

Therefore, in order to detect the evolution of a patient during follow-up, the use of standardised tests may not be sufficient. The case described in this article, as also further evidence found in a more ample research, supports the relevance of a therapeutics and evaluation method centred upon the activities and interests of the patient [As a matter of fact, this contextualised approach has concomitantly been applied with similar results to aphasic patients, all of them suffering from vascular diseases in different territories and so affected by distinct linguistic disorders^{13,14,15}].

Although the focus is on the methodology that can make contextualised approach possible, this research also draws attention to theoretical issues concerning "normal" versus "pathological" distinction. The usual criterion for this distinction plays such a remarkable epistemological role in neuropsychological studies due to its consequences to debates in both the theoretical and the pragmatic fields. Notwithstanding its broad utility it could be extremely useful an appropriate epistemological re-evaluation of the current criterion for "normal" and "pathological" distinction, inasmuch it takes almost no consideration of the personal strategies used to solve linguistic tasks in either

condition^{10,11,12,13,17}. Yet it could provide an encouraging argument for pursuing further studies aimed at the valuable debate on normative criteria for medical sciences⁶.

As the aim of the present study has been to propose an appropriate methodological approach that could assess the individual variability for diagnosis and therapy purposes^{10,11}, and so contribute to the empirical efficacy of the lesion method, this epistemological debate relies far beyond the main scope of this article and will be properly dealt with in another occasion.

Acknowledgements—The authors wish to thank Dr. Maria I. H. Coudry for her helpful advice on linguistics and Dr. R. A. Martins for his helpful advice on image analysis presentation. We also thank the subject of this study and his family for their generous and patient participation in the research. We are particularly grateful to the referees who presented valuable suggestions to this article.

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