February 20, 2015

Analysis of the Methodological Aspects of an Empirical Research Article (Doctoral Assignment)

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Introduction

Methodology is an approach that is employed to empirically resolve the complete set of choices available to the researcher. It is not merely a question of selecting methods, but it rather engages the researcher fully from unconscious worldview to enactment of that worldview via the inquiry process (Guba & Lincoln, 2005; Creswell, 2009; Thomas, 2011; Yin, 2011). Considering the afore-mentioned, methodology is relevant to any study as the objective is to decide the best method of approach to deal with a question or phenomenon. It seeks to answer the question, “How?” In other words, the best way to answer the research questions or hypotheses of any study is by means of a methodological strategy.

Taking into consideration the afore-mentioned, the objective of this assignment, as the title suggests, is to analyse the methodological aspects of a research article, focusing specifically on the data collection, analysis, and interpretation techniques. The article, written by Rayas Tanaka (2014), is entitled “Knowledge of Adjective Reference by Monolingual Spanish- and English-Speaking Children”. It is written in English Language.

Below, a summary is given of the article under study, followed by a brief discussion of the aims, objectives, research questions and hypotheses. Next, an analysis is done of the article’s methodological aspects. Subsequent to this, a brief look at the discussion and conclusion sections of the author’s article is taken. Finally, concluding remarks are made about the analysis of Rayas Tanaka’s (2014) article.

Summary of the Chosen Research Article

The chosen article, written by Rayas Tanaka (2014), is within the context of language learning and teaching, specifically in the acquisition of adjectives. The basis of this author’s experimental study has its origins in research conducted by Waxman, Senghas and Benveniste (1997), and Waxman and Gausti (2009). According to these authors, there are cross-linguistic differences in the way that Spanish, French, English and Italian monolingual children interpret adjectives. As noted by Rayas Tanaka (2014, p. 1), “Their results show that
only Spanish and Italian speaking children categorized a novel adjective as an object in the same way for the categorization of a noun”.

In Rayas Tanaka’s (2014) paper, the sample consists of three year old and four year old children who speak either Spanish or English as their native language. In other words, they are English-speaking monolinguals and Spanish-speaking monolinguals. An experiment was carried out, through the use of tasks in four linguistic contexts, to find out how well these children were able to refer to adjectives as properties of objects, and not directly to the objects themselves. The role of syntax and morphology, through the use of morphological and syntactic cues in the production of these adjectives, was also explored. Through the use of the ANOVA test, the results highlight that both English-speaking and Spanish-speaking monolingual children do understand that adjectives refer to properties of objects.

Aims/Objectives/Research Questions/Hypotheses of the Research Article

It must be noted that this study by Rayas Tanaka (2014) shows depth of research. The objectives and aims of the study, as well as the hypotheses, are clearly spelt out (Rayas Tanaka 2014, p. 6-7). In relation to the hypotheses, these are two specific sets: one set was directed towards the expected results of the experiment (p. 6-7), while the other set was specifically related to the design of the experiment itself (p. 8).

The study also makes us of research questions. Unfortunately, the only reference to research questions before an outline of the methodology used is where Rayas Tanaka (2014, p. 6) says, “Another part of the research question […]”. Such a statement begs the question, “If the author says “Another part of the research question”, then where is the rest of it? Where are the other research questions?” While reading through Rayas Tanaka’s (2014) research article, the research questions were found in the conclusion of the paper (p. 14). Based on how research information is to be presented (Creswell, 2009; Thomas, 2011; Yin, 2011), it would have been better to record all of the research questions in one place, so that the reader could fully understand what exactly is being questioned.
A Closer Look at the Methodological Aspects of the Article under Study: Data Collection, Analysis, and Interpretation Techniques

Methodology (Data Collection and Experiment Execution)

The methodology section of the article under study, by Rayas Tanaka (2014), has the necessary parts which are the participants, the research instrument or ‘stimuli’, as it is called in this paper, and the procedure (p. 7-8). Since this is an experimental study, it also made use of a scoring criteria (p. 8) for the tasks that the three year and four year old children had to do. This section also includes a specific hypothesis of the design referring to the experimental design, the four linguistic contexts.

(A) In terms of the participants, Rayas Tanaka (2014) has used a good sample size. This author points out that there were “29 English-monolingual speaking children and 25 monolingual Spanish-speaking, children whose ages were 3 and 4 years” (p. 7). A footnote on the same page indicates that “One English-speaking child and 4 Spanish-speaking children were excluded from the statistical analyses due to their misunderstanding of the task” (p. 7). When all of these numbers are added together, the actual sample, therefore, would have been 30 English monolingual-speaking children and 29 Spanish monolingual-speaking children, bringing the total sample size to 59.

In relation to the above figures many things seem to be odd. There seems to be some discrepancies, and the following questions arise:

1. Why is the total number for both English and Spanish-speaking monolinguals not the same? Shouldn’t it be 30/30 for each set of monolinguals?

2. With regard to the ages of the children, how many English-speaking children were 3yrs and 4yrs old? How many Spanish-speaking children were 3yrs and 4yrs old? Since Rayas Tanaka’s (2014) paper is dealing with four sets of samples – 3yr/4yr old English-speaking monolinguals and 3yr/4yr old Spanish-speaking monolinguals – perhaps a table showing this information would have been a bit more helpful to the reader.

In relation to the above, a table does exist with this data, however that table, labeled as Table 1, is in the ‘Results’ section of the author's article (Rayas Tanaka 2014, p. 11). A careful look
at this table now reveals that for Spanish monolinguals, there were 9 3yr olds and 21 4yr olds, bringing that sample to 30. For English monolinguals, there were 14 3yr olds and 15 4yr olds, bringing that total to 29. These figures are conflicting for two reasons:

1. Rayas Tanaka (2014, p. 7) says that there are 30 English-speaking monolinguals and 29 Spanish-speaking monolinguals. How is it that the Table 1 (p. 11) shows that there are 30 Spanish-speaking monolinguals, and 29 English-speaking monolinguals?

2. Since the sample consists of both 3yr and 4yr old children from both language categories (Spanish/English), attempts should have been made by Rayas Tanaka (2014) to balance the number of both 3yr and 4yr olds per language category. In other words, there could have been 15 3yr olds and 15 4yr olds from the English monolinguals, and 15 3yr olds and 15 4yr olds from the Spanish monolinguals, to bring the total sample to 30, for each of the two language categories. This would have been the better thing to do regarding the participants, there is no mention by Rayas Tanaka (2014) of the kind of sampling technique used. There is also no mention of the socio-economic status of these children, of whether or not they attended (play) school, nor of the race of the children. Perhaps these were not important to this specific study; however, it would have been good for the author to shed some light on these aspects, for the sake of the reader.

(B) With regard to the stimuli, and as earlier mentioned, there are four linguistic contexts in which the children’s recognition of adjectives as properties of objects is tested. For each of these linguistic contexts, there are four stimuli, thus bringing the total to 16 stimuli. In other words, each of the four samples – the 3yr/4yr old English monolinguals and the 3yr/4yr old Spanish monolinguals – was exposed to these 16 stimuli, making use of morphological and syntactic adjectival cues. Appropriate for the ages of these children, each of the 16 stimuli consisted of drawings/pictures of a ‘model object’, a ‘target object’, and a ‘non-target object’ (Rayas Tanaka 2014, p. 7, 18-22). The linguistic contexts and stimuli are well thought out, and are appropriate for the participants of the study.

Important to mention here, concerning the stimuli, is that Rayas Tanaka (2014, p. 7), in a footnote, highlighted the following:
The adjectives in the syntactic contexts were kept as equal as possible for number of morphemes and syllables within the 2 languages. The number of words in the contexts was very similar in both languages too. The number of morphemes and syllables varied from 1 to 3 in both languages in the four contexts. Spanish always presented an additional morpheme for gender.

This is very important, as it favours reliability and validity of the tasks used, and the expected results. They were, for the most part, of equal degree of difficulty.

(C) As it relates to the procedure, this was another smart idea on the part of the Rayas Tanaka (2014, p. 7-8). Given the ages of the samples, this author used a puppet to play the game with them. The puppet would point to the model object, call the adjective, and then ask the children if they could identify another object from the set with the same adjective. This activity was done with each of the 3yr/4yr old children from each of the two language groups. Important to mention here is that playing games is endorsed by Piaget (1945) who insists that this is pivotal to child language development and learning.

(D) With respect to the scoring criteria, this was also well set out. Once the child selected the correct target object, a score of 1 was given. If the child selected the non-target object, a score of 0 was given. 1 meant that the child understood the use of the adjective as referring to the property of the object, while 0 meant that the child understood the use of the adjective as referring to the object itself. This is a very transparent scoring criterion.

Results (Data Analysis and Interpretation)
According to Rayas Tanaka (2014), the experimental design was done is such a way to analyse three independent variables: (i) the linguistic context/stimuli, (ii) the language of the child, and (iii) the age of the child. This author notes carefully that “the linguistic context was treated […] as the within-subject variable and age and language were treated as between-subject variables” (p. 8). The dependent variable referred to the children’s response to the stimuli: the selection of target objects or non-target objects.

One of the four linguistic contexts was used as the ‘baseline performance covariate’ (Rayas Tanaka 2014, p. 8), while the others were tested for variance, making use of the parametric statistical test ANOVA. Through the use of ANOVA with this specific linguistic context, used as the baseline performance covariate, the analysis revealed ‘two main effects’: linguistic context and age. There was no main effect for language (p. 9). A subsequent
analysis done on another linguistic context also revealed again that there was no main effect for language.

Based on the above, it would not seem unfair to say that the two main independent variables were *linguistic context* and *age*, since these seemed to be ‘statistically significant predictors’. In light of the afore-mentioned, it would also not be unfair to suggest that the *ANOVA II parametric test for independent samples* was used, even though the author, in her article, merely uses the broad term ANOVA.

The author goes on to highlight in the analysis that 4yr olds performed better in some linguistics, while some 3yr olds performed better in some linguistic contexts (p. 9). Important to note also is that another parametric test was used, the *T-TEST for independent samples*. This was used to compare the means of Spanish/English 3yr olds in three linguistic contexts. The author presents two figures and one table to evidence the results obtained (p. 9-11).

Taking into consideration this analysis and interpretation of results done by Rayas Tanaka (2014), there are still some discrepancies:

1. When the author says that “four year olds performed better than three year olds” (p. 9), was a comparison done between the 4yrs and 3yrs of both Spanish and English? Was it done only per language? This is not stated.

2. Similarly, the author goes on to say that “three year olds benefitted from the full context” (p. 9). How is this known? Was a comparison done across languages, between 3yr olds and 4yr olds to determine this, or was a language-specific comparison done? This is not stated.

3. T-Tests were done for the 3yr olds in three linguistic contexts (p. 9). Does this imply that T-Tests were also done for 4yr olds to arrive at such a conclusion? Were comparisons done across languages, or were they language specific? This is also not stated.

In relation to the above, the author gives the critical value of $t$ – “$t(19) = 2.449, p < .05$” and “$t(19) = 2.333, p < .05$” – stating that they are ‘significantly better’. What is
the critical value of $t$? How does one know if 2.449 and 2.333 are higher or lower that the proposed critical value of $t$? This is not stated.

Why the figure 19? Were there 20 3yr olds per language category? In order to establish the critical value, an error margin of 1% N-1 degrees of freedom must be considered. Table 1 (p. 11) apparently shows the total number of participants in the study (even though that is flawed, as was earlier discussed). The total number of 3yr olds for Spanish is 9, and for English, 14. Naturally, 9 added to 14 will result in 23. How did the author arrive at the figure 19? That is unclear.

4. For Figure 1 (p. 9), only three linguistic contexts are evident there. Where is the fourth one, since all four linguistic contexts were tested? Why isn’t it reflected on the graph? The graph also shows 3yr olds and 4yrs olds. Were all the 3yr/4yr olds grouped together from both language categories (Spanish and English)? Why wasn’t this information represented individually on the same graph?

5. The author continues in her analysis, postulating that “four year olds had more correct answers than three year olds” (p. 10), for another linguistic context tested. How is this known? Was a comparison done per age group per language? Was it done across languages? This is not stated.

6. Figure 2 (p. 10) shows the descriptive total means by age for one of the linguistic contexts tested. Were all the 3yr olds and 4yr olds grouped together on this graph? Or does this graph only reflect the 3yr/4yr olds for one specific language? This is not stated.

7. Concerning the table labeled Table 1 (p. 11), a few things seem odd. To highlight this, some statements earlier mentioned in this analysis of Rayas Tanaka’s (2014) paper are posited:

(i) Rayas Tanaka (2014, p. 7) notes that the actual sample was supposed to have been 30 English-speaking monolinguals and 29 Spanish-speaking monolinguals. How is it that the Table 1 (p. 11) shows that there are 30 Spanish-speaking monolinguals, and 29 English-speaking monolinguals? Why this change, even though the numbers “appear” to be correct?
In relation the above, it is stated in the footnote of the author’s article (p. 7), that some students were removed from the experiment. Considering that the author originally stated that 29 English-speaking children participated (1 was removed) and 25 Spanish-speaking children participated (4 were removed) actually participated in the study, the figure should be **54** (**5 children were removed**). Table 1 shows that there are 30 Spanish-speaking children and 29 English-speaking children, bringing the total to **59**. This is incorrect because (a) the total number of Spanish-speaking children **does not** exceed their English-speaking counterparts, and it is contradictory since the table should only account for **54 children**. Why were they all included in the tasks, if 5 were removed?

(ii) As discussed earlier in this analysis of Rayas Tanaka’s (2014) paper, there should have been a balance between the numbers of 3yr/4yr olds for both language categories. A balance in number (excusing those who did not participate) perhaps would have added to the reliability of the results. It is unfair to say that one group performed better than the other, when the numbers across groups were not leveled. Such a tendency can cause discrepancies in the results.

(iii) When looking at the standard deviation (SD) and the mean (M) in Table 1 (p. 11), all of the SD are above the M except one of them: the 3yr old English-speaking children (SD = 1.60357, M = 1.5714). Knowing that generally the SD should never be above the M (even though some statisticians may argue this), is this a cause for concern with the validity of this specific result?

**Discussion and Conclusion of the Empirical Article**

The ‘discussion’ and ‘conclusion’ sections of Rayas Tanaka’s (2014) article restate the results achieved, and also give a description of some of the tasks that the children had to do. A discussion ensues about those specific 3yr/4yr old children who excelled in specific linguistic contexts, and the reasons for such. It is also noted that some students had difficulties attempting certain tasks, and possible reasons were provided for such a tendency. The confirmation of the hypothesis is also repeatedly mentioned by the author, while there is a rejection of those results that had been earlier achieved by Waxman, Senghas and Benveniste...
(1997), and Waxman and Gausti (2009), whose work served as the base study for Rayas Tanaka’s (2014) research. Additionally, the author is careful to mention that this study should not be taken in isolation, and that the results should not be generalized. The author concludes the article, noting that there is much more room for future studies, in order to prove or disprove the results achieved.

**Concluding Remarks**

The principal objective of this exercise has been to do an analysis of the methodological aspects of Rayas Tanaka’s (2014) empirical article. The analysis has shed light on many issues pertinent to research conduction and presentation.

Based on the analysis done of the data collection, analysis and interpretation techniques of the author’s article, it has been evidenced that there are certain methodological aspects that should have been tightened in the paper.

Important to note is that a quick search for the author on Google produced information about her Master’s thesis, bearing the same name of her research article. Bearing that in mind, that may be another reason why pertinent information seems to be missing from the research article. In other words, no Journal article can ever fully present a thesis, given the word limit that forces writers to drastically reduce the data they present. Information will always be overlooked. However, while that may be the case, it is still advisable to always present the relevant information that would help the reader to easily comprehend it.

A Google search of the Journal, in which this article appears, shows that the Journal allows a word limit of 10,000 words. That being the case, perhaps the author could have included more information, therefore avoiding the exclusion of relevant information, since, excluding the ‘Reference’ and ‘Appendix’ sections, the paper is merely 6,149 words. Notwithstanding those areas that could have been improved, the article does have merit: it sheds light on the acquisition of adjectives of English-speaking and Spanish-speaking monolingual children. That is note-worthy.

This exercise of analysing the methodological aspects of Rayas Tanaka’s (2014) research paper has been very fruitful. It has allowed for the serious contemplation of methodology and
what it means to research work, specifically being the format for answering research questions or hypotheses. While no methodology may be perfect, it should be as seamless as possible. Consequently, it is therefore important for researchers to always avail themselves to present methodologically sound research work. Sounds methodology aids in the reliability and validity of empirical research. Is this not one of the principal objectives of researchers?

**References**


