Linguistic criteria for adapting PALPA Test No. 3 (*Minimal Pair Discrimination Requiring Written Word Selection*) to European Portuguese: a proposal [1]

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Since it was created in 1992, the PALPA (*Psycholinguistic Assessment of Language Processing in Aphasia*) test battery has been translated or adapted into other languages entirely (*viz.* the Spanish, Dutch and Hebrew versions) or partially, depending on the assessment needs of specific groups and on the relevance of individual tests to special cases or to research.

Underlying this paper is one of the main goals and the main assumptions of the *Interdisciplinary Project on Aphasia Discourse* (at Centro de Linguística da Universidade Nova de Lisboa, Portugal): adapting and/or creating tests for aphasia assessment in European Portuguese (henceforth EP), building on the provable assumption that translation is not desirable, useful or possible in the assessment of language disorders.

In this paper we present an initial adapted version of the PALPA Test No. 3 (*Minimal Pair Discrimination Requiring Written Word Selection*). This adaptation is crucially grounded on linguistic criteria, which take into account the specificity of European Portuguese phonological structures. Furthermore, we describe and propose a methodology to continue this type of work. The adaptation of PALPA Test No. 3 went through four fundamental stages: 1) understanding the linguistic structure of the original test; 2) making clear the linguistic criteria that underlie PALPA Test No. 3; 3) analysing linguistic issues prompted by the adaptation of PALPA Test No. 3 to European Portuguese; 4) the adaptation itself, i.e., the creation of a test (PALPA-PT N.º 3) based on a set of EP forms according to EP phonological structures.

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1. The Linguistic Structure of PALPA Test No. 3 [2]

The main aim of the PALPA Test No. 3 test is to assess the ability to discriminate words that are part of minimal pairs or metathetic pairs from auditory input with written identification. Therefore, it is not only a matter of assessing phonemic perception, but also of assessing an individual's phonological and lexical systems. This test was devised to be used together with PALPA Test No. 1 in which non-words (or pseudo-words that respect the phonotactics of the language) are used. By comparing the results obtained in each test it is possible to collect information about the processes used by individuals to discriminate minimal pairs, namely understanding how the subject uses lexical and semantic processes, and in what measure the subject depends on lexical contexts for phonemic perception. [3]

PALPA Test No. 3 is composed of a list of pairs of written words that are shown to the subject. In each pair one of the forms is the target word and the other one is the distractor. The examiner asks the subject to tick the written form that corresponds to the form that has been said aloud, ticking the result obtained by the subject on the *Marking Form*, using conventions that have been defined in the *Instructions for Use*. [4]

As is widely known, the PALPA test battery unfortunately does not contain direct and explicit information on the linguistic criteria that underlie the construction of its several tests. This fact raises some difficulties regarding the partial or total adaptation of the battery of tests to other languages. Additionally, *we strongly believe that such adaptation should be based crucially on linguistic criteria (which result from the analysis of the structures of the target language) and not simply on*

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[2] According to Code (2004: 138, 146) this test is one of the least quoted or referred to in scientific journals, within the not very much quoted group of auditory processing tests that are part of PALPA.

[3] For more detailed information on the objectives of the test see Kay / Lesser / Coltheart 1997/2001: 1 – 22.

[4] Some of the problems that we had to face in the analysis of this type of test are related to pronunciation, i.e., which type of pronunciation style should be used when this type of tests is applied, and to the interference of socio-linguistic characteristics both of the examiner and the subject in the application of tests that involve the production and perception of phonetic forms. We believe that these two aspects are important, since regional, social and stylistic (discoursive and pragmatic) diversity can be very pronounced in certain linguistic communities, thus affecting communication between speakers of different varieties. EP is no exception, and the present situation – in which recent phonological changes in Central Portuguese (Lisbon) resulted in a pronounced dissociation of colloquial speech in relation to more formal styles of speech (usually associated or influenced by the standard variety of the language) – has to be taken into accont in the construction of phonological tests both at the segmental and the syllabic levels.

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translation. Information on the construction and structure of the PALPA-tests can only be obtained indirectly by consulting the *Marking Form* that the examiner uses to write the data supplied by the subject and the *Instructions for Use* that precede each test. Thus, we were able to infer the following information about the linguistic structure of PALPA Test No. 3, which can be summarised as shown on Table 1:

TOTALS			Minimal pairs: change in initial C			Minimal pairs: change in final C			Metathetic pairs		
Word pairs											
72			24			24			24		
Manner	Place	Voice	Manner	Place	Voice	Manner	Place	Voice	Manner	Place	Voice
21	33	18	8	8	8	8	8	8	5	17	2
High Freq.	Low Freq.		H L	H L	H L	H L	H L	H L	H L	H L	H L
36	36		6 2	4 4	3 5	3 5	4 4	4 4	2 3	8 9	2 0
			High Freq.	Low Freq.		High Freq.	Low Freq.		High Freq.	Low Freq.	
			13	11		11	13		12	12	

Table 1 – Internal structure of PALPA Test No. 3
(H - high frequency words; L - low frequency words)

To construct PALPA Test No. 3 two basic types of pairs of mono-syllabic words with a simple syllabic structure (CVC / CVVC [5]) were used:

1. minimal pairs — pairs of words that differ in a single phonemic consonant, such as pairs 19. 'cut ~ gut' and 23. 'pick ~ pig', for example; [6]

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[5] In the 'CVVC' pattern the sequence 'VV' indicates a falling diphthong. We use the abbreviation 'C' and the term 'consonant' to name a segment that typically occurs in the marginal position within a syllable and that shows a blockage to the passage of the pulmonic airstream, which can have different degrees and can be compatible with the occurrence of resonance. Thus, the term encompasses non-syllabic contoids (plosives, nasals, trills, taps and laterals) and non-syllabic non-contoids (approximants).

[6] This type of minimal pairs raises some phonological issues that unfortunately are not discussed in the battery of tests itself. In pairs 19. and 23., the relevant consonants are velar stops that are distinct by voicing and also by presence/absence of aspiration. In fact, pairs 19. and 23. show three phonetic velar segments [kH], [k] and [g], as can be seen in the respective phonetic transcription: 19. [kH●t] ~ [g●t], 23. [pHIk] ~ [pHIg]. Given that the occurrence of aspirated plosives is contextually determined and therefore predictable in English (contrary to other languages in which there are 'autonomous' aspirated stops), aspirated and non-aspirated stops do not contrast in English, and are considered manifestations (allophones) of the same phoneme – in spite of being clearly different phonetic segments. These phonetic and phonological aspects are relevant to the current discussion, since the articulatory mechanisms present in the production of allophones of the same phoneme can be very different and the application of such a test presupposes that the subject has the ability to discriminate phonetic segments intact, in addition to phonemic discrimination: i.e., by including allophones PALPA Test No. 3 implicitly presupposes that the subject has the ability to carry out three different

2. metathetic pairs — pairs of words that differ in the order of the initial and final consonants ($C_1 \, V \, C_2 \rightarrow C_2 \, V \, C_1$), such as pairs 3. 'tap ~ pat' and 21. 'tick ~ kit', for example. [7]

Distinctive phonemic segments in each pair differ in voicing, manner of articulation or place of articulation, and can therefore occur in word-initial or word-final positions (i.e. in syllable onset or coda). In the case of metathetic pairs, obviously, there is no difference between initial and final consonantal phonemes besides the position they occupy.

The data compiled on Table 1 allow us to observe the numeric proportion of the groups and subgroups of the forms that constitute the corpus of this test.

On the other hand, by analysing the *Marking Form*, we can see that the pairs of words are organized according to a pattern: after a pair in which the initial consonant changes, there is a pair in which the final consonant changes, followed by a pair in which the initial and final consonants change places. We can also see that low-frequency and high-frequency target words are distributed evenly into the three existing groups: the number of low-frequency target words (or with the same frequency as the distractor) is perfectly balanced in relation to the number of high-frequency words in the group of the metathetic pairs.

2. Discussion on linguistic criteria that underlie the structure of PALPA Test No. 3

The inclusion of metathetic pairs in PALPA Test No. 3 shows that the authors of the test have adopted a broad definition of 'minimal pair'. This concept is usually defined as a pair of phonetic forms of a linguistic system

cognitive tasks – a) recognizing phonetic segments, e.g. [kH] and [k] are phonetic segments in English with a specific distribution, b) recognising/identifying the phonological status of the phonetic segments, i.e. initial [kH] and final [k], although distinct, represent the same phonological unit /k/, and c) the presence of the phoneme /k/ (implemented as [kH] or [k] according to context), in opposition to the phoneme /g/, enables the distinction of lexical items. In PALPA Test No. 3 only the latter ability to discriminate is assessed, and the other two are taken for granted; we do not consider this a moot question, given that the subject can be impaired at the levels of both discrimination and production of allophones. We believe that these phonological aspects should be duly considered and pondered in the construction of tests based on phonetic and/or grapho-phonemic data.

[7] This type of pairs raises issues that are similar to the ones mentioned on the previous footnote. In pairs 3. and 21. of PALPA Test No. 3 the relevant consonants are respectively the English phonemes /t/ and /p/, and /t/ and /k/. Depending on the syllabic position (and other factors that we will not mention here so as not to complicate the discussion unnecessarily), the three English voiceless plosives phonemes are predictably realized as aspirated or non-aspirated. Thus: 3. [tHæp] ~ [pHæt] and 21. [tHIk] ~ [kHIt].

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that are different lexical items and that differ in a single phonetic segment. The relevant phonetic distinction is a (phonological) contrastive distinction.

In metathetic pairs, all the phonetic segments are identical or phonemically equivalent, but they do not occur in the same order: since they contain a minimal distinction between two lexical items their inclusion in this test is therefore understandable. However, it is important to mention that such pairs exist with a reasonably high number in English but not in Portuguese, a fact which raises problems for the adaptation of PALPA Test No. 3 to EP, as we will later explain in more detail. Nonetheless, even in English some of these metathetic pairs are problematic, given that the initial or final position of the phonemic segments can determine a different allophonic realization (that is the case with the voiceless plosives, for example).

We must also consider that two phonetic segments can be distinct in a greater or lesser degree, i.e., the differences in terms of their articulatory gestures and consequently in their acoustic characteristics can be greater or smaller. By observing the pairs of forms included in this test we have gathered that the authors have chosen pairs of words whose distinctive segments have only a slight difference, i.e., they differ in a reduced number of acoustic and articulatory parameters, generally only one or two basic articulatory parameters. For example, in pair 1. 'pill ~ bill', the difference between the initial contoids is basically the state of the glottis, i.e., voicing. The voiceless plosive is also aspirated, contrary to the voiced plosive, but given that aspiration in English is a context-dependent phonetic property, it is considered that the basic – i.e. contrastive – difference is the difference in voicing. In pair 4. 'bone ~ moan' the basic distinction is the presence / absence of nasalization, although it should be noted that the presence of nasalization is manifested in plosives by the occurrence of resonance in the nasopharyngeal tract, nasals being thusly labeled as sonorants. By means of a framework of universal phonetic features, these differences may be captured with a larger or a smaller number of features. [8]

Table 2 shows the different phonemic oppositions of English present in the test — where the most differentiated opposition is between /l/ and /n/ — as well as the respective number of occurrences in each type of pair.

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[8] Although we do not broach this subject in this paper, we believe that an acoustic, or partially acoustic, characterization of segments for the elaboration of tests that involve the perception and discrimination of very similar segments has more advantages that an exclusively articulatory characterization.

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Oppositions	Minimal pairs: initial C	Minimal pairs: final C	Metathetic pairs	TOTAL
MANNER	8	10	5	23
/t/ ~ /s/	2	2	0	4
/b/ ~ /m/	2	2	1	5
/d/ ~ /n/	2	2	2	6
/g/ ~ /●/	0	2	0	2
/l/ ~ /n/	2	2	2	6
PLACE	8	6	17	31
/p/ ~ /t/	1	1	4	6
/p/ ~ /k/	0	0	1	1
/b/ ~ /d/	1	1	3	5
/b/ ~ /g/	0	0	1	1
/m/ ~ /n/	2	2	3	7
/f/ ~ /s/	1	0	1	2
/v/ ~ /z/	1	0	0	1
/t/ ~ /k/	1	1	3	5
/d/ ~ /g/	1	1	1	3
VOICING	8	8	2	18
/p/ ~ /b/	2	2	0	4
/t/ ~ /d/	2	2	2	6
/k/ ~ /g/	2	2	0	4
/f/ ~ /v/	2	2	0	4

Table 2 – Occurrences of consonantal oppositions in PALPA Test No. 3

It is important to make clear that the expression *manner of articulation* is used here (and certainly by the authors of PALPA Test No. 3) with a broad and traditional meaning: it refers not only to characteristics connected with the *degree of stricture* (which constitutes the manner of articulation proper) — described by terms such as 'stop', 'affricate', 'fricative', 'trill' and 'resonant' — but also to the characteristics related with *conformational aspects of articulation* (Cf. Laver 1994: 140), such as *state of the velum* (which enables the distinction oral ~ nasal) and the direction of the airstream in the *buccal cavity* (which enables the distinction between lateral ~ nonlateral).

By analysing the oppositions of segments that occur in the corpus of the test, we were able to observe three additional facts:

1. some consonantal segments in English are not included in the set of opposing segments used: the voiceless and voiced dental fricatives [T] and [D]; the voiceless and voiced pre-palatal fricatives [S] e [Z]; the voiceless and voiced pre-palatal affricates [tS] and [dZ]; the alveolar approximant [®], the dorsal approximants [j], [w], [„], and the glottal approximant [h];

2. the oppositions are repeated several times, and there are only three that occur a single time in the test — /g/ ~ /b/, /p/ ~ /k/ e /z/ ~ /v/;

3. the oppositions of segments that differ in manner of articulation and voicing in minimal pairs are always repeated once.

The reason or reasons for these absences are not explicit. It is, however, an aspect that seems to be important in the construction of the test, and which we took into consideration when adapting it to EP, given that the absences, as we have seen, are not random, or explainable in every case by low frequency either of the missing segments or of the possible minimal pairs containing those segments. We know that to produce pre-palatal fricatives and affricates one needs a good motor control, since their production implies a very precise narrow dorsal stricture (affricates are, besides that, articulatorily complex segments produced with two distinct degrees of constriction in sequence), and are therefore segments that more frequently appear altered in individuals with language disorders. In the case of dental fricatives we can also consider the displaced character of the articulation and the universally marked character of these non-strident fricatives in relation to alveolars, which are more frequent in natural languages. Regarding approximants, their absence may be explained by the intention of including in the corpus only contoids, i.e., consonants produced with a pronounced obstacle to the passage of the airstream, which involves the production of a more defined articulation (and perceptibly more marked) than non-contoids.

By analysing Table 2 the disproportion between the sizes of the subgroups of metathetic pairs becomes also evident (these pairs vary regarding manner, place or voicing). Such disproportion is seen both in the comparison between them and in relation to the corresponding subgroups of minimal pairs, each with eight items. This imbalance or unevenness can be explained by the scarcity of metathetic pairs in which the opposing segments differ in only one, two or three basic phonetic parameters. The omission of some segments could also be explained by the scarcity or lack of certain metathetic pairs, as is the case of approximants which only occur in the syllable onset. However, the test includes the velar nasal [N] that only occurs in syllable coda. It seems therefore that we can conclude that the omission of a significant set of phonetic categories results from substantive criteria and not distributional or statistical criteria.

Regarding graphemic forms, one of the requirements that the words of the corpus seem to meet is the inexistence of homographic forms and inclusion of graphic forms with unambiguous grapho-phonemic mapping. This is a very important aspect, given the existence in English spelling of multivalent and iso-representational vocalic graphemes (a factor that contributes to some difficulties experienced by children when they are learning English spelling). The inclusion of certain vocalic graphemes does

not seem to result from their frequency, and does not seem to take into account their dominant value: the processing of forms that contain multivalent graphemes with a non-dominant grapho-phonemic correspondence ('come', 'veil'), seems to be conditioned by the grapheme in the other form of the pair, in which the vocalic spelling can be multivalent, but has the dominant grapho-phonemic correspondence in the test. These aspects of English spelling have no direct equivalent in EP, but should, nevertheless, be duly pondered, for there are multivalent graphemes in Portuguese spelling, and that is an aspect that has to be taken into account when adapting the test.

In only one of the words of the seventy-two pairs is there grapho-phonemic indeterminancy: 'live' (in pair 20.). The effect of the opposition generated in a minimal pair containing a homograph – highlighting two distinctive segments that are phonetically similar – would be diminished if the subject associated the written word in the test with the homograph, since there would no longer be only two distinctive segments.

Other requirements have to do with the morphological characteristics of the words. By observing the words that make up the corpus, we can see that all of them pertain to lexical categories, and some forms may be interpreted simultaneously as nouns or verbs. Some pairs are composed of a noun and a verb, such as pair 27. 'norm ~ mourn', for example. Regarding internal structure, we can see that the authors have only used words with a maximally simple morphologic structure (i.e., words composed of a single morpheme), certainly with the intention of avoiding possible interference from morphological complexity (the concatenation of several inflexional or derivational morphemes).

Finally, it is important to consider the relevance of word-frequency in the elaboration of the corpus. There are many studies on the importance of frequency in the visual and auditory recognition of words, but there is little consensus regarding *locus* and its effects. Authors that defend the funda-mental role played by frequency in the identification of a word believe that it constitutes a factor of interference especially when dealing with lexical decision tasks (on this topic see Cleland *et al.* 2006), and research indicates that it is easier to perceive more common words in these tasks. By equalising the quantity of low frequency target words with high-frequency target words, the authors of this test have certainly meant to safeguard the precision of the task they had conceived, making the comparison of the results obtained in one group with those obtained in another easier. They have probably tried to ensure that the subjects that were going to be tested did not always make use of lexical and semantic processes to discriminate words, given that those that do not know the target word of a pair will have to resort to grapho-phonemic correspon-dence rules to

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identify the form pronounced by the examiner. We think that frequency is fundamental for the adaptation of PALPA Test No. 3 to EP, given that, as we have seen, the frequency of the forms in the original test cannot be considered random in any way, and it constitutes in our opinion a crucial criterion for the construction of this sort of tests.

3. The adaptation of PALPA Test No. 3 to European Portuguese [9]

The adaptation of PALPA Test No. 3 to EP raises several linguistic issues due to differences between the phonologic systems and the syllabic structures of English and EP. These issues sustain our claim that *the conversion of this sort of tests cannot be based on translation* and that it should result from an adaptation based on the structure of the target language. One of the first issues we had to deal with is the fact that the original list of word pairs contains CV(V)C monosyllables, which is a very uncommon syllabic pattern in EP (and in the Romance languages in general). On the other hand, the phonetic and phonemic inventory of English and EP are significantly different, which led us to rethink the inclusion and exclusion of phonetic categories in the test according to EP phonetic and phonological structure.

To start with we have considered the existence in EP of monosyllables that correspond to lexical categories (i.e., we have excluded articles, prepositions, conjunctions, etc.), in order to conform to the format of the original version as much as possible, and in order to verify which types of monosyllables could or could not be included in the adaptation of the test. In EP there are the following types of monosyllables:

1. monosyllables with CV, CCV (very rare), CVV, and CCVV (very rare) syllabic structures, i.e., monosyllables composed of one open syllable; examples: 'pá' [pa] (shovel), 'cru' [kRu] (raw, uncooked), 'pai' [pai9] (father), 'grau' [gRau9] (degree); [10]

2. monosyllables with CVC, CCVC, CVVC, and CCVVC syllabic structures, i.e., monosyllables composed of a closed syllable; examples: 'sol' [sç...] (Sun), 'flor' [f...oR] (flower), 'pais' [pai9S] (fathers, parents), 'graus' [gRau9S] (degrees); [11]

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[9] The test adapted to EP has been already submitted to a sample study whose results shall be published in a follow-up paper.

[10] We have adopted the conventions for phonetic transcription proposed by Emiliano [1995] 2006[3].

[11] All the plurals of type 1 nouns result in monosyllables of type 2. However, as we have stated before, these monosyllables ending in [S] should not be included since they violate the criterion of morphological simplicity.

3. monosyllables with underlying CVCV, CVVCV or VVCV syllabic structures, i.e., words that are oralized with a syllabic configuration CV(V)C resulting from the apocope of [ˆ] and [u] in colloquial fast tempo speech; examples: 'gato' [»gatu] □ [»gatW] (cat), <fome> [»fçmˆ] □ [»fçm] (hunger), 'sete' [»s●tˆ] □ [»s●t] (seven), 'peixe' [»påi9Sˆ] □ [»påi9S] (fish), 'seixo' [»sai9Su] □ [»såi9SW] (pebble), 'hiato' [i»jatu] □ [»jatW] (hiatus), 'iate' [i»jatˆ] □ [»jat] (yacht).

Type 1 monosyllables should be excluded since they do not contain a second consonant after the nucleus of the syllable. In type 2, monosyllables that have a complex syllabic onset (i.e. CC) do not correspond to the model CVC and do not allow the creation of metathetic pairs, and were discarded. Additionally, CV(V)C monosyllables that are plural nouns (where the final C corresponds to the plural morpheme) were excluded because of the morphological simplicity criterion of the original test. Consequently, in type 2 the only eligible candidates are monosyllables that begin with a single contoid and end with the contoids [R], [...], [S] . Examples: 'mar' [●ma●] (sea), 'mal' [●ma...] (evil), 'paz' [●pa●] (peace). As regards type 3 there is also the matter that apocopated forms coexist vertically and horizontally in the community with forms that preserve the final unstressed vowel (in more formal speech and in regional varieties in which the suppression process does not exist). Additionally, the fact that spelling maintains the "graphic image" of the unstressed vowels [ˆ] and [u] strengthens its maintenance at a phonological level. These "false" monosyllables should not, therefore, be included.

After identifying the possible elements to construct a list of monosyllabic *minimal pairs* with CVC structure, which are only the abovementioned type 2 monosyllables, we were faced with the fact that their reduced number (compounded with the restriction of the occurrence of consonants in final position in EP to only three phonemes) does not enable the creation of a significant number of minimal pairs, and prevents the creation of metathetic pairs with CVC structure. Due to these constraints imposed by the structure of the target language we had to make changes in the linguistic criteria that underlie the original test. In this case, we have chosen to use *pairs of disyllables with CVCV internal structure.* [12]

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[12] We have also included some CVVCV disyllables, i.e. disyllabic words with a falling diphthong in the first syllable, q.v. pairs 26. and 30. below in the addendum; as for pairs 2. and 36., they include words that have a diphthong [ou9] in the northern dialects (reflected in the spelling <ou>), but a monophthong [o] in the central and southern dialects.

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According to acquisition data, «the CV syllabic format is predominant in the first productions of children […]. This conclusion is applied to other languages in the world observed from the perspective of the acquisition process (among other, Dutch, English, German, Spanish, French, Italian and Hebrew).» (Freitas & Santos 2001: 60) The production of closed syllables is possible at a later stage of acquisition. The first stage, in the overall scale of syllabic development, is therefore characterized by the CV format, and only at a second stage is the coda constituent available.[13] Additionally, comparative data resulting from the observation of several natural languages show that the CV syllabic type is universal, corresponding to the more simple (less marked) type of syllable, while the CVC pattern is impossible in some languages, and it is marked and restricted in others (such as EP, in which only a very small number of contoids can occupy the marginal position of coda).

Thus, we have collected a large number of *disyllabic lexical words with CVCV structure* that might constitute *minimal pairs* whose distinctive segments were contoids at the beginning of the first or second syllables bearing a reduced degree of phonetic difference.

Given that the dominant stress pattern in Portuguese is paroxytonic, we have excluded oxytones (e.g. 'bambu' [bå)»bu] (bamboo), 'café' [kå»fE] (coffee), 'sofá' [su»fa] (soffa)), and lexical categories that do not carry stress (such as prepositions, conjunctions, etc.), thus homogenising the corpus prosodically and avoiding the interference of wordstress in the discrimination of minimal pairs. Regarding internal structure and lexical category, we have included disyllables with a simple morphological structure, i.e., *nouns and verbs* made up of a lexeme followed by a theme vowel or a final vocalic morpheme in the phonetic representation. In the case of verbs, the application of this criterion restricted possible candidates to rhizotonic verb forms with CVCV structure. As regards the exclusion of phonetic segments we have maintained the restriction present in the original test regarding pre-palatals, excluding, therefore, the pre-palatal fricatives [S] and [Z].

Resorting to disyllables with simple morphological structure and with CVCV syllabic structure made it more difficult to create a corpus with 24 metathetic pairs, which, according to the definition given in *PALPA*, are «pairs that are metathetically related (in which the order of sounds is reversed)» (PALPA Test No. 3, *Instructions for Use*, p. 1). Thus, in the adaptation of the corpus to EP metathesis does not involve changing the

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[13] «The structuring of the onset constituent follows the whole process of syllabic development of the child, since it is present in the first productions of children […] and it is the last to be stabilized in its branching format.» Freitas & Santos 2001: 61.

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position of initial and final consonants in a pair of words (C_1 V $C_2 \rightarrow C_2$ V
C_1), but rather changing the position of the initial consonants of the two
syllables in a pair of disyllables (C_1 V C_2 V $\rightarrow C_2$ V C_1 V), e.g. 'pata'
[»patå] (paw, female duck) ~ 'tapa' [»tapå] (s/he covers).

Given that the choice of words should take into consideration the
variable *frequency*, we have consulted a reference corpus of the Portuguese
language containing frequency data: therefore, for the definitive version of
our list of words we used the *Léxico Multifuncional Computorizado do
Português Contemporâneo* (lemmatized and morphosyntactically
annotated) [14].

Table 3 shows the consonantal oppositions used in the corpus, and their
respective values of occurrence.

Oppositions	Minimal pairs: initial C	Minimal pairs: medial C	Metathetic pairs	TOTAL
MANNER	8	8	*7*	*23*
/b/ ~ /m/	2	2	*0*	*4*
/d/ ~ /n/	2	*0*	*0*	*2*
/●●/ ~ /n/	2	2	*1*	*5*
/s/ ~ /t/	2	2	*4*	*8*
/●/ ~ /●/	*0*	*2*	*0*	*2*
/d/ ~ /l/	*0*	*0*	*1*	*1*
/z/ ~ /l/	*0*	*0*	*1*	*1*
PLACE	8	8	*14*	*30*
/p/ ~ /k/	*1*	*1*	1	*3*
/b/ ~ /d/	*2*	1	*1*	*4*
/g/ ~ /d/	1	1	*0*	*2*
/g/ ~ /b/	0	*1*	*2*	*3*
/m/ ~ /n/	*1*	*1*	*1*	*3*
/t/ ~ /p/	1	1	*3*	*5*
/k/ ~ /t/	1	1	*4*	*6*
/s/ ~ /f/	*0*	*1*	*2*	*3*
/z/ ~ /v/	1	0	0	1
VOICING	8	8	*3*	*19*
/p/ ~ /b/	2	2	0	4
/t/ ~ /d/	2	2	*3*	*7*
/k/ ~ /g/	2	2	0	4
/f/ ~ /v/	2	2	0	4

Table 3 – Occurrences of phonemic oppositions in the adaptation of PALPA Test No. 3 [15]

Regarding graphemic forms, we have included different spellings of the
same segment so that we could comply with two of the objectives of the

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[14] A computer resource created at *Centro de Linguística da Universidade de Lisboa* in
the scope of the project *Léxico Multifuncional Computorizado do Português Contemporâneo*
(cf. Bacelar do Nascimento *et al.* (2003))

[15] The values in which our adaptation is different from the original test are in bold and
italics.

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task, (i) identifying problems in the organization of the phonological system of the language and (ii) assessing the system of grapho-phonemic correspondence. Examples: 6. '**c**ento [»se)tu] (hundred) ~ ten**s**o [»te)su] (tense)', 9 'ten**ç**a [»te)så] (annuity) ~ **s**enta [»se)tå] (s/he sits)', 21 '**z**ela [»zE...å] (s/he takes care) ~ le**s**a [»...Ezå] (s/he damages, damaging ADJ)', 42 'tan**qu**e [»tå)k^] (tank) ~ **c**ante [»kå)t^] (s/he sing – subjunctive)'. We have, however, excluded homograph words, e.g. 'sede' [»s●d^] (headquarters) or [»sed^] (thirst). Grapho-phonemic indeterminacy, as we have mentioned regarding the original test, may decrease the effect of opposing consonantal segments in the minimal pair (if the subject associates the written word to a homograph with a different vowel in the target form).

Concerning the frequency variable, we consider as 'low-frequency words' all those words that either have significantly lower values than their pair mates or simply do not occur in the *Léxico Multifuncional Computorizado do Português Contemporâneo*. Regarding the occurrence values of the target words, since the original test imposes that half of the words have high frequency and the other half low frequency, we have adopted the following criteria: (i) the target word should only exceptionally be repeated in the list; (ii) whenever there is a very large contrast between frequencies, the least frequent word is included in the group of low-frequency words; (iii) the frequency of forms that can pertain to more than one lexical category (i.e. noun and verb) corresponds to the sum of the values of each category.

Table 4 shows schematically the proportions between the different groups and subgroups of the corpus that was created. In the addendum we present a table with the target words and the list of word pairs.

TOTALS											
Word pairs			Minimal pairs: change in initial C			Minimal pairs: change in medial C			Metathetic pairs		
72			24			24			24		
Manner	Place	Voice	Manner	Place	Voice	Manner	Place	Voice	Manner	Place	Voice
23	*30*	*19*	8	8	8	8	8	8	*7*	*14*	*3*
High Freq.	Low Freq.[16]		H L	H L	H L	H L	H L	H L	H L	H L	H L

[16] We have included here the four pairs in which the target word has the same frequency of the distractor.

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36	36	2	6	5	3	2	6	6	2	3	5	4	4	5	2	7	7	2	1
		High Freq.			Low Freq.			High Freq.			Low Freq.			High Freq.			Low Freq.		
		9			15			13			11			14			10		

Table 4 – Internal structure of the adaptation of PALPA Test No. 3 [17]
(H - high frequency words; L - low frequency words)

4. Final remarks

The tasks of conceiving and constructing tools for language impairments analysis and evaluation, and the equally important task of converting existing tools for use with other target languages crucially require the implementation of explicit and well-grounded linguistic criteria. Thus we find it difficult to understand and to accept that work in impaired language evaluation tools can be done without the involvement of trained linguists. The absence of both linguists and explicit linguistic criteria makes the control of linguistic variables very dubious, and decreases the scientific value and accuracy of tests and procedures. If one does not have a working knowledge of the linguistic structures that are the object of a given test, how can one hope to manage linguistic variables and to create effective treatment measures? [18]

The current situation is quite paradoxical: on the one hand, clinical linguists are usually absent from hospitals, from rehab programmes and research teams, and the contribution of Linguistics is not very significant in the syllabuses of many training programmes for clinicians; on the other hand, more and more scholarly publications emphasize the need to consider linguistic variables and to adopt linguistic criteria in the evaluation of impaired language production and perception. [19] This paper is a small contribution to this ongoing discussion: we claim that language evaluation tests, namely, tests for aphasics, should crucially make use of explicit linguistic criteria and that the conversion of any given test must rest on the

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[17] The values in which our adaptation differs from the original test are in bold and italics.

[18] Already in 1981 David Crystal had pointed: «In fact it is only recently that linguistically – inspired contributions to diagnosis, assessment and remediation have been forthcoming. The point has sometimes been made by way of criticism, that clinical linguistics have not devoted sufficiently attention to the daily problems of clinical practice; but the answer is plain – that without an adequate descriptive and analytical foundation, remedial procedures are scientifically worthless, being dependent for their success on the fortuitous combination of an individual therapist's charisma and the availability of resource excellence. Without this foundation, there is no way of persuading the lay sceptic of the relevance of professional expertise in remedial language work.» (Crystal [1981] 1989: 15)

[19] Several recent titles are worth referring to in this respect (among many others): Berndt *et al.* 2002, Collina *et al.* 2001, Maess *et al.* 2002, Meschyan & Hernandez 2002, Nickels & Howard 2004, Santiago *et al.* 2002.

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analysis of the new target language. We hope to have shown that this methodology can lead to better evaluation tools and better results.

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Addendum — Adaptation of PALPA Test No. 3 for use with speakers of European Portuguese (PALPA-PT N.º 3) [20]

Nº _____

IDADE: ❏ *18 – 24 anos* ❏ *25 – 31* ❏ *32 – 38* ❏ *39 – 45*   *SEXO:*   ❏ *F* ❏ *M*

NÍVEL DE ESCOLARIDADE: ❏ 9º ano do Ensino Básico
                        ❏ 12º ano de Ensino Secundário
                        ❏ Licenciatura
                        ❏ Outro _____

DISTRITO ONDE NASCEU _____

DISTRITO ONDE VIVE _____

NÚM.º	ALVO	IPA [21]	RESULTADOS	FREQ.	TIPO
1	mola	[»mç…å]		B	I m
2	rouba	[»{obå]		B	MD v
3	baga	[»bagå]		=	MT p
4	vela	[»vE…å]		A	I p
5	cara	[»kaRå]		A	MD m
6	pito	[»pitu]		B	MT p
7	gato	[»gatu]		A	I v
8	viga	[»vigå]		B	MD p
9	tenda	[»te)då]		A	MT v
10	tala	[»ta…å]		B	I m
11	cana	[»kånå]		B	MD p
12	lodo	[»…odu]		A	MT m
13	vala	[»va…å]		B	I v
14	rima	[»{imå]		A	MD m
15	nula	[»nu…å]		A	MT m
16	mota	[»mçtå]		B	I p
17	laca	[»lakå]		B	MD p
18	campa	[»kå)på]		A	MT p
19	bilha	[»bi¥å]		B	I v

---

[20] Translation of terms and expressions on the *Marking Form*:

Idade: Age; Sexo: Gender; Nível de Escolaridade: Level of formal education; Distrito onde nasceu: Area where subject was born; Distrito onde vive: Area where subject lives; Núm.º: Number; Alvo: Target (word); Resultados: Results; Tipo: Type; Correctas: Correct answers; Inicial: Initial (consonant); Medial: Middle (consonant); Metatética: Metathetic (consonant); Vozeamento: Voicing; Modo: Manner (of articulation); Ponto: Place (of articulation); Freq. Baixa: Low frequency; Freq. Alta: High frequency.

[21] The phonetic transcription of the target words reflects the overall phonetic characteristics of a slow tempo style of the Lisbon-based standard. Thus, there is reduction of unstressed vowels — which is common to all European varieties — but no suppression of unstressed central [ˆ] and velar [u], a feature of colloquial Lisbon speech.

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NÚM.º	ALVO	IPA [21]	RESULTADOS	FREQ.	TIPO
20	pulo	[»pu…u]		A	MD m
21	safo	[»safu]		B	MT p
22	lado	[»…adu]		A	I m
23	pega	[»pEgå]		A	MD v
24	mono	[»monu]		A	MT p
25	conta	[»ko)tå]		A	I p
26	seiva	[»såi9vå]		A	MD v
27	tanso	[»tå)su]		B	MT m
28	bata	[»batå]		B	I p
29	gado	[»gadu]		A	MD p
30	dente	[»de)t^]		A	MT v
31	nota	[»nçtå]		A	I m
32	roga	[»{çgå]		=	MD v
33	cento	[»se)tu]		*A*	MT m
34	doca	[»dçkå]		B	I v
35	lasso	[»lasu]		B	MD m
36	touca	[»tokå]		A	MT p
37	tacto	[»tatu]		A	I p
38	cimo	[»simu]		A	MD m
39	bode	[»bçd^]		A	MT p
40	bala	[»ba…å]		=	I m
41	pompa	[»po)på]		B	MD p
42	zela	[»zE…å]		B	MT m
43	cama	[»kåmå]		A	I v
44	cabo	[»kabu]		A	MD v
45	face	[»fas^]		A	MT p
46	taco	[»taku]		B	I m
47	tufo	[»tufu]		A	MD p
48	sete	[»sEt^]		A	MT m
49	bote	[»bçt^]		=	I p
50	dono	[»donu]		A	MD m
51	gabo	[»gabu]		B	MT p
52	dado	[»dadu]		A	I p
53	monda	[»mo)då]		B	MD v
54	tanque	[»tå)k^]		A	MT p
55	pomba	[»po)bå]		B	I v
56	maca	[»makå]		B	MD p
57	senta	[»se)tå]		A	MT m
58	fenda	[»fe)då]		B	I v
59	baba	[»babå]		A	MD p
60	pote	[»pçt^]		A	MT p
61	nona	[»nonå]		B	I m
62	mofo	[»mofu]		A	MD v
63	tido	[»tidu]		B	MT v
64	pala	[»pa…å]		A	I p
65	mata	[»matå]		B	MD m
66	cota	[»kçtå]		B	MT p
67	lota	[»…çtå]		B	I m

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NÚM.º	ALVO	IPA [21]	RESULTADOS	FREQ.	TIPO
68	vila	[»vi…å]		A	MD m
69	tapa	[»tapå]		B	MT p
70	tona	[»tonå]		B	I v
71	mota	[»mçtå]		B	MD v
72	cacto	[»katu]		B	MT p

CORRECTAS	/72	INICIAL (I)	/ 24
		MEDIAL (MD)	/ 24
		METATÉTICA (MT)	/ 24

CORRECTAS	/72	VOZEAMENTO (v)	/ 19
		MODO (m)	/ 23
		PONTO (p)	/ 30

CORRECTAS	/72	FREQ. BAIXA (B) =	/ 36
		FREQ. ALTA (A) =	/ 36

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PALPA-PT N.º 3

1. bola	mola	2. roupa	rouba	3. gaba	baga
4. vela	zela	5. cala	cara	6. tipo	pito
7. cacto	gato	8. vida	viga	9. denta	tenda
10. sala	tala	11. cama	cana	12. dolo	lodo
13. vala	fala	14. rima	riba	15. Luna	nula
16. nota	mota	17. laca	lata	18. campa	panca
19. pilha	bilha	20. pulo	puno	21. faço	safo
22. nado	lado	23. peca	pega	24. mono	nomo
25. conta	ponta	26. ceifa	seiva	27. santo	tanso
28. bata	data	29. gabo	gado	30. dente	tende
31. nota	dota	32. roga	roca	33. cento	tenso
34. toca	doca	35. lato	lasso	36. couta	touca
37. tacto	cacto	38. cibo	cimo	39. dobe	bode
40. mala	bala	41. pompa	ponta	42. zela	lesa
43. gama	cama	44. cabo	capo	45. safe	face
46. taco	saco	47. tusso	tufo	48. tece	sete
49. dote	bote	50. dono	dolo	51. bago	gabo
52. dado	gado	53. monta	monda	54. tanque	cante
55. bomba	pomba	56. mapa	maca	57. tença	senta
58. fenda	venda	59. baga	baba	60. pote	tope
61. dona	nona	62. movo	mofo	63. tido	dito
64. pala	tala	65. massa	mata	66. toca	cota
67. lota	nota	68. vira	vila	69. pata	tapa
70. tona	dona	71. moda	mota	72. cacto	taco