

EVIDENCES OF VAGUENESS IN THE ACCOUNTING STANDARDS AND THEIR CONSEQUENCES FOR THE PRINCIPLES- VERSUS RULES-BASED DEBATE

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ABSTRACT

Since the outbreak of corporate accounting scandals such as Enron case, claims for standards based in principles instead of in rules became more frequent and enthusiastic. Then, standard setters introduced a transition to a more principles-based approach and the immediate consequence of such a transition is the increasing need of professional judgment in accounting. However, principles-based standards tend to be more intensively characterized by vagueness (Penno, 2008). The literature has addressed the rules- versus principal-based accounting standards debate, but questions about how accounting decisions are made under vague conditions were hardly explored in practical terms: this is our focus. To address such an issue, we formulated two propositions: (1) accountants' decisions made under vague conditions are significantly different from those made under non-vague conditions; and as an alternative explanation, (2) accountants' decisions can be influenced by their individual cognitive reflection ability. To test the hypotheses connected to those proposition, we collected data via a questionnaire containing accounting tasks related to the classification of assets and cash flows, and the three questions from the Cognitive Reflection Test developed by Frederick (2005). Based on a sample of 859 accountants, we developed univariate analyses and found that the dispersion on classification is significantly higher under vague conditions, than under non-vague conditions. Moreover, the results suggest that the cognitive reflection ability does not help accountants to deal with vague circumstances. Thus, no matter how much they reflect about a transaction, such dispersion persists. It mitigates the consistent application of IFRSs and the quality of accounting information – indeed, its comparability.

Key-words: vagueness; cognitive reflection; decision-making; accounting; principle-versus-rule.

Thematic area: Accounting for External Users.

1. INTRODUCTION

The debate around the principles-versus-rules standards and the arising need for professional judgment has taken a central place in the last decade's accounting research, as well as among standard setters and accountancy bodies (ICAS, 2006; SEC, 2003; Gillette, 2013, p. 9). Since the outbreak of corporate accounting scandals such as Enron case, most of the important players in accounting scenario started asking for standards based in principles instead of in rules. Then, in face of this pressure, the standard setters (mainly the IASB and in a lower scale the FASB) introduced a transition to a more principles-based approach through the reduction of the specific directions for accounting recognition and measurement. An immediate consequence of such a transition is the increasing need of professional judgment in accounting (Ravenscroft and Willians, 2005, p. 364; Tweedie, 2007, p. 4), what is the focus of this study.

The literature has addressed this issue highlighting: (i) the accounting standards consistency (or lack thereof) and the trade-offs involving qualitative characteristics of accounting information emerging from the principle-based approach vis-a-vis the rule-based approach (Wüstemann and Wüstemann, 2010; Gillette, 2013); (ii) the IASB standards imprecision, ambiguity and vagueness (Penno, 2008; Zebda, 1991) and the consequent effect of those in the assets recognition (Cardoso and Aquino, 2009); and (iii) more broad and general critics such as those from Benston, Bromwich and Wagenhofer (2006), Sunder (2009), Beattie et al. (2011) and others.

In spite of all the debate and critics around the theme, questions about how accounting decisions are taken in situations guided by rules versus principles-based standards were hardly explored, in practical terms, amongst the reviewed studies. The exception is Cardoso and Aquino (2009). In order to provide evidences to support the aforementioned debate around principles-versus-rules standards, we address this matter through a questionnaire applied by Brazilian Federal Accounting Council (Conselho Federal de Contabilidade, hereafter CFC) in which participants (preparers and auditors) are exposed to questions covering assets recognitions, as well as cash flow classifications. The questions that guide this research are: How individuals vary when addressing tasks in which accounting standards are vague? How does individual's cognitive ability affect accounting decisions under vague standards?

The main contribution of this study is to investigate the judgment and decision making in accounting based on vague standards in comparison with decision based on non-vague standards; and to explore the role played by individuals' cognitive ability on such a decision.

2. LITERATURE REVIEW

2.1 Principle-versus-rule and the role of judgment under vague accounting standards

The notions of rules and principles in accounting are close to the Law literature, then, they are distinguished in terms of their specificity and the level of judgment required. Wüstemann and Wüstemann (2010, p. 15) argument that, since the outbreak of the Enron scandal, the rule-based accounting standards have been largely associated with the deficiencies of the FASB's standards; whereas principles are frequently characterized as desirable. Still, rules are viewed as being highly detailed and unambiguously prescribing specific accounting methods (SEC, 2003; ICAS, 2006), whereas principles are typically described as broad guidelines that require preparers to exercise judgment in applying them to transactions (Tweedie 2007, p. 7).

Even though these assumed boundaries, Penno (2008, p. 340) argues that, no matter if rule or principle-based, all conceptual accounting framework are vague in some degree, establishing that the current discussion is closely tied to the topic of vagueness. According to Penno, those who explicitly recognize the importance of judgment and advocate principles-based accounting standards appear to be implicitly acknowledging the inherent vagueness in

the framework. This debate became more acute when most of the standard setters and accountancy bodies moved from a static conceptual framework to a dynamic one in order to fit the accounting to rapid technological changes, financial engineering, creative tax planning, and changes in the way that business are done.

The recent trend toward a more principle-based accounting standard was mainly motivated by the confluence of two factors. On one hand, the business world had been long time claimed for a global accounting standard in order to support the growth of the international trade arising from the globalization process. On the other, the corporate accounting scandals were assigned to the gaps in the rules-based accounting systems, once was revealed that Enron had taken advantage of a highly detailed accounting standard such as the US GAAP.

As indicated by Gillete (2013, p. 26), a shift seems to have occurred in the application of accounting, mainly during the U.S. economy deregulation period, from attempting to accurately communicate the economic reality of a transaction to merely being in compliance with standards. Hence, in the absence of strong and clear principles, the predominant thought was: "Where is the law barrier against what I did?" Gillette states that it looks like a set of opportunistic acts towards a larger protection against any potential trial in a court of law. After all, it seems quite obvious the impossibility of the existence of rules for each single transaction nature.

Thus, as pointed out by Sunder (2009, p. 103), principles, not rules, seem to be at the core of the current accounting consensus, but both the standards aligned to this consensus, namely, IFRS as well as FAS, exhibit wide variation in the level of detail in their individual pronouncements, so that the compilation of international standards issued by the IASB and their official interpretations and guidance reach almost 3,000 pages.¹

However, despite extensive and aligned to principles orientation claim, the IASB Conceptual Framework is shown to contain contradictory objectives and qualitative characteristics as well as conflicting general concepts and principles, as sustained by Wüstemann and Wüstemann (2010, p. 9). As a consequence, standards contain inconsistent recognition and measurement principles that reflect different accounting theories. One example is the IASB priority to the revenue/expense view in the recognition of government grants, in which the corresponding income must be allocated over the periods in order to match them with the related costs, but, in contrast, for biological assets the IASB has given priority to the assets/liabilities view because income must be recognized regardless the incurrence of costs when an increase in wealth (asset's fair value) has taken place.

Then, since the IASB has not applied the Framework's general recognition and measurement principles consistently to similar issues, some IFRSs are inconsistent. In other words, if the standards addressing similar transactions or events are not consistent with each other, different companies may make different interpretations and choices and thus apply different accounting policies to identical cases. The frequency and the intensity of these different interpretations are the focus of this paper.

In conclusion, judgment is necessary in the process of applying accounting standards based in principles such as IFRS, especially when a transaction or event is covered by vague rules and contradictory principles. In such cases, in accordance with IAS 8.10, management shall use its judgment in developing and applying an accounting policy that results in information that is relevant and reliable. To do so, management must follow the hierarch set-out on IAS 8.11 and IAS 8.12 (i.e., first consider the requirements in IFRSs dealing with similar related issues, and secondly, consider the definitions, recognition criteria and

¹ Notice that the IFRS Red Book for 2014 (published under the ISBN 978-1-909704-25-1), comprised by two parts (i.e., A and B), has 3,750 pages plus the *Glossary of Terms* and the *Index*.

measurement concepts in the Framework; indeed, consider the most recent pronouncements of other standard-setting bodies that use a similar conceptual framework). From this, arises the first proposition, which is assessed through two complimentary hypotheses:

Proposition 1: Accountants' decisions in regard to the classification of assets and cash flows based on vague standards and circumstances are significantly different from those based on non-vague standards and circumstances.

Differences on classification decisions are assessed through two perspectives, the statistical variance and the distance between agreement points. Hence, two hypotheses were tested in regard to Proposition 1.

First, we measured the variance on the level of agreement on the first-best option among the three possibilities (i.e., inventory; property, plant and equipment (PPE); or intangible, for asset items; and operating, investing or financing activity for classifications on the statement of cash flows); and relied on this to test the Hypotheses H1a and H1a', as stated below.

H1a: The variance on accountants' decisions in regard to the classification of assets and cash flows based on vague standards and circumstances are significantly higher (bigger) from those based on non-vague standards and circumstances.

H1a': The difference on the variance on accountants' decisions in regard to the classification of assets and cash flows based among non-vague standards and circumstance is not significant.

Then, we measured, for each participant, the distance on the level of agreement between the first-best and the second-best classification options (i.e., inventory, PPE or intangible asset, for asset items; and operating, investing or financing activity for cash flows). Such a measure was applied to test the Hypotheses H1b and H1b', as stated below.

H1b: The distance on the agreement levels between the first-best and the second-best options on accountants' decisions in regard to the classification of assets and cash flows based on vague standards and circumstances are significantly lower (smaller) from those based on non-vague standards and circumstances.

H1b': The difference on the distance on the agreement levels between the first-best and the second-best options on accountants' decisions in regard to the classification of assets and cash flows based on non-vague standards and circumstances is not significant.

Beyond the inconsistency of the accounting standards, another possible explanation for the differences in accounting procedures even in light of clear principles is the cognitive abilities of the accountant when addressing open questions around recognition and measurement, as suggested by Cardoso, Barcellos and De Salles. (2014) based in the Frederick's (2005) approach. In order to test this assumption, we developed a further analysis as following.

2.2 Cognitive abilities and judgment in accounting

Cognitive Reflection Test (henceforward CRT) was introduced by Frederick (2005). It is a criterion to measure how impulsively (or reflectively) people make decisions. The CRT test consists of three questions in which the intuitive (i.e., impulsive and spontaneous) answer is wrong. The amount of correct answers determines the individual's CRT score (0, 1, 2 or 3). The most common way to analyze CRT score is to categorize individuals into one of two groups: low score (0 or 1 correct answer) or high (2 or 3 correct answers) (Frederick, 2005 and others). The essence of the CRT was first discussed by Kahneman and Frederick (2002)

in an article that reframed the heuristics-and-biases literature in terms of the concept of attribute substitution.

The intuitive answers are attributed to the “system 1” process of decision making, because it is the first answer that respondents’ cognition suggests; therefore, system 1 is considered ‘fast’. If such an answer is not identified being wrong, the “system 2” is not activated. However, if respondent reflectively exams whether the first answer is wrong and deliberately think about the problem again, she might find the correct answer; therefore, system 2 is considered ‘slow’ (Toplak, West and Stanovich, 2011).

The literature recognizes that cognitive abilities are tied to biases in judgment and decision making (Bergman et al. 2009; Hoppe and Kusterer 2011; Oechssler, Roider and Schimitz, 2009). Nevertheless, even though the growth importance of the judgment and decision making in accounting (Belkaoui 1989; Beattie, Fearnley and Brandt, 2001; Beattie, Fearnley and Hines, 2011), no single study in accounting was found testing the role of accountants’ cognitive abilities in such a process.

Thus, we suggest proposition 2.

Proposition 2: Accountants who apply system 1 more frequently (low CRT score) tend to act more intuitively when performing accounting tasks. In this sense, instead of applying the IASB Conceptual Framework and similar standards, low CRT professionals would be more susceptible to use their own intuition or heuristics such as: previous related facts, more experienced accounting tasks, or more recent and easy to retrieve in memory procedures. On the other hand, accountants who apply system 2 more frequently (high CRT score) would reflectively analyze the accounting standards and the economic circumstances surrounding the transaction in order to make a decision.

Therefore, we test the following hypothesis:

H2a: Low CRT accountants making decisions on vague circumstances tend to present more uncertainty than high CRT accountants.

H2b: There is no significant difference between low CRT accountants and high CRT accountants when making decisions based on non-vague circumstances.

3. METHODOLOGY

3.1 Data collection and sampling

Data were collected via a questionnaire applied by Brazilian Federal Accounting Council (hereafter CFC). Such a questionnaire was entitled “Professional Accountants Profile, edition 2012/13” (CFC, 2013)². Questions were classified into two groups: (i) questions related to the profile report, that were developed in the interest of the CFC³ and (ii) those related to the authors academic research interest. Respondents were recruited via CFC’s publications (e.g., newsletter, professional magazine and academic journal), and e-mail market. From the first group of questions, we selected demographic data; from the second group of questions we used the answers to the classification accounting tasks and the CRT.

Once the main interest of this research is to investigate the effects of vague accounting standards on the classification of assets and cash flows, the focus is under professionals who are (or at least must be) directly involved in this kind of task, namely, preparers and auditors. Hence, among those who answered the questionnaire, we only considered the professionals who declared that spend most of their working time on: (i) the preparation or active participation in the preparation of financial statements (preparer); or (ii) audit tasks (auditor).

² Invitation message presented the objectives of the research, explained that participation was not mandatory and data would be analyzed in aggregate, emphasized that anonymous was assured and respondents would not receive any reward.

³ Full reports in http://portalcfc.org.br/wordpress/wp-content/uploads/2013/12/livro_perfil_2013_web2.pdf.

A total of 2,336 professional accountants (preparers and auditors) answered the questions of interest of this research. After eliminations, as summarized in Table 1, the analyzed sample was comprised by 859 professional accountants. Notice that a rigorous criterion against random answers was established. Such a criterion is briefly described in the Table 1 footnotes and becomes clear when analyzed together with the questionnaire section presented below.

Table 1 – Sample selection.

Total of answers (initial sample):	2,336
(-) Professionals who are not preparers or auditors:	(911)
(-) Professionals who finished only the high school education level ^a :	(143)
(-) CRT unreasonable answers (A1 \cup A2 \cup A3) ^b :	(39)
(-) Answers lower than 10 or higher than 110 for Question 1 (bat and ball) (A1):	(58)
(-) Answers lower than 2 or higher than 96 for Question 2 (lily pads) (A2):	(39)
(-) Answers lower than 1 or higher than 500 for Question 3 (machines) (A3):	(27)
(-) Incoherent answers for assets recognition and cash flows classifications ^c :	(384)
(=) Total of answers considered (final sample):	859

a. To date, in Brazil, there are two types of professional registration: technicians (i.e., those from which the required highest formal educational level in Accountancy is the high school degree) and professional accountants (i.e., those which lowest formal educational level is the graduate program named ‘Bachelor in Accountancy’). In accordance with the law that regulates the profession, until 1st Jun 2015, professionals that conclude the technical high school in accounting can be registered as technicians at the CFC. After 1st Jun 2015, only those who conclude the bachelor in accountancy will be able to register at CFC as professional accountants. Both technicians and professional accountants are allowed to sign the financial reports of the companies. However, technicians cannot audit financial reports.

b. A1 \cup A2 \cup A3 represents the union of unreasonable answers, once some respondents answered inconsistently more than one question.

c. Were considered incoherent, for each question, those answers in which respondents totally agree with more than one item or totally disagree with all items. If respondent answered at least one question like that, it was excluded from the sample.

Among the respondents that comprise the final sample, the mean age is 38.62 (SD = 10.71, max = 74, min = 20), 67.9% are men and 32.1% women and, besides, 50.6% concluded a MBA or the PhD level and the remaining 49.4% have a bachelor as the highest level of formal education.

3.2 Questionnaire: accounting tasks and CRT

In order to test the hypothesis stated above, participants were asked to express their judgments about five cases in a structured questionnaire. Among the cases, five questions were about the classification of assets items, which options were ‘inventory’, ‘property, plant and equipment’ (hereafter, PPE), or ‘intangible assets’; and four questions were about the classification of cash flows on the statement of cash flows (i.e., ‘operating’, ‘investing’ or ‘financing’ activity). On each question, respondents were asked to present their agreement level within each classification option on a six-point Likert scale, where 1 = strongly disagree and 6 = strongly agree. Table 2 describes the questionnaire accounting related tasks.

Such a design was chosen because it permits to capture the doubt effects, once participants are not forced to exclude a given option if they believe that more than one answer is correct. Therefore, this design allows participants to express their uncertainties and doubts.

For instance, for a given asset item (say, motion picture film produced by a film industry), a respondent can mark ‘strongly agree (6)’ with the classification as inventory, ‘strongly disagree (1)’ with the classification as PPE, and ‘agree (5)’ with the classification as intangible asset; hence, the distance attributed by such a respondent would be small (1 point) between the first-best classification (inventory) and the second-best classification (intangible asset). On the other hand, for another asset item (say, the headquarter building), a respondent is sure about the classification as PPE, marking ‘strongly agree (6)’ for PPE, and ‘strongly disagree (1)’ for inventory and intangible asset; hence the distance between the first-best classification in this case (PPE) and the second-best classification (inventory or intangible asset) would be big (5 points).

Notice that the uncertainty when answering the questionnaire cannot be assigned to memory retrieval matters, once assets and cash flows concepts are presented in the inquiry form as stated by IASB. It justifies the data selection criteria aforementioned, i.e., we eliminate of the sample those who were not able to establish a hierarchy at least between the first option and others. Therefore, we assume that a professional accountant who has free access to the accounting standards is able to distinguish at least minimally among the options presented. Thus, if two (or three) options are marked as first (last) option, then, the participant probably did not give the due attention for the task proposed.

Moreover, we set two conditions among the questions. On one hand, the first four are named as *non-vague (NV)* conditions, because IASB standards are very clear about how to recognize and classify them. On the other hand, the last five are named as *vague (V)* conditions, hence, they demand a more reflective judgment.

Table 2 presents the questions addressed.

Table 2 – Questionnaire: accounting tasks.

Code ^a	Question ^b	Expected classification
NV1 Raw mat	Raw materials owned by a manufacturing company, stored in its warehouse and available for consumption in the manufacturing process. It is known that the sale of finished products is the main source of income of that entity. What is your level of agreement with the classification of such an asset item as: (i) inventory; (ii) PPE; and (iii) intangible?	Inventory, because it clearly meets such a definition in accordance with IAS 2.6(c). Therefore, this is a non-vague circumstance. Hence, the reasonable classification would be: close to 6 for inventory; close to 1 for PPE; and close to 1 for intangible.
NV2 Raw mat	Considering the same manufacturing company from NV1, what is your level of agreement with the classification of the cash inflow from the sale of finished goods as: (i) operating activity; (ii) investing activity; and (iii) financing activity?	Operating activity, because it clearly meets such a definition in accordance with IAS 7.6. Therefore, this is a non-vague circumstance. Hence, the reasonable classification would be: close to 6 for operating; close to 1 for investing; and close to 1 for financing.
NV3 Building	A building owned by an educational institution used as headquarters for its campus. What is your level of agreement with the classification of such an asset item as: (i) inventory; (ii) PPE; and (iii) intangible?	PPE, because it clearly meets such a definition in accordance with IAS 16.6. Therefore, this is a non-vague circumstance. Hence, the reasonable classification would be: close to 1 for inventory; close to 6 for PPE; and close to 1 for intangible.
NV4 Building	Considering the same educational institution from NV3, what is your level of agreement with the classification of the cash inflow from the sale of the building as: (i) operating activity; (ii) investing activity; and (iii) financing activity?	Investing activity, because it clearly meets such a definition in accordance with IAS 7.6. Therefore, this is a non-vague circumstance. Hence, the reasonable classification would be: close to 1 for operating; close to 6 for investing; and close to 1 for financing.
V1 Software	Antivirus software produced by an IT solutions company whose purpose is to yield the right to access updates against new viruses (continued)	Intangible asset or inventory. Could be classified as an intangible asset, because it lacks physical substance (IAS 38.8). However,

	<p>protection) upon payment of an annual subscriptions. What is your level of agreement with the classification of such an asset item as: (i) inventory; (ii) PPE; and (iii) intangible?</p>	<p>could also be classified as inventory, because the IT solutions company ‘sells’ subscriptions and the right to download updates in the ordinary course of the business (IAS 2.6(a)). Therefore, this is a vague circumstance. Hence, the reasonable classification would be similar for inventory and intangible asset, but close to 1 for PPE.</p>
V2 Film	<p>Movies and motion picture films produced by a film producer in order to sell the exhibition rights to movie theaters and television channels, as well as the right to reproduce DVD copies. What is your level of agreement with the classification of such an asset item as: (i) inventory; (ii) PPE; and (iii) intangible?</p>	<p>Intangible asset or inventory. Could be classified as an intangible asset, because it lacks physical substance (IAS 38.8). However, could also be classified as inventory, because the film producer ‘sells’ the exhibition rights in the ordinary course of the business (IAS 2.6(a)). Therefore, this is a vague circumstance. Hence, the reasonable classification would be similar for inventory and intangible asset, but close to 1 for PPE.</p>
V3 Film	<p>Considering the same film producer from V2, what is your level of agreement with the classification of the cash inflow from the sale of the exhibition rights as: (i) operating activity; (ii) investing activity; and (iii) financing activity?</p>	<p>Operating activity or investing activity. Could be classified as operating activity because the cash inflow from the sale of exhibition rights seems to be the principal revenue-producing activity of a film producer. However, could be classified as investing activity for means of cohesiveness with the potential classification of the asset in the balance sheet as an intangible asset (i.e., the disposal of long-term assets), in accordance with IAS 7.6. Therefore, this is a vague circumstance. Hence, the reasonable classification would be similar for operating and investing activities, but close to 1 for financing.</p>
V4 Fleet	<p>A fleet of vehicles owned by a car rental, whose the main activity is to rent cars to customers (independent parties) for fair value. It is known that 50% of the entity’s revenue is from renting vehicles, the rest is from the sale of used vehicles (on average 12 months after their acquisition). What is your level of agreement with the classification of such an asset item as: (i) inventory; (ii) PPE; and (iii) intangible?</p>	<p>PPE or inventory. Could be classified as PPE, because it is tangible and held for rental to others, although its expected useful life is 12 months in average (IAS 16.6). However, could also be classified as inventory, because the car rental sells the used cars in the ordinary course of the business (IAS 2.6(a)). Therefore, this is a vague circumstance. Hence, the reasonable classification would be similar for inventory and PPE, but close to 1 for intangible asset.</p>
V5 Fleet	<p>Considering the same car rental entity from V4 what is your level of agreement with the classification of the cash inflow from the sale of the used vehicles as: (i) operating activity; (ii) investing activity; and (iii) financing activity?</p>	<p>Operating activity or investing activity. Could be classified as operating activity because the cash inflow from the sale of used cars is one of the principal revenue-producing activities of the entity (50% from rental, 50% from sale). However, could be classified as investing activity for means of cohesiveness with the potential classification of the asset in the balance sheet as PPE (i.e., the disposal of long-term assets), in accordance with IAS 7.6. Therefore, this is a vague circumstance. Hence, the reasonable classification would be similar for operating and investing activities, but close to 1 for financing.</p>

a. In order to facilitate the references to the questions along the text, we create this code.

b. Respondents were asked to mark their level agreement with each classification option on a six-point Likert scale, where 1 = strongly disagree, and 6 = strongly agree.

In addition to the accounting tasks questions, the questionnaire also comprised the three CRT questions, as developed by Frederick (2005):

- A bat and a ball cost \$110. The bat costs \$10 more than the ball. How much does the ball cost?⁴
- If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?
- In a lake, there is a patch of lily pads. Every day, patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

The impulsive (wrong) and reflective (correct) answers for each question are: (i) Bat & ball: Impulsive answer is \$100 and correct answer is \$50; (ii) Widgets: Impulsive answer is 100 minutes and correct answer is 5 minutes; and (iii) Lily pads: Impulsive answer is 24 days and correct answer is 47 days.

Among the reviewed literature, the most previous study assessed the CRT scores for samples comprised almost exclusively by college students (Frederick, 2005; Hope, Kusterer, 2011; Oechssler et al., 2009; Toplak et al., 2011). Thus, Moritz et al. (2013) is the only research we found that assess the CRT scores for professionals, instead of students. They reported a mean CRT score of 1.51 for 313 supply chain managers employed at one of three Fortune 500 supply-chain-intensive firms from the U.S.A. Therefore, the mean CRT score of Brazilian professional accountants (i.e., 1.55) is slightly higher than the mean CRT score of American supply chain managers (Moritz et al., 2011). Notice that on average, the Brazilian professional accountants had higher mean CRT scores than the 3428 individuals reported in Frederick (2005, Table 1); specifically, of the eleven sample populations in Frederick (2005), only the student population from MIT and Princeton University had higher average CRT scores than the practitioners in our study. Table 3 presents how Brazilian accountants performed on the cognitive reflection test.

Table 3 - Distribution of answers and scores for CRT questions.

<i>Frequency per question</i>			
Question	Correct	Intuitive	Other
Bat and ball	83%	7%	9%
Widgets	36%	51%	12%
Lily Pads	35%	42%	23%
<i>Frequency per CRT score</i>			
Score 0	Score 1	Score 2	Score 3
12%	41%	25%	21%

3.3 Data analysis procedures

To test the hypotheses connected to Proposition 1 we applied the Wilcoxon signed rank sum test, the non-parametric version of a paired samples t-test. Such an option is due to the within research design in which each participant is exposed to both conditions, vague and non-vague conditions. Besides, the variables applied are ordinal (not interval) and the

⁴ Notice that the price presented by Frederick (2005) for the bat and the ball totals \$1.10, and the difference between prices is \$0.10. Considering the average price level in the Brazilian economy, we adjusted the prices as suggested by Silva (2005).

Shapiro-Wilk and Skewness and Kurtosis tests for normality are strong in the sense that the variables in the data set are not normally distributed, in spite of the relatively large sample.

Moreover, we also used the Variance-comparison test, which performs a test on the equality of the standard deviations from two paired samples, i.e., the null hypothesis is that the standards deviations are equal.

On the other hand, considering that samples independent (no paired) when testing the hypotheses related to Proposition 2, but the variables are still ordinal and non-normal distributed, we rely on the Wilcoxon-Mann-Whitney test, which is a non-parametric analog to the independent samples t-test. Once again we applied the Variance-comparison test

Finally, we also based our analyses on the effect size estimates (r), which is calculated as the z-score divided by the square root of the sample size (n)⁵. According to Richler (2012, p. 2), such estimation is useful in addition to statistical significance for determining the practical or theoretical importance of an effect because takes in account its size. The Cohen's guidelines for the effect size are that a large effect is 0.5 or greater, a medium effect is 0.3, and a small effect is 0.1.

Despite of the inferential procedures aforementioned, the analyses also rely on descriptive metrics such as mean, median, standard deviations.

4. RESULTS

4.1 Classifications under vague and non-vague conditions (Proposition 1)

Considering that for each single question respondents should judge, from 1 (strongly disagree) to 6 (strongly agree), three different classification options for assets or cash flows, then, in order to analyze Proposition 1, we compare pairs of the first-best options when testing H1a and H1a'; i.e., we compare a first-best option in non-vague condition with a first-best option in a vague condition (for instance NV1 versus V1) when testing H1a, and both first-best options in a non-vague condition when testing H1a'; as presented in Table 4.

On the other hand, to test H1b we compare: (i) the difference between the agreement level of the first-best and the second-best options in non-vague condition; with (ii) such a difference in a vague condition. To test H1b' we compare both differences in non-vague condition (first-best option minus second-best option to a given question versus first-best option minus second-best option to another question).

⁵ $r = z / \text{sqrt}(N)$.

Table 4 - Descriptive statistics and outputs of Wilcoxon^a and Variance-comparison^a tests for first option of each question^b.

Panel A: Assets' classification tasks						Panel B: Cash flows' classification tasks				
1 st quad.	NV1 Raw M	NV3 Building	V1 Software	V2 Film	V4 Fleet	2 nd quad.	NV2 Raw M	NV4 Building	V3 Film	V5 Fleet
<i>Descriptive statistics – 1st options</i>						<i>Descriptive statistics – 1st options</i>				
Mean	5.82	5.88	4.44	3.38	3.95	Mean	5.88	5.18	5.39	4.12
Median	6	6	6	3	5	Median	6	6	6	5
Std. Dev.	0.70	0.65	2.14	2.29	2.13	Std. Dev.	0.54	1.65	1.42	2.17
<i>Wilcoxon tests – 1st options</i>						<i>Wilcoxon tests – 1st options</i>				
NV1		3.57*** (0.88)	15.66*** (0.11***)	21.58*** (0.09***)	19.73*** (0.11***)	NV2		12.13*** (0.11***)	10.95*** (0.14***)	19.39*** (0.06***)
NV3			16.98*** (0.09***)	21.97*** (0.08***)	20.89*** (0.09***)	NV4			-3.00** (1.34***)	10.29*** (0.58***)
3 rd quad.	NV1 Raw M	NV3 Building	V1 Software	V2 Film	V4 Fleet	4 th quad.	NV2 Raw M	NV4 Building	V3 Film	V5 Fleet
<i>Descriptive statistics – 1st option minus 2nd option</i>						<i>Descriptive statistics – 1st option minus 2nd option</i>				
Mean	4.70	4.78	1.54	2.38	3.98	Mean	4.68	4.20	4.40	4.05
Median	5	5	0	2	5	Median	5	5	5	5
Std. Dev.	0.84	0.76	2.08	2.21	1.39	Std. Dev.	0.91	1.51	1.17	1.44
<i>Wilcoxon tests – 1st option minus 2nd option</i>						<i>Wilcoxon tests – 1st option minus 2nd option</i>				
NV1		-3.42*** (1.22***)	24.02*** (0.16***)	21.11*** (0.14***)	13.87*** (0.36***)	NV2		8.31*** (0.36***)	8.07*** (0.59***)	12.93*** (0.40***)
NV3			24.39*** (0.13***)	22.07*** (0.12***)	15.88*** (0.30***)	NV4			-2.01* (1.65***)	4.2*** (1.10)

a. Each cell of the Wilcoxon tests lines presents the Z-statistics for Wilcoxon test and the f-statistics for Variance-comparison test between parentheses. Consider: *** p < 0.001; ** p < 0.01; * p < 0.05.

b. The 'first-best' options for each question are as follow: NV1 – inventory; NV2 - operating activity; NV3 - property, plant and equipment; NV4 - investing activity; V1 - intangible; V2 - intangible; V3 - operating activity; V4 - property, plant and equipment; and V5 - operating activity.

As expected, the results suggest that classifications of assets and cash flows in vague conditions are different from those in non-vague conditions. According to the 1st quadrant (upper left hand corner) outputs, the hypothesis H1a is not rejected. First, the agreement levels for non-vague conditions are significantly higher than those in vague conditions, as indicated by significance levels (all tests statistically significant at 0.001 level) and also by effect size for Wilcoxon tests (all higher than 0.53). Second, the standards deviations are also significantly higher in non-vague conditions. Despite of the sensibility of Variance-comparison tests in relation to the sample size, the standard deviations descriptive measures corroborate the inferential results.

Although the statistical significance for median differences between NV1 and NV3 is significant (z=3.57, p<0.001), we do not rely only on that to analyze H1a', because the effect size is low (0.12), as well as the difference between the means is 0.06 (5.88 minus 5.82). Then, the significance level can be due the sample size and, thus, the evidences in the sense to not reject H1a' seems stronger than the opposite.

Furthermore, the results presented in the 3rd quadrant (lower left hand corner) do not reject Hypothesis H1b, once the medians of the distances (1st option minus 2nd option) are significantly higher in non-vague condition in comparison with vague condition. Once again the effect sizes are higher than 0.74, except for the interactions with V4, which has a lower effect size, 0.47 and 0.54. Variance-comparison tests and descriptive statistics also support

H1b in the sense that judgment and decision-making in accounting tasks connected to assets classification vary significantly under vague conditions.

Still in the 3rd quadrant analysis, outputs show that differences between medians and between standard deviations are statistically significant when comparing NV1 and NV3 through inferential tests. Nevertheless, descriptive statistics present a small difference between means and also between in standard deviations in non-vague conditions. Besides, the effect size for nonparametric test is low (0.11). Therefore, considering that high significance levels can be due to the sample size, it seems again that accountants do not vary differently when making decisions about assets in non-vague conditions.

The results stated in Panel B, 2nd and 4th quadrants (upper & lower right hand corners), do not follow the same pattern observed for Panel A. First, accountants demonstrate great confidence when classifying as operating activity the cash inflow from the sale of movies' exhibition rights, even when they classified the respective asset as an intangible item (See V3 outputs). Probably it was considered the principal revenue-producing activity of a film producer and the matter of cohesiveness between assets' and cash flows' classifications was not taken into account. Second, at a lower extent, accountants also demonstrate confidence when classifying as operating activity the cash inflow from the sale of used cars by a car rental, presumably because it is one of the principal revenue-producing activities of the entity (See V5 outputs). Notice, however, that the standard deviation for V5 is similar to the standard deviations for V1, V2 and V4.

Hence, in spite of the statistical significance of the inferential tests presented in Panel B, the effect sizes (lower than 0.40) and the descriptive statistics suggest that accountants do not vary differently in classification of the cash inflow from the sale of movies' exhibition rights (vague condition) if compared with non-vague conditions. The outputs for V3 in Panel B support this assertion.

On the other hand, the comparison between NV2 (cash inflow from the sale of finished goods), in which the certainty about the classification as operating activity is the highest among the questions (1st option mean close do 6 and distance - 1st minus 2nd - close to 5), and V5 (cash inflow from the sale of used cars by a car rental), in which the certainty is the lowest, inferential and descriptive statistics suggest that accountants' decisions vary differently when comparing vague and non-vague conditions (effect size equal to 0.66 for 2nd quadrant analysis and 0.44 for the 4th).

While hypotheses H1a and H1b hold partially for cash flow classifications as aforementioned, H1a' and H1b' do not hold, once the descriptive and the inferential outputs show that accountants demonstrate more uncertainty when classifying the cash inflow from the sale of the building headquarters than when classifying the cash inflow from the sale of finished goods. Such incoherence in cash flows' classifications raise doubts about the factors others than vague and non-vague conditions influencing the results.

Perhaps it is due to the Brazilian accountants' difficulties in preparing the statement of cash flows (SCF) and in to deal with the respective taxonomy. Notice that the SCF became mandatory in Brazil only recently, when the implementation of the IFRSs was made mandatory. More precisely, it was applied for the first time for financial reports relative to 2008 fiscal year.

Indeed, the classification of asset items in the balance sheet seems to be much more relevant than the classification of cash flows in the SCF. On one hand, the classification of cash flows in the SCF, is a matter of presentation that may affect in interpretation of the financial reports by external users, who have the opportunity to adjust such a classification in their spreadsheets before calculating any cash flows ratio. On the other hand, the classification of asset items in the balance sheet has, at least, three fundamental consequences:

- (i) Financial statement analysis (liquidity ratio and others), similarly to the presentation of cash flows in the SCF. Therefore, should be argued that this is a minor effect, because analyst can adjust it in their spreadsheets before calculating any ration.
- (ii) Fiscal impacts, for example, the sale of inventory items is taxed by the VAT, but the sale of PPE items or intangible asset items is not subject to VAT taxation. Notice that as widely commented Brazilian accounting standards were severely biased by fiscal rules until the IFRS adoption. Further research seems necessary to conclude certainly about this issue.
- (iii) Initial measurement criteria (i.e., at recognition), the cost of PPE comprises among other costs the initial estimate of the costs of dismantling and removing the item and restoring the site on which it is located (IAS 16.16(c)), but the cost of inventory does not comprise such a cost (IAS 2.10-11), the cost of internally generated intangible asset is subjected to the research versus development phase taxonomy (IAS 38.51-67).
- (iv) Subsequent measurement criteria (i.e., after recognition) for inventory, PPE and intangible assets are significantly different (See IAS 2, IAS 16, IAS 36 and IAS 38).

In summary, the results of both approaches (H1a and H1b) suggest that Brazilian accountants' uncertainty when classifying assets is significantly higher in vague conditions than in non-vague conditions. In contrast, such uncertainty does not vary significantly when comparing two different assets' classifications both in non-vague condition (H1a' and H1b' hold). Notwithstanding, the results are weaker when comparing cash flows' classifications, in the sense that H1a and H1b hold only for one of the cases presented (i.e., V5 compared to NV2, the cash inflow from the sale of the car rental's fleet and from finished products, respectively), whereas H1a' and H1b' do not hold. It led us to develop some intuitions, which need some further research to investigate their plausible.

Considering that behavioral literature indicates that individuals tend to act differently in judgment and decision-making depending of their cognitive abilities, in the following section we investigate a potential alternative explanation: if assets' and cash flows' classifications under vague and non-vague conditions are associated with accountants' CRT scores.

4.2 Alternative explanation? Cognitive reflection ability and its influence (Proposition 2)

In order to verify the effects of the potential alternative explanation mentioned, we test if (and how) judgment and decision-making in accounting in vague (and non-vague) conditions are different depending on the individuals' cognitive abilities. To do so, we divided the sample in two groups, low CRT score (i.e., 0 or 1 correct answer) and high CRT score (i.e., 2 or 3 correct answers), each with 462 and 397 individuals respectively, and compare their agreement level within each classification option for assets' and cash flows' classifications. Then, we analyze medians and standard deviations. Notice that, differently from the previous section, we do not analyze only the first-best (See Table 4, 1st and 2nd quadrant), but all the three options for each question. Moreover, we also analyze the distances between first-best and second-best options (1st option minus 2nd option) as was done to test hypotheses in Proposition 1, but in this section we investigate if the classification differs as a consequence of respondents' different cognitive abilities.

Table 5 – Assets' and cash flows' classifications under vague and non-vague conditions, by low or high CRT groups.

Panel A: Assets' classification tasks							Panel B: Cash flows' classifications tasks					
		NV1	NV3	V1	V2	V4			NV2	NV4	V3	V5
		Raw mat	Building	Software	Film	Fleet			Raw mat	Building	Film	Fleet
Inventory	Low CRT	5.79 / 6 (0.77)	1.10 / 1 (0.55)	2.36 / 1 (2.07)	3.36 / 3 (2.26)	3.85 / 5 (2.18)	Operating Activity	Low CRT	5.85 / 6 (0.61)	1.51 / 1 (1.33)	5.28 / 6 (1.54)	4.17 / 5 (2.16)
	High CRT	5.86 / 6 (0.61)	1.09 / 1 (0.50)	2.33 / 1 (2.04)	3.22 / 3 (2.21)	3.31 / 3 (2.13)		High CRT	5.92 / 6 (0.43)	1.44 / 1 (1.27)	5.52 / 6 (1.26)	4.06 / 5 (2.17)
	z-stats	-0.89	-0.12	0.76	0.81	3.76***		z-stats	-1.83	1.18	-2.03*	0.89
	sd-test	1.61***	1.24*	1.03	1.04	1.05		sd-test	2.04***	1.09	1.49***	0.99
PPE	Low CRT	1.23 / 1 (0.81)	5.87 / 6 (0.68)	1.53 / 1 (1.31)	1.60 / 1 (1.46)	3.68 / 4 (2.18)	Investing Activity	Low CRT	1.25 / 1 (0.78)	5.17 / 6 (1.65)	1.87 / 1 (1.65)	3.10 / 2 (2.21)
	High CRT	1.18 / 1 (0.69)	5.89 / 6 (0.62)	1.51 / 1 (1.32)	1.69 / 1 (1.48)	4.26 / 5 (2.03)		High CRT	1.16 / 1 (0.57)	5.20 / 6 (1.64)	1.69 / 1 (1.42)	3.28 / 3 (2.20)
	z-stats	0.74	0.04	0.32	-1.30	-3.98***		z-stats	1.88	-0.21	1.22	-1.25
	sd-test	1.39**	1.19	0.98	0.97	1.15		sd-test	1.87***	1.01	1.35**	1.02
Intangible	Low CRT	1.11 / 1 (0.55)	1.13 / 1 (0.58)	4.43 / 6 (2.13)	3.25 / 2 (2.29)	1.14 / 1 (0.64)	Financing Activity	Low CRT	1.16 / 1 (0.64)	1.49 / 1 (1.26)	1.25 / 1 (0.83)	1.34 / 1 (1.03)
	High CRT	1.08 / 1 (0.43)	1.16 / 1 (0.68)	4.44 / 6 (2.14)	3.52 / 4 (2.28)	1.12 / 1 (0.62)		High CRT	1.10 / 1 (0.50)	1.53 / 1 (1.31)	1.17 / 1 (0.63)	1.33 / 1 (1.03)
	z-stats	0.90	-0.37	-0.22	-1.71	0.75		z-stats	1.57	-0.05	1.13	0.23
	sd-test	1.36**	0.71***	0.99	1.01	1.08		sd-test	1.66***	0.93	1.72***	1.00
1 st opt. – 2 nd opt. score	Low CRT	4.67 / 5 (0.89)	4.80 / 5 (0.69)	1.55 / 0 (2.06)	2.49 / 3 (2.24)	3.96 / 5 (1.43)	1 st opt. – 2 nd opt. score	Low CRT	4.60 / 5 (1.00)	4.18 / 5 (1.51)	4.37 / 5 (1.20)	4.06 / 5 (1.44)
	High CRT	4.74 / 5 (0.77)	4.76 / 5 (0.83)	1.54 / 0 (2.10)	2.26 / 2 (2.17)	4.00 / 5 (1.35)		High CRT	4.77 / 5 (0.77)	4.23 / 5 (1.50)	4.43 / 5 (1.14)	4.03 / 5 (1.43)
	z-stats	-0.55	0.16	0.13	1.41	-0.17		z-stats	-2.52*	-0.72	-0.60	0.29
	sd-test	1.33**	0.68***	0.96	1.07	1.14		sd-test	1.71	1.01	1.12	1.01

The expected first-best option(s), according to Table 2's approach, is(are) marked in **bold** letters. The statistics for each accounting task by each group of accountants (low and high CRT scores) presented in this Table are as follow: mean / medial; (standard-deviation). Consider: *** p < 0.001; ** p < 0.01; * p < 0.05.

Confirming the previous section's findings, descriptive statistics presented in Table 5 show that standard deviations are higher in vague circumstances than in non-vague not only for the first-best option of each question, but also for other options. However, the results for the effect of cognitive ability are not as expected. Among the tasks under vague conditions (V1 to V5), only when analyzing the question involving the cash inflow from the sale of movies' exhibition rights (V3) the standard deviations for the low CRT group classifications are significantly higher than those for the high CRT group. In the remaining tasks, the descriptive outputs indicate a pattern in which the standard deviations for the low CRT group classifications are slightly higher than those for high CRT group, but it is only by chance, as indicated by significance test. Then, the hypothesis H2a, which states that low CRT accountants making decisions under vague conditions tend to present more uncertainty than high CRT accountants, is not confirmed.

Hence, the analysis of the results for H2a (shown in Table 5) led us to conclude that even the high CRT accountants demonstrate a great level of uncertainty when classifying assets and cash flows in non-vague conditions. Therefore, the intuition arising from those outputs is that under vague accounting standards, no matter how much the individual reflect

(or is willing to) about the correct assets' and cash flows' classifications, there will be a widely oscillation when performing such tasks.

Surprisingly, the hypothesis H2b, which states that there is no significant difference in classifications between low and high CRT accountants when making decisions based on non-vague circumstances, also do not hold. Outputs for NV1, NV2 and NV3 (this in a lower extent), as presented in Table 5, suggest that, in non-vague conditions, low CRT accountants tend to present higher uncertainty level (standard deviations and distances 1st to 2nd options) than high CRT ones. Furthermore, we observe that, if compared with high CRT professionals, low CRT accountants tend to attribute: (i) a lower level of agreement with the expected answers (inventory and operating activity for NV1 and NV2 respectively, and PPE and investing activity for NV3 and NV4 respectively); and (ii) a higher level of agreement with the unexpected answers.

Thus, the effect is the opposite of that suggested by the literature, in the sense that, instead of more reflective (less uncertainty) answers from high CRT professionals in vague circumstances, what we observed is that the reflection ability does not help accountants when dealing with vague standards. Besides, instead of no differences between low and high CRT when dealing with non-vague tasks, as expected, we find that more intuitive accounting professionals (low CRT) tend to present a higher level of uncertainty even under non-vague circumstances.

Therefore, the results reinforce the literature arguments in the sense that vague accounting standards tend to damage the qualitative characteristics of general purposes financial statements. Such a negative effect caused by vague accounting standards is not mitigated by professionals' cognitive reflection ability.

5 CONCLUSIONS

Standards developed on an 'one size fits all' bases, such as the IFRSs (which are non-industry specific), tend to be more principles-oriented than rules-based (Leuz and Wysocki, 2014). On one hand, non-industry specific accounting standards have some advantages, such as, they are less rules intensive, hence, mitigate the possibility of manager structuring transactions to game with numbers, reduce transaction costs associated to the preparation, auditing and analyzes of financial information, and potentially enhances the comparability among industries. On the other hand, non-industry specific principles-oriented accounting standards tend to be more imbedded by vague statements and unclear requirements, which can obstacle consistent application and mitigate the quality of general purposes financial reports.

Based on a sample of 859 Brazilian professional accountants (preparers and auditors), we tested hypotheses formulated on the bases of two propositions: (1) Accountants' decisions in regard to the classification of assets and cash flows based on vague standards and circumstances are significantly different from those based on non-vague standards and circumstances; and (2) Accountants who apply System 1 more frequently (low CRT score) tend to act more intuitively when performing accounting tasks.

In order to test the hypotheses, we applied a questionnaire to assess two features: (i) their understanding and implementation of IAS 2 (Inventory), IAS 7 (Statement of Cash Flows), IAS 16 (Property, Plant and Equipment), and IAS 38 (Intangible Assets) in regard to the classification of asset items on the balance sheet, and the classification of cash flows on the statement of cash flows; and (ii) their cognitive reflection ability, following the method developed by Frederick (2005).

In summary, the results support proposition 1, but do not support proposition 2.

In regard to proposition 1, accountants' uncertainty is significantly higher under vague conditions than under non-vague conditions, specifically for the classification of assets (among inventory, PPE or intangible asset). Notice that in regard to the classification of cash

flows, such evidence is weaker. Probably because the classification of cash flows on the statement of cash flows is a less relevant decision than the classification of asset items on the balance sheet. Notice that the classification of items on the statement of cash flows (e.g., as operating, investing or financing activities) has minor consequences than the classification of items in the balance sheet (e.g., as inventory, PPE or intangible asset) that affects the initial and subsequent measurement criteria and can have taxation impacts (depending on the tax law from a jurisdiction).

The rejection of proposition 2 is fundamental for the principle- versus rule-based accounting standards debate. Based on the Cognitive Science literature, we would expect that vagueness in accounting standards were less problematic than in other (and general) standards and codes, because, accounting tasks demand accountants to intensively reflect before making a decision. Hence, accountants from the high CRT score group would make (good and) consistent decisions even under vague circumstances. Consequently, the accounting standards setters would not need to worry about vagueness; but education institutions and auditing firms would work to enhance the accountants' cognitive reflection ability. Once proposition 2 was rejected, such arguments are not valid. It means that high CRT score accountants are not able to make decision in order to consistently implement the IFRS under vague circumstances (i.e., we cannot rely on accountants' cognitive ability to solve the problems created by vague standards). Hence, reducing the vagueness on accounting standards is necessary to enhance consistently implementation of the IFRSs.

Finally, notice that, among the limitations of this study, we do not control for other factors that potentially influence the results, such as: (i) time of professional experience as accountant; (ii) expertise in a given subject; (iii) environment and conditions under which the survey was applied; (iv) time consumed by respondents to answer the questionnaire. Then, individuals must vary in terms of their familiarity with the issues covered, as well as in terms of the attention they paid on the questions and willingness. Thus, although the rigorous criteria we adopted to select the sample, it is not free from biases. In order to control those and other undesirable effects, we suggest future research through experimental design addressing these and complimentary accounting tasks.

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