

TEACHING OF EXPRESSIVE REPERTOIRE TO CHILDREN WHO ARE USERS OF COCHLEAR IMPLANTS: A LITERATURE REVIEW¹

ENSINO DE REPERTÓRIOS EXPRESSIVOS A CRIANÇAS USUÁRIAS DE IMPLANTE COCLEAR: UMA REVISÃO DE LITERATURA

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ABSTRACT: The aims of this research were (a) to verify the quantity of scientific productions that described procedures of teaching of expressive repertoire, according to Skinner's verbal categories (1957), to children with cochlear implants; (b) to characterize their methods, considering participants, stimuli, materials and experimental design used; (c) to identify manipulated independent variable and dependent measured variable. The methodology followed the PRISMA model for literature reviews and meta-analyses; the search was done in the Web of Science with the descriptors and bullet points: "Cochlear Implant", [and] "Children" [and] "Language", [and] "Teaching". We found 39 papers and, after applying the exclusion criteria, we obtained 12 papers for analysis. Among them, eight papers described methodologies of expressive repertoire teaching. The data pointed out that a concentration of international publications between the years 2012 and 2015. The intraverbal operant has been the major target of the interventions found, followed by tact and textual ones. More than 50% of the studies made use of single-subject experimental designs, corroborating with the indications about the importance of this type of design for research in health and education. National publications were not found, although there is a strong line of research in the country. In order to avoid this situation, it is necessary to insert intentionally the research that is known to the set of researches found through systematic reviews. Synthesizing publications that present teaching methodologies to this population may favor Special Education professionals in the elaboration of their interventions and curricula.

KEYWORDS: Special Education. Cochlear Implant. Behavior analysis.

RESUMO: Os objetivos desta pesquisa foram (a) verificar a quantidade de produções científicas que descrevessem procedimentos de ensino de repertório expressivo, de acordo com as categorias verbais de Skinner (1957), a crianças com implante coclear; (b) caracterizar seus métodos, considerando participantes, estímulos, materiais e delineamentos utilizados; (c) identificar variável independente manipulada e variável dependente mensurada. A metodologia seguiu o modelo PRISMA para revisões de literatura e meta-análises. A busca foi feita na *Web of Science* com os descritores e marcadores boleados: "Cochlear Implant", [and] "Children" [and] "Language", [and] "Teaching". Foram encontrados 39 artigos e, após aplicação dos critérios de exclusão, obteve-se 12 artigos para análise. Dentre estes, oito descreveram metodologias de ensino de repertório expressivo. Os dados apontaram uma concentração de publicações internacionais entre os anos de 2012 e 2015. O operante *intraverbal* tem sido o maior alvo das intervenções encontradas, seguido por tato e textual. Mais de 50% dos estudos fizeram uso de delineamentos experimentais de sujeito único, corroborando com as indicações sobre a importância desse tipo de delineamento para a pesquisa em saúde e educação. Publicações nacionais não foram encontradas, embora haja uma forte linha de pesquisa no país. Para contornar tal situação, sugere-se a inserção intencional das pesquisas que se tem ciência ao conjunto de pesquisas encontradas por meio de revisões sistemáticas. Sintetizar as publicações que apresentam metodologias de ensino à essa população pode favorecer os profissionais de Educação Especial na elaboração de suas intervenções e currículos.

PALAVRAS-CHAVE: Educação Especial. Implante coclear. Análise do comportamento.

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1 INTRODUCTION

During human development, multiple variables of direct interaction with the environment, historical-cultural or genetics are interrelated in the establishment and expansion of behavioral repertoires interfering in the adaptation of the species (Bee, 1997; Papalia, Olds, & Feldman, 2010; Bronfenbrenner, 2011; Todorov, 1989; Skinner, 1957). One of the most complex repertoires of the human species for many theoretical approaches is language (Skinner, 1957; Luria, 1986). The early years of life are determinant for the development of communication, and the constant interaction between the baby-caregiver dyad is favorable for the development of linguistic abilities, such as the relation between words, gestures and events in the world (Levine, Strother-Garcia, Golinkoff, & Hirsh-Pasek, 2016). However, hearing impairments, especially those of the severe or profound type and pre-lingual (prior to the development of oral language), produce restrictions in the establishment of different behavioral skills, such as social interaction, phonological awareness, alphabetic knowledge, vocabulary acquisition, language patterns related to syntax and pragmatics (Messier & Wood, 2015; Lederberg, Miller, Easterbrooks, & Connor, 2014; Lund & Schuele, 2014; Connor, Hieber, & Zwolan, 2000; Levine et al., 2016).

The cochlear implant appears to be a successful biomedical technology, consisting of an electronic device surgically implanted in the inner ear, allowing its users to detect the sounds of the environment (Svirsky, 2017; Sobreira, Capo, Santos, & Gil, 2015). However, after performing the insertion and activation of the cochlear implant and consequent exposure to the sound environment, some children still present delays in speech development and in the schooling process when compared with their hearing peers (Percy-Smith et al., 2013). These delays sometimes occur due to variables such as: educational structure, time of auditory deprivation, time of experience with the implant, gender and family configuration (Geers, 2002; Gordon et al., 2011). Therefore, understanding sounds, relating them to world events, and developing speech requires additional and complementary learning after the implant is activated (Geers & Hayes, 2011).

Considering the rehabilitation that follows cochlear implant surgery and the special educational needs for language acquisition in this population, there is still an incipient field of scientific production regarding the characteristics of the teaching procedures used in the literacy/schooling process of cochlear implants (Tucci, Trussell, & Easterbrooks, 2014). In this scenario, literature reviews that seek to analyze the techniques and procedures of verbal repertoire teaching (vocal or written) contribute to the scientific dissemination and practical application in school and natural contexts.

Neves, Almeida-Verdu, Moret and Silva (2015) carried out a literature review on scientific production (between 2003 and 2013), aiming to present the relationship between the use of cochlear implants and speech development. The authors found an ascending acceleration of academic production on cochlear implants between 2008 and 2013, especially in areas such as Audiology and Education. The prevalence of studies was based on comparative analysis of language skills (receptive and expressive) between groups with and without cochlear implants, lacking methodological descriptions about teaching procedures to the population that received the implants.

Lucchesi and Almeida-Verdu (2017) presented a literature review (between 2000 and 2016) in order to investigate empirical studies describing the application of interventions, programs and methods of teaching receptive and expressive language skills of children with cochlear implants. Ten studies with a positive acceleration of publications between 2006 and 2016 were identified. The publications already presented varied designs such as: comparison between groups (experimental and control), single subject experiments and case studies. Both the review of Neves et al. (2015) and Lucchesi and Almeida-Verdu (2017) found a small amount of research describing procedures for teaching expressive language skills (speaking, reading and writing), confirming Tucci et al. (2014) considerations.

In the review conducted by Almeida-Verdu and Golfeto (2016), the researchers systematized the results of a national research group that proposed the interface between Behavioral Analysis and Speech-Hearing Therapy in the study of language and/or verbal behavior. The authors identified that reading is a successful teaching route in order to improve the accuracy of oral production of cochlear implants. The reading allows for better control of the vocal articulation of the phonemes through the graphemes. Procedures that strengthen the relation between dictated word, printed word and figure, especially those who teach control by syllabic units of the word (e.g. in syllabic or word-building tasks), have increased the accuracy of oral production in figure naming tasks.

A similar way of analyzing successive literature reviews was adopted by Martins (2018) in the search for advances in the relations between fluency and reading comprehension. In the case of the stated literature reviews, they also show the need to periodically carry out new researches on a problem, in order to verify trends, guide accordingly, delineate the state of the art of a certain field of knowledge and analyze critical characteristics in the investigations. Considering that there are still few researches describing procedures for expressive repertoires teaching to children with cochlear implants, the review proposed here has the objective of: (1) verifying the quantity of scientific productions which systematically describe expressive repertoire teaching procedures according to the categories of verbal operants (Skinner, 1957) to children with cochlear implants; (2) to investigate the methodological characteristics of these publications considering: the number of participants, the stimuli adopted, evaluation instruments and types of designs adopted; and (3) to analyze the dependent variables (target responses) as well as the independent variables (intervention/teaching).

2 DEVELOPMENT

In order to delineate this literature review, the guidelines suggested by PRISMA⁶ were followed. The methodological pathway based on *PRISMA* indications is shown in Figure 1. The search was conducted in the international database *Web of Science* and can be described in five stages.

⁶ PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-analysis. Retrieved from March 3, 2018 from www.prisma-statement.org.

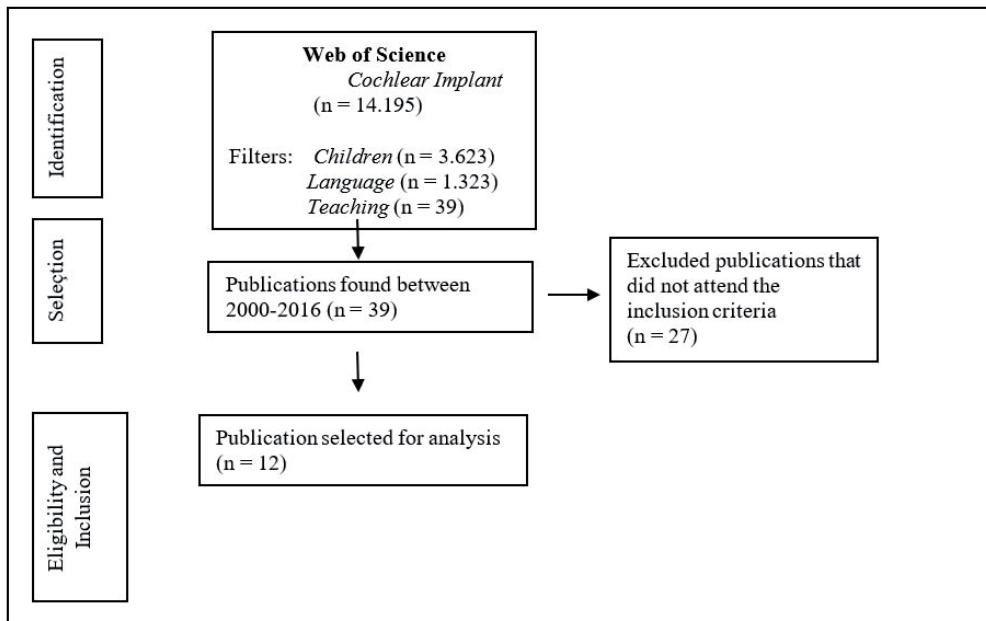


Figure 1. Methodological course adopted to publication search

Source: Elaborated by the authors.

Stage 1: Essay and definition of descriptors in the data platform, to select and list the descriptors that would meet the objectives of this research. The limitation of the years of search (2000 to 2016) was applied because, prior to 2000, few publications on teaching of expressive repertoire to children with cochlear implants were found. The Boolean descriptors and markers chosen for this investigation were “Cochlear implant” [and] “Children” [and] “Language” [and] “Teaching”.

Stage 2: Organization and analytical reading of abstracts. In this stage, all publications were distributed in chronological order and their summaries read in full, in order to observe and register the objectives, participants and methodologies used for data collection and analysis.

Stage 3: Application of the inclusion and exclusion criteria. Publications that were not found and that did not correspond to the research objectives were excluded, being: (a) publication in languages other than English, Portuguese and Spanish; (b) publications referring to medical research on image examinations; (c) studies with participants presenting diagnostic comorbidities; (d) reports on the perception of the use of Personal Sound Amplification Products (PSAP) and Cochlear Implants (CI); and (e) literature reviews.

Stage 4: Categorization of publications and analysis of methodologies. In this stage, an analytical reading of the studies was performed to detect their dependent variables (the target responses of the participants), and independent variables (the procedures used for intervention). In addition, it was identified: (a) taught verbal operants (e.g. tact, textual, intraverbal); (b) stimuli used during expressive repertoire teaching (e.g. oral dictation, printed words, figures,

objects); and (c) expressive and receptive repertoire evaluation tools (e.g. speech-hearing and psychological tests).

3 RESULTS

The systematic search according to the described criteria resulted in twelve studies (n=12) for analysis that met the objectives of this review. Figure 2 shows a graph with the relative and absolute frequency of the studies found, distributed in four-year periods from 2000 to 2016. There is a positive acceleration of scientific production in the period from 2008 to 2015, corresponding to the fourth quadriennium. The fifth quadriennium has data only for the year 2016, making it impossible to predict if there will be a continuation of positive acceleration in this period.

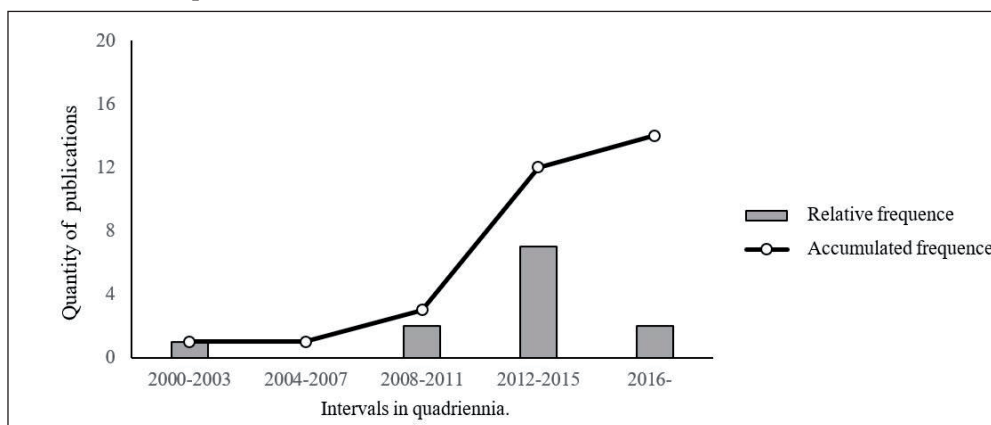


Figure 2. Distribution of publications in four-year periods between 2000 and 2016

Source: Elaborated by the authors.

A summary characterization of the studies can be seen in Table 1 below. It presents the authors, the year of publication, the number of participants, the participants' hearing aid devices, the study design and teaching procedures. The studies are numbered from one to twelve in descending order (from most recent to oldest) according to their year of publication. In 50% (n=6) of the studies found, the participants used only the cochlear implant (CI) as a therapeutic device; 33.3% (n=4) use cochlear implants (CI) and Personal Sound Amplification Products (PSAP) together; and, in two studies, the participants have PSAP or CI. Only two publications (Connor et al. 2000; Lund & Schuele, 2014) repeated from previous reviews, indicated by (*), were detected. The journal with the highest number of publications was the *Journal of Deaf and Deaf Education*, followed by the *International Journal of Pediatric Otorhinolaryngology*.

In the right column of Table 1 the types of designs used in the investigations can be located. More than half of them (58.4%, n=7) used single-subject experimental designs, whereas in five studies (41.6%, n=5), statistical treatments were used to analyze the results (comparison between control and experimental groups). Although all studies considered the expressive repertoire as a dependent variable, two of them presented not teaching itself as

independent variable, but the use of the device, cochlear implant (Percy-Smith et al., 2013; Moon et al., 2011); and two others compared two teaching methodologies (Connor et al. 2000; Lund & Douglas, 2016).

In the column to the right corner of Table 1 the teaching procedures used in the researches can be found, some of these procedures have specific names, others do not. Procedures were identified and often the use of explicit or direct teaching was found. Explicit teaching consists of organizing and planning specific conditions for teaching target responses, expanding the network of relations that each word has through repeated attempts in multiple situations (Lund & Douglas, 2016).

Among the conditions characterized as explicit teaching, books have often been adopted as visual stimuli (textual and figurative). In these, the researchers directly taught the relation between the spoken word and printed words and figures that composed the books and tested participants in intraverbal tasks such as word definition or the report about the story read (Messier & Wood, 2015; Lederberg et al., 2014; Justice, Swanson, & Buehler, 2008; Bobzien et al., 2015).

Nº	Authors (year)	Nº of participants	Hearing Aid Device	Design	Procedure
1	Lund and Douglas (2016)	9	CI e PSAP	Single subject	Explicit Teaching <i>Follow-in labeling</i> Incidental Teaching
2	Richels et al. (2016)	3	CI e PSAP	Single subject	Modeling by peer listeners Explicit teaching
3	Messier and Wood (2015)	18	CI	Comparative statistics	Explicit teaching with E-book
4	Bobzien et al. (2015)	4	CI+PSAP	Single subject	Explicit teaching with repetition of sentences from books
5	Lederberg et al. (2014)	25	CI+PSAP	Comparative statistics	Foundations for literacy
6	Lew, Purcell, Doble and Lim (2014)	3	CI+PSAP	Single subject	Ensino explícito SPEAK – (<i>Speech Perception Education and Assessment</i>)
7	Lund and Schuele (2014) (*)	5	CI	Single subject	Explicit teaching
8	Miller, Lederberg and Easterbrooks (2013)	5	CI+PSAP	Single subject	Explicit teaching
9	Percy-Smith et al. (2013)	94	CI	Comparative statistics	-
10	Moon et al. (2011)	60	CI	Comparative statistics	-
11	Justice et al. (2008)	3	CI	Sujeito único	Explicit teaching
12	Connor et al. (2000) (*)	147	CI	Comparative statistics	Oral communication Total communication

Table 1. General characteristics of publications selected for analysis

Source: Elaborated by the authors.

In Figure 3, the instruments used in each study are located in the vertical column on the left; and, in the lower horizontal line, the numbers correspond to the publications according to the publication dates shown on Table 1. It should be noted that a single research often uses more than one instrument for evaluation. The three most used tests were: **PPVT** (Dunn & Dunn, 1981), 66.6%; followed by **EOWPVT** (Martin & Brownell, 2011a), 41.6%; **GFTA-4** (Goldman & Fristoe, 2000), 33.3%; **ESP** (Moog & Geers, 1990); and **ROWPVT** (Martin & Brownell, 2011b), 25%. The legend that follows Figure 3 shows the full name of the instruments.

Instruments	Absolute frequency											
EOWPVT	■		■		■		■					
ROWPVT	■						■					
PTONI			■				■					
PPVT	■	■		■	■	■	■	■				■
ESP					■	■	■	■				
TOPEL					■	■						
REYNELL							■		■			
Evaluation elaborated by authors			■									
Letter-Sound ID					■							
Woodcock-Johnson					■							
GFTA-4	■	■					■	■				
MCDI							■					
Vocabulary "Vigormaterialt"								■				
K-Ling evaluation									■	■		
TNL											■	■
CELF											■	■
TONI											■	■
Systematic analysis of language transcripts											■	■
Ling Six-Sound											■	■
Quick narrative assessment											■	■
SPEECH											■	■
EXPVOC											■	■
Kaufman brief Intelligence	■											
Preschool Language Scale-4	■	■		■								
Phonological Awareness test-2							■					
	1	2	3	4	5	6	7	8	9	10	11	12
	Publications											

Figure 3. Distribution of evaluation tools used by the researches

Source: Elaborated by the authors.

Legend: EOWPVT - Expressive One Word Picture Vocabulary Test; ROWPVT - Receptive One Word Picture Vocabulary Test ; PTONI - Primary Test of Nonverbal Intelligence; PPVT- Peabody Picture Vocabulary Test-4; ESP - Early Speech Perception Test ; TOPEL - Test of Preschool Emergent Literacy-Phonological Awareness; GFTA/4 - Goldman-Fristoe Test of Articulation ; MCDI - MacArthur Bates Communicative Development Inventory-Words and Sentences; TNL - Test of Narrative Language; CELF - Clinical Evaluation of Language Fundamentals; TONI - Test of Nonverbal Intelligence; EXPVOC - The Picture Vocabulary subtest of the Woodcock Johnson Test of Cognitive Ability.

Figure 4 shows the stimuli used for expressive repertoire teaching. For this, the four publications that had as IV (independent variable) the use of the cochlear implant or the comparison of teaching procedures were discarded. The figure is divided between the target responses, what the participants should present at the end of the teaching, and the stimuli used

to teach, that is, in the presence of which environmental characteristic the participants should present the target responses. Again, a study may have more than one target response and make use of more than one stimulus to achieve its goals.

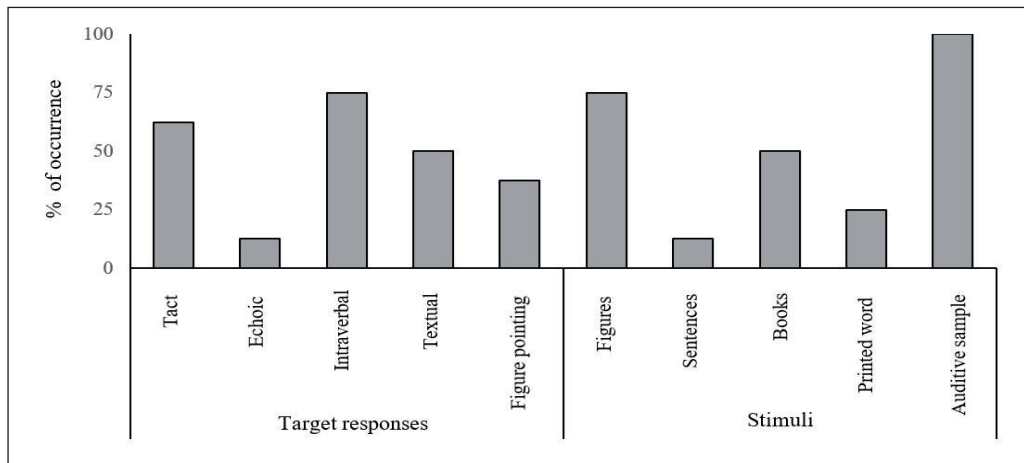


Figure 4. Dependent variables (target responses) and stimuli used in teaching
Source: Elaborated by the authors.

In Figure 4, it is shown that all the researches used auditory samples for children during the teaching-learning process. After auditory stimuli, figures and books were the most used stimuli to meet the research objectives. The target responses taught were intraverbal (responding to verbal stimuli such as questions and interpretations of text) and tact (responding in the presence of events or stimuli, naming figures, objects or events), followed by textual (read words) and figure pointing (receptive reading). Echoic responses (imitation of verbal stimuli provided by others) were requested in only one research.

4 FINAL CONSIDERATIONS

As for the growing scientific production in this area, it was verified, as in the reviews conducted by Neves et al. (2015) and Lucchesi and Almeida-Verdu (2017), a positive acceleration in the amount of publications on the subject in that same time frame. Data from this new review, coupled with data from the two previous reviews, indicate a growing interest in the rehabilitation of the language of children with hearing impairment and cochlear implants. Such researches seek effective and evidence-based educational methodologies for the teaching of expressive repertoire to this population. It should be noted that, although such growth is verified in research of this area, there are still few studies that describe systematic interventions on the expressive repertoire of children with cochlear implants, only eight (n=8) found in the current review.

Although there is a line of research consolidated nearly two decades ago between Behavioral Analysis and Educational Audiology in Brazil (Almeida-Verdu & Golfeto, 2016), no Brazilian study was captured in this current review. This result on Brazilian research may be a consequence of the systematic search technique used, once the algorithms of the international

Web of Science platform were used. The Boolean descriptors and operators chosen also influenced the searches. Future investigations may use descriptors such as “cochlear implant” and “learning” added to the descriptors of this research. Intentionally, we should include in the literature review the investigations, nationally conducted regarding the planning of expressive repertoire for children using cochlear implants. Even if systematic accuracy is lost, in which paradigms of the PRISMA group of reviews and meta-analysis suggest, inserting the national researches may favor to evidence them as important scientific literature.

Another gap observed in this literature review was the controversial relation between sign language learning along with oral language learning after activation of the cochlear implant device (Geers, Mitchell, Earner-Cyzyk, Wuan, & Einsenberg, 2017; Lyness, Woll, Campbell, & Cardin, 2013; Nussbaum, Scott, & Simms, 2012). According to some authors, this controversy occurs because many people ignore the importance of the sensitive period of exposure to the language spoken in the cases of cochlear implant (Levine et al., 2016). The authors argue that the auditory cortex can undergo a cross-modal organization only if a strategy that counterbalances the exposure to sound stimuli, such as sign language, is adopted. If this is not the strategy, that is, to provide hearing impaired people with access to a visual language during the sensitive period of development of the latter, there is no confirmed evidence in the literature that affirms that sign language optimizes oral language, if adopted along with the cochlear implant (Geers et al., 2017; Lyness et al., 2013). However, sign language may be the linguistic choice of parents, upon verification of the existence of hearing impairment in their children. This is an equally vast literature as the cochlear implant and deserves a separate review.

About the evaluation tools, the Peabody Picture Verbal Test – PPVT (Dunn & Dunn, 1981) has been the most widely used instrument in the measurement of receptive language in international research. In addition to the standard assessments, the researchers assessed the participants’ repertoires on the tasks that would be taught and tested the same repertoires after the intervention. The use of direct assessments on the repertoires to be taught offers a more individual view on the baseline (prior knowledge) of the participants and on the effectiveness of the teaching procedure. In Brazil, researches on expressive repertoire teaching for children with cochlear implants often use indirect assessments such as questions and assignment of caregiver’s notes on the language of the children evaluated (e.g. MUSS scale⁷) (Robbins & Osberger, 1990), and direct evaluations presented within the teaching structure (Catisquini & Bevilacqua, 2000). These two types of assessment, when associated, are: (a) indirect - with self-report questionnaires, standard scales and tests, and (b) direct - delineated with teaching procedures, favoring a more accurate view of participants’ skills before intervention, and the effects that teaching generates on their receptive and expressive repertoires.

All identified studies adopted characteristically audio-lingual teaching methods for teaching expressive repertoires to children with cochlear implants. That is, they provided auditory stimuli as models, making use of the auditory behavior, made possible to the participants by the use of the implant. Audio-lingual methods stimulate the discrimination of sounds based on what the children hear. Hearing loss generates significant impairments in the development of symbolic functions and subject-world communication as indicated by Levine

⁷ *Meaningful Use Speech Scale* - MUSS.

et al. (2016), and for this reason the exposure of children with cochlear implants to audio-lingual teaching favors a better use of sound stimulation.

In the studies found, no data on the speech characteristics of the participants were reported, that is, their accuracy when compared to the conventions of the language. It has been observed that, in Brazilian studies, it is common to measure and analyze the characteristics concerning the speech quality of children with cochlear implants. The number of errors in the oral production of implants in relation to pictorial stimuli and printed words has also been a frequent form of analysis (Golfeto & Souza, 2015; Anastácio-Pessan, Almeida-Verdu, Bevilacqua, & Souza, 2015; Lucchesi, Almeida-Verdu, Buffa, & Bevilacqua, 2015; Almeida-Verdu et al., 2008). However, national research has shown the possibility of using an equivalence-based instruction (EBI) as an effective teaching technology to improve speech accuracy (Anastácio-Pessan et al., 2015; Lucchesi et al., 2015; Rique, Guerra, Boreli, Oliveira, & Almeida-Verdu, 2017a; Rique, Almeida-Verdu, Silva, Buffa, & Moret, 2017b) for this population.

From an analytic-behavioral perspective, language is understood as a behavior, selected and maintained by reinforcing contingencies, and is subject to the same principles (e.g. reinforcement contingencies), processes (e.g. maintenance and extinction) and properties (e.g. frequency, magnitude, latency) as any other behavior (Skinner, 1957; Skinner, 1989; Catania, 1999; Baum, 2000).

Studying verbal behavior depends on analyzing not only its form (topography) but also its functions within human interactions; reason for which Skinner (1957) developed a conceptual and categorical system based on the controls exercised over verbal responses, naming these relations as verbal operants (Skinner, 1957). For example, the verbal response “lettuce” can be read when in a text (textual), named before the greenery (tact), spoken when one answers the question “what do you want?” (intraverbal), spoken when imitates the speech of another person saying “lettuce” (echoic), spoken in the need of making an order at the market (mand), written after someone dictates it (dictated) or written after having seen a text (copy). In all of these situations, the same vocal or written verbal response was emitted, but under different conditions, presenting different functions.

According to the researches, the use of the word repetition procedure and/or sentences taught orally (teaching of echoic behavior) for children can be identified (Lebergberg et al., 2014; Anastácio-Pessan et al., 2015). In other studies, parents functioned as teaching agents, favoring generalization after interventions. For this, the parents carried out the reading of books with the children in the domestic environment; the book as well as being a complex visual stimulus, enabled not only the teaching of the relationship between spoken and printed sentences and their figures, but a playful context in which participants could manipulate and explore the object (Messier & Wood, 2015; Justice et al., 2008).

There was more teaching of intraverbal responses, that is, grammatically adequate responses to the questions (e.g. How? Where? Which?). The intraverbal was taught through clues as to what would be the correct answer that the apprentice should emit before action figures. The generalization of the intraverbal response was tested with similar questions, but with different figures (Richels et al., 2016). Also, tasks that involved pointing and naming

figures (Lew et al., 2014; Lund & Scheule, 2014; Miller et al., 2013) were also adopted, but some research has emphasized the development of phonological awareness (Miller et al., 2013; Lew et al., 2014).

As expected from a literature review, some gaps were identified. In the international scenario from which all the papers in this review come, there are not many researches that use textual stimuli (e.g. words and printed sentences) for expressive repertoire teaching. As a result, the oral reading of words, another form of expressive repertoire, is not the target of teaching and/or inquiry in these works. Complementary to this data, it is shown in Figure 4 that the researches are mainly concerned with the teaching of intraverbal responses, complex verbal operants, because they are controlled by verbal antecedents and do not require point-to-point correspondence, present in social interactions.

Supported by the reviews of Cedro, Passareli, and Huziwarra (2014) and Almeida-Verdu and Golfeto (2016), national researches, in contrast to international ones, make use of textual stimuli as one of the important conditions of teaching isolated words. In Brazilian studies, books do not yet show an expressive number of use during interventions. In addition, there is no data from national researches that have an intraverbal target response derived from their teaching procedures. This indicates a gap in the use of more complex stimuli and the demands of more complex verbal responses.

As for the data analysis used by the researchers, the single subject experimental design (SSED) represented more than half of the researches. This trend towards the use of SSED can be an innovation that allows greater accuracy and verification of the effects of intervention in educational research. Byiers, Reichle and Symons (2012) identify the single-subject experimental design as a favorable methodology, especially with participants who present communication disorders. Through the single subject designs, extracting consistent data based on scientific criteria becomes feasible even in situations of regular care such as clinics, hospitals and schools. Moreover, comparing the subject with him/herself favors more accurate descriptions of the subjects' own performances, a characteristic often absent in statistics between groups. One point about this design is the need for multiple replications, conceptual and literal, in different research centers to consolidate and strengthen the data found (Kazdin, 2010).

All the information coming from a literature review can favor researches and researchers in relation to their studied objectives. However, it is believed that some aspects of this review should be highlighted and considered at the end. It was found that, even though there were recent literature reviews and similar new objectives, papers were found indicating (a) a higher frequency of studies with single-subject experimental designs, (b) new publications describing methodologies for teaching expressive repertoires to children with cochlear implants, (c) all researches use auditory stimuli during their teaching procedures, (d) books and sentences added to auditory stimuli have configured the number of stimuli used to promote teaching conditions, (e) intraverbals are often the target verbal operants for teaching, (f) all researches were successful in teaching expressive repertoire to children with hearing impairment and users of cochlear implants. With regard to the instruments of evaluation, the PPVT (Dunn & Dunn, 1981) has been the most used in the measurement of the receptive repertoire of those using cochlear implants.

These results may encourage national educators and researchers to use books and larger textual units, as sentences, as part of the teaching methodologies for this population. In addition, complex verbal operants such as intraverbals and autoclitics can become integrated into teaching curricula. Replications and systematic searches with new sets of descriptors within the scope of journals found in this research can be a useful way to find new publications. In addition, the researches that are known and published in Brazil must be added intentionally in the literature reviews. This would strengthen Brazilian research and link it to international researches, seeking to consolidate and operationalize effective teaching procedures for this population.

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