PROSODY AND LANGUAGE DISORDERS: LIST OF PUBLICATIONS IN INDEXED JOURNALS BETWEEN 1979 AND 2009

Prosódia e transtornos da linguagem: levantamento das publicações em periódicos indexados entre 1979 e 2009

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ABSTRACT

This study has as its subject the relationship between prosody and language disorders, this relationship being investigated from the survey of publications indexed in international databases. The analysis of the articles showed that there is a growth in publications that relate to language disorders deficits production and perception of speech prosody. It also reinforces that the loss or difficulty in skills relating to prosody, pragmatic compromises the function of language, and therefore the interaction of the subject in its social environment. Aphasia is a disorder most studied, probably also influenced by the global increase of the elderly population. And the more thematic publications was found in speech perception.

KEYWORDS: Speech, Language and Hearing Sciences; Language Disorders; Speech Perception; Speech Production Measurement

INTRODUCTION

The use of language is always related to a purpose to be achieved: act on the other, influence him, waking him emotions, images, convince him. Therefore, the statements are guided so that they have meaning, which, in speech, is conveyed through prosody, natural characteristic of the speaker, also important for the interpretation and understanding of speech[1].

Through interaction, the human being is able to change his voice according to the context, the speaker, and the intentions to be achieved in a dynamic process and almost inherent to its communicative ability. The expressiveness of speech happens just from the various prosodic variations of parameters *loudness, pitch* and duration during a conversation, which will confer meaning to the spoken word.

Each speech utterance carries not only the message itself, but also, physical characteristics, personality and the speaker's attitude through the intonation, tone and quality of habitual voice[1]. In this context, in a conversational situation, there is a continuous flow of information between the participants, expressed and perceived by means of speech prosodic elements.

These are the intermediary between form and content itself of speech and comprise acoustic elements of fundamental frequency, duration and intensity, which combined will form the intonation, accent, speech rate, pauses, emphases and own speech rhythm. The combination of these factors will determine the understanding of the message and carry the expression of subject's emotions in speech act[2].

One must consider that the prosodic parameters appear early in the language development because the child understands the voice melody from early, even before understanding the words. And it is on the preverbal stages that these parameters begin

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to settle, since before producing the first words, the child has already mastered the intonation patterns of its native language[3].

Throughout its development, the human being acquires language skills, including the ability to discriminate and produce intention by prosody, which can be regarded as a pragmatic skill. This will become possible if the conditions related to the environment and subject himself propitiate the use (production) and feedback (reception). However, there are situations in which the linguistic development of the child or the use of language by the adult is affected by lesions in the central nervous system, psychiatric disorders, and/or neurodegenerative diseases.

Whereas language has a communicative function and that, by foregoing the prosody plays a primary role in the transmission of meaning during the interaction, this study aims at conducting a survey of indexed publications on international databases that relate to perception/production of prosody to language disorders.

METHODS

This study is characterized as cross-sectional retrospective.

A survey of papers relating the prosody to language disorders, indexed on Medline and PubMed databases published between January 1979 and August 2009 and using the search term "prosody", through the software for bibliographical research EndNote X3 Thomson Reuters.

To use an international terminology, it was chosen the definition of terms from DeHS (Descriptors in Health Sciences), created by the Virtual Health Library (BIREME) for indexing journals on the databases. Thus, the term "language disorder" was used throughout this work, referring to any condition characterized by impairment of comprehension or expression of forms of written and spoken language, including developmental disorders and acquired.

Following this criterion, articles that related perceptual parameters and/or production of prosody to language disorders were selected. Subsequently, articles were grouped according to the specified disorder: aphasia, dementia, dyslexia, specific disorder of language development (SDLD), psychiatric disorders of language and stuttering.

For analysis and data categorization, a protocol for classification and analysis of articles (Figure 1) was elaborated. Texts dealing exclusively with disorders of speech articulation, hearing, and those dealing with the prosody only under the acquisition scope and processing in subjects without communication disorders were excluded.

PROTOCOL FOR ARTICLES CLASSIFICATION			
Title: Author: Pages			
Journal:			
Year:	Month:	Volume:	Issue:
Language disorder: ( ) Aphasia | ( ) Dementia | ( ) Dyslexia | ( ) Specific disorder of language development ( ) Psychiatric disorders of language | ( ) stuttering			
Theme: ( ) Measures of speech production | ( ) Speech perception ( ) Language Therapy | ( ) Non-verbal Communication			
Keywords:			
Abstract:			

Figure 1 - Protocol of classification and analysis of articles

Data were analyzed qualitatively and quantitatively, being presented in the form of graphs.

LITERATURE REVIEW

The prosody is related to changes in frequency, intensity and duration, which, during the speech, confer meaning to what is being said. It includes parameters such as intonation, accentuation, stress/prominence, speech rate and duration of segments (vowel or consonant)[4].

Intonation refers to the distinctive use of patterns of *pitch*, being described overall as contours and performing various functions including, grammatical and paralinguistic, conveying meaning effects in utterance[4].

It interacts with elements of linguistic knowledge and the communication situation, as well as beliefs, intentions and feelings of the speaker, contributing to the complete interpretation of an utterance in a specific speech situation[4]. And its main acoustic parameter is the fundamental frequency and its evolution over a sentence or utterance[5].

The intonation patterns can be described both by the characteristics of its contours as ascending, descending, ascending-descending, descending-ascending or leveled; as their sequence of tones[6].

Intonation has several functions in the language and can convey information about the grammar (declarative, interrogative, imperative and exclamatory patterns) as well as conveying meaning effects as anger, surprise, among others[2].

Among its best known functions are included: attitudinal function, once the intonation is the most effective means of expressing the experience of attitude, being able to assess both the speaker's intention as its degree of involvement in a communicative situation; function of structuring the information; communicative; syntactic; textual and stylistic functions[4].

Another related prosody parameter is the fundamental frequency. This is measured in Hertz (Hz) and corresponds physiologically to the number of vibratory cycles of the vocal cords per second. Aurally, it corresponds to the sense of height, severe or acute[5].

The use of a particular *pitch* is directly related to the speech intention, so that a joyous mood is transmitted through more acute tones, while deeper tones are related to a sad mood. Since the deeper voices are associated with authoritarian personality, those more acute with more dependent people[4].

The accent is another parameter of prosody and may be defined as the degree of strength or intensity to produce a syllable, corresponding to the prominences along an utterance and may be phrasal or lexical[7].

The magnitude marks a situation of relief or prominence of a syllable or word, being measured in decibels (dB).

Variations in sound wave amplitude produced in the emission of a particular syllable or series of syllables correspond to the psychophysical sensation perceived by the listener called *loudness*, recognizing a sound as strong or weak[8], which in psychological level allows numerous interpretations because it expresses how dealing with the notion of own limit and other's boundary[4].

The prominence is detected when comparing one word with another along the utterance, and therefore, there are several ways to emphasize a unit in the speech stream[1]. It is a quantifiable perceptual parameter that can be reduced or increased by any of the sound attributes such as duration, *pitch*, emphasis and vocal quality.

The prominence of a syllable relates to an overall degree of differentiation, consisting of the combined effect of vocal quality, duration, emphasis and intonation in the segment. The emphasis has relation only to the degree of force of an utterance, being independent of the duration and intonation, despite being combined with them sometimes (in prominence)[1].

Furthermore, the ability to use the emphasis on specific parts of speech denotes understanding the exact meaning that one intends to give the message[1].

The speech rate is also a prosodic element and can be measured by the succession of the number of syllables, varying individually and according to the communicative context, it can also be used as instrument of emphasis[8].

The speech rate parameter is calculated by the number of syllables per second, being performed the calculation of the total duration of the speech segment and divided by the number of syllables[9]. And it can be classified into three stages: slow, medium and fast.

Another prosodic parameter, duration, indicates the extent of time involved in the articulation of a sound or syllable, being measured in units of time.

The duration relates to the sensation perceived by the listener for changes in the emission time of one or more successive syllables. In articulatory terms, it corresponds to the time period in which the speaker keeps its sound production[2].

In summary, it is observed that the prosodic parameters are placed in the discourse as key agents of senses, going beyond words. They can provide information about biological, psychological and social aspects of the speaker, besides

determining the positioning of the speakers during an interaction.

Thus, the presence of a language disorder that impairs expressive (production) or receptive aspects (perception) of prosody may compromise the communication effectiveness.

According to DeHS (2009), language disorders are conditions characterized by deficiencies of comprehension or expression of forms of written and spoken language, including those acquired and developed.

In this study, the following language disorders were addressed: aphasia, psychiatric language disorders, dementia, stuttering, specific language disorder and dyslexia.

A total108 indexed papers relating some of these disorders to prosody were found between 1979 and 2009. Figure 2 illustrates the distribution of articles over the years.

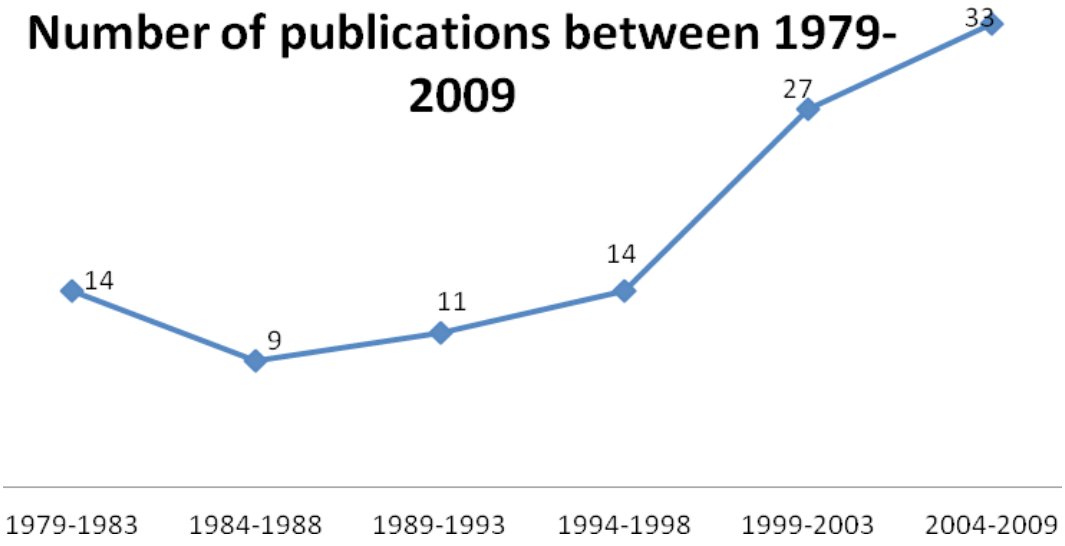

Figure 2 - Distribution of scientific articles according to the year of publication

The upward point of the graph, observed from the year 1984, draws attention to the increasing number of publications in recent years. The various possibilities of experiments in the perceptive area and production of prosody, as well as different manifestations in various language disorders, show that this is not an exhausted topic, but expanding on the achievement of scientific papers.

Furthermore, the development and access to computed voice and speech laboratories, as well as new techniques for studying language processing developed in the last decade may have also influenced the production of new knowledge.

The publication in journals is the main form of dissemination of scientific knowledge, since it legitimates and records the advancement of knowledge. Although there is no absolute correspondence between scientific production and publication, the amount of indexed publications also serves as a reference to vouch for the scientific accuracy of a given area, in this case, the relationship of prosody with communication disorders[10].

Another interesting point is the analysis that perhaps this increase in the number of publications follows a historical trend. Gradually, professionals who work with communication disorders come to understand that the focus of assessment, diagnosis and therapy of patients with language deficits should not only be on organic basis and manifestations presented, but the real impact that this deficit causes in the individual's communication.

Thus, whereas prosody occupies a very special place in human communication, the increasing number of studies involving prosodic aspects may be related to this increased concern with the pragmatic aspects of language.

In Figure 3, we find data on the distribution of articles according to the language disorder, noting that the majority (48.1%, n = 52) deals with aphasia, while a minority of publications is related to dyslexia (1.8%, n = 02).

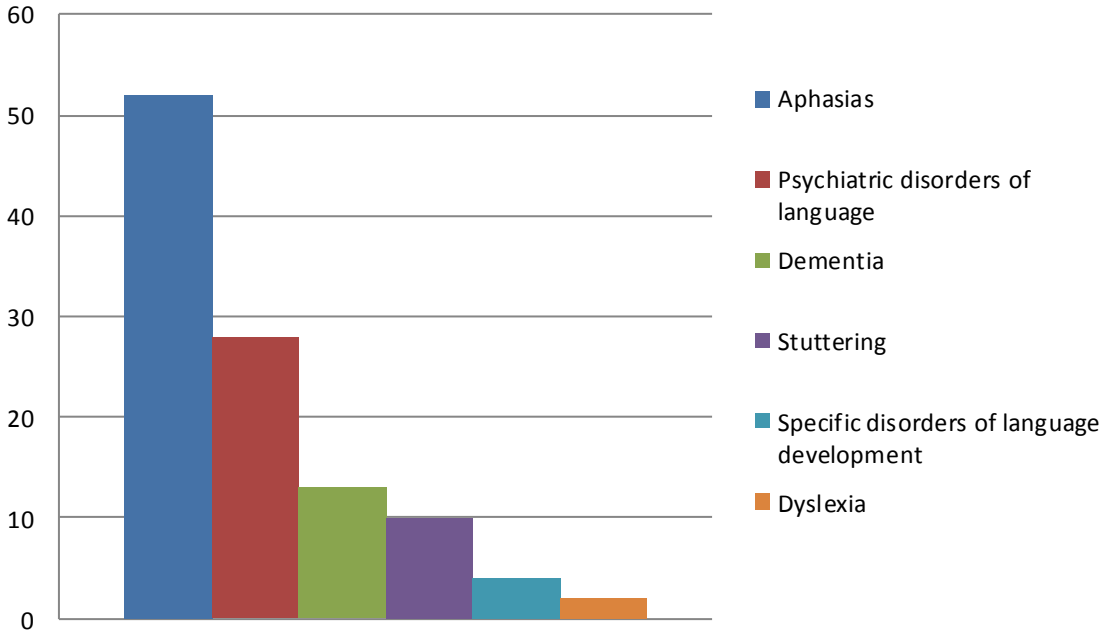

Figure 3 - Distribution of the number of articles according to language disorder

The predominance of studies on aphasic individuals seems to be an indication of the significance of prosodic manifestations in these disorders and their consequent injury to the communicative process.

Moreover, the increased survival of elderly in recent decades, as well as the increasing number of patients suffering from traumatic injuries of the central nervous system, has led to increased number of researches to understand the manifestations presented by the subjects in these areas.

In general, aphasia is considered one of the most studied neurological disorders. The incidence of diseases related to the causes of aphasia can justify the number of publications in the area.

Aphasia is a change in content, form and use of language and its underlying cognitive processes, including perception and memory. It manifests in both receptive expressive plans.

Some of the articles discuss the impact that the prosodic deficits may result in aphasic patients, affecting speech and interaction itself, since the prosody would be one of the major responsible for the pragmatic function.

Most articles searched associates prosodic manifestations in aphasic patients to injured brain areas. This recurrence is justified even because aphasia is a language disorder caused by brain damage and many of these studies have only this local character, which point out that the ability to exercise the language in the human species is characterized by the difference in the participation of cortical and subcortical structures, considering also the hemispheric specialization[11].

One study showed that patients with damage to the right hemisphere compared to those with lesion on the left hemisphere have impaired comprehension of emotional prosody[12]. That's because affectivity and prosody are processed in the same area of the brain, the right hemisphere[13].

However, there is controversy in studies investigating the role of the right hemisphere in the processing of prosodic aspects of language. The perception and production of linguistic/emphatic prosody and emotional prosody may be altered in patients who have suffered damage to the right hemisphere, being most common the impairment of emotional prosody[11].

Furthermore, research on the skills of non-verbal communication in aphasic patients found that most of them lost the ability to grasp intention from the speech prosody[14].

Intentionality refers to the various ways in which individuals use discourses to pursue and perform their communicative intentions, mobilizing therefore, appropriate resources to achieving the target objectives[4].

The intention is situated in the cognitive sphere, once to assign meaning to a given utterance; the speaker uses mental representations about previous

experiences and their knowledge of the world. For example, someone who witnessed a serious car accident records in its memory the emotions and images related to this context. In recounting this fact to another person, probably it brings in his speech prosodic features that help recreate the context and the emotions related to the fact.

The second highest number of articles was found in the area of psychiatric disorders of language, specifically the autism, which is defined as a condition of early onset with behavioral characteristics such as disturbances of affective relationships with the environment, inability to use language for communication, presence of good cognitive potentialities, ritualistic behavior[15].

Therapy with autistic spectrum children is deeply related to the linguistic perspectives, in particular the pragmatic theories, since the observed features in the behavior of these children are just deficient in aspects proposed by these theories, i.e., the relationship between language use and the social and cognitive aspects of development.

In this area, the articles emphasized the relationship between prosodic deficits found in these children, and pragmatic difficulties, both in terms of production and speech perception, stating that these subjects would have difficulty to perceive emotional aspects from prosody[16].

Whereas speech always lend itself to the thought representation in verbal form and representation of motives, intentions, needs and expressive emphases as intonation, besides representing the emotional, momentary or permanent individual states, the difficulty in the production of prosody may undermine the subject's communicative competence[17].

The relationship of prosody with dementia was studied in 13 articles. The dementia, a syndrome in which there is chronic deterioration of intellectual functioning, personality and communication, refers to the loss of intellectual abilities such that interfere with the functional areas of life, either social, occupational, communication, among others[18,19].

The studies are focused on the relationship between cognitive deficits and understanding of the prosodic aspects, as well as the pragmatic aspects of caused by the difficulty of apprehending intention and meaning from prosodic aspects during an interaction[19].

Regarding the stuttering, 10 articles that addressed the intonation patterns, speech rate, as well as the relationship of diffluent segments with prosodic parameters were found.

Stuttering is defined as a disturbance of normal patterns of time and fluency of speech, being characterized by frequent repetitions or prolongations of sounds or syllables. In addition, several other types of speech disfluency may be involved, including interjections, broken words, audible or silent blocking, circumlocutions, words produced with excess of physical tension and monosyllabic repetitions of every word.

This change may occur as a condition of the childhood development or as acquired disorder that can be associated with cerebral infarctions and other brain diseases.

One of the main articles studied even define stuttering as a disorder of prosody[20].

Four articles addressing the relationship between the specific developmental disorder of language and prosody were found. In such disorder, children have impairment of two or more areas of language, concomitant with the absence of any neurological, psychiatric, physical, sensory or intellectual deficit[20].

The focus of articles in this area was the difficulty that these children may have in recognizing emotions from prosody[21].

One study indicated that children with DEDL behave pragmatically less efficiently than their peers with expected development of language, making more communication initiatives, but in a less elaborate way[22].

Finally, two articles relating dyslexia to prosody addressing that the dyslexics would have difficulty in processing the affective prosody were found[23].

Subsequently, according to the protocol, the analysis of the main theme of the articles was performed (Figure 4). Whereas an article could present more than one axis, it was found that 63.8 % (69) were in the area of speech perception, 44.4 % (48) dealt with measures of speech production, 42.6 % (46) focused on nonverbal communication and 7.4% (08) emphasized the language therapy.

The speech perception is the process by which a speech is decoded into a representation in terms of linguistic units: sequences of phonetic segments which combine to form lexical and grammatical morphemes.

Several authors point to the listener's ability to identify emotions, social, biological and sexual features and even identify genres of discourse from speech, more specifically voice quality and prosody[4,24,25].

The prosody in the speaker's speech causes the listener to interpret the utterance, reconstructing its meaning. There will never be a single sense; they are precisely the non-verbal features that would facilitate the comprehension strategies[26].

The number of articles in this area would justifies the concern of both the Health Sciences and Linguistics with the pragmatic aspects of language, since most of the articles studied the ability of the

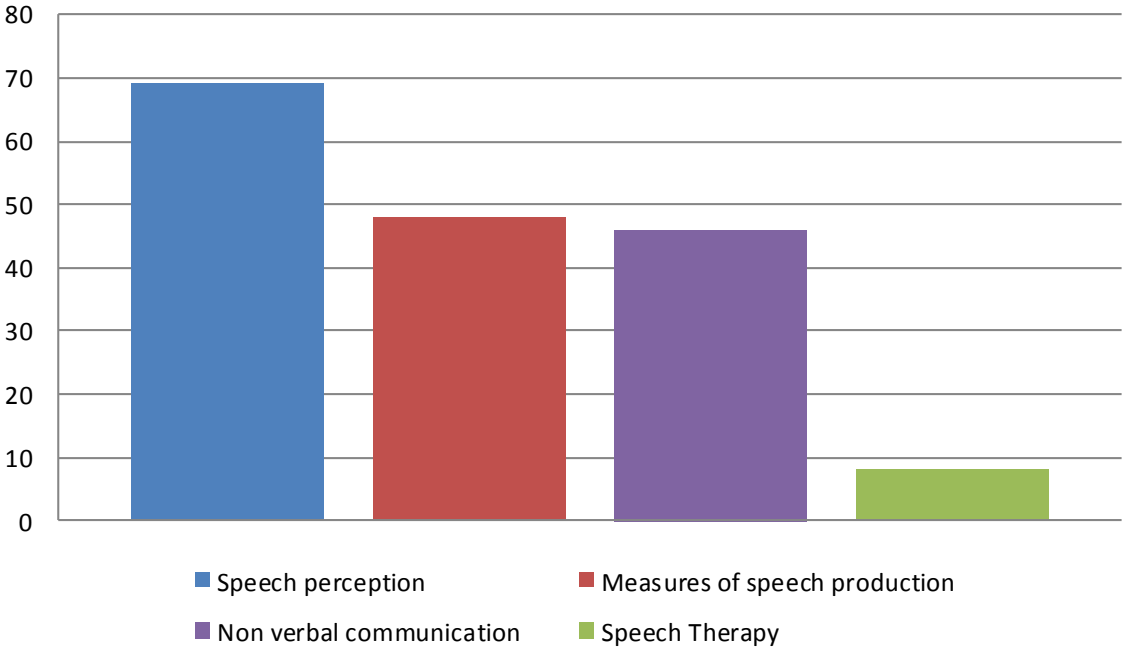

Figure 4 - Distribution of the number of articles according to the thematic area addressed

subjects to assess intentions and general information from prosody.

In disorders addressed in this study, it is observed that the deficit of apprehending information from prosody compromises the role of the subject as interacting during a conversation; it harms, including, maintaining the conversational focus.

With respect to measures of speech production, which in this case, involve the measurement of prosodic parameters, restriction in the use of these resources during the interaction affects the subject's expressiveness.

The speech is significant, precisely because its production conditions allow infinite adjustments, subtle changes in *pitch*, loudness and duration of speech segments, creating different marks throughout a conversation.

Notably, it was found that autistic patients and with stuttering are among those most disadvantaged regarding the use of speech prosody.

Autistic people tend to use a stereotyped intonation pattern, although with respect to echolalia may there be change in intonation curve by repeating some stretch emitted by the adult[27].

The use of prosodic parameters occurs naturally during a conversation, without people being concerned with variations of intonation and emphasis they perform. The context itself, the roles of each subject in conversation, the social and linguistic rules intrinsic to each one, will help determine the prosodic features used by the speaker, which are largely responsible for the success of the interaction.

It is the intentionality, related to cognition along with prosodic choices related to the sound that will build a sense of what is said. There is a close relationship between intention and prosody, between sound and meaning, making the same statement can be interpreted in different ways according to the intention and/or prosodic features.

The speech, in any situation that is, through the vocal characteristics, has the function of establishing a pragmatic representation in both the speaker and the listener memory[26].

The choice of intonation pattern by the speaker then, will be related to both the situational context as the informational, since the listener response will be conditioned to the suprasegmental information associated with the linguistic structure in the segmental level.

In this sense, there are cases in which intonation is used only to qualify the statement, because the segmental part already has all the necessary information to the listener. But there are cases in which the intonation carries all the information[26].

Intonation does not change the meaning of the lexicon, but it is part of the very meaning of the utterance, so that changes in intonation certainly may be accompanied by changes in the utterance function, and differentiating the speaker states[4].

Articles whose main thematic line was language therapy emphasized the importance of working the expression and understanding of the prosodic aspects in patients with aphasia and autism, as a way of improving the communicative performance of these patients.

Whereas a branch of linguistics, the pragmatics, studies the relationship between the social meaning of language, expressed by the interactional context and its semantic content expressed by the meaning of the communicative act itself, the deficit, either in production or in the perception of prosody, generates pragmatic difficulties for the subject.

Pragmatic language disorders are manifested by difficulties in correctly interpreting the actions of others and/or adequately express their desires and intentions. These disorders are usually made by losses in expressive and receptive components[22].

Thus, considering that the prosody is one of the main responsible for the construction of sense/meanings during the interaction, prosodic manifestations in different language disorders may be among the factors that most affect the quality of communication in these subjects.

CONCLUSIONS

The analysis of articles showed increase in publications relating language disorders to the deficits in production and perception of speech prosody. Also, they reinforce that in all disorders studied, loss or difficulty in skills related to prosody compromises the pragmatic function of language and therefore, the interaction of the individual in his social environment.

Aphasia was the most studied disorder, also influenced by the global increase in the survival of the elderly population. The most found thematic axis was the area of speech perception.

RESUMO

Este estudo tem como tema a relação entre a prosódia e os transtornos da linguagem, sendo esta relação investigada a partir do levantamento das publicações indexadas em bases de dados internacionais. A análise dos artigos mostrou que há um crescimento nas publicações que relacionam os transtornos de linguagem aos déficits de produção e percepção da prosódia da fala. Também reforça que, a perda ou dificuldade nas habilidades relativas à prosódia, compromete a função pragmática da linguagem e, portanto, a interação do sujeito em seu meio social. A afasia foi o transtorno mais estudado, provavelmente influenciado também pelo aumento mundial da população de idosos. E o eixo temático mais encontrado nas publicações foi a percepção da fala.

DESCRITORES: Fonoaudiologia; Transtornos da Linguagem; Percepção da Fala; Medida da Produção da Fala

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