A STUDY ABOUT THE ASPECTS RELATED TO THE PRESENCE OF NOISE IN THE ACCOUNTING INFORMATION ELABORATION: WOULD THERE BE THE INFFLUENCE OF BEHAVIORAL HEURISTICS?

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ABSTRACT

The objective of this research was to analyze the relations among communicative ability, the degree of knowledge and the position within the makers' sociocultural system with the presence of noise in the elaboration process of accounting information. To this end, a questionnaire was applied with 233 professionals active in the labor market and the analyzes were conducted using logistic regression techniques and tests of difference between groups. As results, it was possible to verify that communicative ability and the degree of knowledge influence the presence of noise in the elaboration process, intended for the observation of positive and negative relations, respectively, for the academic education and professional experience proxies. These results contribute with evidences that there is a greater propensity for noise incurring by the makers with a higher degree of academic education, while the makers with greater professional experience or who work in the field of Financial Accounting incur a lower degree of noise.

Keywords: Communication Theory. Noise. Heuristics.

1 INTRODUCTION

The effectiveness evaluation of the communication process of accounting information between the makers and their users is the subject of academic investigations. The predominant approach has been conducted in order to foster debates on the usefulness and comprehensibility of information from the perspective of its users (Lee & Tweedie, 1975; Lopes, Ribeiro & Cavalcante, 2010), therefore, the communication process is considered effective when it results in a complete understanding of the message issued.

Thus, so that the accounting information issued is able to reduce uncertainty parameters and foster more efficient economic decisions, it would be necessary for this process to be carried out with full fidelity by the maker and the information interpreted fully – decoded and completely understood without deviation from the original meaning of the message – by the recipient (Dias Filho & Nakagawa, 2001). However, the communication process may be subject to factors that affect its effectiveness, which would result in a relative loss of the qualitative characteristics of accounting information. These factors are referred to in the literature as noise (Shannon & Weaver, 1949; Bedford & Baladouni, 1962).

The body of empirical evidence about the presence of noise in the communication process of accounting information focuses on users perspective as recipients of information, clarifying factors related to damages in their interpretation and understanding (Lee & Tweedie, 1975; Lopes et al., 2010). On the other hand, the investigation of the factors related to the appearance of noise in the communication process by the perspective of the information maker is still incipient, because, despite Dias Filho e Nakagawa (2001) point to factors that influence in all stages of the communication process, no empirical evidence was found in the literature to clarify the emergence of noise in the information development process.

Thus, the focus of this work is on the investigation of the factors pointed out by Dias Filho and Nakagawa (2001) and their possible relations with noises intrinsic to the process of compiling accounting information. The authors back up that the communicative ability, the degree of knowledge about the object and the communication process itself, and their position within the socio-cultural system may affect the makers' behavior.

Assuming that accounting information makers should use technical judgment to interpret and apply accounting standards (Hellman, 2016; Perera, Chand & Mala, 2019; Malaquias & Zambra, 2019), it is plausible to conceive that the noises in the elaboration process are intrinsic to such judgments, and are therefore associated with behavioral aspects. Thus, this work offers as innovation the analysis of the factors that affect the process of preparing accounting information within the communication process on the approach of Tversky and Kahneman's behavioral heuristics (1974), from the maker's perspective

Due to the subjective nature of the judgments, the assumption of this research is that the occurrence of noise in the preparation of information can be captured based on the presence of heuristics, and that these can result in the communication of information with relative loss of its qualitative characteristics. Due to that, the objective of this research is to analyze the relations among the occurrence of noise and communicative ability, the degree of knowledge and the position within the socio-cultural system.

Therefore, by mean of logistic regression analysis, relations were verified between the index of presence of heuristics - as *proxy* for the presence of noise - and the variables academic education and time of professional experience - as *proxies* for the variables communicative ability and degree of knowledge: for the academic education, it was possible to infer that the higher the academic education degree of the maker, the greater the chance of the appearance of noise; and, as far as the time of experience is concerned, it was observed that the generation of noise tends to fall.

Therefore, it was possible to observe that there is no difference among the academic education groups, which suggests that the noises tend to exist for any level of academic education

and that there is no difference among the groups measured in the study. A similar procedure was performed for professional experience, and it was observed that there is a difference in the level of experience among the groups, which allows us to infer that more experienced makers produce a lower degree of noise.

In order to provide greater robustness to the research findings, in view of the finding of the heterogeneity of the makers' field of action, another estimation was carried out with the inclusion of a *dummy* that captures the effect of the field of action on the presence of noise. The results observed after this procedure are similar to those of the original estimate and it was possible to observe that the makers working in the Financial Accounting field have a lower propensity to produce noise.

These results contribute to a wider understanding of how and to which extent behavioral heuristics relate to the judgment exercised by accounting information makers. In the practical field, this research can result in impacts on the degree of understanding of professionals regarding the cognitive limitations inherent to human nature that permeate the Accounting professionals performance.

After this introduction, in the second section, the work theoretical reference is introduced. In the sequence, the third section presents the methodology. In the fourth section, the results are presented and discussed, and finally the conclusions with the reflections on the results of the research.

2 THEORETICAL FRAMEWORK

2.1 Theory of communication and accounting information

One of the purposes of Accounting is to represent economic events, providing efficient communication among the agents and being a useful and widely available source for decision making (Adelberg, 1977; Hellmann, 2016). That is, accounting acts in the intermediation of economic exchanges and has as one of its functions the maximization of usefulness between the parties. Therefore, the first step in adapting the accounting language to the ability of its users to understand is to perceive accounting as a communication and interaction process of its components (Bedford & Baladouni, 1962).

Upon associating the Communication Theory with Accounting it is possible to visualize the elements of the communication process as economic events; the account performs a transmitter, observing events and coding them to transmit information through accounting reports, which in turn make the basic channel of this type of communication; finally, the message is received, decoded and interpreted by its users, who appear in the process as the final recipient (Dias Filho & Nakagawa, 2001).

In this context, accounting information makers should produce reports that are relevant to decision-making and faithfully represent reality, in an impartial, complete and error-free manner (Muzira, 2019). Thus, a financial report must provide useful information about a particular entity, having a significant effect on the economic decisions of the agents (Biddle, Hilary & Verdi, 2009; Cho & Kang, 2019).

Thus, it is admitted that its process of elaboration is carried out by rational agents capable of assigning probabilities to all possible events that constitute their decision problem (Ribeiro, Leite & Crozatti, 2006) , that is, the process of elaboration is carried out based on judgments, estimates and models that seek to maximize the usefulness of the information, being seen, therefore, as something objective and exact, as if different makers under the same conditions could reach identical results.

Based on the utilitarian premise, the process of judging the makers' financial statement establishes the initial reliability of accounting information (Clor-Proell & Maines, 2014). During the communication process, at the time when the maker receives data on economic events, human

interpretation plays a fundamental role in defining the usefulness of the information reported, for it is used by the issuer in choosing the form and content of the information that will be communicated (Dias Filho, 2000).

2.2 Intrinsic behavioral aspects to the preparation of accounting information

The perceived utility (ability to capture, process, and understand information) is one of the main factors that influence the recipient's understanding of information (Nogueira, 2006). Therefore, when observing the decision-making process from the end-user's point of view, it is assumed that the information they use is of maximum utility and is free from interference in their communication (noise).

However, according to Dias Filho and Nakagawa (2001) , there are factors that act on the message issuer, which influence his or her behavior in the communicative act, his or her objective, his or her encoder mechanisms and the content of the messages, such as: the communicative ability; the degree of knowledge he or she possesses regarding the object and process and also his or her position within the socio-cultural system.

Communicative ability, according to the Dias Filho and Nakagawa (2001), can be understood as the individual ability to analyze his or her own goals and intentions, as well as the ability to code the message in order to transmit what is intended. This factor, therefore, is directly related to the capacity of the maker to judge and to reliably express and communicate economic events that incorporate future uncertainties to the financial report in order to establish the initial reliability of the accounting information that is proposed to be disclosed (Clor-Proell & Maines, 2014).

The degree of knowledge refers to the maker's need to conduct technical judgments on the aspects of future uncertainties and their incorporation for the representation and communication of economic events by the appropriate channels. Thus, it concerns both the abstract knowledge necessary for the preparation of information, and the practical knowledge of the communication process itself regarding the means by which information can be treated and transmitted (Dias Filho & Nakagawa, 2001). Thus, a greater degree of knowledge is needed to make more accurate judgments carried out (Malachi & Zambra, 2019) and to conduct the communication process by the appropriate means in order to reach its receiver (Dias Filho & Nakagawa, 2001).

As the last factor to consider, Dias Filho and Nakagawa (2001) point out that it is necessary to know the type of social system in which the message issuer operates and the cultural context in which he or she communicates. Thus, the authors clarify that the position of the issuer in the socio-cultural system is related to the beliefs, values and behaviors considered as required, acceptable and dominant. In view of this, in the research, it is understood that the socio-cultural system can influence the judgment of the accounting information maker, because, as Berlo (1999) states, no communicator transmits information without being influenced by his or her position in the socio-cultural system.

Therefore, these factors that may affect the maker's behavior in the communication process contribute to a possible relative loss of the usefulness of the information, indicating that noise may arise as a result of variables that affect the professional judgment in the accounting information preparation process(Shannon & Weaver, 1949; Bedford & Baladouni, 1962; Dias Filho & Nakagawa, 2001).

A possible explanation for the occurrence of such noise is the approach of cognitive simplifications, because, according to Simon's observation (1959), decision-makers have limited abilities to evaluate all possible alternatives of a decision. That is, rationality, taken by the author as limited, is used to determine that there are cognitive limits in the decision-making process.

Such simplifications are called heuristics, which can be described as approximate calculations based on experiences that seek to simplify the decision-making process with the purpose of compensating for the limited human processing capacity (Shefrin, 2002). Thus, when

one relies on heuristic principles, the complex tasks of assessing probabilities and predicting values are no longer used before simpler judgment operations (Tversky & Kahneman, 1974).

This occurs due to heuristics' actions as mental shortcuts, which simplify the decision-making processes that involve many possibilities, resulting in "satisfactory solutions" obtained with relatively low effort, to the detriment of "optimal solutions", which are those that would bring the best possible result (Martins, Lima & Silva, 2015). In this sense, it is plausible to conceive that noise in the communication process is derived from a judgment permeated by shortcuts and simplifications.

In short, taking into account the subjective nature of accounting and the presence of personal aspects in the judgment of the information makers, their analysis may be under the influence of heuristics, which tends to lead to the disregard of parameters proper to particular events, to simplify the trial process at that time, ignoring relevant data, parameters and probabilities. Thus, information derived from a process of elaboration, permeated by heuristics, may result in noise in the communication process, impairing the usefulness and other qualitative characteristics of the information. In view of the above, the following are conceptualized the main heuristics that influence the decision-making process, according to Tversky and Kahneman (1974).

Representativeness is common in questions about the relationship of two distinct elements. Thus, the probabilities, by means of the decision-maker's personal repertoire, are assessed by the degree to which a certain element A is representative, or similar, of B (Tversky & Kahneman, 1974). This approach, for the probabilities judgment, leads to serious errors, because representativeness is not influenced by several factors that should affect these judgments, that is, when an individual is influenced by representativeness, he or she simplifies odds judgments in a way that factors essential to this type of judgment are not taken into account, such as prior probabilities and sample size and population (Tversky & Kahneman, 1974).

Availability is employed when the frequency or probability of occurrence of a given event is estimated, so it is used according to the ease that similar examples or occurrences can be recalled (Tversky & Kahneman, 1973). Availability is a useful clue for evaluating frequencies and odds because memories of large-scale events are recovered better and faster than less frequent events, but as availability is affected by factors other than frequency and probability confidence in this heuristic tends to result in decisions that are inclined to one judgment instead of another (Keren & Teigen, 2004; Tversky & Kahneman, 1974).

Finally, in situations that need estimates, an initial value is derived from, or starting point that is adjusted to produce the final response (Tversky & Kahneman, 1974). Thus, the anchoring heuristic happens when the decision (a numerical forecast) is influenced by preconceived information or data, or when the decision-maker performs some partial calculation to base his or her estimate, and as new information appears, insufficient or exaggerated adjustments are made to reach a final response. Thus, when the same problem contains different initial values, the individuals arrive at different results, because these different ways of treating the problem generate different starting points and, therefore, produce divergent estimates, which are influenced by the initial values (Tversky & Kahneman, 1974).

3 METHODOLOGY

3.1 Research design

The present research was conducted through the application of a simple questionnaire (*survey*) as a data collection tool for the purpose of carrying out a survey of the individual characteristics and behavioral aspects of Accounting professionals. The design of this strategy was such as to enable an analytical study of the respondents' characteristics and the quantification of the variables needed to reach the research objective.

Individuals who have some kind of knowledge and/or experience in the accounting area were considered as possible respondents. Thus, individuals who have the capacity to make judgments about economic events of an accounting nature were prospected. Due to this methodological delimitation, the target public represents a specialized sample, formed solely by professionals working in the labor market.

Thus, an initial research protocol was constructed for which the questionnaire was designed in two sections, namely: i) The respondents' profile – in which the proposal was to collect data regarding the variables: communicative ability, degree of knowledge and position within the sociocultural system (Dias Filho & Nakagawa, 2001), through the survey of sex, age, academic education and professional experience, as *proxies* that collect aspects of the above variables; and, ii) behavioral aspects inherent to the judgments made in the process of compiling accounting information – in which six hypothetical scenarios were elaborated in which accounting intelligence makers should make decisions based on judgments based on international accounting standards.

Subsequently, the proposed protocol was submitted to the appreciation of two scholars with PhD in accounting sciences and an accountant, all with extensive experience in their respective areas. The purpose of this procedure was to verify the adequacy of the collection instrument, with a view to guaranteeing the sensitivity of the questionnaire in the data collection properly (Martins & Theóphilo, 2016). After the collaborators' review and considerations, the questionnaire was changed and its inconsistencies eliminated.

The procedure to verify the reliability of the data is commonly performed through Cronbach's Alpha, which estimates the survey data reliability. However, this coefficient is robust only for asymptotic and heterogeneous samples, and is not considered adequate for studies with homogeneous target audience, a situation observed in this research, since the respondents consist of specialists and tend to make judgments in a similar way, reducing the variability of the responses.

The data collection procedure was performed by submitting *an online* form through *the LinkedIn* platform for respondents who were in the dimensions demanded to perform the research. Thus, data collection was operationalized in a non-probabilistic way, since all data were obtained for convenience and accessibility, and it was not possible to stipulate a response rate. Finally, the questionnaire was applied in a specific period (*cross-section*), between March and July 2021, totaling 233 responses obtained.

In view of this, it was possible to measure the dependent variable heuristics presence index (HPI) and use it in a multivariate logistic regression analysis against sex, age, academic education and professional experience. Based on the above technique, analysis of variance was performed for the identification of statistically significant variables *(p-value $\leq$ 0.05)* and their subsequent analysis by means of *odds ratio*.

The variables identified by the logistic regression analysis were analyzed by the possible differences among the groups using the *t* and Mann-Whitney U tests, depending on the data distribution, considering a significance level of *p-value $\leq$ 0.05*. The purpose of this procedure was to establish whether there is a difference among the groups in the incurring of a greater generation of noise in the process of compiling accounting information.

3.2 Decision Scenarios

The data collection instrument was constructed in order to evaluate the presence of behavioral heuristics associated with noise intrinsic to the process of compiling accounting information by means of questions that simulate scenarios in which respondents had to make their judgment. The questions were constructed objectively and with dichotomous responses and each scenario contains one or more heuristics that may be incurred by the respondents.

In the first scenario, it was aimed to analyze the presence of the heuristics of representativeness and anchoring, based on the proposition that a particular company caused

environmental damage (oil spill) in regions distinct from the same bay, and that the entity should recognize the provision for repairing such damage. If the respondent were to incur the heuristics of representativeness and anchoring, his or her response would be to use the first spill as a basis for calculating the estimate of the second, considering that the characteristics of one event are representative of the other. In addition, the anchoring would also manifest itself from the adjustment in the historical data of the other event. Thus, if the respondent chose to measure the provision of environmental damage in a similar way for both events, the presence of noise associated with heuristics would be configured.

In the second question, the possible incurrence of the heuristics anchorage was investigated based on the scenario in which an entity seeks to estimate, for the recognition and initial measurement of the right to use, the value of removal and disassembly of a leased good. To perform this procedure, it was proposed that the entity had adopted average values of similar and previous events as a basis for calculating this estimate. If the respondent chose to continue reproducing this procedure, he or she would incur the anchoring heuristic by supporting historical values to make insufficient or exaggerated adjustments, which could result in the elaboration of accounting information with relative loss of its qualitative characteristics, and, consequently, cause noise in the communication process.

The third situation presents a possible incurrence of the representativeness heuristic, proposing a scenario in which a construction company made a purchase of 10 vehicles for its own use. If the respondent chose to depreciate these new vehicles by a percentage of 20%, according to IN RFB number 1.700 of 2017, he or she could incur the representativeness heuristic, considering that the tax depreciation is representative of the useful life of the entity's assets, resulting in a relative loss of the usefulness of the information and is therefore associated with the presence of noise.

In the fourth question, it was aimed to verify the possibility of incurring availability heuristic by proposing the following scenario: in a laboratory that carried out research and development of two types of vaccines (A and B). The first, which was in the development phase, had recognized its decline due to loss in its economic viability. On the other hand, vaccine B presented promising results after its research phase, which justified its economic viability and its consequent development. Therefore, if the respondent chose not to recognize the B vaccine as intangible, he or she would be recalling an event available in his or her mind, which occurred with the A vaccine, suggesting that the availability heuristic is intrinsic to the presence of noise.

In the fifth situation, the presence of availability heuristic was investigated in the context of a *holding* company with two malls, A and B. The first was measured at historical cost by a value of R$ 85,000,000.00, what was judged a faithful representation for the asset. Mall B had its initial measurement performed at the historical cost of R$ 50,000,000.00, and therefore, the respondent was proposed that Mall B could be remeasured at its fair value by an amount of R$ 35,000,000.00, this would result in the recognition of a loss in the Income Statement. If the respondent chose to maintain the initial measurement in order to avoid the loss recognition, he or she would be incurring the availability heuristic , considering parameters available from a past event (initial recognition). In this case, the measurement at fair value represents more adequately, regarding the economic perspective, the potential for generating the economic benefits of Mall B, while the measurement at historical cost would be associated with the manifestation of the heuristic availability, given a possible aversion to the loss derived from the comparison between the initial and subsequent measurement moments.

In the sixth scenario, a possible presence of the representativeness heuristic was analyzed in the recognition of the asset recovery test, in which a *holding* company, the controlling entity A and B, which has similar assets, operations and economic and financial characteristics, performs *impairment* tests periodically for its controlled companies, which are considered Cash Generating

Units (CGU). It was proposed that in the previous period, losses due to CGUs devaluation were recorded in amounts of R$ 150,000.00 and R$ 100,000.00, respectively. However, in the current year, there was a considerable increase in the CGU B recoverable value, resulting in a total reversal of the loss. If the respondent chose to measure CGU A in a similar way to B, the representativeness heuristic would manifest itself, due to the consideration of similarities among the cash generating units, which would result in disregard of the particular parameters and probabilities of CGU A, thus allowing, it can be inferred that the representativeness can be associated with the presence of noise in the process of compiling accounting information.

3.3 Measurement of the heuristics presence index

After obtaining the data, the decision scenarios of the second block of the research questionnaire were used to measure the HPI as *proxy* for the presence of noises intrinsic to the process of compiling accounting information. For questions answered with the absence of heuristics, *score* 0 was assigned, while in the questions where respondents opted for the alternative containing heuristics, *score* 1 was assigned. According to Lima Filho, Bruni and Sampaio (2012) and Aguiar, Araújo, Carmo, Prazeres & Soeiro (2016), upon considering that the answers are random, the average expected value for each scenario is 0.5. Thus, the questionnaire was structured with six decision scenarios, resulting in an expected average value of $\bar{x}=3$, and this value was the product of 6 x 0.5.

The calculation of the final *score*(s) of each respondent for the second block of the questionnaire should vary in the range between $0 \leq s \leq 6$. In order to capture the deviations of the respondents in relation to the expected mean $\bar{x}$ of =3, the *score* (s) is subtracted by its mean (3), resulting in an HPI in the range $-3 \leq HPI \leq 3$, where negative values represent less presence of heuristics; and consequently, less noise, while positive values characterize a higher occurrence of heuristics and higher noise.

Finally, the responses with HPI equal to zero were eliminated because they configured random responses (Lima Filho et al., 2012; Aguiar et al., 2016). Therefore, of the 233 questionnaires received, 59 were eliminated because they presented HPI equal to zero. In addition , 4 questionnaires were excluded because they consisted of incomplete or incorrect answers, totaling 170 statistical observations suitable for analysis.

Table 1 shows HPI calculated after conducting the mentioned procedures. Single and relative frequency data per class are displayed.

Table 1
Heuristics presence index

Level	Frequency	%
-3	10	5.89%
-2	32	18.82%
-1	63	37.06%
1	46	27.05%
2	18	10.59%
3	1	0.59%
Total	170	100.00%

Source: Elaborated by the authors.

Upon analyzing the occurrence in heuristics through the proposition of the questionnaire scenarios, it is important to consider that the respondents of this study are qualified and have professional experience in the area. Therefore, most responses are expected to present a lower level of behavioral heuristics.

Thus, it was possible to observe that a total of 61.77% of the respondents presented a negative HPI. On the other hand, 38.23% incurred in heuristics in most of the proposed scenarios, presenting a positive level of HPI. With this, it is possible to suggest that behavioral heuristics are intrinsic to the process of compiling accounting information, configuring possible signs of noise.

3.4 Econometric modeling

With the HPI measurement, dichotomic values were assigned to this variable in order to use it as a variable explained in a logistic regression model, which measures the logarithm of the probability ratio of occurrence of behavioral heuristics due to the probability of non-occurrence. The logistic model is given by the following equation:

$$\gamma_i = Log\left(\frac{P(x)}{1 - P(x)}\right) = \beta_0 + \beta_i X_i + \varepsilon_i \tag{1}$$

Where:

γ_i is the binary dependent variable, assuming a value equal to "one" when HPI > 0 and, "zero" when HPI < 0;

β_0 represents the intercept of the model;

β_i corresponds to the independent variables vector parameters X_i;

ε_i is equivalent to the error term.

Based on the model estimation, it was possible to calculate the odds *ratio*, which is obtained by the ratio between the probability of occurrence (P_i) and the probability of non-occurrence ($1 - P_i$) of the same event. Thus, the *odds ratio* was calculated with the purpose of measuring how many times the incurrence of behavioral heuristics was more than the non-incurring, for groups (variables) that were significant (p-value ≤ 0.05) in econometric estimation. When the *odds ratio* is greater than 1, it is possible to infer that the chance of occurrence of the event in the first group is greater.

Regarding the measurement of independent variables, sex*,* age, academic education and professional experience *proxies* capture distinct dimensions of the variables communicative ability and knowledge; and, age and sex capture aspects of the position within the socio-cultural system.

Age and professional experience were measured in years, continuously, and the signs of their coefficients are expected to be negative. It is conjectured that these *proxies* capture aspects of communicative ability and the degree of knowledge as the highest level of practical-empirical knowledge, since elaborators with higher age and longer professional experience are more likely to possess concrete knowledge, incurring a higher quality of judgment regarding the processes of compiling accounting information (Malachi & Zambra, 2019). Regarding the sociocultural aspects of age, evidences negatively associate age with cognitive and emotional biases, since people with less age tend to have less experience and less training/qualification in the area (Gonzalez-Igual, Santamaria & Vieites, 2021).

The academic education was measured in a dichotomous manner, assuming the value "zero" for respondents who have only the graduate degree level and the value of 'one' for those who have any level of academic education higher than that of graduate degree. The purpose of this *proxy* was to capture theoretical-abstract aspects of communicative skill and degree of knowledge. It is recommended that this *proxy* be negatively related to the HPI, since a higher academic education leads, in theory, to a greater communicative ability and the ability to conduct judgments with a higher degree of quality (Malaquias & Zambra, 2019).

Sex was measured in a dichotomous manner, being assigned a "zero" value for females and "one" for males. It is expected that this *proxy* will capture a higher degree of risk propensity

on the part of the male sex, due to a socio-cultural construction of which men are excessively confident (Barber & Odean, 2001; Ittonen & Peni, 2012), and that the male gender has a lower communicative ability than the female gender (Schubert, 2006) and that the male positioning is more competitive, whereas the female positioning is more cooperative (Hofstede et al., 2010), therefore, it is expected a positive relationship between this *proxy* and HPI.

As a limitation of econometric modeling, the data were collected for a large sample of respondents in terms of their professional performance. That is, among the respondents there are professionals from the various fields of Accounting activities, which may affect the quality of the results, since the main interest of this research is directed toward professionals working in the field of Financial Accounting.

In order to guarantee the robustness of the estimations, another estimation was made with the inclusion of *a dummy*, capable of measuring the communicative ability and the theoretical and empirical knowledge derived from the field of action. Therefore *, dummy* had the value of "one" for professionals in positions in related fields to Financial Accounting and, "zero" for other professionals.

This procedure, although not initially contemplated, was adopted due to the heterogeneity of the respondents' fields of action. Therefore, this choice was made to assess whether the field of action has an influence on the elaborators' judgment process, since theoretically, professionals operating in the field of interest of this investigation would have a lower propensity to incurring behavioral heuristics due to a higher communicative ability and latent knowledge and experience, derived from the exercise of positions in the field of Financial Accounting.

Finally, in the logistic regression estimates, multicollinearity problems were ruled out by the *Variance inflation Factor* (VIF) and the presence of heteroscedasticity was corrected by estimating models using a robust matrix.

4 PRESENTATION AND DISCUSSION OF RESULTS

4.1 Descriptive statistics

In this section, the descriptive statistics of the independent variables used in this research are presented, with the purpose of presenting and describing the characteristics of the data set collected in this research.

For sex, it is possible to observe in Table 2 that approximately 55% of respondents are female and 45% are male, indicating a relative balance, but also a higher female representation.

Table 2
Descriptive statistics of the variable sex

Sex	Frequency	%
Male	77	45.30%
Female	93	54.70%
Total	170	100.00%

Source: Elaborated by the authors.

In the sequence, Table 3 presents the descriptive metrics of the respondents' age. A mean of the research sample was observed in the order of 33.67 years, which was strongly influenced by extreme values, with a minimum of 18 years and a maximum of 68 years. The median found was 31 years, which, despite being a more robust trend measurement at extreme values than the average, for the data analyzed, can also be understood as a metric influenced by extreme values, presenting a certain asymmetry for the observations 50% lower.

These results can be justified by a strong dispersion, with the deviation of 9.37 years; and, the coefficient of variation of 27.84%, which together indicate a high variability of observations in relation to the mean.

Table 3
Descriptive statistics of the age variable

Variable Age	Values
Mean	33.67
Median	31
Standard Deviation	9.37
Variation Coefficient	27.84%
Maximum	68
Minimum	18

Source: Elaborated by the authors.

Regarding the professional training, based on Table 4, it is possible to observe that although the whole sample of the research is qualified to practice professions in the areas related to accounting, it was observed that 51.17% of the respondents still have some level of academic education (specializations and masters), whereas 42.94% of respondents have only complete graduate degree, and 5.89% are subjects with graduate degree in progress.

Table 4
Descriptive statistics of the variable Education Level

Variable Education Level	Frequency	%
Incomplete Graduate Degree	10	5.89%
Complete Graduate Degree	73	42.94%
Complete Specialization	76	44.70%
Master	11	6.47%
Total	170	100.00%

Source: Elaborated by the authors.

Regarding the professional experience, in Table 5, the mean obtained was 9.68 years, which was strongly influenced by extreme values, with a minimum of 1 year of experience and the maximum was 45 years. The median found was 7 years, which was also influenced by extreme values, presenting a certain asymmetry for the observations 50% lower, which presents more homogeneous values, whereas the 50% higher presented greater amplitude.

These results are justified by the observation of a standard deviation of 8.00 years, and a coefficient of variation of 82.65%, confirming that professional experience values have a high dispersion in relation to the mean.

Table 5
Descriptive Statistics of the variable experience

Variable Experience	Values
Mean	9.68
Median	7.00
Standard Deviation	8.00
Variation Coefficient	82.65%
Maximum	45
Minimum	1

Source: Elaborated by the authors.

Regarding the positions occupied by the respondents at the date of application of the questionnaire, the highest frequencies observed were Accounting Auxiliary and Accounting Assistants (29 observations), Accountant (36 observations) and Accounting Analyst (59

observations), with percentages of 17.05%, 21.17% and 37.70%, respectively. In addition, 6.47% of the sample is composed of auditors, and the remaining 17.61% are from other positions related to the accounting profession, such as consultants, advisors, coordinators, *controllers*, among others, which, in isolation, do not represent a percentage greater than 5% of the sample.

Finally, regarding the respondents' geographical distribution, it was possible to observe a predominance of the Northeast and Southeast regions. The two regions represented 29.41% and 50%, respectively, totaling 79.41%. The Central-West, North and South regions contributed 2.94%, 4.11% and 13.52%, respectively.

4.2 Presentation and Discussion of Results

In this section, the results of the logistic regression model and the tests of hypothesis of difference between the groups are presented and discussed.

Table 6 shows the parameters of the econometric model of the research and its respective odds ratio, in order to identify the latent variables for the study of the phenomenon under observation.

Table 6
Results of logistic regression estimates

Variable	*Odds Ratio*	Coefficient	Standard Error	Statistics Z	p-value
Intercept	0.9054	-0.0992	0.6712	-0.15	0.882
Sex	1.7045	0.5333	0. 3314	1.61	0.108
Age	0.9921	-0.0079	0.0177	-0.44	0.657
Education Level	2.0773	0.7311	0.3630	2.01	0.044
Experience	0.9215	-0.0816	0.0270	-3.02	0.002
Wald Chi^2				11.75	
Prob > Chi^2				0.0193	
Pseudo R^2				0.0580	
Number of observations				170	

Source: Elaborated by the authors.

The Pseudo R^2 (coefficient of determination) of 5.80% of the binary model does not constitute a good adjustment for the study of variance of the data, but it indicates that the *proxies* used for the research variables generate a certain influence in this percentage on the predictability of heuristics as *proxy* for noise in the preparation of accounting information. Furthermore, the sex and age *proxies* did not demonstrate significance for the data set analyzed.

The variable education was positive and significant at a level of 5%, suggesting that the influence of the level of academic education on the dependent variable increases as there is a higher degree of academic education by accounting information makers. Thus, a 10% variation in education would result in a 7.31% increase in behavioral heuristics incurring.

In theory, the process of compiling accounting information has its initial reliability backed by the judgment of the information makers Clor-Proell & Maines, 2014). That is, it is implied that this initial reliability is associated with the quality of the elaborator's judgment, who, in turn, would be determined by a higher level of academic education. However, in a different way from this theoretical prediction, it was observed, based on the estimation of the econometric model of this research, that this relation is not supported.

In view of this result, it is possible to infer that the elaborator's judgment is exposed to behavioral heuristics, which are intrinsic to the presence of noise in the process of compiling accounting information, and that the higher the level of academic formation, the greater the propensity for behavioral heuristics incurring by the elaborators. This statement is supported by

the observation of an odds ratio of 2.07, which allows us to infer that elaborators with a higher level of academic education have, little more than twice, more chances of generating noise.

The education level was used in this research as *a proxy* for the degree of knowledge and communicative ability, based on the premise that the highest level of academic education confers these attributes to the information maker. However, an inverse relation has been identified in this research, which suggests the possible exposure of elaborators with a higher degree of academic education to simplifications of judgment associated with a perceived bias risk, since the judgment of individuals varies according to their experiences, causing different interpretations, and it may harm the process of compiling accounting information (Chand, Cumming & Patel, 2012).

Based on the observation of this result, the analysis of differences among the groups was carried out in order to verify whether there are differences in the level of heuristics between the groups of higher and lower academic education level. Initially, the Shapiro-Wilk test was performed, which indicated a normal distribution for the data. In view of the observation of a Gaussian distribution for this variable, the Levene test for equality of variances was operationalized, in which it was not possible to reject its null hypothesis at a significance level of 5%, which, consequently, it allowed the *student's t* test for two samples.

As a result, it was possible to observe a *t* statistic, in the order of -0.8604, with *a p-value* of 0.3908, which does not allow us to infer that there is a difference between the groups of higher and lower academic education level. This means that heuristics are intrinsic to the process of accounting preparation, associated with noise in the process of elaboration, regardless of the elaborators' education level. This result, together with the estimation of logistic regression, allows us to infer that, for any level of academic education, the elaborator is likely to incur judgement simplifications.

The professional experience was negative and significant at a level of 1%, suggesting that a greater labor market experience results in a lower level of heuristics in the elaborator's judgment. In this sense, a 10% variation in professional experience would result in a 0.08% reduction in the incurrence of behavioral heuristics, which can be considered a weak or almost null influence of this variable on the heuristics associated with noise in the elaboration process.

In theory, it is assumed that the greater professional experience, the better the quality of the elaborator's judgment (Malachi & Zambra, 2019), with a lower propensity to errors and a communication of information with a higher degree of usefulness. Professional experience, similar to academic education, also brings together characteristics to be recognized as *a proxy* for the degree of knowledge and communicative ability, differentiating itself by capturing practical-empirical aspects, while the education level has theoretical-abstract attributes.

In view of this result, it is possible to infer that this practical-empirical knowledge, despite its little influence, results in a better quality of judgment on the part of the elaborators. This finding is based on the observation of an *odds ratio* of 0.9215 times less chances for the elaborator to incur in behavioral heuristics.

These results confirm the theoretical prediction that the greater professional experience is associated with the consideration of relevant parameters of the judgment process for economic events with similar characteristics, which implies less severe incurring of mental simplifications, which in turn, would be associated with a lower degree of noise and greater usefulness of the accounting information reported.

As a result, in possession of these results, the professional experience was manipulated to check for differences in heuristic levels among groups with greater or lesser experience. To this end, the Shapiro-Wilk test was operationalized, which indicated a non-Gaussian distribution to the data, implying the need for a non-parametric analysis through the Mann-Whitney U test

A *z*-statistic was observed in the order of 2.00, and a *p-value* of 0.0455, which allows to reject the null hypothesis of this test that there is a difference between the groups with higher and

lower experience. This, in addition to the results of the logistic regression, makes it possible to confirm the theoretical prediction that the accounting information elaborators with greater professional experience tend to have greater communicative ability and knowledge due to practical-empirical attributes, allowing to infer that there is less exposure to simplifications in the judgment and, consequently, the elaboration of accounting information with a higher degree of utility, due to a lower generation of noise.

According to procedures described in the methodology, the estimation of econometric modeling considering *dummy as a proxy* for the experience and knowledge of theoretical and empirical natures derived from the elaborator's field of operation presented similar results for the variables previously analyzed and a negative (-0.8998) and significant (5%) coefficient, confirming the expected negative relation that individuals acting in the field of Financial Accounting have a lower propensity to incur heuristics associated with the presence of noise.

These results allow us to infer that elaborators working in the Financial Accounting field have a greater ability to judge economic events, resulting in a lower propensity to incur intrinsic noises in the process of compiling accounting information, and that such finding would be derived from a greater communicative ability and greater experience and knowledge of a theoretical and empirical character resulting from professional performance in the field of Financial Accounting. This result is reinforced by observing an *odds ratio* of 0.4067 times less chances of incurring behavioral heuristics.

Finally, from the new estimate*, dummy* was manipulated to check for differences in the level of heuristics between the working and non-working groups in the Financial Accounting field. Thus, the Shapiro-Wilk test was operationalized, which indicated a non-Gaussian distribution to the data, implying the need for a non-parametric analysis through the Mann-Whitney U test

A *z* statistic was observed in the order of 2.098 and a *p-value* of 0.0359, which allows to reject the null hypothesis of the said test that there is no difference between the groups according to the field of action. This, in addition to the results of the second estimation of logistic regression, makes it possible to confirm the theoretical prediction that elaborators working in the field of Financial Accounting have less propensity to generate noise in the process of preparing accounting information, due to the greater theoretical-abstract and practical-empirical knowledge, conferred by experience and knowledge derived from the professional's field of operation.

5 CONCLUSION

The present research aimed to analyze the relations between communicative ability, the degree of knowledge and the position within the sociocultural system of the accounting information makers with the presence of noise in the process of elaboration and communication of accounting information. To this end, it was assumed that the presence of noise is associated with intrinsic behavioral heuristics to the elaborators' judgment, corroborating with the statement of Dias Filho and Nakagawa (2001) that these aspects may affect the elaborators' behavior.

As a result, it was possible to identify that the academic education and professional experience, as *proxies* for communicative skill and degree of knowledge, determine respectively a greater and lesser propensity to the incurrence of heuristics in the elaborator's judgment, influencing the presence of noise in the communication process, which, in turn, affects the usefulness of accounting information.

Regarding these relations, this work contributes by providing new empirical evidence to suggest that a higher level of academic education level is positively related, while a greater professional experience is negatively related to the presence of noise. These results indicate, empirically, that communicative ability and the degree of knowledge influence the presence of noise in the elaboration process, indirectly affecting the usefulness of accounting information, confirming the prediction of Dias Filho and Nakagawa (2001).

In view of the finding of such relations, the differences between the groups for the academic education and professional experience *proxies* were examined, which allowed us to advance in the understanding that: i) for a higher level of academic education, there is a higher tendency to incurring heuristics associated with noise. A possible explanation for this relation is that academic education captures theoretical-abstract attributes regarding communicative ability and the degree of knowledge; and (ii) for a greater degree of professional experience, there is a lower propensity for noise-associated heuristics incurring, which can be explained by the practical-empirical properties of communicative ability and the degree of knowledge.

Such contributions may be useful to both accounting regulatory bodies and the academic community, by instigating the debate to consider that behavioral heuristics are intrinsic to the presence of noise that accounting information may be useful affected by theoretical-abstract and practical-empirical dimensions, clarifying that possible behaviors biased by the elaborator can be explained by different attributes of his or her communicative ability and knowledge.

However, the evidences presented in the study suggests that the dimensions used to capture and evaluate the appearance of noise in the process of compiling accounting information did not have a high power of explanation. These results suggest that there are dimensions little explored by the literature to explain the phenomenon analyzed in the present study, more specifically in the idiosyncratic attributes of intellectual capital, represented in the research by the figure of the information preparer.

These results also contribute to the consideration of a future research agenda regarding the dimensions and characteristics intrinsic to intellectual capital and its possible influences on the decision-making and judgment process by the accounting information maker. Thus, the results of the research suggest the need for greater understanding of how and to what extent behavioral heuristics can be manifested and even result in behavioral biases due to the various aspects of the intellectual capital of accounting information makers.

As limitations of the research, one can mention the consideration that the error of judgment in the questions may be associated with the lack of theoretical and/or empirical knowledge of the subjects addressed. However, this limitation does not make the findings of the present research impossible, since the respondents make up a specialized target public, which suggests a certain degree of knowledge about the subjects addressed. In addition, in order to give greater validity to the results of the research, it was requested, in the application of the collection instrument, to proceed with its resolution only in case they felt comfortable with its content.

In addition, another estimation was performed with the inclusion of *a dummy* to capture the effect of communicative skill and knowledge and experience derived from the respondents' area of operation. This procedure contributed, in fact, to corroborate the hypothesis that elaborators working in the field of Financial Accounting have a lower propensity to generate noise in the process of preparing accounting information, given a higher accuracy in the judgment of economic events than professionals working in other fields of Accounting.

Moreover, the *proxies* used to capture the position within the socio-cultural system capture only some of the intrinsic aspects of this variable. For a country of wide territorial dimensions and wide socio-cultural diversity among its regions, as is the case in Brazil, it is plausible to investigate how the socio-cultural differences among the regions may influence the judgment of accounting information makers and, consequently, the occurrence of noise in the communication process. Thus, it is suggested to identify and compare the sociocultural characteristics among the regions for the development of future research.

As suggestions for future research, it is recommended to study the possible causes of the relations observed as a way of expanding theoretical knowledge about the reasons why elaborators with higher academic education have greater propensity to incur behavioral heuristics. As a guideline, higher academic education may be associated with a cognitive illusion that would lead

to overestimate personal skills and subsequently pursue the need to confirm the overestimated beliefs.

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