

A COMPARATIVE ANALYSIS BETWEEN STATISTICAL TOOLS ADOPTED IN SCIENTIFIC RESEARCH OF THE SPEECH THERAPY AREA AND CONTENTS PRESENT IN THE AREA COURSE SYLLABUSES

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The aim is to compare the statistical tools employed in research of the Speech Therapy area and contents present in course syllabuses of Statistics related disciplines in the Speech Therapy Education, with the purpose of verifying congruence/coherence. The supposition is that the contents of the Statistics syllabus should be congruent to those that have been considered relevant to scientific research activities. The investigation covered 343 scientific papers published in three Speech Therapy periodicals from the Online Brazilian Scientific Electronic Library–SciELO and 12 Statistics course syllabuses of the Speech Therapy area, in Brazil. Concerning the results of the analysis, although descriptive statistical tools present in the course syllabuses are congruent with the ones most adopted by researchers, there are many inferential statistical tools also considered relevant to the area that are not present.

INTRODUCTION

Nowadays, the mastering of statistical tools is of the greatest importance to the health area professional for the development of research, accurate data analysis and interpretation of results. Several researchers have carried out surveys in the health area in order to evaluate which statistical tools the professionals must be acquainted with in order to be able to understand and develop research in their area. We highlight works of Gonzalez et al. (1995), Schwartz et al. (1996), Ambrosano (2001), Harraway and Sharples (2001), Zellner, Boerst and Tabb (2007) and Grácio and Oliveira (2008). However, undergraduates of the health area, as the Speech Therapy students, for instance, find it difficult to associate the contents they are introduced to in the statistics classes with the real needs of their area. In other words, they find it difficult to understand how statistical tools present in their course syllabus will be applied in their future professional practice.

Therefore, we believe that the Statistics teacher, in a context of offering this discipline to an area whose objectives differ so much from its own, needs to understand the instrumental nature of this teaching and to try to get acquainted with the ways of producing knowledge in that area. Only then, the teacher will recognize which contents of Statistics are relevant to the target area practices and will be able to select appropriate items for the course syllabus, contributing to a better development of their students as future professionals and researchers. In this context, the best way to raise the interest of the students is to make them to realize the usefulness of the statistical knowledge to their professional practicing.

In this paper, we aim to compare the statistical tools employed in scientific research of the Speech Therapy area with those present, as contents, in course syllabuses of Statistics disciplines in Speech Therapy university courses, with the purpose of verifying coherence/congruence. We expected that the contents of the Statistics service courses would be coherent with those which are relevant to scientific research activities.

METHOD

We surveyed all papers published in three Speech Therapy periodicals from the *Online Brazilian Scientific Electronic Library–SciELO: Pró-Fono, CEFAC and “Revista da Sociedade Brasileira de Fonoaudiologia”* (The Brazilian Speech Therapy Society Journal). We analyzed 127 papers from periodical *Pró-Fono*, 76 papers from *“Revista da Sociedade Brasileira de Fonoaudiologia”* and 140 papers from *CEFAC*, totaling 343 papers.

Among the 343 analyzed papers, 316 (92%), researchers adopted descriptive and/or inferential statistical tools to carry out the analysis of their data. In each paper from this universe, we identified both the inferential and descriptive tools employed.

Concerning the course syllabuses of Statistics, we found 82 Speech Therapy university courses in Brazil. These courses were requested, by regular mail and/or by e-mail, to send us their

Statistics or Biostatistics course syllabus. Only 18 courses answered to our request (22% of the universe). Among them, 4 informed us that they did not offer Speech Therapy undergraduate courses anymore. Among the other institutions, one answered that it did not offer Statistics in its curriculum, 11 (13%) sent us their course syllabus of Statistics or Biostatistics and one institution informed us that it offered Epidemiology instead of Statistics. Among the institutions that include Statistics in their curricula, 10 institutions sent only one course syllabus and one institution sent two course syllabuses. Thus, we investigated 12 statistical course syllabuses from 11 private and public Speech Therapy courses, in Brazil. The statistical tools selected to be part of the programmatic contents of each course syllabus were identified.

RESULTS

In Table 1, we compare descriptive statistical tools that appear in at least 2% of the analyzed papers and those mentioned in the Statistics course syllabuses. We highlight that among the 343 analyzed papers, 316 (92%) use this kind of statistical tool in the analysis of their data and results.

Table 1. Descriptive Statistics in the analyzed papers and course syllabuses of the Speech Therapy area

	Speech Therapy papers		Course Syllabuses	
	N°	%	N°	%
Descriptive Statistics				
Tables	273	86	7	58
Graphic presentation	125	40	6	50
Percentage	231	73	3	25
Measures of position				
Minimum and maximum	25	8	-	-
Quartiles	14	4	3	25
Measures of central tendency				
Mean	220	70	8	67
Median	63	20	8	67
Measures of variability				
Standard deviation	134	42	8	67
Variation coefficient	7	2	1	8
Standard error	6	2	1	8
Descriptive Statistics non-specified	-	-	5	42

On Table 1, we can observe that the descriptive statistical tool researchers have made most use of was the construction of tables. Tables have been used to present Frequency Distributions of the analyzed variables and to show the evaluated statistical tools, as measures of central tendency and variability. Most papers also presented the calculation of the percentage (73%) and of the mean (70%). The computation of standard deviation and graphic presentation were shown in a significant percentage of the papers. On the other hand, we can observe that in the course syllabuses, the descriptive statistical tools most mentioned were the computation of measures of central tendency and of variability, as well as the tabular and graphical presentation of the data frequency distribution.

We must also point out that we could observe a significant presence of statistical concepts and tools that must precede the data analysis, such as “Sampling” and “Planning of Statistical work”, in 100% and 83% of course syllabuses, respectively. We also highlight that a significant percentage (42%) of course syllabuses indicate the intention of teaching descriptive statistical contents, but without specifying/naming them.

In Table 2, we compare the inferential statistical tools in at least 3% of the papers with the ones mentioned in the analyzed course syllabuses. We point out that among the 343 papers, 264 (77%) researchers have made use of inferential statistical tools to analyze their data.

Table 2. Inferential Statistics in the analyzed papers and course syllabuses of the Speech Therapy area

Inferential Statistics	Speech Therapy papers		Course syllabuses	
	N°	%	N°	%
Normality Tests				
Shapiro-Wilk's Test	7	3	-	-
Kolmogorov-Smirnov's Test	7	3	-	-
Parametric Statistics				
Levene's Test	8	3	-	-
t-Test	68	26	3	25
Analysis of variance (ANOVA)	48	18	2	17
Tukey's Test	8	3	-	-
Test for equality of proportions	26	10	1	8
Confidence Interval	42	16	2	17
Non-parametric Statistics				
Chi-Square Test	61	23	5	42
Fisher's Exact Test	30	11	-	-
Mann-Whitney's Test	53	20	-	-
Wilcoxon's Test	49	19	-	-
Kruskal-Wallis' Test	26	10	-	-
Friedman's Test	11	4	-	-
Correlation Statistics				
Pearson's correlation	25	10	6	50
Spearman's rank correlation	26	10	-	-
Regression Statistics				
Kappa Statistics	9	3	-	-
Other statistics	39	15	-	-
Introduction to Hypotheses Tests	-	-	11	92

On Table 2, we can notice that a large variety of inferential statistical tools have been used in the papers, although no specific type have appeared in more than 26% of the whole amount of papers that have made use of this kind of statistical analysis. Among the parametric inferential tools, we point out the high frequency of use of the t-Test, the ANOVA and the Confidence Intervals, and among non-parametric tests, the Chi-Square Test, Mann-Whitney's Test and Wilcoxon's Test.

We also point out the significant presence of non-parametric tests with the same objective of t-Test, which may show that the researchers could not guarantee the normality of their data distribution and/or that they worked with small samples. On the other hand, we observe that correlation is the most common inferential statistical tool mentioned in most course syllabuses, since it is mentioned in 50% of the analyzed material. Among the tests of hypotheses presented in the syllabuses, the Chi-Square Test is the one more frequently referred to (although only in 42% of the course syllabuses), and among parametric tests, the most frequently mentioned is t-Test (although only in 25% of the course syllabuses). However, an important point to call attention to is that in almost all course syllabuses, we could observe teacher's concerns about introducing tests of hypotheses to students, although a significant number of them did not specify which tests they would be working with.

We must also emphasize that many course syllabuses presented contents associated with probability notions and with normal distribution, which indicates that the teachers are concerned about presenting theoretical foundations of parametric tests to their students.

FINAL CONSIDERATIONS

Results showed that scientific papers in Brazilian periodicals of the Speech Therapy area, available in SciELO, have frequently been making use of statistical tools. Descriptive statistics is

almost always (92%) present and inferential statistics is also found in a high percentage of the papers (77%).

Both parametric statistical tools and non-parametric statistical tools were found. The overall tendency was to use parametric tools with quantitative variables, demonstrating the tendency of the variables in this area to present approximately normal distributions.

On the other hand, the contents observed in the course syllabuses indicate a tendency of the Statistics disciplines to be of an introductory nature, covering only basic contents of descriptive statistics and a little introduction to inferential statistics, and, when possible, one parametric and/or one non-parametric test of hypotheses. We believe that this option is due to a concern of the teacher in, at least, assuring that the students get familiar with the classical statistical tests, such as the t-Test and the Chi-Square Test, since from these tests the students can understand the “dynamics/reasoning” and objective of the other tests which Speech Therapy professionals frequently make use of.

The Statistics disciplines also tend to deal with the planning of statistical work and sampling techniques. We consider this to be quite an appropriate description for these disciplines. The introductory discipline provides the students with the first research experiments which involve collecting samples, establishing measurement levels for each variable to be analyzed, and doing experiment design (randomization, homogeneity of conditions, among others).

Thus, comparatively, we observe a quite larger variety of statistical tools and tests in scientific papers than in course syllabuses of Statistics disciplines of the Speech Therapy courses. Concerning the results of the analysis, although the presence of descriptive statistical tools in the course syllabuses are adequate when compared with the ones considered relevant by researchers, there are many inferential tools relevant to the area that are not present. Results, thus, point out that the contents of the Speech Therapy area syllabuses only partially meet the needs of this Scientific Community.

The results call attention to the need of some reflection on the role of Statistics in the Speech Therapy Education, suggesting a reviewing of the courses main syllabuses in order to contemplate both contents of descriptive and inferential Statistics relevant to the area research and professional practice.

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