

Decoding behaviour and phonetic constraints in second language learners: new insight for the structuralism perspective.

Comportamento de descodificação e constrangimentos fonéticos em aprendentes de Língua Segunda: nova perspectiva para o modelo estruturalista.

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Resumo O campo educacional mantém-se, em Portugal, sem medidas válidas no que respeita à avaliação de alunos imigrantes. O objetivo deste estudo consiste no desenvolvimento de um instrumento electrónico fiável para avaliar os comportamentos verbais, ao nível da consciência fonológica e das competências linguísticas específicas de aprendentes de Língua Segunda. Por um lado, o instrumento avalia capacidades no domínio da descodificação fonética e fonológica, examinando as diferenças entre os locutores estrangeiros (aprendentes de Português como Língua Segunda); por outro lado, o objetivo é observar a performance cognitiva em diferentes contextos, com vários alunos, nas escolas portuguesas. Após a revisão teórica de conceitos e a perspectiva proposta para os processos de descodificação fonética, serão apresentados os resultados decorrentes da aplicação da bateria de testes especificamente no que respeita ao desempenho de aprendentes de Língua Segunda (amostra do estudo) nas provas de segmentação e de pares mínimos. Os alunos mais velhos exibem uma competência maior do que os mais novos, revelando maior estrutura e menor interferência no nível fonológico. A "homopheneity" sugere-se como o constrangimento para a descodificação fonética e percepção. A bateria de testes apresenta-se como um instrumento importante de diagnóstico a adequar ao contexto educativo vigente na sociedade multicultural.

Palavras-chave programa de intervenção, Língua Segunda, alunos imigrantes, medição, descodificação fonética, plasticidade.

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Abstract Educational field remains, in Portugal, with no valid measures concerning immigrant students. The purpose of this study was to develop a reliable electronic instrument to assess verbal behaviours, regarding the phonological awareness and specific language skills of second language learners. In one hand, the instrument measures skills on phonetic and phonological decoding, applying to the differences between the foreign speakers (learning Portuguese as a second language); in the other hand, the objective was to observe the cognitive performance achieved in different sets, regarding several students, in Portuguese schools. After theoretical revision of concepts and a perspective about phonetic decoding processes, will be presented results from the tests battery application specifically on the achievement of second language learners (sample of the study) regarding the segmentation and minimum pairs judgment tests. The older learners present higher competence than younger ones, revealing more structure and less interference at the phonological level. The “homopheneithy” is suggested as the constraint for the phonetic decoding and perception. The tests battery is presented as an important diagnostic tool applied to the current educative context in a multicultural society.

Keywords program of intervention, second language, immigrant students, measurement, phonetic decoding, plasticity.

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Introduction

The scientific discussion in the field of learning/ acquisition of second language (SL) is still recent and less structured than the one developed for investigation in acquiring a first language (Richtie & Bhatia, 1996). It is still scarce (rather rare actually, since we can't find any Portuguese sources on this field) in the Portuguese context, both relating to generally acquiring a second language and, on the other hand, to the specific cognition related to acquiring a SL. The few studies on this theme, considering Portuguese as a SL, are mostly from Brazilian authors, which are at the moment developing their work in different parts of the world (Andrade & Martins, 2007; Correa & Dockrell, 2007; Cardoso-Martins et. al., 2006; Bacelar & Carvalho, 2006). "...In spite the pride with which some frequently refer to the importance of Portuguese among the languages of the world, the investigation works on Portuguese as a non-maternal language are still few [...]" (Leiria, 1999: p. 8). The observation of the relationship between learning and having ability into second language on the one hand, and verbal behaviour on the other is mostly present having English as a study object, followed by Spanish, French and Chinese languages. In fact, alphabetizing different populations is a crucial tool that guaranties progress; it is the foundation for science itself to develop. Hence, it is not only important to study and understand the cognitive aspects of learning a mother language but also a SL, considering that acquiring a SL is evermore a reality we leave in. On the other hand, without the proper evaluation and intervention instruments, based on academic investigation, our national educational context will continue to present a not so proud picture of the literacy abilities of the general population, placing Portugal among the least prepared for academic and scientific development.

In a first moment of this work, important concepts will be approached, such as verbal behaviour, language and meaning, advocating Skinner's behavioral theory (Skinner, 1978). After conceptual introduction, several aspects of theoretical review will be presented, relating to phonetic perception and decoding of first and second language. In a second stage, we present the various components of the scientific method, describing the sample, procedures and results. Based on the data, we will discuss the perception of SL learners on foreign phones, by analyzing their ability in segmenting and identifying minimal pairs. The participant's performance in two tests of an electronic based battery will be considered, which presents as an important tool for promoting teaching and learning of language (mother language and mostly second language) in educational context.

Verbal behavior in a functionalist perspective: insights into language development.

Conceptual clearing and phonetic perception development in distinct linguistic exposure context.

According to the behavioral theory, the concepts of “language”, “verbal behaviour” and “meaning” are distinct phenomena, even if related, and are very well explicated in Skinner’s “Verbal Behavior” (Abib, 1994; Skinner, 1957). According to Abib, “[...] Skinner’s vocabulary is original, and an alternative to other disciplines [rhetoric, classic grammar, linguistic, semantic, psycholinguistic, literacy critique and language philosophy], to define concepts such as verbal behaviour, language and meaning.” (p.468). Also, according to Skinner himself,

“Linguistics, for example, has recorded and analysed speech sounds and semantic and syntactical practices, but comparisons of different languages and the tracing of historical changes have taken precedence over the study of the individual speaker. Logic, mathematics, and scientific methodology have recognized the limitations which linguistic practices impose on human thought, but have usually remained content with a formal analysis; in any case, they have not developed the techniques necessary for a causal analysis of the behaviour of man thinking.” (1957: p. 4)

In order to understand what verbal behaviour is, we must settle on an explicit basis of the concept and of its relationships with other close concepts, such as “language”. Language, as we must note, is a concept tied to linguistic “code”, referring to the linguistic system that underlies and explains verbal behaviour. Language is, in a general sense, the “practices of a linguistics community”, which is to say, reinforcement practices by verbal communities (Abib, 1994), governed by code grammars (languages). On the other hand, grammar is a set of rules that are defined as described conventions and are conditioned by verbal communities. Grammar does not contain meanings, but rather these are inferred from the context of relationships (between components – situation, organism action, result/ consequence) that are inherent to behaviors.

Meaning is defined as a contingency relationship (conditions that the situations present and that determine behaviour). The concept of “reference” is neglected, although not rejected, not corresponding to what meaning is considered to be. Meaning is not observable and is inferred from the relationships between the organism and the context in which it operates. According to Abib, a verbal response to a given situation is a relationship that means another relationship, which is a meaning (p. 486), being reference a parasite of the term “meaning”. In other words, meaning resides in the relationship between what is communicated and the event in which the verbalization (vocal or not) occurs, and it is not observable, because it is not a component of behaviour (Skinner, 1978).

Verbal behaviour is, therefore, an expression of the general behaviour of speakers, modeled and kept by verbal communities (the cultures). These control the individuals repertoire (operant reinforcement: way of controlling the probability of a certain class of verbal responses) with their own verbal behaviors (practices that materialize in spoken word(s), that constitute themselves verbal operatives (operatives are more meaningful, because they “operate” in context, comparing to simply using the term “word”, that do not interact in the sense of “function”). In itself, the repertoire must not be confused with vocabulary, because repertoire describes the potential verbal behavior of a speaker, adding the dynamic dimension that is lacking in vocabulary, which refers only to an inanimate deposit (“mental lexicon”) that is seldom activated (Skinner, 1978). This distinction may be applied to the conceptual difference between “verbal operant” and “word” respectively. The verbal operant is presented in a dynamic perspective, considering potential related to an effective function. The word appears more concealed in its reinforcement value.

In analyzing language and verbal behaviour, it is important to consider the outlines of both theories, as to allow for a more complete study that does not assume exclusively either a mentalist or a functionalist philosophy perspective (Cazacu, 1979; Catânia, 1999). In regulating languages processes, the individual depends not only on his own mental structures to produce verbal behaviors, but also on the relationships between them and the context of which they are part. The individual does not process all the stimuli he is presented with, but rather he is conditioned by the need to select sounds, increasingly demonstrating the ability to emergently discriminate (new behaviors). The child, while developing her language ability, alternates between behaviors based on imitation and behaviors based on autonomous operation of detours – emergent performance and generalization (Skinner, 1978; De Rose, 1988). The process is controlled at the unconscious level by the practices (verbal operant) of the linguistic community, which determine the subjects’ learning. In the first weeks of his life, the human being begins to practice sounds, the first mainly biologic (pre-phonetic phase), which are afterwards replaced by giving sounds close to the phonetics of his linguistic environment. However, language sounds are not harder than biologic ones. Both demand effort from the child in appropriating to the environment, in which both sources of stimuli are present. While developing language, the individual develops knowledge, which is of social nature (behavior is always a social operation). Hence, the human being, ever since he starts to discriminate sounds of speech, is initiating “social language” development. The grammar that the individual gradually acquires is a verbal instrument of his communication intentions, as well as a reflection of his projections, because grammar categories do not exist in nature (Postman, n/d). They are Men conventions that only have meaning when we individually relate to the referents wished. The learnt meaning of concept changes according to the context in which a same concept is applied. This is why the operant conditioning of verbal communities is only partial, because language meanings change according to the individual’s per-

ception – the symbol systems (represented in a Language), is, in fact, a point of view (Postman, n/d).

For the linguistic coding and decoding processes, the patterns of neuronal activation in the brain are in constant “perceptual flux”, since assimilating new phonetic information implies accommodation and restructuring at the neuronal level, as learning occurs. This flux may be strongly activated when certain challenges are presented, for instance, the effect of homophonous words, which leads the perception to become more specific to knowledge of pronunciation and orthography. Therefore, the higher the frequency of lexicon, the more efficient the activation becomes, because the identifying schema becomes inherent, by orthography and phonological paths (see Gillon, 2004). Conversely, we must consider that perception of sound segments has a neurological base, that is to say, specific phonetic traits are created, associated to a certain neuronal representation (probably in the hearing cortex of the left hemisphere) developed in the early years, while acquiring a first language. This representation may be altered or added when learning a new language. The speech perception as only a set of phonetic traits, that constitute themselves the early recognition of the defining aspects of the linguistic code, varies throughout the first year of life (with a more evident beginning around the fourth month). Yet, it is by the twelve months that the child is able to discriminate sounds of two systems, when exposed to a bilingual system. Even if in the stage of a forming conscience, the child understands two phonetic and phonological systems, being predominant the visual discrimination (the child mainly imitates the oral-facial movements of others), making it easier to distinguish by the facial movements of the speakers what language is being spoken. As for producing language, this ability is developed mainly until the fourth year of age - articulated phonetic training. For monolinguals, speech perception is accomplished during the first half of the first year of life, being that they react to familiar and unfamiliar sounds, capturing more efficiently the more prominent phonetic traits, based on their evident properties. However, during the second half of the first year, this ability becomes latent, indicating a natural decline that is overcome at twelve months. For bilinguals, this process is less linear, because there are more stages of decline and recovering in the discriminatory ability, contributing to its’ perfecting, relating to the two phonetic systems. By the seventeen month (stage of phonetic emergence), the human being possesses the phonetic information needed to discrimination in context, but does not yet knows how to use this behaviour, because there are not enough phonetic details to justify discriminatory process. With entering the phonetic stage, lexicon comprehension starts having a phonological meaning (decoding and coding) and not only phonetic. The bilingual’s child attention is higher towards assimilating a new lexicon. However it takes longer in the lexical decision, for it involves a greater selection and consult of known phonetic categories. Bilingual’s performance may be more implicated in this moment of the decoding process, comparing to monolingual, but the metaphonological consciousness is more rapidly developed.

An important factor in explaining the decoding of phones and phonemes in second language or foreign language context is the type of orthography (from the mother tongue) of the individual. The notion of minimal unit (phoneme) or greater (syllable) varies as a strong or weak predictor of writing and reading decoding abilities. The individuals who dominate languages with consistent orthographies (and transparent ones: languages that present a corresponding orthographic and phonological code, in opposition to languages where the correspondence between grapheme and phoneme is almost absent: opaque languages) can benefit from knowing minimal units. On the contrary, individuals with more inconsistent maternal orthographies benefit from knowing greater units (Ziegler et. al., 2001). The same items in verbal language may therefore be processed in different ways to achieve the same success. These types of orthographical differences, and accordingly alphabetical, constitute the contingencies that determine the relationship plan between components (the stimuli that is substantiated in the verbal stating in SL, the subject's action, the response, and the consequences, may be either positive or negative, depending on the expected result after processing a linguistic message), whose dynamic action defines behavior.

The same alphabet may be different for two languages or two languages may present to different alphabets (which implies higher error incidence in transference between languages). However, languages with the same type of alphabet contain in their phonological matrix minimal units that are distinctive in their articulation nature (the articulation as a criteria for categorizing) and in number. The SL learner, while learning a new phonological matrix, always applies his idiosyncratic version and creates a phonological matrix with free variants (a variation that depends on the speaker himself and not on the phonological context) that, on their turn, characterize accent (Schütz, 2008). Different writing systems represent different meaning units (syllables, phonemes or morphemes) and exhibit different properties. Learning a SL implies new knowledge of linguistic units, new rules, orthographic conventions, even new manual and oculars movement adequateness. Therefore, the SL learner is changing from "biliterate and biscriptal" (Bassetti, 2005: 1), with the acquisition of a new phonetic and graphological consciousness.

Method

Sample

Case sample: 61 subjects (Portuguese as a SL learners, with migration experience), with a mean age of 16,1 and standard-deviation of 6,3. 19 (31,1%) are children (ages 7 through 12 years old), 22 (36,1%) are adolescents (ages 13 to 18 years old) and 20 (38,2%) are adults (ages 19 through 30 years old). The subjects attend High School, Secondary School and Higher Education. The participants of this study present a total of 26 different nationalities. This variety of nationalities and spoken languages is

intentional, although we do not intend to specify nationality or speakers groups for the research, as is the usual perspective of studies in this area. The sample selection was based on two important criteria, which define specific aspects of the migration experience we intended to have: date of arrival at Portugal and Portuguese language proficiency. The proficiency indicator to each participant was based on specific diagnostic evaluation performed by the schools. The proficiency levels intended for this study are A2 and B1 (European Commission, 2001). A1 was not considered, because the student might not understand the questions proposed in the test battery. We stress the fact that these levels (including A1) are considered requisite to have educative support on Portuguese learning referred by the orienting documents (2005) and legislation for the application of curricular measures in the schools. On the other hand, we considered only subjects that arrived at Portugal for the first time, without previous knowledge on the Portuguese language, no more than four years ago, relating to 2006. We noticed that in total there are 22 languages in the sample of which the subjects are active speakers. In what concerns the support they get on Portuguese Language discipline (as SL), 42 (68,9%) are receiving support as a curricular discipline. This kind of support is at an initiation stage, because students have not arrived, mostly, over a year ago. The remaining 19 (31,1%) are not getting any kind of support (those that have been in Portugal longer).

Instruments

Tests Battery of Verbal Behaviors Assessment in the context of SL: the purpose of this 12 test battery, prepared as a research instrument, is essentially to evaluate various levels of phonological consciousness (syllabic, intrasyllabic and phonetic) in the context of the Portuguese idiom (Second Language). The battery was developed in an electronic form, so its effectiveness, validity and data organization could be guaranteed, as well as to present the tasks in a dynamic and attractive manner. The test presents simultaneously the response options, the results, and the quotation, as if in a manual in paper form. It will be available online, with previous divulgation of its access and using rules. All the data (subjects responses and time used, in seconds, for each test) are registered safely in a database built for that purpose. An English version of the same test was built. The programming of the test (in ASP, depending on the server IIS installation, on only one laptop) occurred between October 2006 and January 2007. This battery, as applied to the sample, reveals and adequate internal consistency, with a *Cronbach Alpha* of 0.76 (number of items = 43).

Procedure

After the cognitive debriefing, the test was applied to students in their own schools, in a laptop previously prepared. The tests took about 50 minutes to complete. These process followed several steps (authorization request, getting data from the schools, selecting subjects, formalizing consents, receiving consents and authorization from

the school) and was initiated in September 2006, which led the battery to be applied only in January 2007 (ending in December 2007).

Data analysis

We determined means, standard deviations, frequencies, percentages, pearson correlations, t-test for independent samples, factorial analysis with varimax rotation for eigenvalues equal or higher than 1, as well as chi-square analysis and multivariate analysis of variance, using the SPSS 15.0 program.

Results

* Independent variables

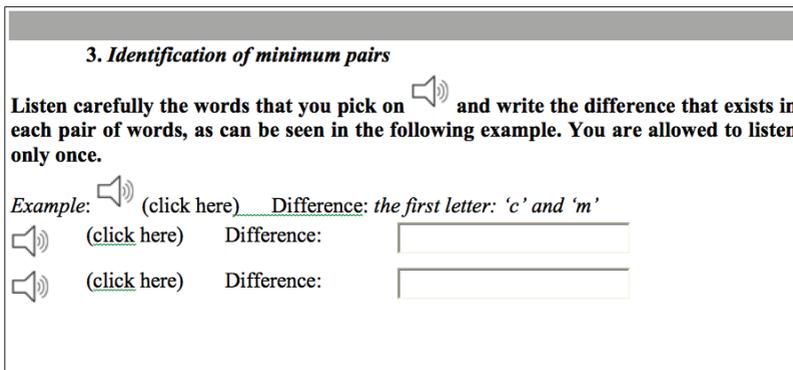
“Age Groups” (Group I – 7-12 years old; Group II – 13-18 years old; Group III – 19-30 years old)

** Dependent variables (tests battery)

(Test 3) “The identification of minimum pairs” (correct answer: identifying two minimum pairs heard, by recording the differentiating letter in each pair);

(Test 4) a) “Spelling” and “Reading” (correct answer: spelling and complete reading for four read words); “Phonemic blending” (b); (correct answer: blending three heard words).

Figure 1. Print screen of the electronic test



In what concerns participants distribution for the variables “Age Groups” and “The identification of minimum pairs” (test 3), the distribution is not random ($\chi^2=20.728$; $g.l._{10}$; $p_{.023}$; $\eta=.470$). In the “The identification of minimum pairs” variable, among the “Age Groups”, it is the Group V that presents the more correct answers (27,3% - 2 recordings), followed by Group III (25,9% - 1 recording). The group that has the least correct answers is Group I (38,1%), as noted in table 1.

Table 1. Age groups distribution regarding their achievement on the Test of Identification of Minimum Pairs (test 3).

			Test of Identification of Minimum Pairs (number of reports)			Total
			0	1	2	
Age Groups	7-9	Count	8	0	1	9
		% within age groups	88,9%	,0%	11,1%	100,0%
		% within test of identification of minimum pairs	38,1%	,0%	9,1%	15,3%
	10-12	Count	3	4	2	9
		% within age groups	33,3%	44,4%	22,2%	100,0%
		% within test of identification of minimum pairs	14,3%	14,8%	18,2%	15,3%
		% of Total	5,1%	6,8%	3,4%	15,3%
	13-15	Count	7	7	1	15
		% within age groups	46,7%	46,7%	6,7%	100,0%
		% within test of identification of minimum pairs	33,3%	25,9%	9,1%	25,4%
		% of Total	11,9%	11,9%	1,7%	25,4%
	16-18	Count	0	4	2	6
		% within age groups	,0%	66,7%	33,3%	100,0%
		% within test of identification of minimum pairs	,0%	14,8%	18,2%	10,2%
		% of Total	,0%	6,8%	3,4%	10,2%
	19-23	Count	2	6	3	11
		% within age groups	18,2%	54,5%	27,3%	100,0%
		% within test of identification of minimum pairs	9,5%	22,2%	27,3%	18,6%
		% of Total	3,4%	10,2%	5,1%	18,6%
	24-30	Count	1	6	2	9
		% within age groups	11,1%	66,7%	22,2%	100,0%
		% within test of identification of minimum pairs	4,8%	22,2%	18,2%	15,3%
		% of Total	1,7%	10,2%	3,4%	15,3%
	Total	Count	21	27	11	59
		% within age groups	35,6%	45,8%	18,6%	100,0%
		% within test of identification of minimum pairs	100,0%	100,0%	100,0%	100,0%
		% of Total	35,6%	45,8%	18,6%	100,0%

Figure 2. Print screen of the electronic test

4.

a) *Segmenting and reading*

Spell the following words, as can be seen in the following example.

Example:  (click here)

a) passagem
b) bagagem
c) vaso
d) onda

b) *Phonemic blending*

Listening carefully, find and write the words spelled in each :

a) 

b) 

c) 

Regarding participants' distribution for the variables "Age Groups" (considering three groups) and "Phonemic blending" (task 4b), both distributions are not random ($\chi^2=7,039$; $g.2_{10}$; $p_{.030}$; $\eta=.263$). Differences in the "Phonemic blending" variable for the categories of "Age Group" show that it is the Group II that presents more successful blending skill (53,3%), and Group III that presents the least successful (43,8%), as can be seen in table 2.

Table 2. Age groups distribution regarding their achievement on the Test of Segmentation (test 4a.).

			Test of Segmentation		Total
			Incorrect answer	Correct answer	
Age groups	7-12	Count	10	6	16
		% within age groups	62,5%	37,5%	100,0%
		% within test of segmentation	31,3%	40,0%	34,0%
		% of Total	21,3%	12,8%	34,0%
	13-18	Count	8	8	16
		% within age groups	50,0%	50,0%	100,0%
		% within test of segmentation	25,0%	53,3%	34,0%
		% of Total	17,0%	17,0%	34,0%
	19-30	Count	14	1	15
		% within age groups	93,3%	6,7%	100,0%
		% within test of segmentation	43,8%	6,7%	31,9%
		% of Total	29,8%	2,1%	31,9%
Total	Count	32	15	47	
	% within age groups	68,1%	31,9%	100,0%	
	% within test of segmentation	100,0%	100,0%	100,0%	
	% of Total	68,1%	31,9%	100,0%	

Discussion

The results allows us to identify some of the difficulties in decoding and coding by migrated populations in Portugal, considering age and mother tongue type previously known. Particularly, we addressed the identification of minimum pairs and phonetic segmenting/blending tests, both relating to the alphabetical or phonemic consciousness evaluation.

The identification of minimum pairs allows for the subject himself to evaluate his phonetic decoding abilities, at the highest level of phonological consciousness, because this task addresses knowledge of the phonological matrix of the language in which it is operating. A minimum pair refers to two words (test example in Portuguese, ['kɔla] and ['mɔla]) that only differ in one certain phoneme that changes not only

the phonetic of the word but also determines its meaning (the phonological aspect). Hence, this minimum pair is proof that the phonemes /k/ and /m/ are really distinctive units (therefore phonemes), and their distinctive traits rely on the following articulation properties: sound (to /m/ there is vibration of the vocal cords, which does not occur when producing /k/) and the nasality (that is only property of /m/, done by the physical lowering of the palatine veil, which leads to air flux passing through the mouth and nose cavities simultaneously; in producing /k/, the palatine veil is up, obstructing the air passage for the nasal cavity).

Considering the same test, the minimum pair 'pinha' e 'pilha' (first pair presented as a stimuli in test 3, in Portuguese) was the least identified comparing to the minimum 'cão' e 'pão' (second pair, also retrieved from portuguese lexicon). The more positive performance in the second pair may be strongly related with de consonant position, which may mean that the medium position is easier to identify. Alternatively, another argument may be that the phones to be distinguished are associated, in the second pair, to another phone (h), becoming a digraph that "masks" the identity of the phones. The way the individuals identify minimum pairs determines their perception of the phonetic system, which in turn determines the articulation production (Flege, 1993). The performance revealed by the subjects of this sample is, in a general sense, very low, being that the strategies (Flege & Hillenbrand, 1984) used by the subjects seem to be not very efficient in detecting phonetic contrasts that determine the phonetic identity of each minimum pair. Subjects seem to be easily influenced by the obstacle of "homopheneithy" (Binnie & Montgomery., 2004), which is to say, of phonetic similarity of the sounds (homophony), considering that the subject is challenged in his auditory discrimination to detect which is the distinctive unit in the pair of words presented. The set of distinctive traits that define the phoneme (in the foreign language/second language) may suffer interference from the phonological system of the individual's mother tongue. It is considered that children excel for their selective attention, however it is the younger group (less than nine years old) that commits more errors in this task, failing to detect the detail of the distinctive traits when hearing two minimum pairs on the test, which is in accordance with Flege, Frieda, Walley e RandaZZa (1998) conclusive argument: "Finally, children have more difficulty than adults in discriminating minimally paired words" (p. 157). The fact that judging minimum pair demands higher right hemisphere processing may contribute to explain this performance from the younger subjects, considering that it is only with aging that the right hemisphere becomes more evidently involved in language, especially in a second one. Specifically, the pair 'pinha/pilha' offered the greatest difficulty to its identification, probably because the distinctive information is placed in the middle (nh/lh) and not in the beginning as in 'cão/pão' (c/p). The child therefore reveals less discrimination because, according to Flege et al. (1998), "children need to hear a larger portion from the beginning of words presented in a gating task in order to identify the words than do adults" (p. 157). Also, this middle position is aggravated by the fact that the phone is associated with another one thus composing one single phonetic meaning ([Λ]).

In the phonetic segmenting test (done by spelling) as well as the reading of a group of vocables randomly placed ('passagem', 'bagagem', 'vaso', 'onda', Portuguese lexicon), children are still not the most successful group, being the adolescent group (aged between 13 and 18 years old) the most successful one in spelling the four presented words. Yet, the adults are the ones who reveal the worst performance in both tests. Considering the results from the remaining tests, we realize this is a level where adults rarely present a weak performance, because this is the age group that more positively surpass in resolving almost all the tests of the battery. The fact that the adolescents present a more evident articulation ability (Andrade & Martins, 2007), favored by the higher velocity in producing, associated also to the "variability in the pathways of articulation" (Andrade & Martins: p. 778), may explain their positive and outstanding performance in the spelling and reading spelled words. Their perfected ability of articulation perception influences their production performance, as well as their evaluation of it. The segmenting process, as well as others previously referred to, involves the subject at the phonetic level, therefore demanding a more or less thorough phonological knowledge of the language in which is it operating. Considering that adults are thought to be learners that initiate their understanding processes from the more complex level, like the minimal unit (phoneme), in this case it is not so, specifically in the segmenting task, being that adolescent exhibit higher competence, while children are placed half-way, however having a much more successful performance than adults. These reveal higher problems in identifying sounds such as [g]. We observed that, when recording the oral resolution of the task, there was more time used (because of the trials to perfect articulation and produce the correct sound) for these types of phones, in what production and subsequent perception is concerned.

The interference of the first language of the subject is notorious in producing sounds, in that the phonetic production by analogy (Gillon, 2004) is evident, showing that there is a learnt tendency of recognition by analogy. There are three types of situations that may occur in speech perception for SL: assimilating the native phonetic category, assimilating the phone as non-categorized (unknown), and, finally, no assimilating as a speech (Aoyama, 2003). We believe that the first situation is more frequent, being simultaneously probable the neglecting of sounds.

Speakers frequently produce and perceive sounds in SL, especially vowels, like real allophones in the mother phone perspective. In fact, we consider it to be much harder for the speaker/listener to understand, code and hence produce a sound that, a priori, has some similarity with a certain phone of the phonetic system of mother tongue, than produce a sound that he entirely doesn't know, being able to initiate the complete process of phonetic knowledge for the minimal unit implied. This reason may explain the difficulty and doubts manifested by students from the PALOP's (African pupils) or Brazil shown, although having frequent contact with the Portuguese, once is their official language, at the perception and production of phones that constitute

for them allophones after the sounds they know (the most known example is that of the vowels [e] e [o]). These phones (allophones) may be neutralized according to context (that is, stop being opposing to phones [ɛ] e [ɔ] respectively), which creates conditions for less phonetic perception, since it is harder to capture the neutralizing opposition then the contrasting one, that is to say, a neutralizing opposition does not constitute a real opposition that determines the minimal distinctive unit (Boomershine, Hall, Hume & Johnson, 2005). The contrast opposition presumes that a certain phoneme in a certain position (for instance the phoneme /R/ will always be /R/ when in the beginning of the word, however that is not the case when in the middle position, when it becomes [r]) is always kept the same segment, without changing its identity). The allophone's impact and the phonetic contrast (for instance the "minimal pair") has effect not only on the phonetic and phonological perception but also at the semantic level, contributing for word intelligibility.

To make the speech perception and its component effective it is not enough to individually know each phone but also to relate it to the phonological system, which is to say, to detect its identity after the set of interaction that are possible of occur in a given language. From here it is possible for the speaker to learn the neutralizing and contrasting opposition. In the understanding by analogy perspective, this is a strategy that by itself may be transferred from the first to the second language, working not only in recognizing global vocabulary but also minimal units like phonemes. The efficacy of this strategy may not be, however, as evident in the new linguistic code. As the experience with the new language grows, it is natural that the discrimination be adjusted, as if recoded. Subjects, mainly children and adolescents, shown better performance in spelling (segmenting in producing) of Portuguese words then in the identifying of spelled sounds, not related and individually exhibited (/a;/R;/v;/f/). The non-native listener usually faces problems such as pseudo-homophony and the activation of de false word, based on information from the first linguistic system (mother tongue). He then has a tendency to understand phones in the context of a certain vocabulary, not considering easy to decode abstract units of sound (at the phoneme level) and out of context (Flege *et al.*, 1998), which is the case in the test of sounds identification previously referred. The principle of vocabulary familiarity prevails, that expects "surrounding phonetic context" (Flege *et al.*, 1998: 157).

Learning a new phonetic system is harder, because in the first phonetic learning the subject acquired a phones' holistic and not particular identity (Flege *et al.*, 1998), being that, in transferring for another code, certain traits will have to be selected and properly recovered for recognizing the foreign phone. It is very common, judging from the previous results, that the learners of a new language usually perceive non-familiar sounds according to their mother tongue' phonetic inventory, with the vowels being the most filtered sounds (Imsri, 2002; Flege, *et al.*, 1999). For authors who stand for the connectivism theory, applied to the acquisition of SL, the patterns

("linguistic pattern complexes", Gasser, 1990: 12) acquired on mother tongue are transferred for the processing of SL.

Once a network has learned an association of a pattern P1 with a pattern P2, when it is presented with a new pattern P3, this will tend to activate a pattern that is similar to P2 just to the extent that P3 is similar to P1. (Gasser, 1990: 13).

This kind of principles ascertains the existence and importance of the universal linguistics that are evident in language development throughout the individual's life. The question remains in how language patterns are acquired and readjusted when there is transference and code interference. The phonological system works like a filter itself for foreign sounds to the listener who considers he may find in the foreign lexicon cognate words, which share similar radicals to vocabulary in his first language, sharing mainly phonetic traits, what may not be an advantage in the phonetic and lexical decision: "Cognate status has been shown to affect performance in a wide range of psycholinguistic tasks" (Flege et al., 1998: 159). It should be considered the role of recognizing cognate words by the speakers, which depends on the lexicon organization that, according to the theoretical conceptions on the matter, may be on a "common store" (Flege et al., 1998: 158), being that the phonological forms are independent but connected to a same referent (semantic), or in a "separate store" (Flege et al., 1998: 158), where the phonological forms are directly tied without semantic mediation, and the meaning is indirectly given by the equivalent phonological form in the first language. The way the lexicon influences the segmenting ability in oral production is still unclear (Flege et al., 1998), however being natural that the kind of lexicon, derived from the kind of language that the speaker exhibits, will determine his segmenting ability and the type of accent or intonation he makes when phonologically producing.

Final Considerations

With the battery developed and the results discussed, we intended to reveal that the "issue for someone [scientifically investigating the ability of the speaker] focused on operational processes" can no longer consist of "developing tests that give correct results and make relevant distinctions" (Chomsky, 1978: 101). Our goal is to identify performance clues and the subjects' intuition as to contribute in the future with a test that may represent an opportunity of leveling the subjects' performance and inform them on their ability, without cataloguing "correct results". Naturally, second language learners are students at risk in what concerns developing literacy abilities (Snow et. al., 1999), which may determine their academic performance in general. Considering this, the test battery developed in this investigation is a contribute for Education, in that it holds as an important instrument of diagnostic evaluation, and simultaneously as an intervention program in teaching and learning, especially directed at students who are initiating the learning/acquisition process of Portuguese as

a SL, for it may provide indicators to facilitate the process of attribution of proficiency levels by the teacher/ educator (European Commission, 2001), according to students' performance. On the other hand, it is a more efficient determination of the language levels in which the subject reveals higher ability, deduced by his performance that is in such a way fast as to be captured by the electronic test. The test configuration is based on the principle of organization by task level, sound stimuli hearing' precision and in conditioned writing tasks, by the dynamic given by the interaction of the user with the stimuli presented in the test, and by the control and time recording ability.

Applying this test allows to set a written and oral verbal behavior profile, contributing to the programming of learning activities that promote a successful school progress, where knowing the language is of the utmost importance.

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