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THE LANGUAGE OF CORPORATE ENVIRONMENTAL DISCLOSURE: A RESEARCH NOTE

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ABSTRACT

We investigate different language techniques used in corporate environmental disclosures and test whether the impression management (see Neu et al., 1998) hypothesis holds when disclosures are measured as such. We argue that the *way* information is presented (i.e., the language and verbal tone of narratives) in environmental disclosure is equally or perhaps more important than its amount or thematic content, and that such narrative choice is not neutral to firm environmental performance. We use a computer-based measurement approach to evaluate the extent of language bias contained in corporate environmental disclosures for a cross-sectional sample of U.S. firms' 10-K reports. This study contributes to the social and environmental literature by (1) systematically analyzing the language used in environmental disclosures, (2) examining whether corporations attempt to manage impressions by writing such disclosures, and (3) further exploring the characteristics of impression management.

Keywords: Environmental disclosure; language tone; impression management

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LANGUAGE USED IN 10-K REPORT ENVIRONMENTAL DISCLOSURE: A RESEARCH NOTE

1. Introduction

Corporate environmental information is increasingly desired by firm stakeholders (Epstein and Freedman, 1994; Berthelot et al., 2003; Cormier et al., 2004) and is material to their decision-making (Neu et al., 1998). In spite of this, a 1998 U.S. Environmental Protection Agency (EPA) study found that 74 percent of publicly traded corporations violated at least some Securities and Exchange Commission (SEC) environmental disclosure regulations in their 10-K reports.[1] In addition, the U.S. Government Accountability Office (GAO) reported that some users of company filings view existing disclosure requirements as "too flexible and too narrowly scoped" (2004, p.3) and accuse the SEC of implicitly condoning violations of disclosure regulations. The broad reporting guidelines coupled with the lack of enforcement provide firms with discretion regarding *how much* and *what* to include in their 10-K environmental disclosures. Therefore, it is not surprising to observe significant variations in both the content and the quantity of this type of disclosure.

Environmental disclosures are generally included by corporations in their accounting reports (e.g., the 10-K report or annual report) to convey information (Berthelot et al., 2003) to specific stakeholders (see Roberts, 1992). Such disclosures are often described as "accounting narratives" (Jones and Shoemaker, 1994). Through the use of these narratives, firms decide the amount of information (quantity) and range of topics (thematic content) provided in their reports. Several studies quantitatively examined disclosures from both perspectives (see, e.g., Patten, 1992; Neu et al., 1998 for the quantity approach and see, e.g., Wiseman, 1982; Hughes et al., 2001; Cho and Patten, 2007 for the thematic content approach). Neu et al. (1998) argue that management prefers accounting narratives such as environmental disclosure, rather than financial or

[1] The rules set forth in Regulation S-K cover 1933 and 1934 Act registration statements, and all other periodic statements (e.g., annual and quarterly reports filed on Forms 10-K and 10-Q, respectively) to be filed with the SEC by registrants as outlined in Regulation S-K. Under SEC regulations and accounting standards relating to contingencies (Statement of Financial Accounting Standard No. 5), U.S. firms registered on a stock exchange must disclose environmental information in their 10-K reports. Regulation S-K items 101, 103, and 303 provide guidance for environmental disclosures.

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other quantifiable information because disclosures can be tailored for specific key stakeholders to effectively manage public impressions. This is an important issue because (1) corporate managers have the authority to determine, at their full discretion, which verbal communication techniques to use when formulating environmental disclosure in their 10-K reports; and (2) firm stakeholders must be able to effectively comprehend the content of accounting narratives without much effort. Thus, transparent, unbiased conveyance and transmittal of information is critical.[2]

The purpose of this study is to extend prior social and environmental accounting (SEA) research, especially the methodology of environmental disclosure measurement, and to test whether impression management theory holds when disclosures are measured as such. We argue that the *manner* in which information is presented in environmental disclosure is equally or perhaps more important than its amount or its thematic content, and that such narrative choice is not neutral to firm environmental performance. We use Diction, a computerized content analysis software (see Hart, 2000; 2001) to evaluate the verbal tone of corporate environmental disclosure for a cross-sectional sample of U.S. corporations' 10-K reports.

The current study contributes to the SEA literature in two ways. First, it improves the metric used in corporate environmental disclosure analysis by introducing alternative measures capturing communicative tone. We advance this particular literature by analyzing the syntactic structure of corporate environmental disclosure using a systematic computer-based measurement approach that overcomes significant issues related to the reliability of disclosure measurement. Second, we bring evidence to bear whether corporations attempt to manage impressions by writing disclosures in a biased fashion. In short, this study explores further the characteristics of impression management.

[2] There is currently a debate at the U.S. federal government level regarding the complexity of financial reporting. In fact, there was a Congressional hearing before the U.S. House of Representatives' Committee on Financial Services, Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises held on March 29, 2006 entitled "Fostering Accuracy and Transparency in Financial Reporting". A review of testimonies from Bill Gradison (Acting Chairman of the Public Company Accounting Oversight Board), Robert H. Herz (Chairman of the Financial Accounting Standards Board) and Scott A. Traub (Acting Chief Accountant of the U.S. Securities and Exchange Commission) reveals a consensus on the essentiality of transparent financial reporting.

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The remainder of the paper is organized as follows. Section 2 offers some background on the link between legitimacy theory and impression management, prior research in environmental disclosure measurement, computerized content analysis, and Diction. Hypotheses are developed in Section 3. Section 4 explains the methods and analysis, and Section 5 presents the results. Finally, a discussion, with limitations and future research opportunities are provided in Section 6.

2. Background

2.1 Legitimacy theory and impression management

Legitimacy theory has emerged as a way to explain the organization-society interface, stating that "organizations continually seek to ensure that they operate within the bounds and norms of their respective societies, that is, they attempt to ensure that their activities are perceived by outside parties as being legitimate" (Deegan, 2000, p. 253). Therefore, the level of congruence between a corporation's activities and societal expectations of that particular corporation's activities (see O'Donovan, 2002) is a direct reflection of its legitimacy.

Dowling and Pfeffer (1975, p. 127, emphases added) suggest that the organization might adopt one or more of three alternative approaches to become, or at least appear, legitimate:

- the organization can adapt its output, goals, and methods of operation to conform to prevailing definitions of legitimacy;
- the organization can attempt, *through communication*, to alter the definition of social legitimacy so that it conforms to the organization's present practices, outputs and values;
- the organization can attempt, *again through communication*, to become identified with symbols, values and institutions which have a strong base of social legitimacy.

In each of the last two strategies, communication plays an essential role in the legitimation process. Because environmental disclosures constitute an efficient

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communication device for corporations, legitimacy theory has been widely tested, referenced and validated in the literature (see, e.g., Neu et al., 1998; O'Donovan, 2002; Patten, 1992; 2002; Milne and Patten, 2002; Cho and Patten, 2007).

Legitimacy seeking behavior involves managing societal perceptions, thus impression management can be positioned within organizational legitimacy theory. The link between impression management and organizational legitimacy is supported by Neu et al. (1998) who argue that "while the symbolic aspects of organizational actions have been central to legitimation researchers, textually-mediated discourses [aimed at managing public impressions] have more recently been seen as fulfilling a similar function" (Neu et al., 1998, p. 268).

This growth in organizational impression management research has led to several studies examining the various strategies that help organizations enhance and preserve their image. Organizations often use shareholder meetings, press releases, annual reports and other corporate documents to shape the perception of the public about their image (Elsbach and Sutton, 1992; Ginzel et al., 1992; Elsbach, 1994). Impression management strategies, such as excuses, justifications, concession, apologies, and denials are often used to influence stakeholder perceptions of the firm (Ginzel et al., 1992).

2.2 Prior research on the measurement of environmental disclosure

Methods used to measure environmental disclosures, whether in annual reports, 10-K reports or other official corporate accounting releases, have generated substantial debate among researchers. This is due mainly to inconsistency across studies regarding the way corporate accounting reports' content has been analyzed and the associated measurement reliability issues (Milne and Adler, 1999; Unerman, 2000). The debate is important because content analysis is a "research technique for making replicable and valid inferences from data according to their context" (Krippendorff, 1980, p. 21). Milne and Adler (1999) argue that prior SEA research shows "unevenness in regard to dealing with matters of reliability and replicability" (p. 238). When concern is shown, the focus is solely on the reliability of the data used in the particular study. While some studies report the use of multiple coders and explain their coding rules to address reliability issues (see, e.g., Gray et al., 1995a), others provide little or no explanation of how the

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coded data can be considered reliable (see, e.g., Neu et al., 1998; Trotman and Bradley, 1981).

Al-Tuwaijri et al. (2004) and Smith and Taffler (2000) distinguish disclosure measurement techniques for environmental disclosure content analysis into two distinctive groups. The first group uses a disclosure-scoring measure index derived from pure content analysis or a "meaning oriented" (subjective) analysis (Smith and Taffler, 2000, p. 627). A scoring index categorizing disclosure themes is designed and researchers assess the presence or the absence of each identified item in the disclosures using a "yes/no" (or 1, 0) coding methodology. After their quantification, an aggregate score is determined for each firm in the sample, generally labeled as the disclosure score variable (see, e.g., Wiseman, 1982; Cho and Patten, 2007). Recent studies have modified the traditional content analysis scoring method by assigning different levels or weights to disclosures based on whether the disclosure contained monetary, quantitative or qualitative terms (see, e.g., Al-Tuwaijri, 2004), or whether the disclosures were descriptive, vague or immaterial (see, e.g., Hughes et al., 2001).

The second approach measures the quantity of environmental disclosures, generating discussion among researchers about which is the optimal "unit of analysis" (see, e.g., Milne and Adler, 1999). Disclosures have been measured by counting the number of words (see, e.g., Neu et al., 1998), number of sentences (see, e.g., Buhr, 1998), or number of pages (see, e.g., Patten, 1992). The disclosure measure may also be calculated as the percentage of pages (see, e.g., Gray et al., 1995b) or the percentage of total disclosures (see, e.g., Trotman and Bradley, 1981). Smith and Taffler (2000, p. 627) refer to this approach as "form oriented" (objective) analysis. This count method solely focuses on the extent of disclosures. After a thorough review of different units of analysis, Milne and Adler (1999) prescribe using sentence counts for both coding and measurement because they offer "complete, reliable and meaningful data for further analysis" (p. 243).

While both the themes ("what") and the amount ("how much") of disclosures are important for firm managers and accounting report users, some measurement concerns related to validity and reliability seem to persist. For the "meaning oriented" (subjective) analysis (Smith and Taffler, 2000, p. 627), the problem appears to lie in the intrinsic

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human subjectivity when coding the narratives or determining the absence or the presence of themes (Krippendorff, 1980). This need for the researchers' judgment can cause some inherent reliability issues, despite the use of several coders. As to the "form oriented" (objective) analysis (Smith and Taffler, 2000, p. 627), solely focusing on the amount of environmental disclosure in a given accounting report can be misleading. For instance, if companies provide a large quantity of environmental information expressed in a language that is biased, the validity of this disclosure measurement may be questionable. We suggest that accounting narratives such as environmental disclosures need to convey all information in a transparent and unbiased fashion ("how") for the best interest of firm stakeholders. That is, in terms of language and communicative tone, they must remain consistent, objective and neutral vis-à-vis external factors such as firm performance or time. Thus, a syntactic type of analysis looking at their communicative tone is deemed useful as one would expect business disclosures to "tell it like it is" (Ober et al., 1999, p. 280).

3. Development of hypotheses

Prior research shows that organizations have adopted a number of impression management tools and strategies to successfully maintain or enhance their image (see, e.g., Elsbach and Sutton, 1992; Ginzel et al., 1992; Elsbach, 1994). Additionally, several studies of annual report narratives regarding firm performance (e.g., Smith and Taffler, 2000; Sydserff and Weetman, 2002) conclude that the use of certain language characteristics helps corporations shape perceptions vis-à-vis their stakeholders.

We argue that a consequence of an impression management strategy is a resulting bias in the communicative tone employed in the disclosure narrative. Aerts (1994), drawing on the work of Schlenker (1980), examined the presence of accounting bias in annual reports from an impression management perspective. He argued that managing impressions can be effectively accomplished with the use of a biased accounting language because explanations of organizational events and performance in annual reports are "not simply the outcome of a straightforward data analysis process" (1994, p. 337).

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Accounting disclosures can be systematically biased because of their rationalizing capacities, their ability to avoid responsibility assignments and their inherent ambiguity, which constitute "interrelated performative characteristics of accounting explanations which make them particularly apt to confront and appease a negative performance environment" (Aerts, 1994, p. 341). As Aerts (1994) suggests, the coping strategies people express in their behavior can become visible through systematic biases in their explanations. In other words, the more firm performance differs from a desired benchmark, the more management is motivated to manage impressions, and the larger the accounting bias.

Bias has been demonstrated in the context of annual reports and shows a general tendency to attribute negative performance effects to external causes and positive results to internal factors, promoting an optimistic view of the company. It can thus be assumed that a positive outlook such as the identification with "symbols, values and institutions which have a strong base of social legitimacy" (Dowling and Pfeffer, 1975, p. 127) requires the use of biased language, especially when performance is negative. The emphasis on favorable outcomes, while downplaying the negatives, draws on the notion of "optimism" as it is used in the Diction program (and only as it is so used). In this context, "optimism" refers to a language "endorsing some person, group, concept, or event, or highlighting their positive entailments" (Hart, 2001, p. 247) and is deemed appropriate to be used as a measure of biased language. We state our hypothesis H_1 as:

> H_1: *The optimism exhibited in 10-K report environmental disclosures will be negatively related to firm environmental performance.*

Similarly, biases in accounting narratives can also be regarded as purposive impression management behavior (Aerts, 2005). He suggested that depending on the social context, a different logic for assertive attributional tendencies should be modeled as a test of accounting bias. His results revealed that the degree of assertiveness of the bias was significantly impacted by an environment where motives for external impression management were strong and that these results supported its motivational interpretation. Assertiveness, which influences bias to a certain extent, can be closely associated with

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the notion of tenacity and insistence. As such, accounting bias can also draw on the notion of "certainty," deemed as an appropriate measure of the construct. As it used in the Diction program (and only as it is so used), the term "certainty" refers to a language indicating "resoluteness, inflexibility, completeness, and a tendency to speak ex cathedra" (p. 246). Although Ober et al. (1999) reported that certainty in public business discourse does not appear to be affected by financial performance (i.e., profitability), we investigate the relationship between the level of certainty in environmental disclosure and firm environmental performance, as hypothesized in H_2 below. Because certainty is more likely to be prevalent when the performance is positive, we state our hypothesis H_2 as:

> H_2: *The certainty used in 10-K report environmental disclosures will be positively related to firm environmental performance.*

A summary of the hypotheses is depicted in Figure 1.

4. Methods and analysis

4.1 Sample selection

To be included in this study, sample firms had to meet the following criteria:

1. They had to be listed in the 2002 ratings of corporate social and environmental performance compiled by KLD Research Analytics, Inc. (hereafter, "KLD").
2. They had to have a fiscal year ended June 30, 2002 or later[3].
3. They had to be listed on the Standards and Poor's 500 index for fiscal year 2002.
4. They had to have a 2002 10-K report available on the SEC's EDGAR database.
5. They had to have 10-K environmental disclosures of at least 100 words[4].

[3] A fiscal year-end subsequent of June 30, 2002 better reflects and matches 2002 firm environmental disclosure in relation to its 2002 environmental performance.

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A total of 221 firms met all five criteria and constitute the final sample. Sample firms ranged in size (based on 2002 revenue levels) from $512 million to $184,214 million, with a mean (median) of $13,235 million ($6,149 million). Summary data on the sample firms are provided in Table 1.

----------Table 1 about here----------

4.2 Computerized content analysis

The benefits of automatic, computerized text coding and the much reduced need for human intervention and judgment are significant (Smith and Taffler, 2000). Computer-based methods may not be the perfect solution to analyze texts since they may be appropriate for some tasks more than others and the famous phrase "garbage, in, garbage out" still holds (Diefenbach, 2001). Nonetheless, the social science literature appears to have accepted and extensively used computer-based methods for several decades, notably in political science (see, e.g., Narcos et al., 1991), psychology (see, e.g., Rush et al., 1974) and management accounting (see, e.g., Abernethy et al., 2005). The advantages to computerized content analysis are summarized in Appendix A.

4.3 Environmental disclosure

We identify environmental disclosures in the 10-K reports[5] for the same fiscal year as the year of interest (i.e., 2002) because we hypothesize direct disclosure/performance relationships (see, e.g., Patten, 2002) and examine how impressions are managed (i.e., measured by optimism and certainty) in relation to the information presented.

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[4] This length criterion appears to be adequate for the analysis and measure of bias. It is also important to note that avoidance (i.e., providing no environmental disclosure) is also viewed as an impression management and legitimacy tool. However, we excluded firms using this tactic from the sample because the focus of this study was to analyze the language of environmental disclosures that are actually provided by firms.

[5] Because of the SEC disclosure requirements (see discussion in note 1 above), we examine environmental disclosures included in section 1 (Description of Business), section 3 (Legal Proceedings) and section 7 (Management's Discussion and Analysis of Financial Condition and Results of Operations).

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Diction,[6] developed by Dr. Roderick Hart, is a dictionary-based, computerized content analysis software that examines a text for its communicative or verbal tone across five variables: certainty, optimism, activity, realism, and commonality (Hart, 2000, 2001; Sydserff and Weetman, 2002). Diction deploys some 10,000 search words in 33 separate dictionaries, and none of the search terms is duplicated in these lists, which enables the user to get a rich understanding of a text passage. In addition, the program is relatively easy to use and offers reliability and objectivity (Sydserff and Weetman, 2002). Since Diction is able to separately assess the five verbal tone master variables (and subaltern variables), we select the measurements related to our third hypothesis, which are certainty and optimism scores (see H_1 and H_2). It must also be noted that a distinct feature of Diction 5.0 is the option to extrapolate a particular text to a 500-word norm "equivalent" (which is the basic unit of analysis) so that input texts of any length can be measured consistently.

Diction generates scores for each variable that are being used on a relative basis to compare them across firms from any sample. In our study, environmental disclosure optimism scores ranged from 40.21 to 59.16 and certainty scores ranged from 33.84 to 68.23. The sample mean disclosure scores were 48.08 and 50.26 for optimism and certainty, respectively.

4.4 Environmental performance

Although a number of external corporate social and environmental performance (SEP) evaluations have been published over the past 30 years, most have been limited to a relatively small number of companies, or have focused on only smaller subsets of performance. In response to this need, the independent ratings firm KLD[7] has, since

[6] The Diction program is driven by the five master variables, which are created by combining (after standardization) the subaltern variables. These variables were selected under the assumption that, if only five questions could be asked of a given passage, these five would provide the most robust understanding. A typical Diction output generally includes the names of the variables (and subaltern variables), their frequency, the percentage of words analyzed, the normal score range, the standard range and whether they are out of range. Diction is also able to make the conversion, transfer, import and export of texts and data with other computer programs (e.g., Excel, SPSS) easy and user-friendly (Hart, 2000; 2001). A comprehensive overview of Diction is provided in Appendix B.

[7] The professional services firm of KLD Research and Analytics, Inc. is located at 250 Summer Street, Boston, MA 02210, USA. KLD's social research is distributed in SOCRATES - The Corporate Social

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1994, maintained a database that appears to overcome these problems. KLD independently rates hundreds of companies traded on U.S. stock exchanges[8] in terms of their social performance across a range of dimensions related to stakeholder concerns. The company draws upon a variety of sources to capture relevant social performance data (Waddock and Graves, 1997; Hillman and Keim, 2001). Because the KLD database provides a quantifiable and enhanced corporate SEP measure and preserves its independent rating system (Hillman and Keim, 2001), the KLD data have been extensively used in U.S. management research on corporate social performance issues (e.g., Waddock and Graves, 1997) and recently used in environmental accounting research (see Cho and Patten, 2007). KLD separately assigns strengths and concerns across seven SEP categories[9] and gives a score of zero or one for each of the strength and concern areas included in each category.

Given the apparent benefits of the KLD ratings and because our focus is on examining the relationship between firm environmental performance and the extent of bias of environmental disclosure, we use this database to identify environmental performance for our sample firms. KLD analyzes corporate environmental performance based on an extensive assessment of each company's environmental management, planning and impact assessment, utilization of resources, compliance with applicable laws and regulations, and emissions (see Appendix C). More specifically, we use KLD *concern* ratings[10] from 2002 for comparisons with the different 2002 10-K report

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Ratings Monitor[SM]. SOCRATES is a proprietary database program that provides access to KLD's ratings and other data pertaining to the social records of over 3,000 publicly traded U.S. companies (KLD, 2003).

[8] As of 2002, the academic spreadsheets are a summary of strengths and concerns assigned to approximately 1100 Socrates companies listed on the S&P 500, Domini 400 Social Index, Russell 1000, or KLD Large Cap Social Indexes as of December 31st of each year. Prior to 2002, the spreadsheets contain data from approximately 650 companies listed on the S&P 500 or Domini 400 Social Indexes as of August of each year (KLD Research & Analytics, Inc.,, 2003).

[9] KLD's social responsibility categories include community, corporate governance, diversity, employee relations, environment, human rights, and product (KLD Research & Analytics, Inc., 2003).

[10] Concern ratings are generally assigned to companies that (1) reveal poor compliance records with environmental laws and regulations; (2) emit hazardous or toxic substances and waste in large quantities; (3) fall behind their industry competitors in implementing preventive measures to reduce environmental impact; and/or (4) generate a significant portion of their revenues from products or services that negatively affect the environment.

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environmental disclosure scores. Sample scores ranged from 0 (i.e., no environmental concern) to 5 (i.e., high environmental concern) with a mean score of 1.03.

4.5 Control variables

Prior research documents that the extent of environmental disclosure (as previously measured in "form" or "meaning" oriented) is significantly related to firm size and industry type. That is, the expectation is that firms with higher visibility and operating in industries that are more sensitive to environmental laws and regulations will tend to disclose more extensive environmental information (see, e.g., Patten, 1992, 2002; Cho and Patten, 2007). Similarly, these factors were found to also bias (see, e.g., Aerts, 1994) such environmental information. Therefore, we control for the effects of size and industry type in our models.

Firm size is measured by taking the natural log of the 2002 revenues. For industry membership, we label the chemical (primary SIC code 28xx, excluding pharmaceutical, code 283x), metals (33xx), mining (10xx), oil exploration (13xx), paper (26xx), and petroleum (2911) industries as "environmentally sensitive industries." We use a dichotomous one/zero coding scheme to separate firms that operate in this group from their counterparts operating in non-environmentally sensitive industries. A total of 52 of the 221 sample firms were from environmentally sensitive industries.

4.6 Statistical analysis

Ordinary least squares multiple regression is used to identify the relation between environmental performance and the different characteristics of firm environmental disclosure. The models are stated as:

(1) $EDC_i = a_1 + B_1EP_i + B_2SIZE_i + B_3IND_i$ to test H_1

(2) $EDO_i = a_1 + B_1EP_i + B_2SIZE_i + B_3IND_i$ to test H_2

where

EDC_i = the 2002 environmental disclosure certainty score for firm *i*,

EDO_i = the 2002 environmental disclosure optimism score for firm *i*,

EP_i = the 2002 KLD environmental concern score for firm *i*,

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$SIZE_i$ = the natural log of 2002 revenues for firm *i*, and

IND_i = one if firm *i* belongs to an environmentally-sensitive industry, and zero otherwise.

Because firms with a *negative* performance reflect a *higher* environmental concern score, we expect to find a positive relation between the EP variable and the EDO variables. Further, a negative relation is predicted between the EP variable and the EDC variable.

5. Results

Table 2 presents the results of the regression analyses testing the optimism hypothesis (H_1). As highlighted in the table, the model is significant (based on the model F-statistic). Control variable SIZE is significant whereas IND is not. This can be interpreted as indicating that larger firms, whether they are from environmentally sensitive industries or not, exhibit a higher level of optimism in their 10-K report environmental disclosure. More importantly, firm environmental performance is, as hypothesized, positively associated with the optimism level of environmental disclosure (EDO), and significant at the $p < .001$ level, one-tailed. This supports the argument that poorer environmental performers use a more optimistic language tone when writing their environmental disclosures.

Table 3 presents test results of the certainty hypothesis (H_2). As noted in the table, the model is significant (based on the model F-statistic). Control variables SIZE and IND are not significant; suggesting that the level of certainty exhibited in environmental disclosure is not affected by the size or the industry of the company. However, firm environmental performance is significantly and negatively related to environmental disclosure certainty level ($p < .05$, one-tailed). This result indicates that firms with lower environmental performance use language of less certainty in their 10-K environmental disclosures than their better-performing counterparts.

Overall, these findings thus provide evidence that, as predicted, there is a significant relationship between firm environmental performance and the use of biased language in 10-K report environmental disclosures.

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----------Tables 2 and 3 about here----------

6. Discussion, limitations, and future research

The purpose of this study was to test whether impression management theory holds when environmental disclosures are measured for their communicative tone. Because environmental disclosures constitute a mandated and integral part of a company's financial report (annual or 10-K report), the recent Congressional debates focusing on the transparency and accuracy of financial information reporting (see note 2) are pertinent to the issues addressed in this paper. As the common business communication advice is to "avoid hedging" and "tell it like it is" (Ober et al., 1999), corporate environmental disclosures in general should be transparent and unbiased. More than financial information, accounting narratives, such as environmental disclosures, give managers ample opportunities to put this advice into practice. Our argument is that the *way* (or *how*) information is presented in environmental disclosure is equally or perhaps more important than the amount or the thematic content, and that such narrative choice by management is not neutral to firm environmental performance.

In this paper, we investigated the language used by U.S. firms in their 10-K report environmental disclosures. We examined the relationships between environmental performance and different environmental disclosure measurements for a cross-sectional sample of 221 U.S. firms' 10-K reports from 2002 listed on the S&P 500 index. Results of regression analyses indicate that, controlling for firms size and industry type, there is a significant relation between environmental disclosure language bias, as measured by optimism and certainty, and firm environmental performance. Higher levels of optimism and lower levels of certainty are associated with poor environmental performance. Overall, these results support the conjecture that firms with poor environmental performance records and operating in environmentally sensitive industries attempt to manage public impressions by using a biased language in their environmental disclosures. These results extend Patten (2002) in that worse environmental performers not only disclose more extensively but do so using a biased language to mitigate their negative exposure to the social/political environment.

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These empirical findings are relevant to the recent information transparency issues raised by the different U.S. accounting regulatory bodies such as the Securities and Exchange Commission, Public Company Accounting Oversight Board, the Financial Accounting Standards Board, and the American Institute of Certified Public Accountants. Despite SEC regulations, firms can freely decide on the content, quantity and verbal tone of their disclosures, making the latter questionable. For instance, the current findings contribute to the impression management argument that extensive *and* biased (more optimistic and less certain) environmental disclosures may be strategically used by companies to offset some of their negative environmental performance.

However, our results are based on a cross-sectional sample. While they may have provided a snapshot of the relationships examined in this paper, we assumed a constant, homogenous level of political pressure in regards to environmental regulation. The extent to which these findings would hold in other periods cannot be determined.

Future research may extend this work to a longitudinal basis, examining the relations between the changes in environmental performance and the changes environmental disclosure language metrics over time. This comprehensive analysis may provide a more complete picture of the impression management strategy and determines whether there are temporal event factors to be considered. Also, future studies may investigate the differences, if any, between the language metrics of environmental disclosures of 10-K reports vs. annual reports, due to their distinct nature (i.e., writing style) and their different audiences.

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Figure 1
Summary of hypotheses

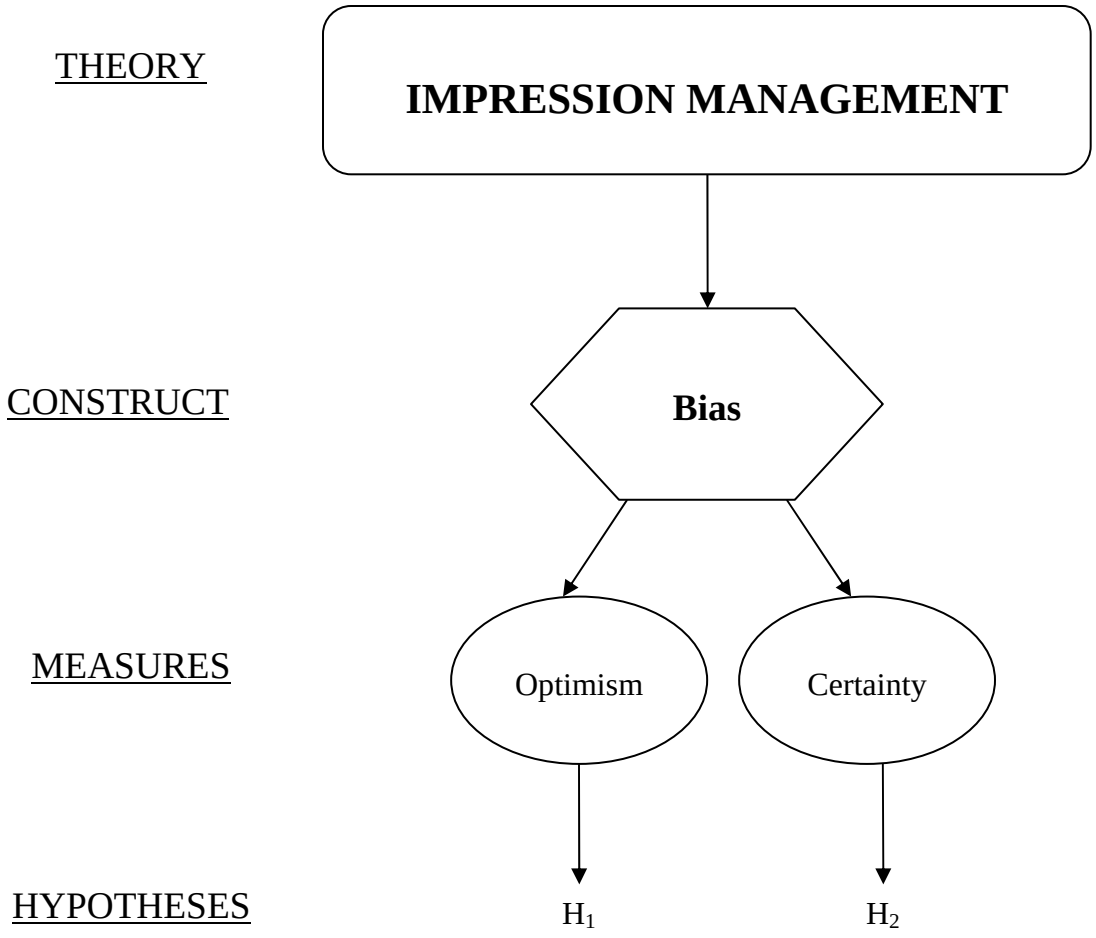

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Table 1
Descriptive statistics

n (sample size)	221
Firm size (2002 revenues)	
Mean	$13,235 million
Median	6,149 million
Standard deviation	24,203 million
Firms from environmentally sensitive firms (chemical, metals, paper, mining, petroleum)	52
KLD environmental concern ratings	
Mean	1.03
Standard deviation	1.291
Environmental disclosure certainty score	
Mean	50.26
Standard deviation	3.8
Environmental disclosure optimism score	
Mean	48.08
Standard deviation	2.39

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Table 2
Results of OLS regression analysis testing the relation between environmental performance and environmental disclosure optimism ($EDO_i = a_1 + B_1EP_i + B_2SIZE_i + B_3IND_i$)

Model explanatory power	
Number of observations	221
Model *F*-statistic	7.903
Significance of *F*-statistic	0.000
Adjusted *R*-squared	0.086

Parameter estimates

Variable	Predicted sign	Parameter estimate	*t*-statistic	Statistical significance*
INTERCEPT	None	44.313	32.957	0.000
EP	(+)	0.358	2.684	0.004
SIZE	(+)	0.376	2.425	0.008
IND	(+)	0.333	0.880	0.190

* Significance levels are based on a one-tailed test for the EP, SIZE and IND variables.

EDO_i = the 2002 environmental disclosure optimism score for firm *i*,
EP_i = the 2002 KLD environmental concern score for firm *i*,
$SIZE_i$ = the natural log of 2002 revenues for firm *i*, and
IND_i = one if firm *i* belongs to an environmentally-sensitive industry, and zero otherwise.

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Table 3
Results of OLS regression analysis testing the relation between environmental performance and environmental disclosure certainty ($EDC_i = a_1 + B_1EP_i + B_2SIZE_i + B_3IND_i$)

Model explanatory power	
Number of observations	221
Model *F*-statistic	2.158
Significance of *F*-statistic	0.094
Adjusted *R*-squared	0.016

Parameter estimates

Variable	Predicted sign	Parameter estimate	*t*-statistic	Statistical significance*
INTERCEPT	None	50.609	22.784	0.000
EP	(-)	-0.421	-1.911	0.029
SIZE	(-)	0.026	0.100	0.460
IND	(-)	-0.617	-0.069	0.162

* Significance levels are based on a one-tailed test for the EP, SIZE and IND variables.

EDC_i = the 2002 environmental disclosure certainty score for firm *i*,
EP_i = the 2002 KLD environmental concern score for firm *i*,
$SIZE_i$ = the natural log of 2002 revenues for firm *i*, and
IND_i = one if firm *i* belongs to an environmentally-sensitive industry, and zero otherwise.

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Appendix A
Advantages of computerized content analysis*

- The computer can do menial tasks, such as repetitive counting and sorting, and thereby liberating researchers for more theoretical and creative tasks.

- Not only can a computer do all the counting, it can do so with perfect reliability (i.e., computer-produced results will be the same every time the data are counted or otherwise examined).

- Computers remember, ostensibly forever

- Computers detect continuities and discontinuities.

- If properly coached, computers can track associations across semantic space, note situational changes (and changes within those changes), distinguish the characteristics word choices of one person from those of another.

- Computers can detect the stabilities in language behavior, the things that never change.

- With computer-assisted content analysis, data sets themselves can be easily reproduced and shared with other researchers.

- Computer-assisted content analysis enjoys the benefit over human-coded data of bypassing both hand-coding and subsequent data entry of hand-coded forms, thus eliminating two stages of potential error.

- Advances in personal computers, inexpensive optical readers, and online information services that provide the full text of documents in digital forms, make computer-assisted content analysis more accessible and practical now than ever before.

* Adapted from Diefenbach (2001, p. 14-15) and Hart (2001, p. 44)

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Appendix B
DICTION: The text-analysis program*

Author: Roderick P. Hart, University of Texas at Austin
Developers: Tom Cox and Michael Stanton

Overview
Diction is a Windows-based program that uses a series of dictionaries to search a passage for five semantic features — Activity, Optimism, Certainty, Realism, and Commonality — as well as thirty-five subfeatures. Diction conducts its searches via a 10,000-word corpus and the user can create additional (custom) dictionaries for particular research needs. The program writes its results to both alphabetic and numeric files. Output includes raw totals, percentages, and standardized scores and, for small input files, extrapolations to a 500-word norm. Diction also reports normative data for each of its forty scores based on a 20,000-item sample of contemporary discourse. The program can accept either individual or multiple passages and, at the user's discretion, provide special counts of orthographic characters and high frequency words.

History
Diction is a revised version of an earlier (mainframe) program described in Hart (1984). The newer version of the program is described in Hart (2001).

Program Features

1) Diction processes sixty passages (30,000 words) in one minute on a Pentium-based system; results can be viewed without leaving the program.

2) No programming knowledge is required to use the program; texts need not be pretreated by the researcher.

3) The contents of all program dictionaries can be scanned by the user.

4) Batch-processing permits thousands of passages to be run at once; both small and large input files are handled in a consistent manner.

5) Diction compares a given text's features to a data base of 20,000 previously analyzed texts; output produces both raw and standardized scores.

6) The program "learns" each time a text is analyzed, thereby increasing its processing speed with later texts.

7) Diction permits up to ten custom dictionaries to be created by the researcher for specific purposes; high frequency word or character counts can also be enumerated upon request; verbal and numerical output is customizable.
8) The program's numeric output can be immediately transported into standard statistical packages.

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9) To help with later analysis, the user may add an Alpha-Numeric Identifier at the top of an input file. Once a search is completed, the Alpha-Numeric Identifier will be the first piece of data to appear in the numeric file.

10) The user may also use a descriptive identifier to mark a passage in the program's report file.

11) An extensive on-line help system is built into the program; in addition, a complete user's manual as well as 800-number and e-mail support are available.

Program Restrictions: All passages must be converted into text-only format to be processed. Also, at the discretion of the user, Diction will analyze (a) only the first 500 words of a given passage or (b) any passage up to 5,000 words in length. In the latter case, DICTION will automatically break up the passage into 500-word segments. Passages shorter than 500 words can also be processed and the user can elect to have either raw or extrapolated scores reported.

Dictionaries: Diction's word lists lie at the heart of the program. By design, no individual word is duplicated in the thirty-one dictionaries, thereby permitting a comprehensive examination of a given passage. Because its dictionaries are general ones, the program is not discipline or subject-matter dependent.

* Source: Hart (2001)

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Appendix C
Environment concern screen for KLD ratings on corporate social performance*

ENVIRONMENT	
Concerns	
Hazardous Waste	The company's liabilities for hazardous waste sites exceed $50 million, or the company has recently paid substantial fines or civil penalties for waste management violations. Before 1996 the threshold for liabilities was $30 million.
Regulatory Problems	The company has recently paid substantial fines or civil penalties for violations of air, water, or other environmental regulations, or it has a pattern of regulatory controversies under the Clean Air Act, Clean Water Act or other major environmental regulations.
Ozone Depleting Chemicals	The company is among the top manufacturers of ozone depleting chemicals such as HCFCs, methyl chloroform, methylene chloride, or bromines.
Substantial Emissions	The company's legal emissions of toxic chemicals (as defined by and reported to the EPA) from individual plants into the air and water are among the highest of the companies followed by KLD.
Agricultural Chemicals	The company is a substantial producer of agricultural chemicals, *i.e.*, pesticides or chemical fertilizers.
Climate Change	The company derives substantial revenues from the sale of coal or oil and its derivative fuel products, or the company derives substantial revenues indirectly from the combustion of coal or oil and its derivative fuel products. Such companies include electric utilities, transportation companies with fleets of vehicles, auto and truck manufacturers, and other transportation equipment companies. KLD began assigning concerns for this issue in 1999.
Other Concern	The company has environmental problem not specifically covered in KLD's categories, usually an environmental accident.

* Source: KLD Research & Analytics, Inc. (2003)