Disciplinary and Paradigmatic Influences on Interactional Metadiscourse in Research Articles

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Abstract

This comparative study draws on an interpersonal model of metadiscourse to examine disciplinary and paradigmatic influences on the use of interactional metadiscourse in the post-method sections of 120 research articles. These research articles were drawn from three social science disciplines (i.e., applied linguistics, education, and psychology) and two research paradigms (i.e., quantitative and qualitative research). Quantitative analyses showed that the applied linguistics and education research articles used boosters more frequently than the psychology research articles. Furthermore, the applied linguistics subcorpus deployed more reader references but fewer self-mentions than the psychology subcorpus. Cross-paradigmatic comparisons revealed that the quantitative research articles made more frequent use of hedges, boosters, attitude markers, engagement markers as a main type, and directives as a subtype than the qualitative research articles. Qualitative analyses identified additional cross-disciplinary and cross-paradigmatic differences in the choice or function of specific metadiscoursal resources. These observed differences are attributable to the knowledge-knower structures characteristic of the disciplines and the epistemologies underlying the research paradigms.

Keywords: applied linguistics; education; interactional metadiscourse; psychology; qualitative research; quantitative research

1. Introduction

Metadiscourse is a construct grounded in the fundamental understanding of discourse as a form of social engagement. It refers to rhetorical and pragmatic expressions whereby "we project ourselves into our discourses by signalling our attitude towards both the content and the audience of the text" (Hyland, 2005a, p.4). Along with an increasing recognition of their important functions in connecting writer, reader, and text, such self-reflexive expressions have attracted much attention in research on academic discourse (Aguilar, 2008; Hyland, 2005b). Previous studies have shown that the use of metadiscourse in academic communication can be influenced by such factors as discipline (e.g., Abdi, 2002; Hyland, 2005b; Khedri, Heng, & Ebrahimi, 2013), language/culture (e.g., Loi & Lim, 2013; Mur Dueñas, 2011), and genre (e.g., Kuhi & Behnam, 2011). Much of the extant research on metadiscourse has focused on the academic genre of research article (RA) because it is a key genre for knowledge creation and communication that are shaped by complex social interactions in academic discourse communities (Hyland, 2009; Swales, 1990). Building on this line of research, the present study draws on Hyland's (2005a) interpersonal model of academic metadiscourse to examine

disciplinary and paradigmatic influences on the use of metadiscoursal resources in published qualitative and quantitative RAs across the disciplines of applied linguistics, education, and psychology.

Hyland's model distinguishes between interactive and interactional metadiscourse. While the former comprises self-reflexive expressions (e.g., *as noted earlier, by contrast, therefore*) for managing the flow of information and "addressing how writers guide readers by anticipating their likely reactions and needs," the latter consists of linguistic resources (e.g., *importantly, in our opinion, undoubtedly*) for writers to make "explicit interventions to comment on and evaluate material" (2005a, p.44) and to involve imagined readers collaboratively in textual construction. This study focuses on interactional metadiscourse because these resources, by affording RA writers various means of marking their presence, negotiating knowledge claims, and engaging their readers, lie at the very core of academic communication as socio-rhetorical activity. Arguably, the same consideration has motivated previous cross-disciplinary research on various types of interactional metadiscourse in RAs across a spectrum of academic disciplines (e.g., Abdi, 2002; Harwood, 2005a, 2005b; Hyland, 1998, 2001a, 2001b, 2005b; Lafuente-Millán, 2010, Peacock, 2006). Notably, the bulk of this research compared the use of interactional resources between hard and soft disciplines (Becher & Trowler, 2001). For example, Hyland (2005b) examined interactional metadiscourse in 240 RAs from eight disciplines straddling the hard/soft division and reported that RAs from the soft disciplines used interactional metadiscourse more frequently than RAs from the hard disciplines. Differences between hard and soft disciplines were also reported for specific types of interactional resources: hedges (Abdi, 2002; Hyland, 1998, 2005b; Vold, 2006), boosters (Hyland, 1998, 2005b; Peacock, 2006), attitude markers (Abdi, 2002; Giltrow, 2005), self-mentions (Harwood, 2005a; Hyland, 2001b; Lafuente-Millán, 2010), and engagement markers (Hyland, 2001a, 2002b, 2005b). Taken together, the findings from these cross-disciplinary studies point to disciplinary variation in the use of interactional metadiscourse.

Although the extant research has produced robust evidence of different deployment of interactional metadiscourse between hard and soft disciplines, little attention has been given to how disciplines falling on either side of the hard/soft divide may vary from each other in their use of interactional resources. Such a research focus is needed because the dichotomous grouping of knowledge domains as hard or soft, as Becher and Trowler (2001) acknowledge, is a broad-brush characterization that necessarily overlooks "the evident differences between and within their constituent subjects" (p.39). For example, the humanities and the social sciences have their own dominant "knowledge structures" (Bernstein, 1999, p.162) that utilize specialized modes of inquiry and different "languages of legitimation" (Maton, 2000, p.149), namely, discursive practices for constructing and validating knowledge claims. In response to the relative paucity of research on cross-disciplinary metadiscoursal variation within knowledge domains broadly characterized as hard or soft, this study set out to examine the use of interactional metadiscourse across three social science

disciplines.

In contrast to the growing body of research on disciplinary influences, there is a paucity of empirical investigations into the use of interactional metadiscourse across different research paradigms. A research paradigm has been broadly defined as "a basic set of beliefs that guides action" in disciplined inquiry (Guba, 1990, p.17). Quantitative and qualitative research, with their fundamentally different ontological and epistemological assumptions, constitute two major rival paradigms in the social sciences (Cohen, Manion, & Morrison, 2011; Guba, 1990). Briefly, the quantitative paradigm subscribes to (post)positivism, assuming that there is an independent social reality and that genuine knowledge can be gained only through objective means (Creswell, 2009). By contrast, the qualitative paradigm adopts anti-positivist and constructivist epistemologies, holding that there exist multiple socially-constructed realities which can best be understood from an emic perspective (Cohen et al., 2011). Two exploratory studies (i.e., Firestone, 1987; Hansen, 1988) suggested that paradigmatic thinking may shape rhetorical conventions of academic communication. Based on a textual analysis of a qualitative and a quantitative research report he co-authored, Firestone (1987) noted that although they presented educational research on the same issue, the two reports employed very different persuasive strategies. While the qualitative report persuaded by describing in rich detail "people acting in events," the quantitative report adopted the rhetorical strategy of portraying "a world of variables and static states" (p.19). Paradigm-based differences in rhetorical conventions were also reported by Hansen (1988), who compared a report of a sociological survey with an ethnographical inquiry. The former text conveyed epistemic tentativeness by qualifying its conclusions, in contrast to the latter's greater assertiveness and authoritativeness in its knowledge claims. Such differences in discursive practices, as Hansen (1988) suggested, can be ascribed to paradigmatic assumptions about "what can be known, how it can be known, and how certainly it can be known" (p.207). Two interview-based studies by Harwood (2006, 2007) examined the use of one type of metadiscourse – personal pronouns – by political scientists from various research traditions. While they all used personal pronouns in their RAs to achieve a number of textual effects (Harwood, 2007), they also reported distinct, research paradigm-based tastes for pronoun use, for example, positivist-minded political scientists' preference for pronoun-free RAs vs. political philosophers' use of personal pronouns to add a personal tenor to their academic writing (Harwood, 2006). Despite the close link between the paradigm and language of research suggested by the aforementioned studies, how different types of interactional metadiscourse may vary across the qualitative and quantitative research paradigms remains an unanswered question.

To bridge the research gaps identified above, this study was designed to examine both disciplinary and paradigmatic influences on the use of interactional metadiscourse in the post-method sections of RAs in applied linguistics, education, and psychology. These disciplines were selected not only because they embrace both qualitative and quantitative paradigms but also because they are under-represented in existing research on interactional metadiscourse. The focus on the post-method sections

of RAs was motivated by two considerations. First, merging the *Results*, *Discussion*, *Conclusion*, and/or other equivalent components of an RA into a single post-method section would overcome the problem of considerable structural variation in a corpus of RAs and make it possible to compare their functionally equivalent parts across the different disciplines and paradigms. Second, because it is the locus of knowledge construction and disciplinary conversation, the post-method section is likely to occasion active and rich use of interactional metadiscourse. Thus, this study aimed to answer the following questions:

1. Is there disciplinary variation in the use of interactional metadiscourse among the post-method sections of RAs in applied linguistics, education, and psychology?
2. Is there paradigmatic difference in the use of interactional metadiscourse between the post-method sections of qualitative and quantitative RAs?

2. Methodology

2.1 Corpus

To address our research questions, we built a corpus of 120 RAs in applied linguistics, education, and psychology. Within each discipline, we focused on a subfield: language teaching and learning in applied linguistics, learning and instructional science in education, and counseling and clinical research in psychology. The decision to focus on a single subfield of each discipline was motivated by previous research (e.g., Harwood, 2006; Ozturk, 2007) which found considerable discoursal and rhetorical variation across subdisciplines of the same field. Given such variation, as Harwood (2006) rightly pointed out, "distinguishing between writing practices only at the disciplinary level is an oversimplification" (p.443). The three specific subfields were selected because of their embrace of both qualitative and quantitative research. Our focus on these subfields, however, would also mean that our empirical findings may not be generalizable to other subfields of the three disciplines.

For each subfield, we consulted disciplinary experts, previous research on disciplinary paradigms (e.g., Alise & Teddlie, 2010; Kidd, 2002; Richards, 2009), and five-year impact factors provided by ISI Web of Science (2011) to identify four peer-reviewed English-medium journals of international prestige. The journals selected for applied linguistics were *Applied Linguistics, Language Learning, TESOL Quarterly*, and *The Modern Language Journal*. The four education journals were *American Educational Research Journal, Instructional Science, Journal of the Learning Sciences*, and *Learning and Instruction.* The psychology journals included *Journal of Abnormal Psychology, Journal of Consulting and Clinical Psychology, Journal of Counseling Psychology,* and *Professional Psychology: Research and Practice*. To build our corpus, we extracted all full-length empirical research reports from the selected journals for the period of 2007 – 2011. Next, we drew on Creswell's (2009) characterizations of qualitative, quantitative, and mixed methods research in social and educational research and developed a coding scheme that classified RAs as qualitative, quantitative, or mixed methods on the basis of the global research design, instrument(s) of data collection, type(s) of collected data, and method(s) of data analysis adopted in the reported studies. A miscellaneous

category was added to the coding scheme because some RAs in the target pool did not provide sufficient information to allow a confident decision. The second author of this article and a PhD candidate specializing in scholarly publishing used the coding scheme to classify a randomly selected subset of the RAs from the aforementioned journals independently. Given perfect inter-coder agreement, the second author coded all the remaining RAs. Finally, we used computer-generated random numbers to select 20 quantitative and 20 qualitative reports from the respective pools of quantitative and qualitative RAs identified for each discipline to include in our corpus. The post-method sections of the selected RA were converted into the plain text format for corpus analysis after block quotations, figures, tables, excerpts of data, footnotes/endnotes, and reference lists were removed. Table 1 summarizes the descriptive statistics for the corpus by discipline and paradigm.

2.2 Analytical framework

To identify interactional metadiscourse in our corpus, we adopted Hyland's (2005a) taxonomy of interactional resources in his interpersonal model of metadiscourse. Hyland's classification of interactional metadiscourse has been used in many studies of academic discourse (e.g., Abdollahzadeh, 2011; Del Saz-Rubio, 2011; Gillaerts & Van de Velde, 2010) and comprises five types of interactional resources that "help control the level of personality in a text as writers acknowledge and connect to others, pulling them along with their argument, focusing their attention, acknowledging their uncertainties and guiding them to interpretations" (Hyland, 2005a, p.52). Table 2 presents the main types and subcategories of interactional metadiscourse in our analytical framework that are illustrated with examples from our corpus.

Hedges constitute a main type of interactional metadiscourse and are used in scholarly writing to mitigate writers' commitment toward propositional content (Hyland, 2005a) or to attenuate the imposition of face-threatening acts (Myers, 1989). In academic discourse, hedges can be realized by a variety of lexico-grammatical forms, such as epistemic modal verbs (e.g., *could, may*), lexical verbs (e.g., *appear, claim*), adjectives and adverbs (e.g., *plausible, probably*), nouns (e.g., *likelihood, possibility*), and other linguistic expressions for marking qualification (e.g., *in general, to some extent*). The importance of hedges in academic writing has been well documented in many studies (e.g., Hyland, 1998; Myers, 1989; Salager-Meyer, 1994; Skelton, 1997; Vold, 2006). A judicious use of hedges enables writers to present their knowledge claims with appropriate qualification and construct the dual authorial identity of "humble servants" (Myers, 1989, p.4) of their disciplines and originators of new knowledge.

Antithetical to hedges, the second main type of interactional metadiscourse in our analytical framework – boosters – increases writers' degree of certainty regarding propositional content. Like hedges, however, boosters in written discourse are realized by epistemic modal verbs (e.g., *must*), lexical verbs (e.g., *demonstrate, prove*), adjectives and adverbs (e.g., *undisputed, undoubtedly*), nouns (e.g., *fact, certainty*), and other emphatic expressions (e.g., *without a doubt*). As illustrated by the examples, boosters "allow writers to close down alternatives, head off conflicting views and express

their certainty in what they say" (Hyland, 2005a, p.52). The appropriate use of boosters in academic writing can not only accentuate writers' epistemic stance but also promote solidarity with readers (Hyland, 1998; Peacock, 2006; Skelton, 1997).

Attitude markers are mainly used to express writers' evaluative and affective stance toward propositions. Lexico-grammatical resources that can function as attitude markers include deontic modals (e.g., *have to, should*), attitudinal adjectives (e.g., *desirable, unfortunate*), affective adverbs (e.g., *interestingly, surprisingly*), and other expressions conveying stance or evaluation (e.g., *what is important, it is necessary*). These devices encode explicitly positive or negative affect/evaluation such as "surprise, agreement, importance, obligation, frustration, and so on" (Hyland, 2005a, p.53). The expression of authorial evaluation and attitudes can reflect the value system or ideology of a particular disciplinary community (Thetela, 1997). Consequently, attitude markers can help writers persuade readers by foregrounding shared attitudes and values.

Like attitude markers, self-mentions indicate author presence. They allow writers to intrude directly into their discourse to mark authorial identity explicitly (Hyland, 2001b). Such explicit self-references are made through the use of first-person pronouns (e.g., *we, I*), possessive determiners (e.g., *our, my*), and third-person nominal phrases (e.g., *the present author*). Self-mentions can fulfill different interpersonal functions in RAs, ranging from discourse organization to marking the writer's role in the research to negotiating knowledge claims (e.g., Harwood, 2005a, 2005b; Hyland, 2002a; Lafuente-Millán, 2010). As Hyland (2001b) points out, they provide a useful rhetorical strategy for accentuating a writer's own contribution.

Finally, engagement markers "refer to the various ways writers bring readers into the discourse to relate to them and anticipate their possible objections" (Hyland, 2005a, p.151). As a main category of interactional metadiscourse, engagement markers comprise five subtypes of devices for explicitly involving readers in a virtual dialogue (Hyland, 2001a). Directives instruct readers to act or see things in a particular way through the use of imperatives (e.g., *recall, suppose*), obligation modals (e.g., *should, ought to*), and *it*-clauses containing predicative adjectives (e.g., *it is important to remember*). Reader references acknowledge readers' presence and address them as participants in knowledge-making by the use of second-person pronouns (*you, your*), inclusive first-person pronouns (*we, our*), indefinite pronouns (*one*), and other reader-referring expressions (e.g., *the reader*). Questions refer to both rhetorical and real questions asked to engage readers overtly (e.g., *Is it necessary to distinguish…?*). Appeals or references to shared knowledge are expressions that are used to position readers within shared disciplinary understanding and bring them to agreement with writers' argument (e.g., *it is all too obvious that….*). Personal asides are comments that interrupt the flow of text and are directly addressed to readers. They typically occur within parentheses or between dashes to engage readers in an interpersonal dialogue (e.g., *the policy initiative – a misguided effort, in my opinion – gave rise to….*). As revealed by previous research (e.g., Hyland, 2001a, 2005b; McGrath & Kuteeva, 2012), the strategic use of engagement markers in RAs can enhance rhetorical persuasiveness by

engaging readers in the active construction of knowledge.

2.3 Data coding and analysis

Using O'Donnell's (2012) UAM CorpusTool (version 2.8), a free computer program for annotating text at multiple levels, we manually coded all instances of interactional metadiscourse in our corpus. We did not conduct automated searches for metadiscoursal realizations due to two considerations. First, whether a linguistic form is an instance of metadiscourse depends crucially on the context in which it occurs (Hyland, 2005a). For example, the verb *show*, when used to mean "display" in Example 1, is not a metadiscoursal expression, but the same verb is a booster in Example 2, where it expresses epistemic certainty.

(1) Figure 1 **shows** the flow of participants from screening through follow-up. (PSY/QUAN13)

(2) The present study **shows** that this assumption is not justified. (EDU/QUAN9)

Second, because metadiscourse is multifunctional (Hyland, 2005a), no one-to-one correspondence can be mapped between a linguistic form and a metadiscoursal function. For example, the modal verb *should* can function as a hedge when expressing an epistemic meaning (Example 3), as an attitude marker when expressing a deontic meaning (Example 4), and as a directive when explicitly addressed to readers (Example 5). A specific metadiscoursal expression may fulfill different functions which can only be identified according to its co-text.

(3) Among the four positions, the first position **should** show no difference in RT because the two versions of a sentence were identical up to this point. (APL/QUAN1)

(4) In this case, facilitators **should** intervene if they see a problem, but the intervention should be strategic. (EDU/QUAL20)

(5) First, it **should** be noted that there were no significant interaction effects…. (PSY/QUAN15)

Preliminary data coding started with the inventory of interactive metadiscoursal features compiled by Hyland (2005a) and supplemented by exemplars identified in previous research. As the preliminary coding went on, the expanded list of metadiscoursal features was revised iteratively until there were no further changes to it. The second author and the aforementioned PhD student then used the finalized inventory to independently code about 7.5% of the data (i.e., 9 RAs randomly selected from the corpus). Prior to coding the data, the PhD student received several sessions of training in using the coding scheme. Inter-coder agreement was assessed with Cohen's kappa statistics for the five main types of interactional metadiscourse separately. The obtained kappa statistics were .97 for hedges, .71 for boosters, .91 for attitude markers, .98 for self-mentions, and .96 for engagement markers. Based on guidelines proposed by Landis and Koch (1977), these kappa values indicated substantive to almost perfect agreement. The disagreements between the two coders were resolved through discussion. Because the inter-coder reliability was acceptable, the second author coded all the remaining data.

We conducted both quantitative and qualitative analyses of the coded instances of interactional metadiscourse. The quantitative analyses included a series of two-way ANOVAs run with IBM-SPSS

(version 21.0) to compare disciplinary (applied linguistics vs. education vs. psychology) and paradigmatic (quantitative vs. qualitative) effects on the normalized frequencies (per 1,000 words) of the various types of interactional metadiscourse included in our analytical framework. When a significant main effect of discipline was detected, post hoc tests with the Bonferroni correction were run to make pairwise comparisons between the three disciplines. The alpha was set at .05 for all main statistical tests. The qualitative analyses consisted in examining each coded instance of interactional metadiscourse in its context and identifying salient patterns of qualitative differences and similarities across the disciplines and the paradigms.

3. Results

Table 3 summarizes the descriptive statistics for the main types and subtypes of interactional metadiscourse by discipline and paradigm. As the standard deviations suggest considerable variability within the disciplines, Appendix A provides a frequency table showing how all the metadiscoursal features were distributed across the individual RAs by discipline and paradigm. In the following sections, we present the results of our quantitative and qualitative analyses by the main types of interactional metadiscourse included in our analytical framework.

3.1 Hedges

The ANOVA run on hedges yielded a nonsignificant main effect of discipline, $F(2, 114) = 0.406$, $p = .667$, $\eta_p^2 = .007$, showing that hedges occurred equally frequently in the applied linguistics (M = 9.33, SD = 4.66), education (M = 8.60, SD = 4.50), and psychology (M = 9.13, SD = 4.42) subcorpora. However, a significant effect of paradigm was found, $F(1, 114) = 54.843$, $p < .001$, $\eta_p^2 = .325$, with the quantitative RAs (M = 11.56, SD = 4.48) using hedges more frequently than the qualitative RAs (M = 6.48, SD = 2.78). The effect size indicated that paradigm accounted for 32.5% of the variance in the frequencies of hedges, far exceeding Cohen's (1988) benchmark for a large effect size ($\eta_p^2 = .138$). The discipline/paradigm interaction was nonsignificant, $F(2, 114) = 0.657$, $p = .521$, $\eta_p^2 = .011$.

Textual analyses did not identify any salient qualitative differences in the rhetorical functions of hedges across the disciplines or the paradigms. Hedges mainly served four important functions. First, they were commonly used to mitigate authorial commitment to knowledge claims or conclusions. As Example 6 illustrates, a typical way of doing so was to attribute claims to inanimate subjects (e.g., *results, findings*). This strategy of yoking inanimate nouns and epistemic verbs (e.g., *suggest, indicate*) allowed the RA writers to conceal their subjectivity behind the data and present the knowledge claims as if the data could speak for themselves. Second, hedges were also frequently used to negotiate alternative explanations of empirical results, hence opening up a dialogic space and entertaining diverse viewpoints (Example 7). Third, as illustrated by Example 8, hedges were sometimes deployed to speculate on research limitations. By admitting potential liabilities of their research, the RA writers pre-empted possible criticisms from others. Finally, hedges often cohered with discussions of practical implications and recommendations for further research (Examples 9 and 10). Since directing others to action and further research could be face-threatening, the use of hedges

helped the RA writers reduce the degree of imposition.

(6) The results **suggest** that the degree of vocabulary coverage required depends on the degree of comprehension required. (APL/QUAN12)

(7) One **could** argue that the deficit in selective attention is also due to dysfunctional perceptual organization. (PSY/QUAN4)

(8) Several limitations apply to the generality of these findings. First, our subjects were college students, and **it is possible** that the effects observed here **might** be muted or even absent with much younger students. (EDU/QUAN5)

(9) However, the study also **may** have practical implications, which we make cautiously because of the size of the sample. (EDU/QUAN20)

(10) Future investigations **could** also pursue more in-depth analysis of the performance among members of Group 3. (APL/QUAL4)

3.2 Boosters

The ANOVA on boosters detected a significant effect of discipline, $F(2, 114) = 17.932$, $p < .001$, $\eta_p^2 = .239$, and a significant effect of paradigm, $F(1, 114) = 34.225$, $p < .001$, $\eta_p^2 = .231$. Post hoc Bonferroni tests revealed that both the applied linguistics RAs ($M = 2.97$, $SD = 1.45$) and the education RAs ($M = 3.14$, $SD = 1.89$) used markedly more boosters ($p < .001$ in both cases) than the psychology RAs ($M = 1.54$, $SD = 1.06$). The former two subcorpora did not differ significantly ($p = 1.000$). Furthermore, boosters were deployed more frequently in the quantitative RAs ($M = 3.25$, $SD = 1.86$) than in the qualitative ones ($M = 1.85$, $SD = 1.04$). No significant discipline/paradigm interaction was found, $F(2, 114) = 2.804$, $p = .065$, $\eta_p^2 = .047$.

Our further textual analyses identified no differences in the discourse functions of boosters among the disciplines, though there appeared to be disciplinary preferences for particular linguistic forms. For example, both the applied linguistics and education RAs clearly preferred *show* over other expressions (Examples 11 and 13), but it occurred infrequently in the psychology RAs. In both the qualitative and the quantitative RAs, the most common function of boosters was to increase authorial commitment to knowledge claims. There were, however, paradigm-based preferences for specific boosters. While the epistemic verb *show* was the most frequent booster in the quantitative RAs (Example 11), the modal verb *will* occurred most frequently in the qualitative RAs (Example 12). In addition, the specific uses of *show* seemed to differ between the two paradigms. The verb was more likely to underscore statements based on statistical results in the quantitative RAs (Example 11), but was typically used in the qualitative RAs to present interpretations of qualitative evidence (Example 13).

(11) The Chi-square analysis **showed** that there was no statistical effect of the prior belief on the selection of experiments. (APL/QUAN6)

(12) Along this road, trainees **will** find that they are by turns excited, afraid, motivated, confused, inspired, and angry – and they **will** catalyze many of those same feelings in their family and

friends. (PSY/QUAL17)

(13) I have **shown** that Mr. Thompson did not assign tasks or engage in activities precisely as instructed by the NLS curricular materials. (EDU/QUAL8)

3.3 Attitude markers

The ANOVA on attitude markers did not locate a significant effect of discipline, $F(2, 114) = 0.589$, $p = .556$, $\eta_p^2 = .010$, indicating similar frequencies of these interactional resources in the applied linguistics ($M = 1.95$, $SD = 1.17$), education ($M = 1.66$, $SD = 1.19$), and psychology ($M = 1.81$, $SD = 0.94$) subcorpora. However, a significant effect of paradigm was found, $F(1, 114) = 6.021$, $p = .016$, $\eta_p^2 = .050$, with the quantitative RAs ($M = 2.04$, $SD = 1.17$) making more frequent use of attitude markers than the qualitative RAs ($M = 1.56$, $SD = 0.97$). The effect size barely fell short of Cohen's (1988) criterion for a medium effect ($\eta_p^2 = .059$). No significant paradigm/discipline interaction was detected, $F(2, 114) = 1.343$, $p = .265$, $\eta_p^2 = .023$.

Although our textual analyses did not reveal any apparent qualitative differences across the three disciplines, the two paradigms appeared to differ in the attitudinal parameters of expectability and obligation. The quantitative RAs typically evaluated research results as either expected or unexpected against a priori hypotheses through such attitude markers as *it is (not) surprising*, *surprisingly*, and *as expected* (Examples 14 and 15). Obligation was realized mainly through deontic modal verbs (e.g., *should*, *need*, *must*). In academic discourse, such modal verbs can be divided into knowledge and field deontics. According to Giltrow (2005, p.177), knowledge deontics are "expressions of obligation to do with carrying out research" (see Example 16), and field deontics consist of "expressions of obligation to do with carrying out actions in the world" (see Example 17). While the quantitative RAs used more knowledge deontics in making prescriptive suggestions for further research, the qualitative RAs used more field deontics to obligate the readers to act on research-attested knowledge.

(14) **It is somewhat surprising** that there was no significant relationship between total scores on career-sustaining behaviors and emotional exhaustion. (PSY/QUAN15)

(15) **As expected**, when reading in Spanish, the high-exposure group's kernel recall is significantly better than the low-exposure group's recall. (APL/QUAN10)

(16) Future research **needs** to explore these additional factors. (PSY/QUAN1)

(17) Furthermore, not only **should** instructors learn about their students, but they **must** also be cognizant of the metanarratives circulating within their own professional groups and communities. (APL/QUAL3)

3.4 Self-mentions

The ANOVA on self-mentions detected a significant effect of discipline, $F(2, 114) = 3.186$, $p = .045$, $\eta_p^2 = .053$. Post hoc comparisons revealed a significant difference ($p = .039$) between the psychology subcorpus ($M = 4.34$, $SD = 3.23$) and the applied linguistics one ($M = 2.68$, $SD = 2.76$), though neither differed significantly ($p = .681$ for the former; $p = .580$ for the latter) from the education subcorpus ($M = 3.54$, $SD = 2.92$). Paradigm had no significant effect, $F(1, 114) = 2.011$, p

= .159, η_p^2 = .017, indicating that the qualitative RAs (*M* = 3.12, *SD* = 2.66) and the quantitative ones (*M* = 3.90, *SD* = 3.34) used self-mentions with similar frequencies. The discipline/paradigm interaction was also nonsignificant, $F(2, 114) = 2.107$, $p = .126$, $\eta_p^2 = .036$.

A salient cross-disciplinary difference revealed by our close textual analyses lay in the distributions of different forms of self-mentions. In the applied linguistics RAs, *I* and *my* accounted for approximately 28% of the total self-mentions, whereas exclusive *we* and *our* contributed 69%, a percentage markedly higher than the proportion (i.e., 52.5%) of multiple-authored articles in the applied linguistics subcorpora. In contrast, *I* and *my* accounted for less than 1% in the psychology RAs, and exclusive *we* and *our* made up 98% of the total self-mentions, though only 85% of the psychology RAs were multiple-authored. These patterns are exemplified by Examples 18 and 19.

(18) In this subsection, **I** discuss two very subtle cases of overuse. (APL/QUAN11)

(19) **We** next examined whether there would be the expected sex differences in marital power (i.e., that husbands would possess more power). (PSY/QUAN19)

Our textual analyses also identified four main rhetorical functions of first-person pronouns in the corpus. They were used to (a) structure discourse (Example 20), (b) recount research procedures (Example 21), (c) state results and make knowledge claims (Example 22), and (d) elaborate arguments (Example 23). The first and second functions were more prominent in the qualitative and quantitative RAs, respectively, though no cross-disciplinary differences were noted in this regard.

(20) In the following discussion, **I** focus on this micro-level, analyzing interactional genres and the teacher's use of open questions. (EDU/QUAL8)

(21) **We** conducted a repeated measures ANOVA with speaker L1 (two levels), Word (six levels) and Time (two levels) as within-listener factors. (APL/QUAN9)

(22) **We** found moderate to large effect sizes for most comparisons, reinforcing the practical significance of these findings. (PSY/QUAN3)

(23) Nevertheless, **we** thought it was important to replicate and extend these initial findings for several reasons. (PSY/QUAN2)

3.5 Engagement markers

The ANOVA on engagement markers did not find a significant main effect of discipline, $F(2, 114) = 1.002$, $p = .371$, $\eta_p^2 = .017$, showing that engagement markers as a group occurred with similar frequencies in the subcorpora of applied linguistics (*M* = 2.44, *SD* = 1.77), education (*M* = 2.55, *SD* = 1.73), and psychology (*M* = 2.05, *SD* = 1.65). However, there was a significant effect of paradigm, $F(1, 114) = 3.997$, $p = .048$, $\eta_p^2 = .034$, with the quantitative RAs (*M* = 2.66, *SD* = 1.82) making more frequent use of engagement markers than the qualitative RAs (*M* = 2.04, *SD* = 1.56). The discipline/paradigm interaction was nonsignificant, $F(2, 114) = 1.900$, $p = .154$, $\eta_p^2 = .032$.

Of the five subtypes of engagement markers in Table 3, further statistical analyses (with Bonferroni adjustments) were conducted only on directives and reader references because there were insufficient data for the other subtypes. Discipline did not have a significant effect on the use of

directives, $F(2, 114) = 2.624$, $p = .077$, $\eta_p^2 = .044$, with these metadiscoursal expressions occurring with comparable frequencies in the applied linguistics ($M = 0.95$, $SD = 0.79$), education ($M = 1.46$, $SD = 1.32$), and psychology ($M = 1.44$, $SD = 1.49$) subcorpora. There was a significant effect of paradigm, $F(1, 114) = 16.285$, $p < .001$, $\eta_p^2 = .125$, indicating that the quantitative RAs ($M = 1.70$, $SD = 1.48$) used directives more frequently than the qualitative RAs ($M = 0.87$, $SD = 0.78$). There was also a significant discipline/paradigm interaction, $F(2, 114) = 5.238$, $p = .007$, $\eta_p^2 = .084$. The interaction occurred because although the quantitative RAs showed considerable cross-disciplinary difference, the qualitative RAs lacked such variation.

The directives in our corpus were restricted to a narrow range of imperatives expressing textual acts (e.g., *see*, *refer to*), physical acts (*ask*, *use*), or cognitive acts (*consider*, *note*). Textual acts predominated across the disciplines. A closer analysis showed that textual directives functioned either intertextually or intratextually (Swales, Ahmad, Chang, Chavez, Dressen, & Seymour, 1998). Intertextually, the RA writers referred readers to other texts for further information (Example 24); intratextually, the RA writers directed readers to visual displays or other parts of the same text (Examples 25 and 26). Compared with their qualitative counterparts, the quantitative RAs were more likely to refer readers to visual information, such as tables and figures.

(24) Although a detailed exploration of these constraints is beyond the scope of this article, I do wish to offer a few considerations (also **see** Ashcraft, 2002, 2006). (EDU/QUAL1)

(25) Pre-microgenesis activity normally entails organisational talk and an awareness/consciousness stage, leading to microgenesis affordance (**see** below). (APL/QUAL7)

(26) Simply, our results can be seen along a continuum (**see** Figure 1). (PSY/QUAN9)

The ANOVA on reader references yielded a significant main effect of discipline, $F(2, 114) = 6.260$, $p = .003$, $\eta_p^2 = .099$. Post hoc tests revealed that the applied linguistics RAs ($M = 1.00$, $SD = 1.14$) used significantly more reader references ($p = .002$) than the psychology RAs ($M = 0.36$, $SD = 0.52$), but did not differ significantly ($p = .178$) from the education RAs ($M = 0.66$, $SD = 0.61$). The education and psychology subcorpora, however, did not differ ($p = .317$). No significant effect was found for paradigm, $F(1, 114) = 0.178$, $p = .674$, $\eta_p^2 = .002$, indicating comparable frequencies of reader references in the qualitative RAs ($M = 0.71$, $SD = 0.89$) and the quantitative ones ($M = 0.64$, $SD = 0.79$). Nor was a significant interaction found between paradigm and discipline, $F(2, 114) = 0.632$, $p = .533$, $\eta_p^2 = .011$.

Reader references in our corpus were most frequently realized by inclusive *we*, followed by the indefinite pronoun *one*, and the inclusive determiner *our*, with the pronoun *you* and the referent *reader* occurring only occasionally. Inclusive *we* mainly served three discourse functions: guiding readers through a text (Example 27), orienting readers toward an intended interpretation (Example 28), and calling readers to take certain actions (Example 29). Our textual analyses indicated that the applied linguistics RAs employed inclusive *we* more frequently than the psychology RAs for all three

discourse functions.

(27) **We** now turn to an analysis of subject-verb agreement and tense marking on lexical and nonthematic verbs. (APL/QUAN7)

(28) In Example 7b **we** can see how the player (P) reproduces the same comment during another scene on the following day. (APL/QUAL15)

(29) As professional psychologists, **we** first need to be aware of military enlistment as a potentially significant family context for anyone seeking psychological services. (PSY/QUAL14)

4. Discussion

To facilitate our discussion of the empirical results reported in the previous section, Table 4 summarizes all the statistically significant main effects, interaction effects, as well as post hoc comparisons between the three subdisciplines of language teaching and learning (applied linguistics), learning and instructional science (education), and counseling and clinical research (psychology).

4.1 Disciplinary influences

As Table 4 indicates, there were statistically significant differences in the use of two main types of interactional metadiscourse and a subcategory of a third one across the subdisciplines. Specifically, boosters occurred more frequently in the applied linguistics and education RAs than in the psychology RAs. The latter subcorpus, however, used more self-mentions than the applied linguistics RAs. Furthermore, the applied linguistics subcorpus made more frequent use of reader references (i.e., a subtype of engagement markers) than the psychology subcorpus. These cross-disciplinary differences can be plausibly attributed to the knowledge-knower structures and legitimation codes prevailing in these disciplines (Maton, 2014).[1] Building on Bernstein's (1999) characterization of intellectual fields in terms of horizontal/hierarchical knowledge structures and adding a social dimension of knower structures to disciplinary knowledge-making, Maton (2000, 2014) postulates that disciplines can be located along a continuum ranging from "a knowledge code" at one end to "a knower code" at the other. These two codes, referred to as knowledge-knower structures by Maton, are exemplified by the natural sciences and the humanities respectively. Disciplines dominated by a knowledge code have a more structured hierarchical body of knowledge verified against established scientific principles and procedures. In such academic communities, the backgrounds of the scientists or "knowers" are largely irrelevant. By contrast, disciplines operating with a knower code depend more on the distinct individual characteristics of those constructing disciplinary knowledge. Claims to knowledge tend to be legitimated by appealing to knowers' personal voice, expertise, experience, and authority. Although the three disciplines in this study take the middle ground of the continuum, psychology and applied linguistics lean toward the knowledge and the knower code respectively, with education

[1] This association with discipline-specific knowledge-knower structures should not be taken as ruling out the possibility that other factors might have contributed to the observed patterns of variation in the use of interactional metadiscourse.

falling in between (Harper, 2008; Hood, 2011; Madigan, Johnson, & Linton, 1995).

The higher incidence of boosters in the applied linguistics and education RAs is largely consistent with previous research involving soft disciplines (e.g., Hyland, 1998; Peacock, 2006) and seems to be a function of the knower code at work. Knowledge claims in intellectual fields dominated by the knower code are legitimated by the "unique insight of the knower" (Maton, 2000, p.157), which necessitates a language that persuades by stressing the knower's individual authority and expertise. Boosters, particularly when co-occurring with first-person pronouns (Example 13), assist writers in increasing commitment to their knowledge claims, asserting their authority, and positioning themselves as privileged knowers in their disciplinary communities. Their strong voice helps align readers with their knowledge claims and arguments. In contrast, psychology's stronger orientation to the knowledge code would mean that knowledge legitimation in the discipline may depend more on empirical authority that results from applying universally accepted principles of inquiry and methods of validation than on personal voice or authority. Thus, procedural adequacy and methodological rigor alone could be epistemically persuasive and legitimate new knowledge claims without strong authorial intervention. Consequently, there would be a less need for psychologists to deploy such metadiscoursal resources as boosters to accentuate epistemic conviction.

The knowledge/knower code continuum does not appear to provide a coherent explanation for the higher incidence of self-mentions, particularly exclusive *we* and *our*, in the psychology RAs than the applied linguistics RAs. A historical review of influential writing guides in psychology, however, reveals a more complex relationship. Traditionally, passive and third person constructions were commonplace in psychology RAs (Polyson, Levinson, & Miller, 1982). However, advances of humanistic psychology in the 1970s and the growing recognition of the many subtle ways a researcher could influence empirical research encouraged the use of first-person self-mentions. Thus, the 1974 edition of the American Psychological Association's (APA) *Publication Manual* recommended that first-person references would be appropriate without detracting scientific objectivity. This recommendation notwithstanding, a survey of 147 senior editors of top psychology journals in the early 1980s reported that close to one-third of them preferred the traditional third-personal writing style (Polyson et al., 1982). The reasons given for this preference, for example, the impersonal tone, the emphasis on objectivity, and the appeal to "rationality rather than personal persuasion" (p.336), were reflective of a strong knowledge-code orientation. Subsequent editions of APA's *Publication Manual* became increasingly hostile to the traditional impersonal style. For example, the latest edition exhorts authors to use first-person pronouns because "an experiment cannot *attempt to demonstrate*, *control unwanted variables*, or *interpret findings*, nor can tables or figures *compar*e (all of these can, however, *show* or *indicate*)" (American Psychological Association, 2010, p.69). Since APA's *Publication Manual* has been a most important standardizing influence on "the language of psychology" (Madigan et al, 1995, p.428) and because all four source psychology journals are APA publications that require strict adherence to the *Publication Manual*, it is no surprise that the

psychology RAs used more self-mentions (predominantly exclusive w*e* and *our*) than the applied linguistics RAs. This preference for exclusive w*e* and *our*, however, does not mean that psychology is shifting to the knower code as a discipline. First, multiple-authored RAs (i.e, 85%) in the psychology subcorpus far outnumbered those (i.e., 52.5%) in the applied linguistics subcorpus, and consequently there were more opportunities for the psychologists to use exclusive w*e* and *our*.[2] Second, as pointed out by previous studies (Harwood 2005a, 2005b; Hyland, 2001b, 2002a), exclusive *we* and *our* conveyed lower levels of authorial intervention and personal voice than *I* and *my,* whose frequencies (i.e., less than 1% of the total self-mentions) were extremely low in the psychology RAs. Third, Madigan et al (1995) note that in general APA's *Publication Manual* encourages "a utilitarian view of language in which words are implicitly assumed to function as simple transmitters of information from the writer to the reader" (p.433), a view strongly suggestive of the knowledge code.

Finally, the applied linguists' more frequent use of reader references than the psychologists could also be ascribed to the varying knowledge-knower structures dominating the two disciplines. Metadiscoursal resources such as reader references can be deployed to evoke intersubjectivity, or solidarity, between writer and reader as knowers. This solidarity building is necessary in the knower code because the validity of writers' knowledge claims must be approved by disciplinary readers before they are finally accepted. Therefore, reader references, particularly inclusive *we*, not only help applied linguists "predict and respond to their readers' line of thought" but also "encourage particular reactions to their argument" (Hyland, 2001a, p.558), leading their readers toward preferred interpretations. On the other hand, the stronger knowledge-code orientation of psychology makes the application of scientific procedures and criteria a primary means of validating knowledge claims, arguably reducing the need to employ solidarity-seeking devices such as reader references as a rhetorical strategy for legitimating knowledge claims.

4.2 Paradigmatic influences

As reported earlier, research paradigm (i.e., the distinction between qualitative and quantitative research cutting across disciplines) appeared to exert a greater influence on the use of the metadiscoursal features than disciplinary subfields did. Table 4 shows some intriguing differences in the use of interactional metadiscourse across the two research paradigms. Specifically, the quantitative RAs consistently used more hedges, boosters, attitude markers, engagement markers as a main type, and directives as a subtype than the qualitative RA did.[3] These differences could be

[2] The varying proportions of multiple-authored RAs, however, could not account for all of the marked differences in the percentages of *I/my* (28% for the applied linguistics RAs vs. less than 1% for the psychology RAs) and exclusive *we*/*our* (69% for the applied linguistics RAs vs. 98% for the psychology RAs) found in the two subcorpora. In other words, if multiple authorship was the only cause of differences in the use of the first-person pronouns, we would expect the proportions of exclusive *we*/*our* and *I*/*my* to be similar to the percentages of multiple- and single-authored RAs in the subcorpora.

[3] As reported in the previous section, no statistically significant difference in the incidence of self-mentions (comprising primarily personal pronouns) was found between the qualitative and quantitative RAs from the three disciplines. These results differed from Harwood's (2006, 2007) findings about the use of personal

explained by the different epistemologies underlying the two research paradigms.

First, it may seem counter-intuitive that hedges were used more frequently in the quantitative RAs than in the qualitative ones. Because it is typically perceived to be deterministic, definite, and causally oriented, we would expect quantitative research to have a less need to employ hedges than qualitative research, which is often seen as subjective, uncertain, and contingent. This apparent contradiction, however, could be accounted for by the epistemological assumptions about and empirical approaches to causality that dominate quantitative and qualitative research respectively (Cohen et al., 2011; Firestone, 1987). The (post)positivist epistemology underlying the quantitative research paradigm values highly general laws of causality and calls for an inductive-deductive approach to establishing causality in rigorously controlled conditions by utilizing standardized and precise procedures, methods, and measurement tools (Hu & Wang, 2014). Thus, quantitative research in the social sciences "reduces human behaviors, attitudes, performances, demographics, and other attributes to numerical information and mathematically modeled relationships" (Cao & Hu, 2014, p.27; Russo, 2008). Such statistical relationships, together with the asymmetry, non-linearity, and unpredictability characteristic of causation in the social world, contribute to the opacity of causality in the social sciences, making it difficult for researchers to backtrack causes or identify the detailed dynamic workings of causal relations (Cohen et al., 2011). Consequently, quantitative researchers can only infer rather than determine causality (Russo, 2008). The "inferential, conjectural, and probabilistic" (Cohen et al, 2011, p.56) nature of causal explanations in quantitative research would give rise to a constant need to "apprise readers of varying certainty" (Hyland, 2005a, p.63) through the use of hedges to modulate the strength of knowledge claims (see Example 6), negotiate alternative explanations of empirical results (Example 7), and speculate on potential research limitations (Example 8). By contrast, the various anti-positivist and anti-foundationalist epistemologies underlying qualitative research value the revealing of contextualized understanding from an emic perspective rather than the discovery of universal causality. In other words, research informed by such epistemologies focuses on identifying local concrete causal relations interpretatively through observation, interviewing, and other ethnographic methods which could "get inside the heads" of participants (Cohen et al., 2011, p.62). This interpretive approach can lead to detailed emic accounts of local causal processes. Although such accounts of causality are not free from researchers' inferences and conjectures, they appear more "authentic" because the causal processes are reported, identified and/or verified by research participants themselves (Cohen et al, 2011), in contrast to causality identified in probabilistic terms. Thus, compared with their quantitative counterparts,

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pronouns in political science. One plausible explanation for the discrepancy concerned the research designs adopted in the studies. While our data were collected from a single subfield in each of the three disciplines, Harwood's data came from "members of a broad disciplinary church that embraces everything from 'number-crunchers' and 'full-blown positivists' at one end of the spectrum and discourse analysts and ethnographers at the other" (Harwood, 2007, p.49). There was good reason to expect less variation within a single subdiscipline than across the full range of subfields in a discipline.

qualitative researchers could be more confident of their understandings and may feel less compelled to hedge their claims and interpretations.

Second, the greater incidence of boosters in the quantitative RAs would seem at first blush to contradict the explanation given above for their more frequent use of hedges since these two types of metadiscourse serve opposite rhetorical functions. A close examination of the specific uses of boosters, however, revealed epistemological linkages once again. Boosters were often used to explain how particular statistical results should be understood (Example 11), whether statistical analyses *confirmed* the hypotheses in question, what statistical tests *found,* and what tables/figures *clearly demonstrated* or *showed.* Such uses are consistent with Hyland's (2005a, p.147) observation that "boosters are … more often expressed impersonally with more assertive claims largely restricted to specific experimental results, either suggesting the strength of the relationship between data and claims with verbs such as *establish* and *show,* or expressing the certainty of expected outcomes, often with *predict* and *will*." The myriad statistical analyses and results to report, the constant need to compare empirical results with hypotheses, and the pervasive use of visual representations would mean that the quantitative RAs had much more opportunities to use boosters than the qualitative RAs. The strong certainty and confident rhetoric embodied by such uses were apparently based on the adherence to consensually accepted nomothetic procedures and methods. They were indicative of the positivist epistemological belief that "facts should be allowed to 'speak for themselves'" (Hyland, 2005a, p.147).

Third, paradigmatic differences in knowledge-making practices also provide a plausible explanation for the more frequent use in the quantitative RAs of attitude markers, especially expressions of expectability and knowledge deontics. Knowledge-making in quantitative research centrally involves the formulation and testing of hypotheses about relationships between variables (Creswell, 2009). The hypotheses are essentially expectations about possible research outcomes. Thus, the actual empirical results may turn out to be expected or unexpected, depending on whether they confirm or disconfirm the hypotheses. This creates a need for quantitative researchers to comment on the expectability of the results through attitude markers (Examples 13 and 14). Qualitative research, on the other hand, aims to develop contextualized understandings through inductive and reiterative analysis of emergent themes and issues (Creswell, 2009). Consequently, a priori hypotheses become irrelevant, which obviates the need to present actual findings as expected or unexpected. Furthermore, knowledge is reviewed in the quantitative research paradigm as cumulative in nature. In other words, it is accumulated through what Kuhn (1970, p.5) terms "normal science," in which every empirical study is a puzzle-solving effort. Drawing on knowledge deontics to make recommendations about further research (Example 16) coheres with such a view of knowledge building and accumulation. In contrast, knowledge is taken to be reiterative and contextual in qualitative research. Consequently, there is a less perceived need for a community of qualitative researchers to pursue a common, cumulative research agenda (Becher & Trowler, 2001). Such assumptions about the nature of

qualitative inquiry would diminish the obligation to carry out further research piecemeal and in lockstep, hence fewer opportunities for qualitative RAs to use knowledge deontics to make such research prescriptions.

In a similar vein, two unique and related characteristics of knowledge-making practices in the quantitative paradigm could account for the quantitative subcorpus' more frequent use of directives than the qualitative subcorpus. Incidentally, the statistically significant difference found for engagement markers as a whole was a function of the incidence of directives because the latter constituted a predominant subset of the former. The first characteristic is the overwhelming reliance of quantitative research on mathematical models and statistical analyses to establish causal relationships. As has been noticed (McGrath & Kuteeva, 2012; Swales et al., 1998), directives, particularly those containing *consider* and *note*, are much more common in the language of mathematics and statistics than other disciplines. Consequently, it is not surprising that such imperatives also occurred with greater frequencies in our quantitative RAs. The second characteristic contributing to a greater incidence of directives is the pervasive use of what Latour and Woolgar (1986, p.51) call the "inscription devices" of science, namely statistical tables and graphs in the quantitative subcorpus. These visual representations, as Example 26 illustrates, were frequently referred to with directives containing *see.* Obviously, the absence of statistical models and the infrequent use of tables and graphs in the qualitative RAs would mean fewer opportunities to use directives that often accompany them.

5. Implications

By way of conclusion several broad pedagogical implications can be derived from the findings of this study. Given the crucial rhetorical functions that metadiscourse can serve in academic discourse, one implication is the clear need to give pedagogical attention to metadiscourse, especially interactional resources, in courses and materials that teach writing for academic/research purposes. Although many research methodology texts (e.g., Cohen et al., 2011; Creswell, 2009) and academic writing guides (e.g., Wolcott, 2009) address the reporting of empirical research, most of them focus predominantly on macro-level issues, such as structure and organization, and pay only scant attention to micro-level issues of language use and rhetorical strategies. As our findings demonstrate, however, such micro-level issues are integral to and play a pivotal role in effective persuasion. A related implication concerns how metadiscourse should be taught. Our study found differences in the use of boosters, self-mentions, and one subtype of engagement marker (i.e., reader references) among the three subdisciplines; it also revealed paradigmatic differences in the deployment of all main types of interactional metadiscourse except self-mentions. These findings suggest that a generic pedagogical approach to academic writing, as found in many current undergraduate and graduate programs of writing for academic/research purposes, would be unlikely to teach metadiscourse effectively. Metadiscourse needs to be taught and learnt in a disciplinarily and paradigmatically meaningful way, that is, with a sound understanding of how its use is shaped by and serves disciplinary knowledge-

knower structures and paradigm-specific epistemologies. This can be achieved in discipline- and paradigm-tailored writing courses.[4] It is also attainable in a general ESP course that explicitly raises students' awareness of disciplinary and paradigmatic differences in the use of metadiscourse. Last but not least, programs of writing for academic/research purposes should equip student writers with useful strategies to explore disciplinary and paradigmatic norms in the use of metadiscourse themselves. For example, they can construct their own small-scale corpora using freely available corpus tools such as UAM CorpusTool and conduct corpus-based analyses of metadiscoursal resources in academic communication. In the final analysis, student writers must develop the strategic competence to explore and acquire metadiscourse as socio-rhetorical resources that serve situated knowledge-making practices.

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[4] It may be objected that the disciplinary differences in metadiscourse use identified in this study do not suffice to justify the cost of running a separate writing course to teach interactional metadiscourse to students from a single discipline. Disciplinarily grounded metadiscourse instruction, however, can be integrated into a discipline-tailored ESP course that teaches many other writing and rhetorical features for which disciplinary variation has been observed, for example, lexico-grammatical resources, citation practices, and rhetorical structures of various academic genres (Hu & Wang, 2014; Ozturk, 2007; Swales, 1990).

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Table 1

Descriptive Information on the Corpus

	Applied linguistics		Education		Psychology		Total	
	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative	Quantitative
No. of RAs	20	20	20	20	20	20	60	60
Total No. of words	97,644	80,120	140,150	67,567	100,810	69,572	338,604	217,259
Mean No. of words	4,882	4,006	7,008	3,378	5,041	3,479	5,643	3,621

Table 2

Analytical Framework for Interactional Metadiscourse

Type/Subtype	Function	Typical realization	Example
Hedges	to mitigate certainty/commitment	epistemic modals, verbs, adjectives, adverbs, nouns; qualifying expressions	*might, possible, perhaps, suggest*
Boosters	to increase certainty/commitment	epistemic modals, verbs, adjectives, adverbs, nouns; emphatic expressions	*will, demonstrate, show,*
Attitude markers	to express affective attitudes	obligation modals; attitudinal adjectives; affective adverbs	*should, interesting, surprisingly*
Self-mentions	to mark authorial presence in text	first-person pronouns; possessive determiners; third-person nominal phrases	*I, we* (exclusive), *me, us, my, our*
Engagement markers			
Directives	to direct readers to particular actions	obligation modals; imperative verbs; *it*-clauses with predicative adjectives	*see, note, should*
Reader references	to make reference to readers	second-person pronouns; first-person inclusive pronouns and possessive determiners; indefinite pronouns	*you, we* (inclusive), *the reader(s)*
Questions	to anticipate readers' questions	rhetorical and real questions	rhetorical and real questions
Knowledge appeals	to refer to shared knowledge	adjectives and adverbs indicting shared knowledge	*well-known, obviously*
Personal asides	to address readers through interjections	interjections separated by parentheses or other punctuation marks	*(which I discuss later)*

Note. The types/subtypes of interactional metadiscourse are adapted from Hyland (2005a).

Table 3

Descriptive Statistics for Interactional Metadiscourse by Discipline and Paradigm

	Applied linguistics				Education				Psychology			
	Qualitative		Quantitative		Qualitative		Quantitative		Qualitative		Quantitative	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Hedges	6.62	3.13	12.05	4.39	5.69	2.20	11.51	4.36	7.13	2.87	11.12	4.84
Boosters	2.36	1.07	3.58	1.54	2.05	0.97	4.22	1.97	1.13	0.62	1.95	1.25
Attitude markers	1.75	1.10	2.15	1.23	1.22	0.95	2.11	1.26	1.76	0.85	1.86	1.04
Self-mentions	2.38	2.11	2.96	3.33	3.73	3.06	3.30	2.86	3.24	2.68	5.44	3.42
Engagement markers	2.51	1.66	2.38	1.91	2.24	1.67	2.87	1.78	1.38	1.15	2.72	1.81
Directives	0.96	0.72	0.94	0.88	1.00	1.00	1.92	1.46	0.64	0.53	2.24	1.71
Reader references	0.92	1.20	1.09	1.10	0.77	0.68	0.55	0.52	0.43	0.65	0.30	0.36
Questions	0.31	0.48	0.23	0.34	0.40	0.70	0.27	0.61	0.16	0.35	0.09	0.17
Knowledge appeals	0.07	0.14	0.07	0.22	0.02	0.10	0.04	0.11	0.00	0.00	0.00	0.00
Personal asides	0.25	0.60	0.05	0.14	0.04	0.07	0.09	0.19	0.15	0.25	0.09	0.20
Total	15.57	4.40	23.11	7.97	14.93	5.70	24.01	5.98	14.64	4.54	23.09	6.38

Note. Mean frequencies were normalized per 1,000 words.

Table 4

Summary of Statistically Significant Comparisons

Type of metadiscourse	Cross-disciplinary difference		Cross-paradigmatic difference		Discipline/Paradigm interaction
Hedges	N (p = .667)		Y (p < .001)	Quantitative > Qualitative	N (p= .521)
Boosters	Y (p < .001)	APL > PSY; EDU > PSY	Y (p < .001)	Quantitative > Qualitative	N (p = .065)
Attitude markers	N (p = .556)		Y (p = .016)	Quantitative > Qualitative	N (p = .265)
Self-mentions	Y (p = .045)	PSY > APL	N (p = .159)		N (p = .126)
Engagement markers	N (p = .371)		Y (p = .048)	Quantitative > Qualitative	N (p = .154)
Directives	N (p = .077)		Y (p < .001)	Quantitative > Qualitative	Y (p = .007)
Reader references	Y (p = .003)	APL > PSY	N (p = .674)		N (p = .553)

Note. N = No; Y = Yes; APL = Applied linguistics; PSY = Psychology; EDU = Education

Appendix A: Incidence of Interactional Metadiscourse by RA, Discipline, and Paradigm (per 1,000 words)

	Applied Linguistics					Education					Psychology				
RA	H	B	AM	SM	E	H	B	AM	SM	E	H	B	AM	SM	E
QUAN															
1	12.73	3.74	1.50	4.12	6.74	12.63	4.47	2.89	1.58	1.32	7.10	2.47	1.85	0.00	0.62
2	15.41	3.14	2.52	0.00	0.63	11.76	2.52	2.10	3.36	4.62	8.61	1.39	3.33	9.16	3.61
3	8.82	3.43	3.92	6.86	2.45	16.48	4.98	1.15	0.00	2.68	4.21	2.61	1.40	6.61	0.60
4	18.66	6.87	2.70	0.00	2.46	9.97	4.69	0.59	2.35	1.47	1.82	5.83	0.00	2.55	8.38
5	20.46	5.31	2.65	0.38	1.52	13.85	7.09	3.04	4.39	0.34	19.03	2.81	3.74	4.37	1.56
6	15.61	1.77	3.55	2.84	0.00	10.35	5.70	2.70	0.30	0.90	19.95	3.22	0.32	4.18	3.86
7	4.57	3.85	0.96	1.20	6.50	13.02	2.89	4.82	2.41	6.27	9.60	1.37	1.83	3.66	3.20
8	7.36	2.04	0.94	3.76	1.72	16.73	2.82	2.17	8.26	3.04	12.34	1.70	1.70	6.81	2.13
9	7.33	3.77	0.44	2.66	0.67	12.33	6.89	1.09	3.26	2.90	13.40	1.19	2.98	12.2	1.49
10	7.78	2.24	2.24	4.62	2.37	13.01	4.07	0.81	0.00	1.63	15.75	1.17	2.92	0.00	4.08
11	10.83	2.28	1.14	0.76	1.14	8.05	2.25	2.58	5.48	4.51	9.97	2.80	2.80	8.10	4.36
12	10.08	4.54	1.76	11.34	3.78	11.76	4.55	2.28	6.45	1.90	8.52	0.30	0.91	9.44	4.57
13	8.24	3.74	1.87	1.87	1.87	10.57	3.02	3.52	2.35	1.68	8.44	2.05	1.14	2.28	1.37
14	13.49	1.01	2.36	0.67	1.69	8.83	2.13	0.30	2.13	1.83	7.16	0.24	0.72	8.12	1.43
15	10.41	2.25	1.41	1.69	0.56	9.64	6.19	2.06	0.00	4.82	8.48	1.28	3.08	4.11	3.08
16	12.41	3.75	2.02	1.73	3.03	4.53	0.53	0.80	0.53	3.20	11.57	2.19	1.88	6.56	2.81
17	10.18	2.26	0.57	1.41	1.41	8.87	6.00	1.83	9.91	1.83	17.80	1.14	2.65	8.33	2.27
18	11.37	3.92	2.05	0.75	2.05	10.61	7.16	4.58	6.59	5.16	10.99	1.19	1.43	2.39	2.15
19	19.69	5.27	5.63	11.25	5.63	3.46	5.19	0.86	4.75	6.05	17.04	2.81	1.40	8.42	1.00
20	15.47	6.39	2.69	1.35	1.35	23.68	1.25	1.99	1.99	1.25	10.64	1.18	1.18	1.48	1.77
QUAL															
1	4.26	2.21	1.73	4.25	2.99	8.23	2.27	1.52	3.03	1.84	4.15	0.59	0.15	0.15	0.44
2	3.88	1.14	1.14	0.68	0.46	4.54	2.03	1.07	0.00	2.39	10.54	1.19	2.67	5.94	2.52
3	4.90	1.22	3.26	3.47	1.22	8.21	3.34	0.28	5.29	1.95	10.12	0.87	2.60	4.34	0.43
4	4.43	2.38	0.51	0.17	4.43	2.94	2.26	0.56	2.03	1.02	9.36	1.56	1.04	3.81	1.91
5	16.45	1.61	3.21	0.40	4.01	3.67	1.14	0.38	13.41	3.16	4.80	1.13	0.85	0.00	0.28
6	5.61	0.45	0.67	3.81	2.91	5.98	2.88	3.91	2.88	3.09	10.42	2.32	1.16	0.46	1.62
7	5.55	2.22	0.74	1.66	7.02	3.66	0.65	0.86	0.43	0.22	3.87	0.81	1.61	4.67	0.81
8	6.24	2.71	1.09	3.26	4.34	9.55	2.67	0.98	5.76	5.20	6.48	0.99	2.20	8.23	0.66
9	10.26	2.65	1.95	2.65	2.48	8.69	3.98	2.17	3.98	6.51	8.88	0.33	1.32	0.00	0.33
10	10.82	2.45	0.00	0.20	2.65	4.56	1.73	0.63	8.02	2.83	2.41	0.40	2.41	3.62	4.43
11	6.87	2.29	2.94	1.64	2.94	6.19	1.50	0.80	5.19	1.60	5.18	1.30	2.81	6.48	0.22
12	3.48	5.49	1.28	6.77	3.66	5.31	0.92	0.37	2.75	4.58	6.45	0.66	2.31	7.27	0.99
13	7.88	3.64	3.44	0.20	2.22	4.33	1.39	0.62	3.25	1.70	6.02	0.80	0.80	2.01	3.61
14	4.98	2.27	2.72	0.68	0.45	9.08	2.52	2.77	4.79	1.51	13.73	0.61	1.83	4.58	0.92
15	7.11	1.84	0.26	2.11	1.05	2.45	2.22	1.11	0.00	2.67	4.53	1.26	2.52	1.26	1.26
16	9.29	3.04	2.36	5.91	0.68	4.79	3.39	1.83	1.69	0.28	9.30	2.84	1.29	1.29	1.03
17	6.07	3.54	2.53	3.54	1.77	4.23	0.38	0.13	1.54	0.51	4.37	1.71	1.52	5.71	1.90
18	6.05	1.51	0.84	0.00	1.85	7.48	0.90	0.74	3.78	0.25	6.30	1.48	0.56	0.37	0.19
19	3.65	1.95	2.92	0.97	2.44	3.36	2.36	1.35	2.36	1.68	7.76	0.92	2.24	4.34	1.97
20	4.60	2.58	1.47	5.52	0.55	6.56	2.54	2.22	4.45	1.80	7.97	0.89	3.25	0.30	2.07

Note. QUAN = Quantitative RAs; QUAL = Qualitative RAs; H = Hedges; B = Boosters; AM = Attitude markers; SM = Self-mentions; E = Engagement markers