

Descriptive study on language assessment instruments published in Brazilian Speech, Language and Hearing Sciences journals

Estudo descritivo sobre instrumentos de avaliação de linguagem oral publicados nos periódicos fonoaudiológicos brasileiros

Estudio descriptivo sobre instrumentos de evaluación del lenguaje oral publicados en revistas fonoaudiológicas brasileñas

Maria Claudia Cunha* 

Mabile Francine Ferreira Silva** 

Tatiane Ichitani* 

Fernanda Prada Machado* 

Abstract

Purpose: to describe speech therapy instruments of oral language evaluation published in Brazilian periodicals, and to analyze the validation procedures used. **Method:** Casuistry: All volumes from the periodicals Audiology Communication Research (ACR), Revista CEFAC (CEFAC), Revista Distúrbios da Comunicação (DIC) and Communication Disorders and Sciences (CoDAS) published from January/2016 to July/2019. Publishing's were selected from titles, abstracts and descriptors, to full text readings and then were categorized according to the following variables: periodical, volume/number, date, purpose (elaboration or translation/adaptation of oral language evaluation instruments), original language (in translation/adaptation cases), sample size and statistics techniques used (validity and reliability). **Results:** Most of the articles were intended for children and are intended to develop a new instrument. The predominance of studies that presented content validation is noteworthy; however, few performed

* Pontificia Universidade Católica de São Paulo, SP, São Paulo, Brazil.

** Universidade Federal da Bahia, Salvador, Bahia, Brasil.

Authors' contributions:

MCC: Study conception, methodology of data collection and analysis of results.

MFFS: Data collection and analysis, in addition to literature review and article writing.

TI and FPM: Data collection and analysis, in addition to literature review and article writing.

Correspondence email address: Maria Claudia Cunha - clauclaucunha@ig.com.br

Received: 10/28/2020

Accepted: 11/23/2020

the reliability test by alpha Cronbach. It was also found that only one study performed a sensitivity and specificity test and no study published in the studied period performed a predictive value calculation, likelihood ratio or ROC curve. **Conclusion:** the results indicate limitations in validation studies and suggest caution regarding the use of language assessment instruments, both in clinical activity and in research.

Keywords: Language tests; Diagnosis; Validation study; Speech-Language and Hearing Sciences

Resumo

Objetivo: descrever instrumentos fonoaudiológicos de avaliação de linguagem oral publicados em periódicos brasileiros e analisar procedimentos de validação utilizados. **Método:** Casuística: publicações de todos os volumes dos periódicos Audiology Communication Research, Revista CEFAC, Revista Distúrbios da Comunicação e Communication Disorders and Sciences no período de janeiro/2017 a julho/2019. As publicações foram selecionadas a partir dos títulos, resumos, descritores e leitura dos textos na íntegra. As publicações selecionadas foram categorizadas de acordo com as variáveis: periódico, volume/número, data, objetivo (elaboração ou tradução/adaptação de instrumentos de avaliação de linguagem oral), língua original (nos casos de tradução/adaptação), tamanho da amostra e técnicas estatísticas de validação (validade e confiabilidade) utilizadas. **Resultados:** A maioria dos artigos encontrados foi destinada a crianças e se propõe ao desenvolvimento de um novo instrumento. Destaca-se o predomínio de trabalhos que apresentaram validação de conteúdo, no entanto poucos realizaram o teste de confiabilidade pelo alfa Cronbach. Apenas 01 estudo realizou teste de sensibilidade e especificidade, e nenhum estudo publicado no período realizou cálculo de valor preditivo, razão de verossimilhança ou curva ROC. **Conclusão:** os resultados indicam limitações nos estudos de validação e sugerem cautela quanto à utilização dos instrumentos de avaliação de linguagem, tanto na atividade clínica quanto em pesquisas.

Palavras-chave: Testes de linguagem; Diagnóstico; Estudos de validação; Fonoaudiologia

Resumen

Objetivo: describir los instrumentos de evaluación del habla y el lenguaje publicados en revistas brasileñas y analizar los procedimientos de validación utilizados. **Método:** publicaciones de todos los volúmenes de las revistas Audiology Communication Research, Revista CEFAC, Revista Distúrbios da Comunicação y Communication Disorders and Sciences de enero / 2017 a julio / 2019. Las publicaciones fueron seleccionadas a partir de los títulos, resúmenes, descriptores y lectura de los textos en su totalidad. Las publicaciones seleccionadas se categorizaron según las variables: revista, volumen / número, fecha, objetivo (elaboración o traducción / adaptación de instrumentos de evaluación para lengua oral), lengua original (en el caso de traducción / adaptación), tamaño de la muestra y técnicas de validación estadística (validez y fiabilidad) utilizadas. **Resultados:** La mayoría de los artículos encontrados estaban destinados a niños y están destinados a desarrollar un nuevo instrumento. Se destaca el predominio de trabajos que mostraron validación de contenido, sin embargo pocos realizaron la prueba de confiabilidad por alpha Cronbach. Solo 01 estudio realizó una prueba de sensibilidad y especificidad y ningún estudio publicado en el período realizó un cálculo de valor predictivo, razón de verosimilitud o curva ROC. **Conclusión:** los resultados indican limitaciones en los estudios de validación y sugieren cautela en el uso de instrumentos de evaluación del lenguaje tanto en la actividad clínica como en la investigación.

Palabras clave: Pruebas del lenguaje; Diagnóstico; Estudio de validación; Fonoaudiología

Introduction

Developing and translating/adapting clinical assessment instruments are essential activities in the health field. Combined with diagnostic and therapeutic processes, instruments are indispensable tools for the desirable exercise of evidence-based practice in order to provide the effectiveness of interventions and clinical research¹⁻³.

There are few oral language assessment instruments developed for Brazilian Portuguese in Speech-Language Pathology, thus prevailing the adaptations of the abundant international material on the topic³.

More than two decades after the first publication, this scenario has been the subject of contemporary scientific studies of a different, but complementary nature, based on a common assumption: the improvement of the speech-language pathology clinical method, in terms of diagnostic accuracy and scientific evidence of the effectiveness of treatments^{3,4,5}.

On the one hand, there are literature review surveys (systematic, integrative and narrative) focusing on the description/characterization of the available language assessment instruments⁶⁻⁸. These studies agree on the scarcity of instruments developed in Brazil. On the other hand, there is the elaboration, translation/adaptation of new instruments, in which the translation/adaptation work prevails almost entirely^{3,9-12}, followed by few preparations¹³. Therefore, there is a strong compatibility between the results obtained in the research on both sides.

It should be noted that such research has intensified in recent years, as a result of the gradual incorporation of the principles (and culture) of evidence-based practice by Speech-Language Pathology and Audiology, and also to meet the strict editorial criteria regarding methodological procedures, in force in renowned scientific journals.

However, this movement is still incipient in terms of publications, as shown by the following data:¹⁴: of the 280 publications investigated in Brazilian journals of Speech-Language Pathology and Audiology (Audiology Communication Research (ACR), Revista CEFAC (CEFAC), Revista Distúrbios da Comunicação (DIC) and Communication Disorders and Sciences (CoDAS)), from January 2013 to June 2015, only 12 (4.2%) address language assessment instruments; while nine (75%)

address the translation/adaptation and three (25%) address the preparation.

In turn, there is a gap in which this project is located: the analysis of clinical assessment instruments according to validation criteria (validity and reliability), with a view to their use in interventions and in clinical research (data collection).

Validity is the degree to which an instrument measures what it proposes to measure; that is, its accuracy expressed by statistical criteria of sensitivity and specificity. Reliability is the ability of the instrument to produce the same results in repeated attempts; that is, the reproducibility that assigns the degree of internal consistency. Both concepts are essential in the evaluation of measurement instruments, in general and in the health field (traditionally in the Epidemiology field)^{1,15,16}.

It should be noted that evaluating language is a complex task, particularly in the pathological dimension, as the nature of the phenomenon combined with the diversity of current theoretical concepts of language make it impossible to establish fixed/standardized methodological criteria for the development of formal measurement instruments, which also makes it difficult to compare evidence obtained in studies with different theoretical orientations. Thus, unlike other speech-language pathology specializations (hearing, voice and orofacial motricity), such limitations typical of the language field may partially explain the scarcity and difficulties in validating measurement instruments in the field^{3,5}.

Therefore, this study aimed to describe speech-language pathology assessment instruments published in Brazilian journals from 2017 to 2019 and to analyze the validation procedures used.

Method

This was a cross-sectional descriptive study and the case study included all publications from January 2017 to July 2019.

The study adopted the following selection criteria: original articles of preparation, translation/adaptation of assessment instruments of oral language, from the field of national Speech-Language Pathology and Audiology published in journals indexed by Qualis*.

* "Qualis is the set of procedures used by the Coordination of Improvement of Higher Education Personnel (CAPES) to

As exclusion criteria, this study excluded articles related to the development and/or use of applications in the language field.

Procedures

The publications from Audiology Communication Research (ACR), Revista CEFAC (CEFAC), Revista Distúrbios da Comunicação (DIC) and Communication Disorders and Sciences (CoDAS) were assessed. The selected journals are the most relevant in the field of Speech-Language Pathology according to the study's theme: oral language assessment instruments.

Following the order of priority, the publications were selected based on the type of publication (original article), titles, abstracts and descriptors and full reading. Then, the categories were developed according to the following variables: journal, volume/number, date, purpose (preparation or translation/adaptation of assessment instruments for oral language), original language (for translations/adaptations), sample size and calculation, age range and statistical validation techniques (validity and reliability) applied.

In turn, the following variables were defined to identify the validity of the instrument construct: hypothesis formulation; selection of measuring instrument; hypothesis testing and verification of data consistency and plausibility.

To this end, studies should have identified a criterion that was in line with the object and method of measurement, if the sample was representative, determining the strength of the relationship between both. The likelihood ratio, sensitivity, specificity and predictive value were verified. The internal consistency indicators were analyzed for reliability, thus assessing whether the data belonged to the same construct and whether the sample was representative and heterogeneous.

After defining the analysis variables, an Excel spreadsheet was prepared and submitted to each of the 4 researchers who participated, independently

stratify the scientific production of Brazilian graduate programs. The result of Qualis is a list of journals used by these programs for the dissemination of their intellectual production. Thus, Qualis measures the quality of articles, and other types of production, based on the analysis of the quality of the scientific journals. The classification of journals is carried out by the evaluation areas and undergoes an annual update process. The classification is annual and are ranking in strata ranging from A1, the highest, and A2; B1; B2; B3; B4; B5; C. The latter has zero evaluation weight". <http://capes.gov.br/avaliacao/qualis>

and blindly, in the data collection, evaluation and tabulation procedure according to the eligibility criteria. Each researcher completed the spreadsheet according to the variables established for analysis.

The researchers included 1 biostatistics and 3 speech-language pathologists with a doctoral degree and experience in research on instrument validation.

After being completed by the researchers, the 3 spreadsheets were submitted by email to the main researcher who performed the review, verification and unification of the data collected in a final Excel spreadsheet.

The collected data did not show significant divergences regarding the completion of the spreadsheets and the disagreements were resolved by consensus.

Data analysis

A descriptive analysis of the data was performed using absolute (n) and relative frequencies (%).

The Fisher's exact test was used to investigate the association between validation and reliability tests (predictor variables) and the outcome and type of validation (cross-cultural and development of another instrument).

A 5% descriptive level ($p < 0.05$) was assumed for statistical significance. Data were introduced in Excel and analyzed in the SPSS v23.0, for Windows.

Results

The initial search (from January 2017 to July 2019) found 24 studies on language assessment instruments in national journals in the Speech-Language Pathology and Audiology field. Of these, two were excluded for being brief communications, while one was excluded for addressing application development, resulting in a final sample of 21 studies ($n=21$).

Most of these studies were published in CoDAS in 2018 and were aimed predominantly at children (Table 1).

Table 1. Number and percentage of articles according to year and characteristics of articles

Variables		n	%
Journal	DIC	4	19.0
	ACR	3	14.3
	CEFAC	3	14.3
	CODAS	11	52.4
Year of Publication	2017	7	33.3
	2018	12	57.1
	2019	2	9.5
Groups analyzed	Children	15	71.4
	Children and adolescents	4	19.0
	Adults	2	9.5
	Total	21	100.0

Table 2 shows that only one article presented a sample size calculation and that most of the studies carried out were focused on the development of a new instrument. It should be noted that most of the articles had a content validation and

only few studies performed the reliability test by Cronbach's alpha.

In addition, only one study performed a sensitivity and specificity test and, within the evaluated period, no published study performed a calculation of predictive value, likelihood ratio or ROC curve.

Table 2. Number and percentage of articles according to type of analysis

Variables		n	%
Sample calculation	No	20	95.2
	Yes	1	4.8
Validation type	Cross-cultural validation	4	19.0
	Development of a new instrument	17	81.0
Back-translation	No	17	81.0
	Yes	4	19.0
Content validation	No	8	38.1
	Yes	13	61.9
Construct validation	No	20	95.2
	Yes	1	4.8
Sensitivity	No	20	95.2
	Yes	1	4.8
Specificity	No	20	95.2
	Yes	1	4.8
Predictive values	No	21	100.0
ROC curve	No	21	100.0
Likelihood ratio	No	21	100.0
Reproducibility	No	20	95.2
	Yes	1	4.8
Cronbach's alpha	No	16	76.2
	Yes	5	23.8
	Total	21	100.0

Table 3 shows that there was a statistically significant association between the use of the back-translation technique and cross-cultural validation ($p < 0.001$). The back-translation was performed on all articles that required such a process. Although most cases of content validation have been reported

in instrument development articles, this association was not statistically significant ($p = 0.253$).

Chart 1 shows the objectives of the selected studies, as well as the journal and the year of publication.

Table 3. Association between predictor variables and outcome (type of validation)

Variables		Validation type				p-value
		Cross-cultural validation		Development of a new instrument		
There was a calculation for the sample size	No	4	100.0	16	94.1	1.000
	Yes	0	0.0	1	5.9	
Back-translation	No	0	0.0	17	100.0	<0.001
	Yes	4	100.0	0	0.0	
Content validation	No	3	75.0	5	29.4	0.253
	Yes	1	25.0	12	70.6	
Construct validation	No	4	100.0	16	94.1	1.000
	Yes	0	0.0	1	5.9	
Sensitivity	No	4	100.0	16	94.1	1.000
	Yes	0	0.0	1	5.9	
Specificity	No	4	100.0	16	94.1	1.000
	Yes	0	0.0	1	5.9	
Reproducibility	No	4	100.0	16	94.1	1.000
	Yes	0	0.0	1	5.9	
Cronbach's alpha	No	3	75.0	13	76.5	1.000
	Yes	1	25.0	4	23.5	
Total		4	100.0	17	100.0	

Chart 1. Purpose of the studies, according to year and journal

Journal	Year	Purpose
DIC	2017	To develop a chart with indicators for the preparation of a proposal for guidance to family members of children with language disorders and undergoing speech-language pathology therapy, based on the understanding of their needs.
DIC	2017	To develop a neurofunctional assessment protocol and to associate the types of neurofunctional changes found with the CAC resources to be used with each subject.
DIC	2018	To describe the development of an instrument to assess the understanding of the oral language of children aged 2 to 6 years and obtain evidence of validity based on the content.
DIC	2018	To develop an instrument (checklist) for the early identification of children at risk for developing oral language changes or who already show signs of such changes.
ACR	2017	To develop an instrument for the perceptual identification of phonic contrasts in Brazilian Portuguese for children from 4 years of age.
ACR	2018	To develop and validate the content of a language assessment instrument based on Complementary and Alternative Communication (CAC).
ACR	2019	To present the study of internal consistency and latent factors responsible for the variability of responses to a task of assessing syntactic competences, applied to school children of the 2nd cycle of elementary school I.
CEFAC	2017	To propose a communication assessment protocol including the conversational analysis of children with chronic non-evolutionary encephalopathy with complex communication needs and their interlocutors.
CEFAC	2018	To validate the neurofunctional assessment protocol for Augmentative and Alternative Communication.
CEFAC	2018	To investigate whether the accuracy in the analysis of ultrasound images (US) is affected by the experience of the researchers and the sound class - alveolar liquids and coronal fricatives.

Journal	Year	Purpose
CODAS	2017	To develop an instrument to investigate the perception of minimal contrasts using pairs of signs, which present oppositions in relation to one of the parameters: hand configuration, hand location, hand movement and hand orientation.
CODAS	2017	To analyze the results of the construction validation of enunciative signs of language acquisition for children aged 3 to 12 months.
CODAS	2017	To present procedures and steps for the preparation of a list of homonyms, their meanings and images that represent them.
CODAS	2018	To develop the cross-cultural adaptation of the Detailed Assessment of Speed of Handwriting 17+ (DASH 17+) for Brazilians.
CODAS	2018	To apply the Test of Pragmatic Skills to Brazilian children with typical development.
CODAS	2018	To propose a protocol for instrumental assessment of adult speech, according to linguistic and psychometric criteria.
CODAS	2018	To prepare a list of pseudowords in Brazilian Portuguese to assess the ability of auditory discrimination of speech sounds and to investigate the internal consistency of test items and the effect of the school year on performance in discrimination.
CODAS	2018	To present evidence of validity and reliability of a phonological assessment instrument (INFONO) developed to evaluate Brazilian Portuguese phonemes.
CODAS	2018	To develop a list of pseudowords based on favorable environments and submit it to experts in order to obtain a validated list of pseudowords that can be used in therapy.
CODAS	2018	To investigate the performance of Brazilian Portuguese speakers in the Test of Narrative Language and correlate the performance in the tasks of production and understanding of the narrative.
CODAS	2019	To translate and adapt the "Language Use Inventory" assessment tool from English to Brazilian Portuguese.

The absolute count (n) was used in the analysis of the word cloud (Figure 1). The words that repeated the most in the objectives of the studies

were: "Assessment" and "instrument", followed by "children", "language" and "Portuguese".



Figure 1. Word cloud of the objective for the language theme.

Discussion

There was an increase in the number of studies on language assessment instruments within the assessed period, as reported in previous studies^{3,8}. However, previous studies on the subject also report the existence of few validation procedures for these instruments^{3,5,17}.

Most of the oral language assessment instruments evaluated are aimed at children. In this sense, it is worth noting the systematic review data on the validity of instruments in the Speech-Language Pathology and Audiology field⁸, which is in line with this trend, reporting that 35% of the studies surveyed included only children. In this sense, a study that describes the development of an instrument to assess the comprehension of oral language in children aged 2 to 6 years should be highlighted²¹. In addition, another study proposed to develop an instrument for the perceptual identification of phonic contrasts in Brazilian Portuguese for children from 4 years of age¹⁹. It is also noteworthy a study that present evidence of validity and reliability of a phonological assessment instrument (INFONO) developed to evaluate Brazilian Portuguese phonemes⁴.

A significant part of the studies address proposals for new instruments. This data is interesting, since it is contrary to a previous study³ that reported a greater interest on the part of speech-language pathologists in making adaptations and cross-cultural translations of international instruments.

In turn, most of the articles on instrument development performed content validation (through expert analysis), thus suggesting a concern with the internal structure of such instruments.

The studies that proposed a cross-cultural translation used the back-translation technique, which is recommended when working with instruments from other countries^{11,20}.

As for reliability, a few studies have performed the reliability test by Cronbach's alpha, which is an important measure for instruments that evaluate a single construct, using a variety of items for this purpose. A low internal consistency estimate may suggest that the items measure different constructs or the presence of inconsistencies in the answers to the instrument's questions²¹.

In general, the validation procedures used do not report the sample calculation. As warned by the literature²², this is a significant limitation that

requires caution regarding their use both in clinical activity and in research, in the sense of generalizing the results obtained.

In addition, as found in the case study, only one study performed a sensitivity and specificity test and no published study performed a calculation of predictive value, likelihood ratio or ROC curve. These results represent the greatest limitation of the instruments assessed, which is probably explained by the lack of language assessment instruments considered to be the gold standard in Portuguese that allow comparative calculations.

Therefore, it should be noted that the absence of such a comparative assessment may have undesirable implications as to the level of accuracy in the diagnostic identification.

Conclusion

There was an increase in the number of studies on language assessment instruments within the evaluated period, including proposals for new instruments, aimed mainly at children. A significant number of articles on instrument development performed content validation. However, few articles have proposed to perform the test of reliability, sensitivity and specificity, as well as the calculation to define the sample size. Therefore, there is a significant limitation that requires caution regarding their use both in clinical activity and in research.

References

1. Alexandre NMC, Coluci MZO. Validade de conteúdo nos processos de construção e adaptação de instrumentos de medidas. *Ciênc. saúde coletiva*. 2011; 16(7): 3061–8.
2. Salmond SS. Evaluating the Reliability and Validity of Measurement Instruments: *Orthop Nurs*. 2008; 27(1): 28–30.
3. Giusti E, Befi-Lopes DM. Translation and cross-cultural adaptation of instruments to the Brazilian Portuguese language. *Pró-Fono R. Atual. Cient*. 2008; 20(3): 207–10.
4. Ceron MI, Gubiani MB, Oliveira CR de, Keske-Soares M, Ceron MI, Gubiani MB, et al. Evidence of validity and reliability of a phonological assessment tool. *CoDAS*. 2018; 30(3): e20170180.
5. Gurgel LG, Kaiser V, Reppold CT. The search for validity evidence in the development of instruments in speech therapy: a systematic review. *Audiol. Commun. Res*. 2015; 20(4): 371–83.
6. Pagliarin KC, Oliveira CR de, Silva BM da, Calvette L de F, Fonseca RP. Instrumentos para avaliação da linguagem pós-lesão cerebrovascular esquerda. *Rev. CEFAC*. 2013; 15(2): 444–54.

7. Lindau TA, Lucchesi FDM, Rossi NF, Giacheti CM. Systematic and formal instruments for language assessment of preschoolers in Brazil: a literature review. *Rev. CEFAC*. 2015; 17(2): 656–62.
8. Casarin FS, Pagliarin KC, Koehler C, Oliveira CR de, Fonseca RP. Instrumentos de avaliação breve da comunicação: ferramentas existentes e sua aplicabilidade clínica. *Rev. CEFAC*. 2011; 13(5): 917–25.
9. Guimarães C da S, Cruz-Santos A, Almeida L. Adaptation of the Parent Report Language Use Inventory for 18- to 47-month-old children to European Portuguese: a pilot Study. *Audiol. Commun. Res.* 2013; 18(4): 332–8.
10. Machado FP, Palladino RRR, Cunha MC, Machado FP, Palladino RRR, Cunha MC. Adaptation of the Child Development Clinical Risk Indicators instrument to retrospective parent report. *CoDAS*. 2014; 26(2): 138–47.
11. Costa VBS da, Harsányi E, Martins-Reis V de O, Kummer A. Translation and cross-cultural adaptation into Brazilian Portuguese of the Children's Communication Checklist-2. *CoDAS*. 2013; 25(2): 115–9.
12. Bento-Gaz ACP, Befi-Lopes DM, Bento-Gaz ACP, Befi-Lopes DM. Adaptation of Clinical Evaluation of Language Functions - 4th Edition to Brazilian Portuguese. *CoDAS*. 2014; 26(2): 131–7.
13. Savoldi A, Ceron MI, Keske-Soares M. What are the best words to compose an evaluation phonological instrument? *Audiol. Commun. Res.* 2013; 18(3): 194–202.
14. Cunha MC, Oliveira GR. Publicações brasileiras em periódicos científicos: níveis de evidência científica da produção na área de linguagem. In: *Tratado de linguagem: perspectivas contemporâneas*. 1ª ed. Ribeirão Preto: Booktoy; 2017: 293–9.
15. Sireci SG. The Construct of Content Validity. *Soc. Indic. Res.* 1998; 45: 83–117.
16. Monteiro GTR, Hora H. *Pesquisa em saúde pública: como desenvolver e validar instrumentos de coleta de dados*. Curitiba: Appris; 2014.
17. McLeod S, Verdon S. A review of 30 speech assessments in 19 languages other than English. *Am J Speech Lang Pathol*. 2014; 23(4): 708–23.
18. Sá TBF de, Lima RF de, Mattar T de LF, Ciasca SM. Construction of an instrument to assess oral language comprehension of children from 2 to 6 years. *Disturb Comun*. 2018; 30(1): 158–69.
19. Berti LC. PERCEFAL: an instrument to assess identification of phonological contrasts in Brazilian Portuguese. *Audiol. Commun. Res.* 2017; 22: e1727
20. Colina S, Marrone N, Ingram M, Sánchez D. Translation Quality Assessment in Health Research: A Functionalist Alternative to Back-Translation. *Eval Health Prof.* 2017; 40(3): 267–93.
21. Souza AC de, Alexandre NMC, Guirardello E de B. Propriedades psicométricas na avaliação de instrumentos: avaliação da confiabilidade e da validade. *Epidemiol Serv Saúde*. 2017; 26: 649–59.
22. Friberg JC. Considerations for test selection: How do validity and reliability impact diagnostic decisions? *Child Lang Teach Ther.* 2010; 26(1): 77–92.