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Agency and Responsibility: A Linguistic Analysis of Culpable Acts in Retraction Notices

Abstract

Informed by image repair theory, this study examines grammatical resources used to represent agents of retraction-engendering acts in retraction notices (RNs). A corpus of 250 RNs from two broad disciplinary groupings and authored by different stakeholders was analyzed to determine if agents of retraction-engendering acts were identified and how linguistically visible they were made. It was found that agents of culpable acts were identified in only 44.40% of the RNs and that agent-obscuring grammatical resources were deployed about 3.35 times more frequently than agent-identifying ones. Furthermore, the hard-discipline RNs authored by journal authorities identified agents of culpable acts significantly less frequently and less explicitly than both the hard-discipline RNs from authors of retracted publications and the soft-discipline RNs written by journal authorities. These results suggest that choices of grammatical resources in RNs are influenced by a complex web of factors, including different retraction stakeholders' varied communicative purposes, their image repair efforts, their relation to the reprehensible acts, and legal considerations. These findings warrant further attention to language use in RNs as a high-stakes genre.

Keywords: retraction notice; linguistic representation of agency; culpability; image repair; discipline; authorship

1. Introduction

Retraction of academic publications has been drawing increasing scholarly attention since the late 1990s. The prevalence and severity of the phenomenon is disturbing, to say the least. Retraction has plagued a great majority of the disciplinary groupings listed by the Web of Science (Grieneisen & Zhang, 2012), and the number of retractions is forever on the rise (Fang, Steen, & Casadevall, 2012; Lu, Jin, Uzzi, & Jones, 2013; Steen, Casadevall, & Fang, 2013). To date, as documented in The Retraction Watch Database (retractiondatabase.org), more than 18,000 publications have been retracted (Brainard, You, & Bonazzi, 2018). High-profile cases of retraction (see Feldwisch-Drentrup, 2017; Stigbrand, 2017) and repeat offenders (see Lei & Zhang, 2018; Retraction Watch, n.d.) cause uproars from both the scientific community and the general public. Disconcertingly, retracted publications even continue to be cited positively post retraction (Bar-Ilan & Halevi, 2017; Bolboacă, Buhai, Aluaş, & Bulboacă , 2019; Davis, 2012), which leads to the retraction of the citing publications (Accili & Valenti, 2005; Bertholf & Ghezzi, 2018), distortions of academic metrics (Madlock-Brown & Eichmann, 2015; Teixeira Da Silva & Dobránszki, 2018), and a waste of limited academic resources.

Retraction is intended as a mechanism for correcting the scientific literature and ensuring its integrity (Wager, Barbour, Yentis, & Kleinert, 2009). In most cases, it is through retraction notices (RNs) that the mechanism of retraction operates. Drawing on RNs as their major data sources, extant studies have investigated various aspects of the phenomenon of retraction, but only a few of them (Hesselmann & Reinhart, 2019; Marcus & Oransky, 2015; Authors, 2018, in press) have examined RNs from a linguistic perspective. RNs constitute a high-stakes academic genre (Authors, in press) because of their close association with academic misconduct (Budd, Abritis, & Coble, 2016; Fang et al., 2012; Lei & Zhang, 2018; Moylan & Kowalczuk, 2016), potential severe consequences (Azoulay, Bonatti, & Krieger, 2017; Lu et al., 2013; McCook, 2016; Oransky, 2014a; Salam, 2013; Stern, Casadevall, Steen, & Fang, 2014), and an inevitable tarnishing of the image and reputation of those held responsible for retractions (Authors, in press).

Retractions are made for various reasons, and misconduct is reported to account for the majority of retractions in many disciplines (Fang et al., 2012; Grieneisen & Zhang, 2012; Resnik & Dinse, 2013). To better correct the scientific literature, the Committee on Publication Ethics (COPE) recommends that RNs should disclose reasons for retraction, namely retraction-engendering acts (Wager et al., 2009). However, sizeable proportions (5–32.6% reported in different studies) of RNs do not follow the recommendation (Bilbrey, O'Dell, & Creamer, 2014; Fang et al., 2012; Nath, Marcus, & Druss, 2006; Wager & Williams, 2011). Whatever the reason for retraction, at least one person must have committed a retraction-engendering act that has led to the retraction. Consequently, to better deter potential offenders, RNs should not only disclose reasons for retraction but also identify agents of retraction-engendering acts. However, there are widespread concerns with such disclosures and identifications. A telling case is an American researcher, mentioned in Van Noorden (2011), who volunteered to retract a paper due to an honest error early in his career. Talking to *Nature* about the retraction many years later,

when his career was well established, the researcher still requested not to disclose either his name or any details of the retraction. This anecdote points to the potentially image-tarnishing nature of retraction-engendering behaviors and the undesirable visibility of their agents.

According to image repair theory (Benoit, 2015), individuals and organizations make efforts to repair their image through verbal communication when accused or suspected of having committed image-damaging wrongdoing. The extent to which one's image is damaged depends on his or her level of responsibility for the wrongdoing; that is, the more accountable one is held for an instance of misconduct, the more seriously tarnished his or her image is (Benoit, 2015). In the case of retraction, to what extent the image of the authors of retracted publications can be damaged would conceivably depend in no small measure on how their culpability is represented in RNs. Representing responsibility for retraction involves disclosing what acts led to the retraction and who committed them. When retraction-engendering acts are made known in RNs, their agents can be either identified or obscured, depending in part on RN writers' needs for image repair. As journal authorities (i.e., journal editors and publishers) are rarely involved in a retraction-engendering act (Grieneisen & Zhang, 2012; Authors, 2018) and work as gatekeepers of academic integrity, they would have no vested interest in obscuring authors' responsibility for retraction by hiding their agency in culpable acts. Rather, there appears to be good reason for them to make explicit the agents of responsibility to deter potential offenders and curb the undesirable phenomenon of academic retraction (Cox, Craig, & Tourish, 2018). Guilty authors, on the other hand, would have their image tarnished if their culpability is disclosed and, consequently, could be motivated to conceal their agency in retraction-engendering acts. However, the concomitantly threatened image of innocent co-authors would plausibly benefit from clearly demarcating responsibility for retraction and explicitly identifying their guilty co-authors. The potential responses of the various parties to a retraction that are mooted here would be interpretable in terms of Benoit's (2015) image repair theory and consistent with his recommendation that blame should be apportioned when a wrongdoing is a result of joint efforts of more than one person. In a similar spirit, the COPE retraction guidelines (Wager et al., 2009) propose that RNs should distinguish between the guilty authors of retracted publications and their innocent co-authors if not all the authors are responsible for the retraction-engendering acts.

Agent as a term in Systemic Functional Grammar (SFG) is defined by Halliday and Matthiessen (2004) as the entity that causes the actualization of a process. The Agent answers the question of "who or what brought the happening about" (Martin, Matthiessen, & Painter, 2010, p. 110). In other words, linguistic agency assignment refers to the ascription of an action or change of an event to one or more entities that are held accountable for it (Dowty, 1991). As agency and responsibility are closely linked (Lamb, 1991; Lamb & Keon, 1995; Marcel, 2003), there is good reason to expect RN writers to deploy various grammatical devices to modulate the agency of retraction-engendering acts both in line with the prioritized communicative purposes of their RNs and in protection of their threatened image. This study set out to verify this expectation empirically.

The English language provides a variety of grammatical devices for representing different degrees of agency in an act. In active-voice clauses, the Agent is highlighted as the Subject (e.g., *the first author fabricated the data*), whereas the Agent of passive-voice clauses may or may not be explicitly presented. When presented, the Agent is introduced by a prepositional phrase that functions as an Adjunct (e.g., *the data was manipulated by the first author*). When left unindicated, the Agent as a necessary participant in the process is perceived as being present (Halliday & Matthiessen, 2004), making it possible to ask "by whom or what is the process caused?" (e.g., *the data was manipulated*). Middle-voice clauses (e.g., *attempts to reproduce the reported data failed*), or what Stubbs (1996) calls ergative intransitive constructions, leave out the Agent and present a process as being self-engendered, thus removing agency or causality. Another strategy for concealing agency is to use active verbs with inanimate subjects (Master, 1991), as illustrated by *Much of the paper summarized other articles without citation*. Still another strategy is nominalization (Halliday & Martin, 1993), a central form of grammatical metaphor which creates abstractions (Lukin, Butt, & Matthiessen, 2004). The deployment of nominalizations (e.g., *the article is retracted due to data fabrication*) may render the Agent of a process irretrievable grammatically or contextually (Hodge & Kress, 1979).

The aforementioned grammatical resources for representing Agents have been integrated into a cline of agent visibility by Martínez (2001). The cline has been adopted as an analytical framework for investigating impersonality in experimental research articles, based on the observation by many scholars (e.g., Halliday & Martin, 1993; Henderson & Hewings, 1990; Hodge & Kress, 1979; Stubbs, 1996) that the use of agentless structures "contributes to abstraction and consequently to impersonality" (Martínez, 2001, p. 233). In a similar vein, Dreyfus (2017) proposes to differentiate clause structures by degree of responsibility assigned to them linguistically. In Dreyfus' cline of responsibility, effective clauses in the active voice assign the greatest responsibility, followed in decreasing magnitude by effective clauses in the passive voice with an Agent, effective clauses in the passive voice without an Agent, and clauses in the middle voice. Unlike Martínez's hiearchy of agent visibility, Dreyfus' cline of responsibility excludes nominalization.

The two clines described above were integrated into an agency/responsibility scale (see Figure 1) of grammatical voice and nominalization constructions to investigate whether agents of retraction-engendering acts are identified and how their responsibility for retraction-engendering acts are assigned linguistically in RNs. Notably, our scale included a type of construction not found in either Martínez's or Dreyfus' cline, that is, nominalization constructions in which the Agent of a process is explicitly represented (e.g., *The article has been retracted due to the first author's manipulation of data*). In this study, agency/responsibility of retraction-engendering acts is defined as the extent to which agents of retraction-engendering acts are grammatically specified in RNs. The more explicitly the agent of a retraction-engendering act is specified, the more clearly the responsibility for the retraction-engendering act is ascribed to the agent. Since there are various grammatical means for representing the agency/responsibility of retraction-engendering acts, the use of one means rather than another to

represent such agency/responsibility is unlikely to be a result of writing on the spur of the moment but may very well be "a goal-directed, purposeful, and intentional activity" (Benoit, 2015, p.15) reflecting self-interests and motives lying deep. Thus, empirical research that explores the grammatical representation of agency at the intersection of responsibility and image has the potential to shed light on the psychological considerations involved in penning RNs and provides a novel way of using linguistic analysis to understand academic misconduct in particular and the psychology of responsibility and ethics in general. It should be noted, however, that more often than not, the psychological considerations do not emanate from any one actor but diverse stake-holders involved in the complex process of writing and issuing such high-stakes texts as RNs.

Agency/responsibility		Grammatical device
Highest level		Agent + Active Voice
		Passive Voice + Agent
		Nominalization with an Agent Marker
		Passive Agentless Construction
		Active Agentless Ergative Construction
		Active Verb with an Inanimate Subject
Lowest level		Nominalization without an Agent Marker

Figure 1. *Cline of agency identification and responsibility assignment*

Since no published research has investigated how agency of retraction-engendering acts is represented grammatically, the present study started with two hypotheses. The first one was that there would be authorship-based variations in the representation of agency/responsibility in RNs. Specifically, RNs authored by journal authorities would be more likely to identify agents of retraction-engendering acts than those by authors of retracted publications would. Accordingly, agency/responsibility would be higher in the former and lower in the latter. Based on image repair theory, it is reasonable to expect authors of retracted publications to tone down or even obscure their agency in retraction-engendering acts to minimize damage to their image. By contrast, journal authorities, as gatekeepers of academic integrity and stakeholders who are not personally responsible for the retraction-engendering acts, have good reason to disclose reasons for retraction unreservedly and identify the agents of the retraction-engendering acts explicitly so as to effectively correct the scientific literature and deter potential offenders. The second hypothesis was that there would be cross-disciplinary differences in agent identification and agency/responsibility in RNs. This hypothesis was based on previous studies that reported systematic cross-disciplinary variations in the obscuration of authorial identity in RNs (Authors, 2018), in the rhetorical strategies deployed in RNs for image repair (Authors, in press), and in various academic genres other than RNs, as reviewed comprehensively by Hyland (2006). It was also motivated by the possibility that RNs are greeted with varying ignominy in different disciplines and

result in varying severity of image damage, hence increased or reduced pressure to obscure agency/responsibility.

This study set out to test the two hypotheses by investigating how authors of retracted publications as agents of retraction-engendering acts are represented in RNs from two broad disciplinary groupings (i.e., hard and soft disciplines) and authored by different stakeholders (i.e., journal authorities and authors of retracted publications). The following research questions were formulated to guide the study:

1. What grammatical resources are utilized to represent the agency of retraction-engendering acts in RNs produced by journal authorities and authors of retracted publications, respectively?
2. Do RNs vary in agent identification and agency/responsibility representation by authorship?
3. Do RNs vary in agent identification and agency/responsibility representation by discipline?

2. Methodology

2.1. Data collection and corpus construction

To investigate potential cross-disciplinary differences, RNs from four subject areas in the Web of Science Core Collection were selected, namely Cell Biology, Business, Finance, and Management. These four subject areas were included for three main reasons. First, Cell Biology is a hard discipline, whereas Business, Finance, and Management are soft disciplines (Becher & Trowler, 2001; Hyland, 2012; Kolb, 1981). Second, according to the records archived by the Retraction Watch database at the time of data collection for this study, these focal disciplines were the hard and soft disciplines with the largest numbers of retractions, respectively. The three closely related soft disciplines were selected because none of them alone yielded sufficient RNs for inferential statistical analyses. Third, in terms of scholarly publication and ethics, differences have more often been found between hard and soft disciplines than within the hard or soft groupings (Authors, 2015).

The RNs examined in this study came from a corpus of 370 RNs collected for a larger research project. They were all the RNs in the four focal disciplines indexed in the Web of Science Core Collection database and were published between 1966 and March 2017, when the data collection was completed. Of these RNs, 301 were from Cell Biology and 69 from Business, Finance, and Management. Using the criteria for identifying RN authorship developed by Authors (2018), 114 and 87 RNs from the hard discipline of Cell Biology were determined as being authored by journal authorities and authors of retracted publications (hereafter HD-BJ and HD-BA RNs, respectively). Of the 69 RNs from the soft disciplines of Business, Finance, and Management, 54 were identified as being authored by journal authorities (hereafter SD-BJ RNs), but none could be unambiguously attributed to authors of retracted publications. One SD-BJ, two HD-BA, and two HD-BJ RNs were issued not solely due to retraction-engendering acts by authors of retracted publications. Although an analysis of retraction-engendering acts committed by individuals other than authors of retracted publications could contribute to a comprehensive understanding of the linguistic representation of research-engendering acts, those five RNs were not included in the present dataset for two reasons. First, there were too few retraction-

engendering acts committed by stakeholders other than authors of retracted publications to make any reliable or representative comparisons. Second, and more importantly, it was necessary to hold the agents of retraction-engender acts constant to test our two hypotheses. Thus, a corpus of 250 RNs comprising three sub-corpora (i.e., SD-BJ = 53; HD-BJ = 112; HD-BA = 85) was constructed for this study. Notably, all the RNs in each sampled discipline that met the authorship criteria were included in our study. Although the sizes of the three sub-corpora were relatively small, they were complete samples for the disciplines involved and, consequently, could be taken to be representative of the disciplines (Pratt, Raiffa, & Schaiffer, 1995). However, we did recognize that the sample sizes could affect the chances of finding statistically significant associations or differences.

2.2. Data coding and analysis

In this study, retraction-engendering acts were operationalized as acts that were responsible for the retraction of published journal articles. In line with SFG (Halliday & Matthiessen, 2004), retraction-engendering acts were construed as experiential happenings through clauses at different rank levels (i.e., clause simplex, included clause, and embedded clause) and nominalizations. Therefore, every clause or nominalization serving that grammatical function was identified as an instance of reporting a retraction-engendering act. Notably, a clause may include more than one instance of reporting retraction-engendering acts. For instance, in the clause simplex *As a result of this error, the authors incorrectly calculated key fit statistics* (SD-BJ-005), the nominalization *error* and the remaining text were identified as two separate instances of reporting retraction-engendering acts.

To code agency/responsibility, the cline of agency/responsibility presented earlier in Figure 1 was adopted as a coding scheme. As summarized in Table 1, seven grammatical means were included in the cline to represent levels of agency/responsibility in a decreasing order. They were treated as a 7-point ordinal scale to yield Agency/Responsibility Scores (ARSs), that is, measurements of relative agency/responsibility. Thus, each instance of reporting a retraction-engendering act in the corpus received an ARS based on the grammatical means used to represent agency/responsibility. In addition to the cline of agency/responsibility, a binary metric of agent identification (i.e., agent-identifying vs. agent-obscuring) was derived from the seven grammatical means (see the "AI" column in Table 1). The binary metric and the cline-based scores provided somewhat different but complementary perspectives on the data. The binary metric was used to determine how frequently agents of retraction-engendering acts were explicitly identified in the RNs, but it did not capture variations on either side of the binary. Such variations were better captured by the cline-based scores, which provided a more graded view of the observed pattern. Note that only those retraction-engendering acts committed by authors of retracted articles were coded. Furthermore, expressions of retraction-engendering acts quoted by journal authorities in their RNs (n = 13; 5.20%) from authors of retracted publications were excluded from the coding and subsequent analyses because they were not linguistic output from the journal authorities themselves and thus may not be fully indicative of how the journal authorities would independently

represent the culpable acts. Such exclusions made our data set homogenous and were necessary to test our hypotheses. However, it is worth pointing out that if the number of RNs with direct quotations from authors had been sufficiently large to allow the quantitative identification of robust patterns, journal authorities' stylistic decisions to include direct quotations in their RNs could have been factored into this study as an important variable to yield insights into how it would shape the linguistic assignment of responsibility.

Table 1. Grammatical means for representing agency/responsibility

ARS	AI	Grammatical means with illustrative examples
7	Yes	Agent + Active Voice Dr. [XXX] fabricated the data used in this study.... (SD-BJ-052)
6	Yes	Passive Voice + Agent Original data were processed inappropriately by the first author of the paper. (HD BA-062)
5	Yes	Nominalization with an Agent Marker The author has been inconsistent in his treatment of the variables. (SD-BJ-046)
4	No	Passive Agentless Construction Some of the primary data were erroneously or artificially presented in the paper. (HD-BA-027-S1)
3	No	Active Agentless Ergative Construction … how this error [in the reported data] occurred. (HD-BA-054)
2	No	Active Voice with an Inanimate Subject This paper plagiarizes a paper published in Stem Cells…. (HD-BJ-008-S2)
1	No	Nominalization without an Agent Marker Inspection of Figure 3 revealed inappropriate duplications of exemplar current traces. (HD-BA-087)

Note. ARS = agency/responsibility score; AI = agent identification; yes = agent-identifying; no = agent-obscuring

To establish coding reliability, the second author and an invited graduate student versed in SFG undertook a coding exercise. As part of the exercise, the invited coder was given training in identifying clauses construing retraction-engendering acts and in coding their agency/responsibility. The training was conducted with 20% of the RNs randomly selected from each of the three sub-corpora. Subsequently, the two coders independently coded another 20% of the RNs similarly sampled. Cohen's kappa showed excellent inter-coder agreement ($k = .813$). All disagreements were resolved through discussion between the two coders. Given the robust inter-coder reliability estimates, the second author coded all the remaining RNs independently.

To address the three research questions, both descriptive and inferential statistics were computed. Specifically, to find out what grammatical resources were used by journal authorities and authors of retracted publications to represent the agency of retraction-engendering acts in RNs, descriptive statistics were generated for the frequencies of different grammatical constructions by RN authorship

(i.e., HD-BA vs. HD-BJ). To determine whether the RNs varied in agent identification by authorship and discipline, two Chi-square tests were run on the absence/presence of explicitly specified agents in the RNs to compare the HD-BA and HD-BJ sub-corpora and the HD-BJ and SD-BJ sub-copora, respectively. Finally, to assess whether the RNs varied in agency/responsibility by authorship and discipline, two Mann-Whitney U tests were performed on the overall ARSs to compare the HD-BA and HD-BJ sub-corpora and the HD-BJ and SD-BJ sub-corpora, respectively. Independent-samples *t*-tests were not used because the scores were not normally distributed. The overall ARS of an RN was the sum of ARSs for all the instances of reporting retraction-engendering acts in the RN divided by the total number of the instances in question.

3. Results

3.1. Grammatical resources used to represent agency/responsibility of retraction-engendering acts

As can be seen from Table 2, a total of 1,322 instances of reporting retraction-engendering acts committed by authors of retracted publications were identified in the corpus (HD-BA = 438; HD-BJ = 369; SD-BJ = 515), averaging 5.28 per RN for the whole corpus, 5.15 for the HD-BA sub-corpus, 3.29 for the HD-BJ sub-corpus, and 9.72 for the SD-BJ sub-corpus. All the seven types of grammatical device that can represent agency/responsibility of retraction-engendering acts were deployed in the three sub-corpora, but their frequencies varied widely. Nominalizations without Agent Markers, indicating the lowest level of agency/responsibility, were employed more often than all the other six grammatical means in the two hard-discipline sub-corpora (i.e., HD-BA and HD-BJ). The frequencies of Agent + Active Voice constructions, indicating the highest level of agency/responsibility, ranked fourth in the entire corpus as well as the two sub-corpora of RNs authored by journal authorities (i.e., HD-BJ and SD-BJ) and third in the HD-BA sub-corpus. Agents were explicitly identified in a small minority (23.00%) but obscured in a great majority (77.00%) of the coded instances of reporting retraction-engendering acts in the whole corpus. In other words, agent-obscuring grammatical resources were deployed about 3.35 times more frequently than agent-identifying ones. Similar patterns were observed in the three sub-corpora (HD-BA: 23.74% vs. 76.26%; HD-BJ: 16.26% vs. 83.74%; SD-BJ: 27.18% vs. 72.82%). Agents of retraction-engendering acts were identified in only 44.40% (n = 111) of the RNs in the corpus (HD-BA = 48, HD-BJ = 28, and SD-BJ = 35). Within the 111 agent-identifying RNs, instances of obscuring agents of retraction-engendering acts were 1.99 times more than those of identifying agents, and similar discrepancies were found across the three sub-corpora (HD-BA = 1.88; HD-BJ = 1.56; SD-BJ = 2.25). Agents of retraction-engendering acts were distinguished from their innocent co-authors in only 29.60% (n= 74) of the RNs in the corpus (HD-BA = 24, HD-BJ = 20, and SD-BJ = 30). Notably, 5.60% (n = 14) of the RNs (HD-BJ = 3; SD-BJ = 11) retracted single-authored publications, and only 4 of them (HD-BJ = 1; SD-BJ = 3) explicitly identified agents of retraction-engendering acts probably because even without such identifications the sole authors of the retracted

publications could be assumed to be responsible for the acts.

Table 2. Descriptive statistics for grammatical means representing agency/responsibility

Grammatical means	HD-BA (RNs = 85)		HD-BJ (RNs = 112)		SD-BJ (RNs = 53)		Corpus (RNs = 250)	
	n	%	*n*	%	*n*	%	*N*	%
Agent + Active Voice	75	17.12	40	10.84	73	14.17	188	14.22
Passive Voice + Agent	18	4.11	6	1.63	7	1.36	31	2.34
Nominalization with an Agent Marker	11	2.51	14	3.79	60	11.65	85	6.43
Passive Agentless Construction	53	12.10	60	16.26	104	20.19	217	16.41
Active Agentless Ergative Construction	10	2.28	10	2.71	15	2.91	35	2.65
Active Voice with an Inanimate Subject	122	27.85	103	27.91	151	29.32	376	28.44
Nominalization without an Agent Marker	149	34.02	136	36.86	105	20.39	390	29.50
Subtotal	438	100	369	100	515	100	1322	100

Note. HD-BA = RNs produced by authors of retracted publications and published in Cell Biology; HD-BJ = RNs authored by journal authorities and published in Cell Biology; SD-BJ = RNs authored by journal authorities and published in Business, Finance, and Management

3.2. Variations in agent identification

Two Chi-square tests were run, respectively, to determine whether there were authorship-based and cross-disciplinary variations in agent identification. As summarized in Table 3, the first Chi-square test found a statistically significant association between RN authorship and identification of agents of retraction-engendering acts, indicating that the HD-BA RNs identified the responsible agents markedly more frequently than the HD-BJ RNs did. The phi coefficient (φ) represented a medium effect size for the magnitude of the association. The corresponding odds ratio showed that the HD-BA RNs were 3.89 times more likely to identify agents of retraction-engendering acts than the HD-BJ RNs were, as illustrated by Examples 1 and 2. Using one Passive Voice + Agent and two Agent + Active Voice constructions (underlined), Example 1 identifies the agents three times. By contrast, Example 2 obscures the agent through two constructions: Passive Agentless Construction and Nominalization without an Agent Marker.

Example 1

We were unable to reproduce data presented in Figures 4 and 6C of the paper, which were generated by JGP when he was in CDOC's laboratory. Specifically, we have been unable to reproduce immunoblots indicating that …. (HD-BA-001)

Example 2

After a thorough investigation this article was found to contain substantial sections that were taken from a Ph.D. thesis (…) without proper attribution and acknowledgement. (HD-BJ-013)

The second Chi-square test also found a statistically significant association between disciplinary background and agent identification in the RNs authored by journal authorities, with the soft-discipline

RNs (i.e., the SD-BJ sub-corpus) being far more likely to identify the agents of retraction-engendering acts than their hard-discipline counterparts (i.e., the HD-BJ sub-corpus). The phi coefficient marked the association as one of a medium effect size. As indicated by the related odds ratio, the SD-BJ RNs were 5.83 times more likely to identify the agents of retraction-engendering acts than the HD-BJ RNs were. As an illustration, Example 3 from the SD-BJ sub-corpus identifies the agent through two Agent + Active Voice constructions (underlined), whereas Example 4 from the HD-BJ sub-corpus avoids identifying the culpable agent by using a Passive Agentless construction:

Example 3

The retraction is on the grounds of the authors' advice that they made an error in relation to the level of analysis used. As a result of this error, the authors incorrectly calculated key fit statistics…. (SD-BJ-005)

Example 4

The Publisher and Editor retract this article in accordance with the recommendations of the Committee on Publication Ethics (COPE). After a thorough investigation we have strong reason to believe that the peer review process was compromised. (HD-BJ-024)

Table 3. Results of Chi-square tests with the Yates correction

Comparison	*N*	*df*	χ^2	*p*	φ	Odds Ratio
HD-BA vs. HD-BJ	197	1	18.892	<.001	-.320	HD-BA: HD-BJ = 3.89
HD-BJ vs. SD-BJ	165	1	23.958	<.001	.394	SD-BJ: HD-BJ = 5.83

3.3. Variations in agency/responsibility

Table 4 presents descriptive statistics for the ARSs of the RNs by sub-corpus. On a 7-point scale, the mean ARS for the whole corpus was only 2.73, indicating rather low agency/responsibility in the RNs examined in this study. Of the three sub-corpora, the average ARS of the HD-BJ sub-corpus was lower than those of the HD-BA and SD-BJ sub-corpora. Two Mann-Whitney U tests were run, respectively, to determine if the RNs varied significantly in agency/responsibility by discipline and authorship. As summarized in the first row of Table 5, a statistically significant difference in agency/responsibility was found between the RNs by authors of retracted publications (the HD-BA sub-corpus) and those by journal authorities (i.e., the HD-BJ sub-corpus), with the former exhibiting greater agency/responsibility than the latter. The corresponding *r* value indicated a medium effect size. As can be seen in Table 2, the greater agency/responsibility in the HD-BA sub-corpus resulted mainly from its relatively more frequent use of two types of Agent-marking construction (i.e., Agent + Active Voice; Passive Voice + Agent) and the HD-BJ sub-corpus' relatively greater use of two types of Agentless construction (i.e., Passive Agentless Construction and Nominalization without an Agent Marker), as illustrated by Examples 1 and 2 above. Specifically, the ARS for Example 1 is 6.67 ([7+6+7] / 3), more than twice higher than that for Example 2, which is 2.50 ([4+1] / 2).

Table 4. Descriptive statistics for ARSs by sub-corpus

Sub-corpus	*n*	*M*	*SD*	*Mdn*
HD-BA	85	2.99	1.45	2.75
HD-BJ	112	2.24	1.56	2.00
SD-BJ	53	3.34	1.53	3.00
Total	250	2.73	1.58	2.40

A statistically significant difference in agency/responsibility was also found between the hard-discipline RNs authored by journal authorities (i.e., the HD-BJ sub-corpus) and their soft-discipline counterparts (i.e., the SD-BJ sub-corpus), with the latter showing markedly higher agency/responsibility than the former. The difference was of a medium effect size and resulted mainly from the SD-BJ sub-corpus' relatively more frequent use of constructions with Agents (i.e., Agent + Active Voice; Nominalization with an Agent Marker) and the relative high frequency of agentless nominalizations in the HD-BJ sub-corpus, as demonstrated by Examples 2 and 3. As an illustration, the ARS for Example 3 is 7.00 ([7+7+7] / 3), in contrast to the ARS of 2.50 for Example 2.

Table 5. Results of Mann-Whitney U tests

Comparison	*n*	*U*	*Z*	*p*	*r*	*Mean rank*	
HD-BA vs. HD-BJ	197	3,401.5	-3.463	.001	-.25	HD-BA = 122.0	HD-BJ = 79.0
HD-BJ vs. SD-BJ	165	1,794.0	-4.107	<.001	-.32	SD-BJ = 107.5	HD-BJ = 65.0

4. Discussion

4.1. Grammatical resources used to identify agents and represent agency/responsibility

As reported in the preceding section, agents of retraction-engendering acts were clearly identified in only 23.00% of the instances that reported retraction-engendering acts in the whole corpus. Accordingly, only 44.40% (n = 111) of the 250 RNs in our corpus explicitly specified one or more culpable agents. Although all the grammatical means for representing agency/responsibility summarized in Figure 1 and Table 1 were utilized in our corpus of RNs, agent-obscuring grammatical resources (i.e., Passive Agentless Construction, Active Agentless Ergative Construction, Active Voice with an Inanimate Subject, and Nominalization without an Agent Marker) were deployed about 3.35 times more frequently than agent-identifying ones (i.e., Agent + Active Voice, Passive Voice + Agent, and Nominalization with an Agent Marker). Even within the 111 RNs where culpable agents were identified, agent-obscuring grammatical resources were used 1.99 times more frequently than agent-identifying ones. As a result, the mean ARS for the whole corpus was only 2.73 on a 7-point scale (see Table 4), indicating a rather low level of agency/responsibility.

The low rate of agent identification and the low agency/responsibility could be attributed to a number of factors. Here we focus on two of these factors, leaving the remainder to the following two

subsections. One of the factors concerns the causes of retraction and their negative impact on the image (i.e., reputation or face) of the authors of retracted publications (Benoit, 2015). Previous research has revealed that although research can be retracted for honest errors, the majority of retractions were due to various forms of academic misconduct. For instance, in a comprehensive examination of 4,449 retracted publications, Grieneisen and Zhang (2012) found that research misconduct (fraudulent/fabricated data and others) and publishing misconduct (e.g., plagiarism, duplicate publication, and authorship issues) accounted for 20% and 46% of those retractions, respectively. Similarly, Fanelli et al. (2015) found that over 67% of 2,047 biomedical and life-science research articles were retracted due to suspected fraud (43.4%), duplicate publication (14.2%), and plagiarism (9.8%). These reprehensible forms of conduct can invoke great ignominy because they indicate that the offenders are "morally or intellectually inferior" (Benoit, 2015, p. 8). Consequently, they are likely to "prompt attempts at image repair" (Benoit, 2015, p. 1). One such response is distancing, that is, accepting the existence of an offense but trying to weaken the link between the offender and the offense (Coombs & Holladay, 1996). In the context of RNs, distancing can be achieved by admitting a retraction-engendering act without identifying the agent. Where a retraction involves a co-authored article (e.g., 94.4% of the RNs in our dataset retracting co-authored publications), this distancing strategy could lead to a situation where the audience perceives a reprehensible act but cannot link it unambiguously to any of the authors concerned, hence allowing the offenders to get off the hook and minimizing the threat to their image (Benoit, 2015).

The other factor has to do with the dire consequences of retracting research for academic misconduct. Previous studies have found that misconduct-related retraction can lead to an immediate, severe, and long-lasting decline in the subsequent citations of the culpable authors' pre-retraction unproblematic publications (Azoulay et al., 2017; Furman, Jessen, & Murry, 2012; Lu et al., 2013). Furthermore, retraction may incur financial losses and decreased opportunities for funding (Stern et al., 2014). A years-long or even life-long publishing ban may be imposed on authors of retracted articles. For instance, a researcher was banned from publishing in *Journal of Business Ethics* for five years because of duplicate publication in the journal (Michalos, 2013), and two other researchers were "no longer welcome to submit any future papers to the *Canadian Journal of Chemistry*, and their institution has been informed of this decision" as a punishment for plagiarism (Canadian Journal of Chemistry, 2014, p.267). More serious than publishing bans, academics may end up resigning or even having their careers terminated because of high-profile cases of retraction (see McCook, 2016; Oransky, 2014b). To explicitly identify the agents of retraction-engendering acts in RNs is to make the authors concerned liable to these undesirable consequences. As Schlenker (1980) points out, the more reprehensible an act (a retraction-engendering act, in our case) is, "the greater the negative repercussions for an actor" (p.131). Given the severity of the impending consequences, it would be in the culpable authors' interest to avoid identifying the agents of retraction-engendering acts and "exploit the ambiguity in language" (Benoit, 2015, p.27).

4.2. Authorship-based differences in agent identification and agency/responsibility representation

One of the hypotheses tested in this study was that RNs would vary systematically in the representation of agency/responsibility by authorship. It was reasoned that culpable authors of retracted publications would attempt to minimize damage to their image by deploying grammatical resources at their disposal to linguistically obscure their agency/responsibility in the RNs, whereas journal authorities as gatekeepers of scientific integrity and non-participants in the retraction-engendering acts would prioritize the correction of the contaminated literature and deterrence of potential offenders by singling out culpable agents in their RNs. As reported in the preceding section, statistically significant differences in agent identification and agency/responsibility were indeed found in our dataset but were opposite to the hypothesized direction. In other words, the HD-BA sub-corpus identified the agents of culpable acts relatively more frequently and exhibited greater agency/responsibility than the HD-BJ sub-corpus did. These findings, while unexpected and counter-intuitive, could still be interpreted in terms of image repair theory (Benoit, 2015). They could be attributed to two groups of factors related to authors of retracted publications and journal authorities, respectively.

Two author-related factors seem to have contributed to the more frequent agent identifications and greater agency/responsibility in the HD-BA sub-corpus than the HD-BJ sub-corpus. First, a need/desire to protect innocent authors' image appeared to be at work. As Benoit (2015, p.22) argues, "it seems reasonable to assume that a person's reputation will suffer in proportion to the extent to which they are personally or individually held responsible for the undesirable action". Thus, the innocent co-authors of retracted publications had a genuine need to protect their image. According to Benoit (2015), an effective image repair strategy for an innocent individual is to deny responsibility for the reprehensible act and provide supporting evidence. In the context of RNs, this strategy can take the form of publicly distinguishing the guilty authors from their innocent co-authors. The need/desire to protect the innocent authors' reputation could explain why 28.24% (24/85) of the RNs by authors of retracted publications identified the culpable agents and distinguished them from their innocent co-authors, in contrast to the much smaller proportion (i.e., 17.86%; 20/112) of the RNs by journal authorities that did so. This need would be more strongly felt when more serious forms of academic misconduct were involved (Benoit, 2015). This was consistent with what we found in our data: 75.00% (18/24) of the HD-BA RNs that distinguished the guilty authors from the innocent ones involved more serious forms of academic misconduct (e.g., data manipulation and plagiarism), in contrast to the 25.00% (6/24) that involved less serious forms of retraction-engendering acts. A 2 x 2 Chi-square test with the Yates correction found a statistically significant association between agent identification and severity of academic misconduct, $\chi^2 (1, N = 48) = 10.08, p = .001, \varphi = .500$. The odds ratio indicated that the HD-BA RNs involving more serious academic misconduct were nine times more likely to distinguish guilty and innocent authors than those HD-BA RNs that involved less serious retraction-engendering acts.

Second, some guilty authors could have voluntarily identified themselves as responsible for the

retraction-engendering acts either because they anticipated more serious consequences of denying their responsibility or because they were remorseful and wanted to repair their tarnished image by adopting an ethical response. Evading responsibility by deliberately denying (i.e., hiding) one's relation to a retraction-engendering act could conceivably lead to more severe outcomes (e.g., institutional investigations) and greater ignominy. For instance, when contacted by a journal to explain alleged misconduct, a professor in Taiwan did not provide a satisfactory explanation, which led to his university being notified of the allegation and requested to conduct an investigation. The subsequent institutional investigation resulted in the retraction of 60 papers by the professor and the termination of his academic career (Oransky, 2014b). As Benoit (2015, p.40) points out, "in addition to being unethical, using denial when the accused is guilty may well backfire when the truth emerges". Some culpable authors might have been aware of such possible developments and want to "nip the problem in the bud" by accepting their responsibility. Other guilty authors might have repented of their action and taken the ethical and, often, more effective approach to repair their damaged image by accepting their responsibility, taking corrective action, and engaging in mortification (Benoit, 2015).

Three factors, on the other hand, could plausibly explain the less frequent agent identification and lower agency/responsibility in the RNs penned by journal authorities. First, none of the publications retracted by the RNs in our corpus was due to the journal authorities' faults, which means that their image was not threatened and that they were not under any pressure to distance themselves by explicitly identifying the offenders. In the words of Benoit (2015, p.20), "it is not reasonable to form an unfavorable impression of a person who is not responsible for [a reprehensible] act". Second, even though some journal authorities may have wished to deter prospective offenders by publicly exposing the guilty authors, it would have been difficult for them to identify the offenders without the willing cooperation of the latter or "the legal powers to sieze or peruse lab notes or any other raw date that is not voluntarily submitted by the authors" (Williams & Wager, 2013, p. 8). Given the complexity of the task and the unfavorable circumstances, offender misidentification would be likely and could result in litigation by the affected authors (Wager et al., 2009). Unless they had clear evidence, it was unlikely for journal authorities to single out suspected offenders. This explanation is supported in part by our data. Of the 20 RNs where the journal authorities identified the culpable authors, 13 were based on the results of institutional investigations. Third, journal authorities could have prioritized the correction of the literature (by identifying retraction-engendering acts) over the punishment of the offenders in line with the COPE guidelines on retraction (Wager et al., 2009). Admittedly, it is impossible to determine which of the aforementioned factors were at work in the absence of first-hand accounts from the journal authorities.

4.3. Cross-disciplinary differences in agent identification and agency/responsibility

Our hypothesis about cross-disciplinary variation in agent identification and agency/responsibility was confirmed by our dataset. Specifically, the journal authorities in the soft disciplines of Business,

Finance, and Management identified agents of retraction-engendering more frequently and construed higher agency/responsibility than their counterparts in the hard discipline of Cell Biology did. These cross-disciplinary differences could be attributed to three factors. First, because retractions are much less frequent in soft disciplines than in hard disciplines (Grieneisen & Zhang, 2012), they tend to generate much greater ignominy in soft disciplines (Authors, 2018). Consequently, the journal authorities in the soft disciplines of Business, Finance, and Management were conceivably under greater pressure to demarcate responsibility clearly and engage in "third party image repair" (Benoit, 2015, p.12) for the innocent authors. Second, as soft disciplines' method of inquiry and object of study (i.e., human behavior) make it more difficult to ascertain academic misconduct and the resultant need to retract publications (Authors, 2018), retractions in these disciplines more often result from institutional disciplinary investigations that have confirmed misconduct. In this study, 66.04% (35/53) of the RNs in the SD-BJ sub-corpus followed from institutional investigations, in contrast to the much lower 28.57% (32/112) in the HD-BJ sub-corpus. Backed by the evidence provided by such investigations, it would be much easier and safer for the soft-discipline journal authorities to identify the wrongdoers and make them highly visible in an effort to repair the image of their journals tarnished by publishing research subsequently retracted. Finally, the different numbers of repeat offenders (i.e., with more than one retraction) in the SD-BJ and the HD-BJ sub-corpus appeared to contribute to more frequent agent identifications and greater agency/responsibility in the former. Repeat offenders were involved in 73.58% (39/53) of the SD-BJ RNs but only in 55.36% (62/112) of the HD-BJ RNs. Notably, the top three repeat offenders accounted for 60.00% (21) of the 35 agent-identifying RNs in the SD-BJ sub-corpus. Thus, the greater ease with which these repeat offenders could be identified, the stronger justifications available, and a concomitantly reduced risk of litigation seemed to enable the soft-discipline journal authorities to identify such offenders more readily in their RNs.

5. Conclusion

This study has examined the use of various grammatical resources to identify agents of retraction-engendering acts and represent agency/responsibility in RNs from two broad disciplinary groupings and authored by different stakeholders. It has found that culpable agents were identified in only a minority of the RNs and that agent-obscuring grammatical resources were deployed much more frequently than agent-identifying ones. Furthermore, the hard-discipline RNs authored by journal authorities identified agents of retraction-engendering acts significantly less frequently and less explicitly than both the hard-discipline RNs from authors of retracted publications and the soft-discipline RNs written by journal authorities. A number of factors, including the ignominious causes and serious consequences of retractions, various considerations of authors of retracted publications and journal authorities, disciplinary contexts, and the complexity of determining academic misconduct, have been identified as contributors to the observed patterns of use of the various grammatical resources as well as authorship-based and cross-disciplinary differences. Interpreting these factors through the lenses of image repair

theory (Benoit, 2015), we have shown that apart from serving the purpose of correcting the contaminated literature, RNs are also goal-directed, reasoned actions that capitalize on the ambiguity afforded by language "to repair, reduce, redress, or prevent damage to [the stakeholders'] image" (p. ix). Our findings demonstrate how a combination of image repair theory and a principled linguistic analysis can shed light on the psychology of agency and responsibility lying deep in high-stakes academic genres such as RNs

Further research on RNs from a linguistic perspective can examine other linguistic resources that are abundant in the genre, for example, evaluative language (Martin & White, 2005), to explore how various types of attitude are construed in relation to authorial and disciplinary considerations and on the basis of audience analysis (Benoit, 2015). Future research may also explore how different causes of retraction (e.g., honest error, editorial mistake, authorship dispute, plagiarism, and fraud) influence the representation of attitude, agency, and responsibility in RNs. Given the varying severity of such misbehavior and the concomitant differing intensity of the threat to a stakeholder's image, there is good reason to expect that causes of retraction constitute a major source of influence on the use of lexico-grammatical and rhetorical resources in RNs. Furthermore, because our focus on a single hard discipline (i.e., Cell Biology) and three soft disciplines (i.e., Business, Finance, and Management), as well as the relative small sizes of our sub-corpora, does not warrant a claim about the generalizability of our findings to hard and soft disciplines in general, future investigations should include other hard and soft disciplines to determine if our findings can be corroborated in a broad spectrum of disciplinary fields. Finally, since writing and issuing such high-stakes texts as RNs is a highly complex process and involves different stakeholders, our lack of access to process data and multiple stakeholders' perspectives is a limitation of this study. Accordingly, researchers interested in investigating RNs from a psychological perspective would benefit from collecting process data and incorporating various insiders' perspectives into the research design. As evidenced in our study, a discourse analyst's perspective alone may not be equipped to determine which of several equally plausible explanations pinpoint the real causes. Although it is extremely difficult to gain access to authors of RNs because of the high sensitivity and intrusiveness of the research topic, as we have found out in our attempts to approach potential participants, it would be invaluable to interview even just a few revelatory cases to provide an emic perspective that can triangulate and complement the etic perspective of a discourse analyst. A multi-perspectival, process-based study of this nature is positioned to develop a richer understanding of RNs as a high-stakes genre.

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