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D E L T A

Articles

Structural Variation of Directives in University Classroom Discourse: A Corpus-Based Investigation

Variação estrutural em atos diretivos no discurso de sala de aula universitária: Um estudo baseado em corpus

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ABSTRACT

The present study examines structural variation of directives[2] across different situational contexts in university lectures. The data comes from the lecture component of a large corpus of university discourse[3]. The following analytical steps were taken: 1) possible linguistic patterns of directives were manually identified in sample lectures; 2) five most-frequent lexico-grammatically explicit structural types of directives were selected for automatic analysis; 3)Python scripts were written to automatically identify directives with the five structural types; 4) structural variation of directives was analyzed in relation to three situational variables: level of interaction, level of instruction, and discipline. Results show that situational variables affect the use of directives in important ways.

Keywords: *directives; academic discourse; university lectures; register variation.*

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2. Directives are "attempts by the speaker to get the hearer to do something" (Searle, 1976:11), e.g., Teacher: "you should submit the essay by Friday midnight".
3. TOEFL 2000 Spoken and Written Academic Language corpus (T2K-SWAL, see Biber et al., 2002).

RESUMO

O presente estudo examina variação estrutural em atos diretivos presentes em diferentes contextos situacionais na sala de aula universitária. Os dados provêm do componente de sala de aula extraído de um grande corpus de discurso universitário. A análise seguiu os seguintes passos: 1) possíveis padrões linguísticos de diretrizes foram identificados manualmente a partir de uma amostra de discurso de sala de aula; 2) os cinco tipos de estruturas léxico-gramaticais explícitas usadas mais frequentemente foram selecionados para a análise; 3) Scripts em Python foram escritos para identificar automaticamente diretivas com esses cinco tipos estruturais; 4) a variação estrutural das diretivas foram analisadas em relação a três variáveis situacionais: nível de interação, nível de instrução, e disciplina. Os resultados mostram que variação situacional afeta o uso de diretivas de forma significativa.

Palavras-chave: *diretrizes; discurso acadêmico; aula universitária; variação de registro.*

Introduction

Directives, as one of the frequent speech acts in university classrooms (Garcia, 2004; McAllister, 2014) are used by instructors to perform significant functions, such as assigning homework, guiding the students to do class work, and encouraging participation. Research has found that ineffective use of directives can bring about misunderstanding and hindrance in learning for the students (Waring & Hruska, 2012). One of the main factors that has been associated with the ineffectiveness of directives is the linguistic realization of a directive and lack of variation in the linguistic forms of directives used (Fitch & Morgan, 2003; Hwang, 2013; Reinhardt, 2010). Thus, the primary purpose of this study is to describe the structural variation of directives used by professors in university lectures. The data in the study comes from the lecture section of a corpus of spoken and written academic register.

Corpus-based analyses of speech acts combine the methodologies used in the two fields of pragmatics and corpus linguistics in order to achieve reliable results in the most efficient ways. Pragmatics and corpus linguistics are on the two ends of a continuum in terms of research methodology. While pragmatic analysis is primarily conducted by line-by-line-reading of texts, corpus-based methodology traditionally deals with computerized techniques, such as the analysis of Key Words in Context (KWICs). Abundance of indirect speech acts and their unconventional forms (McAllister, 2014; Rühlemann & Aijmer, 2014), absence of a one-on-one relationship between the structural form of a speech act and its pragmatic function (Garcia, 2004; Koester, 2002; McCarthy, 1998), and heavy reliance of pragmatic meaning on the context make it impossible to solely rely on KWICs or automatic analysis of texts to investigate speech acts. Careful integration of the two methodological approaches, on the other hand, allows pragmatic researchers to analyze larger databases in shorter amount of time and consequently report their findings with more generalizability. The present study builds on these traditional approaches but then extends them to yield more reliable and truly generalizable findings.

In the present study, first, a bottom-up discourse analysis approach was used to identify all the possible directive utterances emerging in a sample of academic lectures. Next, to automatize the pragmatic identification of directives, the structural types of directives that were lexicogrammatically explicit and easy to extract using a computer program were systematically selected. For instance, directives with obligation modals are among the easy-to-extract directives because they usually contain conventional structures, such as “subject + have to” and such formulaic structures are easy to detect by a computer program. Finally, a computer program was developed to automatically identify, extract, and categorize the lexicogrammatically explicit directives in the lecture corpus.

The secondary goal of this study is to explore the variation in the use of directives across three situational features of the lectures: discipline (i.e., Business, Engineering, Humanities, Social Sciences, Natural Sciences, and Education), level of instruction (lower-division, upper-division, and graduate), and level of interaction (low, medium, and high). The following section reviews the literature on directives, with a focus on the structural and pragmatic realizations of these speech acts.

Directives

One of the earliest and most-cited definitions of directives in the pragmatics literature is that of Searle's (1976). Searle (1976:11) defines directives as "attempts by the speaker to get the hearer to do something". Searle distinguishes directives from other speech act categories (i.e., representatives, commissives, expressives, and declarations) by introducing the following set of felicity conditions (see Table 1). Moreover, Searle (1969) adds additional rules for differentiating speech act sub-categories included in the general category of directives (i.e., commands, requests, and suggestions). For instance, for producing commands, the speaker must be in authority over the hearer, while a sincerity condition for suggestions is that the speaker (S) believes the action (A) will benefit the hearer (H).

Table 1 – Felicity conditions for directive speech acts (Searle, 1969:66)

Preparatory condition	H is able to do A.
Sincerity condition	S wants H to do A.
Propositional content condition	S predicts a future act A of H.
Essential condition	Counts as an attempt to get H to do A.

In the late 70s and early 80s, two seminal studies were conducted by Ervin-Tripp (1976) and Holmes (1983), in which detailed description of directive constructions were presented. The former investigated directives in the context of naturally-occurring conversations using a bottom-up approach. Ervin-Tripp (1976) introduced six directive construction types, including need statements (e.g., "I need a match"), imperatives (e.g., "coffee, black"), embedded imperatives (e.g., "why don't you open the window?"), permission directives (e.g., "can I have my records back?"), question directives (e.g., "you ready?"), and hints (e.g., "my nose is bleeding"). She suggested that for precise interpretation of directives, we should examine the social features of the register, as speakers may use different linguistic forms based on the contextual factors, such as familiarity, social status, or gender.

Holmes (1983) investigated directives in the context of elementary classrooms and focused on teacher directives. She presented three main structural categories for directives: imperatives, interrogatives, and declaratives. She also divided each of these categories into different sub-categories. According to Holmes (1983), imperatives appeared in 6 different construction forms: 1) base form of the verb (e.g., "speak up"), 2) you + imperative (e.g., you look here"), 3) present participle form of the verb (e.g., "listening."), 4) verb-ellipsis (e.g., "hands up."), 5) imperative + modifier (e.g., "children looking this way please."), and 6) let + first person pronoun (e.g., "Let's finish there."). Interrogatives, which were less frequent than imperatives in Holmes (1983), appeared in 2 different forms: 1) modals (e.g., "would you open the window?", and 2) non-modal interrogative directives (e.g., "have you tried it?"). Finally, declaratives fell into two categories according to their explicitness: 1) embedded agent (e.g., I'd like everyone sitting on the mat.") and 2) hints (e.g., "Kelly's hand is up.").

Ervin-Tripp's (1976) and Holmes' (1983) categorization of directive construction types have been adapted and employed in later studies (Hwang, 2013; Reinhardt, 2010). The slight differences in the types of directives emerging in different studies are due to several reasons, such as differences in the data that is analyzed, differences in the context of speech (i.e., the register), and the scope of the study.

Directives in University Discourse

University discourse comprises a range of spoken and written activities related to academic life, including but not limited to classroom teaching, labs, office hours, study groups, student presentations, service encounters, textbooks, and pamphlets (Biber, 2006). Academic corpora, such as TOEFL 2000 Spoken and Written Academic Language (T2K-SWAL; Biber et al., 2002) and MICASE (Michigan Corpus of Academic Spoken English; Simpson et al., 2002), include a range of sub-registers, and situational features (e.g., speaker roles, audience characteristics, academic levels, and interactiveness); therefore, they are suitable resources for pragmatics analysis, as "language in the context is in the heart of pragmatic research" (McAllister, 2014:30). Since the scope of the current study is limited to university lectures, the review of the literature in the following paragraphs will mainly focus on the spoken university discourse as opposed to the written discourse.

The literature on spoken academic registers has demonstrated variation within discourse in the linguistic features and pragmatic functions of directives, as a result of various situational characteristics of sub-registers. For example, Reinhardt (2010) illustrated the use of directives by learner (international teaching assistants) and expert (native English speaker teaching assistants) speakers in a corpus of office hours. The learner speaker data contained recorded role-plays in ESL and international teaching assistant (ITA) preparation courses and the expert data were retrieved from the office hour speech events in MICASE (Simpson et al., 2002). Reinhardt (2010) employed a mixed corpus and discourse analytic approach. Initially, he employed the lexical search technique to look for a pre-determined list of directives (i.e., modals, semi-modals, directive vocabulary, and imperative forms). The corpus analysis indicated that ITAs mostly tended to use structures that limit hearers' choice, such as 'had better'. According to Reinhardt (2010:98), the use of 'had better' implies "undesirable consequences with non-compliance" and will restrict students' choice. Reinhardt also reported on ITAs underuse of structures that promote involvement, such as periphrastic modals (e.g., 'you need to', or 'you've got to'). On the other hand, the expert group frequently used "you can" and "you want to" structures.

Hwang (2013), who similarly examined the use of directives by native speaker TAs and ITAs (i.e., Korean TAs), also used a mixed method approach for the analysis. However, it differed from Reinhardt (2010) in that the ITA data were videotaped teaching sessions and comparable to the native English speaker TA data (retrieved from MICASE), in terms of authenticity. The transcripts in the native English speaker TA data were sampled from four different registers or speech events (student presentation, lecture, lab, and discussion section), while the ITA data were sampled from three registers (lab, lecture, discussion section). The results indicated that ITAs favor particular types of directives, such as bare imperatives. However, these structures were mitigated about 30% of the time, using lexical (e.g., "please") and syntactic (e.g., past tense) devices. Hwang (2013:71) also investigated the purpose of directives to come up with a categorization, including three types: commanding, requesting, and suggesting. In terms of the difference between native English speaker TAs and the ITAs, ITAs used less direct structures compared to native speaker TAs. On the contrary to the mentioned studies (Hwang, 2013; Reinhardt, 2007), the current study focuses on the use of directives by one participant group (i.e., university teachers), who happen to be mainly native speakers of English in the current data, except for two cases.

In an earlier study, Garcia (2004) examined the use of speech acts (based on Searle's speech act categories) in T2K-SWAL, a corpus of academic English representing the language used in American universities. She conducted a bottom-up corpus analysis by reading the conversations line by line and listening to the audio recordings simultaneously. Given her thorough methodology, she limited the analysis to three registers (i.e., service encounters, office hours, and study groups). In addition, she only selected highly-interactive conversations involving two interlocutors. Her results indicated that situation type and speaker role played a part in the form of directives used. For instance, while requests and suggestions were common in service encounters, office hours were characterized by a high frequency of suggestions/commands. It was also found that, during office hours, the professors produce more suggestions/commands than requests. While Garcia's (2004) and Hwang's (2013) inclusion of a variety of registers allowed the researchers to see the role of situation type in the type of speech acts (i.e., directive forms) used, the small sample size in both studies limited the generalizability of the results. To address this issue, the current study analyzes a larger corpus, using computer programming techniques.

The role of situational factors in university language has been investigated in previous studies on spoken and written discourse (Barbieri, 2008; Hyland, 2002). Hyland (2002) found that directives in a corpus of academic writing are used in various forms for different purposes across disciplines. On the other hand, Barbieri (2008) showed that there is little variation in the use of involvement markers (e.g., directives) across different situational factors, such as interactiveness, class size, and level of instruction. Given that no previous studies have examined the effect of discipline, level of instruction, and level of interactivity on the use of directives in spoken academic discourse, including these situational variables in the current study will contribute to the existing literature on directives. To this end, the present study attempts to examine the variation in the use of directives in university lectures across disciplines, levels of instruction, and levels of interactivity.

Methods

The corpus

The data in this study comes from the spoken sub-corpus of the T2K-SWAL corpus (Biber et al., 2002), representing the spoken discourse in American universities. Texts in the spoken section of T2K-SWAL are sampled from a range of spoken registers in American universities, including lectures, labs, office hours, study groups, and service encounters. These texts are sampled from six major academic disciplines—Business, Engineering, Humanities, Social Sciences, Natural Sciences, and Education—and represent three academic levels in American universities, i.e., lower division, upper division, and graduate (Biber et al., 2002). The academic levels or levels of instruction are defined as follows: lower division refers to classes taught to freshmen and sophomores, upper division refers to classes taught to juniors and seniors, and graduate refers to classes taught to graduate students.

For the purposes of this study, the complete set of texts in the lecture sub-corpus—176 texts consisting of 1,298,913 words—was analyzed. The 176 texts were automatically grouped by three factors (i.e., disciplines, levels of instruction, and levels of interactivity) with the help of the corpus annotations and a Python script written by the researcher. Table 2 outlines the composition of the lectures in T2K-SWAL across disciplines and levels of instruction. Each cell contains the number of texts and the total number of words in each category. For instance, there are 8 texts in lower division Business lectures, containing a total of 45,345 words.

Table 2 – Breakdown of lectures across disciplines with different levels of instruction in T2K-SWAL

Disciplines	Instruction Level # of texts (# of words)			Total # of texts (# of words)
	Lower Division	Upper Division	Graduate	
Business	8 (45,345)	20 (136,969)	8 (70,275)	36 (252,589)
Engineering	8 (47,555)	14 (75,384)	8 (55,332)	30 (178,271)
Humanities	10 (68,764)	12 (94,346)	9 (92,583)	31 (255,693)
Social Sciences	15 (126,777)	15 (111,339)	8 (64,030)	38 (302,146)
Natural Sciences	9 (49,701)	7 (42,058)	9 (76,670)	25 (168,429)
Education	4 (26,602)	4 (26,674)	8 (88,509)	16 (141,785)
Total	54 (364,744)	72 (486,770)	50 (447,399)	176 (1,298,913)

Table 3 shows the number of texts and words in T2K-SWAL lectures across disciplines and levels of interactivity. Biber (2006:25) defines levels of interactivity in T2K-SWAL as follows:

- Low: "Fewer than 10 turns per 1,000 words (i.e., average length longer than 100 words per turn)"
- Medium: "Between 10 and 25 turns per 1,000 words (i.e., average length between 40 and 100 words per turn)"
- High: "More than 25 turns per 1,000 words (i.e., average length shorter than 40 words per turn)"

Table 3 – Breakdown of lectures across disciplines with different levels of interactivity in T2K-SWAL

Disciplines	Interactivity # of texts (# of words)			Total # of texts (# of words)
	Low	Medium	High	
Business	3 (15,257)	13 (92,893)	20 (144,439)	36 (252,589)
Engineering	20 (113,147)	7 (51,255)	3 (13,869)	30 (178,271)
Humanities	8 (53,226)	9 (73,192)	14 (129,275)	31 (255,693)
Social Sciences	11 (89,573)	17 (134,052)	10 (78,521)	38 (302,146)
Natural Sciences	11 (68,961)	10 (59,979)	4 (39,489)	25 (168,429)
Education	1 (8,347)	5 (46,029)	10 (87,409)	16 (141,785)
Total	54 (348,511)	61 (457,400)	61 (493,002)	176 (1,298,913)

The sub-sample used for the piloting stages

A stratified random sample of 14 texts (83,725 words) was drawn from two disciplines in the lecture sub-corpus in T2K-SWAL for multiple analytical purposes: (1) developing an operational definition of directives, (2) identifying all possible directive utterances in sample lectures, (3) presenting a structural categorization of directives found in lectures, and (4) selecting lexicogrammatically explicit structural types for the automatic identification of directives. To build this sample, texts in Engineering and Humanities were randomly drawn from 2 strata, each with 3 substrata— (1) levels of instruction (lower division, upper division, graduate) and (2) levels of interactivity (low, medium, high). Humanities and Engineering were included in the analysis since they fall at the two ends of a continuum, Humanities being an "academic" discipline and Engineering being a "professional" discipline (Biber, 2006:226). Overall, the sample comprised 19% of the total number of words in the Business and Engineering lectures.

Table 4 breaks down the composition of the sample across disciplines (Engineering and Humanities) and levels of instruction (lower division, upper division, and graduate). The disproportionate number of texts and words in the sample reflects the composition of the corpus and the nature of academic discourse in different levels.

Table 4 – Breakdown of 14 lectures in Engineering and Humanities across levels of instruction

Disciplines	Instruction Level # of texts (# of words)			Total # of texts (# of words)
	Lower Division	Upper Division	Graduate	Lecture
Engineering	3 (193,27)	3 (15,566)	1 (1,025)	7 (35,918)
Humanities	2 (7,432)	3 (21,854)	2 (18,521)	7 (47,807)
Total	5 (26,759)	6 (37,420)	3 (19,546)	14 (83,725)

Table 5 demonstrates how the 14 sample lectures are distributed across disciplines (Engineering and Humanities) and levels of interactivity (low, medium, high). Each cell contains the number of texts and words in each specific category.

Table 5 – Breakdown of 14 lectures in Engineering and Humanities across levels of interactivity

Disciplines	Interactivity # of texts (# of words)			Total # of texts (# of words)
	Low	Medium	High	Lecture
Engineering	2 (8,587)	3 (19,327)	2 (8,004)	7 (35,918)
Humanities	2 (8,634)	2 (15,462)	3 (23,711)	7 (47,807)
Total	4 (17,221)	5 (34,789)	5 (31,715)	14 (83,725)

Analytical steps

The following seven steps were taken to meet the study goals:

Step 1: Developing an operational definition

To reliably identify all possible directive utterances in lectures, a comprehensive operational definition of directives was developed through a pilot research study. First, an initial definition of directives was developed by relying on the directive literature (Holmes, 1983; Hwang, 2013; Searle, 1976; Sinclair & Coulthard, 1975), and by reading through sample texts and getting to know the data. Next, to evaluate and improve the reliability of the developed definition, multiple piloting procedures were conducted on 8 texts (29,756 words) selected from the 14 Engineering and Humanities texts (as in Tables 4 and 5). In the piloting procedures, the researcher along with 2 other coders[4] read through the 8 texts (4 from each discipline) line by line and identified the directive utterances, using the initially developed definition of directives and through a bottom-up discourse analysis approach. The percentage agreement between the researcher and the second coder in the final round of piloting was 72% for both disciplines before discussing discrepancies and 100% after discussing the discrepancies. It should be noted that the 72% coding agreement was the overall percentage agreement and it varied for different structural types (see Table 6 in step 4). The operational definition used in the piloting procedures was revised after each round of piloting. Following is the final version of the operational definition of directives:

4. The 2 coders were doctoral students in Applied Linguistics.

Directives in university lectures are utterances produced by an instructor to get the students to perform an action, regardless of whether the action is performed immediately or later (See Excerpt 1). The action could be either concrete (e.g., writing, reading, turning in) or mental (e.g., thinking, remembering, noticing).

Excerpt 1.

T: ... Now ***you're going to be highly specific and establish in your papers how and why you selected your works*** *which you selected. And as well as how women represent themselves. (humenleldhg049)*

Directive constructions may appear in 3 different clause types (Holmes, 1983):

1. Declaratives or subject-verb structures which usually express statements (e.g., "I'd like to know how many are taking each one")
2. Imperatives (including base form of the verb, usually without the subject, such as "narrow them")
3. Interrogatives (wh-questions, yes/no questions, alternative questions, and statements marked with a question mark in the transcripts)

However, in some instances, directives can be non-sentential (See Excerpt 2). In Excerpt 2, the instructor is asking for participation by saying "you my dear".

Excerpt 2.

T: ... You remember Rochester? What was, tell us a little bit about Rochester, his position in society. **You my dear**, *yeah. No, what?*
S: Like I was in high school. I don't remember. (humenleldhg049)

In contexts that there are successive directive verbs within the same utterance, each main verb is counted as a different directive. For instance, in the following excerpt (3) there are two directives, "you're gonna have to do …" and "you're gonna have to show".

Excerpt 3.

T: ...OK here's what you're gonna have to ***do*** *you're gonna have to* ***show*** *either using the navigation tool or use the story board ... (engcslegrhn217)*

The following explains utterances that will not be counted as directives:

1. Any response to a student's question is not counted as a directive. For instance, in the following utterance (excerpt 4), the instructor's response is not a directive.

Excerpt 4.

S: so when does it mean that we are going to do the presentations?
T: Wednesday, next week Wednesday (engcslegrhn217)

2. Clarification requests do not count as directives. For instance, "what?", "huh?", "could you please repeat that?" are not considered directives.
3. Questions that the instructor asks in order to elicit course-related content are not considered directives, e.g., "What do you think he means by the term expedient there?"

Step 2: bottom-up coding of directives in 14 sample texts

In this step, the researcher carefully read through the 6 remaining sample texts from step 1 and highlighted all the existing directive utterances, using the operational definition of directives developed in step 1. The main purpose of this step was to identify all the possible directive types in sample lectures to provide a baseline for determining major structural types of directives in lectures.

Step 3: structural categorization of directives

To structurally categorize directives, the researcher coded the identified directives in the 14 sample texts (see steps 1 and 2) for their linguistic features and accordingly, developed a structural categorization with 15 types (see Table 6 in step 4). In building the structural categorization of directives and naming different categories, Blum-Kulka and Olshtain's (1984) framework on request strategy types as well as Hwang's (2013) categorization of construction types were taken into consideration.

Step 4: selection of explicit structural types of directives

In order to automatically identify directives in a large quantity of texts, the following analyses were performed on the directives extracted from the 14 sample texts: coding the structural types of directive utterances using the structural categorization developed in step 3, analyzing the frequency of each structural type to identify the most frequently-used directive types, calculating the inter-coder reliability[5] for identifying directives with different structural types, and examining the sources of discrepancies between the coders. The inter-coder reliability was conducted based on the 2 coders' performance in the last round of piloting on the 8 sample texts (see step 1). Table 6 demonstrates the structural categorization of directives with examples, in addition to frequency percentages and inter-coder agreement rates for each structural category.

5. The inter-coder reliability for identifying each structural type was calculated as follows: the number of directives with a certain structural type which were coded similarly by the two coders divided by the total number of directives with that structural type.

Table 6 – Structural types of directives, frequencies, and coding reliability

Clause type	Structural type	Linguistic patterns	Frequency* (%)	Inter-coder agreement (%)
Declaratives	1. Performatives	I ask you to V I suggest I recommend You are required to V I expect you to V	2.51%	90%
	2. Obligation modals	You have to You must You should You are going to You ought to You'd better	14.29%	81%
	3. Intention and desire verbs	You need to You want to	14.67%	85.4%
	4. Permission/suggestion/ possibility modals	You can You could You may	17.76%	72.8%
	5. If you + verb		2.32%	66.7%
	6. Would/wouldn't	I would(n't) V You would(n't) V	4.44%	100%
	7. Non-sentential	e.g., "you my dear."	0.77%	0%
	8. Other declaratives	e.g., "It's something to keep in mind for next year."	5.60%	55%
Imperatives	9. Imperative	Base form of the verb	24.13%	71.8%
	10. Subject + imperative	You + base form of the verb	4.44%	72.2%
	11. Present progressive	e.g., "Looking at the order of these place time ones."	0.77%	66.7%
	12. Let's	Let's V	5.79%	35.5%
Interrogatives	13. Feasibility/ability modal questions	e.g., "Would you pass that back to Joe."	0.58%	N/A**
	14. Non-modal questions	e.g., "are you passing out that article then?"	1.74%	N/A
	15. Suggestory formulae	e.g., "How about if I allowed you to write it out? neatly?"	0.19%	N/A

*To calculate the frequency percentage for each structural type, raw frequency of directives with each structural type was divided by the total number of directives found in the 14 sample texts and the result was multiplied by 100.
**The structural types that do not have a coding reliability measure (i.e., N/A) were not present in the 8 sample texts used for piloting the operational definition of directives.

The results of this step showed that the most frequent structural types of directives (imperatives, permission/suggestion/possibility modals, intention/desire verbs, and obligation modals) were all linguistically overt—i.e., directives with permission/suggestion/possibility modals have conventional structures which occur frequently, and it is easy to identify these directives in texts. Moreover, the most frequent directives, which appear to be lexicogrammatically explicit, were coded with the highest inter-coder agreement (over 70%). With respect to the structural types with lower frequency rates, the inter-coder agreements were examined and performatives with 90% coding agreements were included in the analysis. However, this category was renamed as directive vocabulary[6]. Consequently, it was concluded that automatically coding the lexicogrammatically explicit directives will result in a higher reliability rate (precision) compared to manually identifying directives. Adding up frequencies of the structural types that were selected for analysis, we can conclude that the automatic analysis could roughly extract 78% of the existing directive utterances in lectures (i.e., recall rate[7]). This is a relatively high number to reveal patterns of use of a construct in a register.

Table 7 – Explicit structural types of directives included in automatic identification of directives

Structural Types	**Example Linguistic Patterns**
Imperatives	Base form of the verb Let's V
Obligation Modals	You have to You must You should You are going to You ought to
Intention and Desire Verbs	You need to You want to
Permission/Suggestion/Possibility Modals	You can You could You may
Directive Vocabulary (performatives in Table 6)	I ask you to V I suggest I recommend You are required to V I expect you to V

6. For more information on the selection of lexicogrammatically explicit directives, see Kia (2018:54-66).
7. The precision rate for individual directive types is presented in Table 8.

Step 5: development of algorithms of lexicogrammatically-explicit directives

In this step, careful attempts were made to ensure comprehensiveness of retrieval of the lexicogrammatically explicit directives. First, the patterns of occurrence of all the instances in the pilot data (8 texts) were analyzed and all the elements of patterns were added to a list of patterns to be included in the program scripts.

While in the process of developing algorithms, three important factors that could affect directive functions emerged: (1) personal vs. impersonal (i.e., directives with personal pronouns, such as "we" and "you" vs. those with 3rd person indefinite pronouns, such as "this" and "these"), (2) mitigated vs. unmitigated (i.e., directives with or without mitigating devices, such as "please", "just", "only"), and (3) positive vs. negative (i.e. directive utterances that ask the students to perform or not to perform a task, such as "have to" and "don't have to"). These factors were considered as structural sub-types and as a result, 27 directive structural sub-categories were developed (see Tables 8 and 9 in step 6). It was assumed that differences in the use of pronouns, inclusion or exclusion of mitigating devices, and positivity or negativity of the directive utterance can affect the pragmatic functions.

To locate imperatives in lectures, regular expressions were written for the four structural sub-types of imperatives. A concordancer program, AntConc (Version 3.5.7; Anthony, 2018), was used to search for the regular expressions in the POS tagged lecture texts (i.e., texts that had been previously annotated for parts of speech of the words). Using tagged texts allowed the researcher to find all the imperative directives as defined in the study, without confining the search to certain verbs. In total, 454 algorithms and 6 regular expressions were written for the 5 structural types[8].

Step 6: development of a computer program for the automatic identification of directives

The list of 454 algorithms developed in step 5 was used to write Python scripts (Version 3.5) to automatically code lexicogrammatically

8. See Appendix B in Kia (2018:147-163), for a complete list of algorithms and regular expressions.

explicit directives with 23 structural sub-types (or 4 structural types: obligation modals, intention and desire verbs, permission/possibility modals, and directive vocabulary). The Python script that was developed for this study does the following:

1. Extract the file name.
2. Distinguish and separate teacher turns (coded with “1:”) from other turns.
3. Extract information regarding the situational features of the texts, i.e., discipline, level of instruction, and interactivity.
4. Automatically identify lexicogrammatically explicit directives in teacher turns.
5. Count the number of words in teacher turns.
6. Code the identified directives for their structural sub-types.
7. Quantify the identified directives across structural sub-types.
8. Produce an excel sheet with text files in each row. The columns provide information regarding the file name, teacher turn word count, raw frequency of directives with the 27 structural sub-types, discipline, sub-discipline, level of instruction, and level of interactivity.
9. Produce another Excel sheet similar to the first Excel sheet with one main difference. In this Excel sheet, instead of the raw frequencies, normed rates of occurrences of directives with specific structural types are calculated (see Figure 1). According to the average length of texts in the lecture sub-corpus (5,648), it was decided that the normalizing basis would be 6,000.

$$\left(\frac{Frequency\ of\ a\ structural\ type\ of\ directives}{Total\ words\ in\ the\ text}\right) * (6{,}000) = Rate\ of\ occurrence$$

Figure 1 – Equation for calculating the rate of occurrence of a linguistic feature in a corpus (Biber, Conrad, & Reppen, 1998).

10. Produce duplicate files of all the 176 texts, in which all the identified directives have been annotated with a numerical code representing the structural sub-type (ranging from 1 to 27) and the number of the algorithm (see Figure 2). The purpose of this step was to calculate the precision statistics.

```
structure and we looked at case one which was a simple layout for m one and m two and i'm gonna look at several other layout
strategies for m one and m two this morning and after we get done looking at the layout strategies for m one and m two then the
next question we're gonna ask is if you      <13.1>      want to get real high frequency performance are you better off to go with
the integrator based structures these [2 syl] integrator based structures or are you better to go with the [2 syl] integrator
based structures and we'll try to answer that question as well now why are those issues important when you're trying to operate if
you're trying to build (folders) that operate in the three gigahertz range or maybe four gigahertz range in a quarter micron
process or maybe a point three five micron process if we      <21.1>      can find that if we      <21.1>      can get a twenty or
thirty percent improvement frequency by changing from one to get a better architecture to another that's the trade off you're
<5.26>      gonna have to make if you      <13.2>      really want to push things up [035] does that make sense so our our major
concern right now is is gonna be to see how layout effects the ultimate high frequency performance potential um in a given process
```

Figure 2 – A sample duplicate file annotated for individual algorithms in each sub-type

Precision of the automatic coding was calculated based on two different methods. First, precision statistics (i.e., correctly identified directives divided by the total number of directives identified) were run to analyze the accuracy of the program in finding the algorithms it was given. To perform precision statistics, the duplicate files produced by the program were searched for each structural type tag and the annotated directive utterances were examined to see whether they had been correctly tagged or not (see Table 8).

Table 8 – Precision of the developed program for identifying different types of directives

Structural Type	Personal/ Impersonal	Mitigated/ Unmitigated	Positive/ Negative	Index #	Overall Count	Program Precision
Obligation Modals	Personal	Unmitigated	Positive	**5**	**1,289**	100%
	Personal	Unmitigated	Negative	**6**	**149**	100%
	Personal	Mitigated	Positive	**7**	**47**	100%
	Personal	Mitigated	Negative	8	0	N/A
	Impersonal	Unmitigated	Positive	**9**	**41**	100%
	Impersonal	Unmitigated	Negative	10	2	100%
	Impersonal	Mitigated	Positive	11	2	100%
	Impersonal	Mitigated	Negative	12	0	N/A
Total					1,530	
Intention and Desire Verbs	Personal	Unmitigated	Positive	**13**	**934**	100%
	Personal	Unmitigated	Negative	**14**	**105**	100%
	Personal	Mitigated	Positive	**15**	**74**	100%
	Personal	Mitigated	Negative	16	1	100%
	Impersonal	Unmitigated	Positive	17	1	100%
	Impersonal	Unmitigated	Negative	18	0	N/A
	Impersonal	Mitigated	Positive	19	0	N/A
	Impersonal	Mitigated	Negative	20	0	N/A
Total					1,115	

Structural Type	Personal/ Impersonal	Mitigated/ Unmitigated	Positive/ Negative	Index #	Overall Count	Program Precision
Permission/ suggestion/ possibility modals	Personal	N/A	Positive	**21**	**2,915**	100%
	Personal	N/A	Negative	**22**	**360**	100%
	Impersonal	N/A	Positive	**23**	**5**	100%
Total					3,280	
Directive Vocabulary	Personal	N/A	Positive	**24**	**48**	100%
	Personal	N/A	Negative	**25**	**10**	100%
	Impersonal	N/A	Positive	**26**	**21**	100%
	Impersonal	N/A	Negative	27	1	100%
Total					80	

Second, regarding the imperatives which were searched for in tagged texts using the regular expression formulas, all the instances that were returned by the concordancer were carefully examined in context and only instances that functioned as directives were kept in the analysis. After precise qualitative analysis of the concordance lines, only 668 were coded as directives (see Table 9).

Table 9 – Accuracy of the imperative directives included in final analysis

Structural Type	Personal/ Impersonal	Mitigated/ Unmitigated	Positive/ Negative	Index #	Overall Count	Directive Precision
Imperatives	N/A	Unmitigated	Positive	**1**	**600**	100%
	N/A	Unmitigated	Negative	**2**	**28**	100%
	N/A	Mitigated	Positive	**3**	**39**	100%
	N/A	Mitigated	Negative	4	1	100%
Total					668	

After ensuring the coding precision, the program was run on the 176 texts in the lecture sub-corpus to automatically locate, structurally categorize, and quantify 23 types of lexicogrammatically explicit directives, as in Table 8.

Step 7: conducting descriptive and multivariate statistics

To answer the research question, the normed rates of occurrence of directives with 16 different structural patterns per text were averaged for each situational feature and its levels. Subsequently, descriptive statistics were performed.

The reason for including only 16 out of 27 structural sub-types is that among the 27 structural sub-types initially defined, 5 did not have any representation (viz., sub-types 8, 12, 18, 19, 20); therefore, they were excluded from the analysis. Also, 6 out of the 22 remaining structural sub-types with only 1 or 2 instances in the whole corpus were omitted from the analysis since they only had 1 or 2 instances in (viz., sub-types 4, 10, 11, 16, 17, 27). The number associated with each sub-type can be found in the column, "Index #", in Tables 8 and 9.

After analyzing descriptive statistics[9], in order to identify the statistically significant differences in the structural types of directives in texts with different disciplines, levels of instruction, and levels of interactivity, a three-way Factorial Multivariate Analysis of Variance (MANOVA) test was conducted applying IBM SPSS (version 24.0). The independent variables in this test were discipline with 6 levels, instruction level with three levels, and level of interactivity with 3 levels. The dependent variables, on the other hand, were rates of occurrence of 16 different structural sub-types of directives with continuous level of measurement. To analyze the pairwise comparisons between each 2 independent variables, multiple ANOVAs were run after conducting the MANOVA. Bonferroni adjustment was applied to the level of significance for analyzing the two-way ANOVAs because of the number of dependent variables (16). The main effect produced by the Factorial MANOVA provided statistical evidence on whether the differences among the structural types of directives across the situational features were significant.

Results and discussion

A 6 x 3 x 3 Factorial MANOVA was carried out to test the overall significance of the 16 individual ANOVA analyses: one for each structural type of directive. The results of the MANOVA showed that there was a statistically significant interaction effect between discipline and level of interactivity on the combined dependent variables (structural types of directives), F (160, 1103.721) = 1.483, p = .000, Wilks' Λ = .190, partial $\eta 2$ = .153, indicating that the variance in the

9. For a complete report of the means and standard deviations of the 16 structural types of directives across situational features, see Kia (2018).

combined structural types of directives across the 6 disciplines was not the same across lectures with different levels of interactivity and this interaction accounted for 15% (η 2 = .15) of the total variance in the structural types of directives (see Table 10).

Table 10 – Two-way MANOVA for directive structural types across disciplines, levels of interactivity, and instruction levels

Source	*Value*	*F*	*Hypothesis df*	*Error df*	*p*	Partial η^2
Discipline × Instruction	.284	1.096	160	1103.721	.212	.118
Discipline × Interactivity	.190	1.483	160	1103.721	.000**	.153
Instruction × Interactivity	.628	.985	64	499.459	.512	.110
Discipline	.352	1.865	80	615.694	.000**	.189
Instruction	.762	1.157	32	254	.266	.127
Interactivity	.585	2.444	32	254	.000**	.235

**p* value < 0.05; ***p* value < 0.01

Follow-up two-way ANOVAs for the use of each structural type of directive across disciplines and levels of interactivity showed statistically significant interaction effects for unmitigated positive imperatives (Type 1), F (10, 142) = 4.871, p = .000 < .003, partial η2= .255, and personal unmitigated positive obligation modals (Type 5), F (10, 142) = 3.009, p = .002 < .003, partial η2= .175. The positive mitigated imperatives (Type 3), although not significant, is worth discussing, due to its close significance value and considerable effect size—F (10, 142) = 7.730, p = .003, partial η2= .165. None of the remaining 13 structural types showed a statistically significant interaction effect; thus, they will not be further analyzed and discussed. It is worth noting that Bonferroni adjustment was applied to the level of significance for analyzing the two-way ANOVAs because of the number of dependent variables (16). Thus, an interaction effect was only declared significant if p < .003 (p < .05/16). To learn more about the interaction effect between discipline and level of interactivity for structural types 1, 3, and 5, simple main effects analyses and follow-up simple comparisons were conducted for these three structural types.

As for positive unmitigated imperative directives, results of the simple main effects for discipline showed that there was a significant difference across disciplines in high interactivity lectures, F (5, 142) = 10.460, p = .000 < .0167 (.05/3), partial η2= .269. Pairwise comparisons of positive unmitigated imperative directives' mean scores across disciplines in high interactivity lectures (see Table 11) revealed that high interactivity Engineering lectures (M = 210.73, SD =360.90) were significantly different from high interactivity lectures in all other 5 disciplines: Business (M = 7.01, SD = 4.17), Education (M = 8.16, SD = 5.04), Humanities (M = 7.36, SD = 10.26), Natural Sciences (M = 2.21, SD = 2.18), and Social Sciences (M = 3.35, SD = 4.04).

Table 11 – Pairwise comparisons of positive unmitigated imperative directives' mean scores across disciplines in high interactivity lectures

Interactivity	Discipline (I)	Discipline (J)	Mean Difference (I-J)	Std. Error	p^1
High	Engineering	Business	192.870	27.213	0.000^{**}
		Education	187.792	29.567	0.000^{**}
		Humanities	184.565	28.912	0.000^{**}
		Natural Sciences	178.282	37.172	0.000^{**}
		Social Sciences	189.128	29.394	0.000^{**}

*p value < 0.05; **p value < 0.01
[1] Bonferroni adjustment for multiple comparisons

Simple main effects analyses were also run for interactivity and not surprisingly, there was a significant difference across levels of interactivity in Engineering lectures, F (2, 142) = 26.532, p = .000 < .008 (.05/6), partial η^2= .272. Simple comparisons of positive unmitigated imperative directives' mean scores across levels of interactivity in Engineering lectures (see Table 12) revealed that high interactivity Engineering lectures (M = 210.73, SD = 360.90) were significantly different from both low interactivity (M = 3.59, SD = 4.31) and medium interactivity Engineering lectures (M = 7.60, SD = 2.90).

Table 12 – Pairwise comparisons of positive unmitigated imperative directives' mean scores across levels of interactivity in Engineering

Discipline	Interactivity (I)	Interactivity (J)	Mean Difference (I-J)	Std. Error	p^1
Engineering	Low	Medium	0.434	19.730	1.000
		High	-194.932	26.935	0.000**
	Medium	Low	-0.434	19.730	1.000
		High	-195.366	31.573	0.000**
	High	Low	194.932	26.935	0.000**
		Medium	195.366	31.573	0.000**

*p value < 0.05; **p value < 0.01
[1] Bonferroni adjustment for multiple comparisons

After analyzing high interactivity texts, it was revealed that the significant difference was led by only one text among the high interactivity lectures. Overall, there were only 3 high interactivity lectures in Engineering, one of which had 16 instances of directives in a total of 153 words. The small number of words used by the teacher and the comparatively large norming criterion resulted in an inflated rate of occurrence.

The outlier high interactivity Engineering text was a class in electrical Engineering. Based on the information provided in the transcripts, in this class, the professor is teaching the students how to communicate effectively in their field by writing abstracts, research articles, and so on. Therefore, directives involve many consecutive short directions. Excerpt 5 provides an example from the same text, including 4 directive utterances which are in bold. All 4 directives are unmitigated positive imperatives, which are short and functional.

Excerpt 5. Engeeleudhi054.txt

T[10]: you should have at least the first one - what's the purpose of this study? you know it's not the first sentence because that's just situating it. what's the what's the purpose of this study?
S: the second sentence.
T: OK. ***synthesize it summarize it.***
S: um, OK well it's a report on [unclear]
T: and?
S: [unclear]

10. T stands for Teacher and S stands for student.

T: *OK, to get a report to [produ] to do a study between your, subject relationship between [unclear] or the beginning. um, methodology? yeah*

S: *[unclear] studies that they did were pretty much boring, but basically they make sense*

T: *OK* ***tell us the sentence give us the gist of it.*** *what was the methodology?*

Regarding positive mitigated imperative directives, results of the simple main effects for discipline showed that there was a significant difference across disciplines in medium interactivity lectures, F (5, 142) = 4.917, p = .000 < .0167 (.05/3), partial η^2= .148. Pairwise comparisons of positive mitigated imperative directives' mean scores across disciplines in medium interactivity lectures (see Table 13) revealed that medium interactivity Education lectures (M = 14.46, SD =9.08) were significantly different from medium interactivity lectures in all 5 other disciplines: Business (M = 4.73, SD = 4.69), Engineering (M = 7.60, SD = 2.90), Humanities (M = 1.20, SD = 2.28), Natural Sciences (M = 1.48, SD = 1.34), and Social Sciences (M = 2.44, SD = 4.62).

Table 13 – Pairwise comparisons of positive mitigated imperative mean scores across disciplines in medium interactivity lectures

Interactivity	Discipline (I)	Discipline (J)	Mean Difference (I-J)	Std. Error	p^1
Medium	Education	Business	3.693	0.888	0.001**
		Engineering	4.051	1.013	0.002**
		Humanities	4.061	0.957	0.001**
		Natural Sciences	4.042	0.922	0.000**
		Social Sciences	3.869	0.884	0.000**

*p value < 0.05; **p value < 0.01
[1] Bonferroni adjustment for multiple comparisons

Simple main effects analyses were also run for interactivity and not surprisingly, there was a significant difference across levels of interactivity in Education lectures, F (2, 142) = 13.648, p = .000 < .008 (.05/6), partial η^2= .161. Pairwise comparisons of positive mitigated imperative directives' mean scores across levels of interactivity in Education lectures (see Table 14) revealed that medium interactivity Education lectures (M = 4.15, SD = 9.28) had significantly higher use of positive mitigated imperative directives than high interactivity Education lectures (M = .04, SD = 139).

Table 14 – Pairwise comparisons of positive mitigated imperative mean scores across levels of interactivity in Education

Discipline	Interactivity (I)	Interactivity (J)	Mean Difference (I-J)	Std. Error	p^1
Education	Low	Medium	-1.959	1.995	0.983
		High	3.157	2.076	0.392
	Medium	Low	1.959	1.995	0.983
		High	5.116	0.980	0.000**
	High	Low	-3.157	2.076	0.392
		Medium	-5.116	0.980	0.000**

*p value < 0.05; **p value < 0.01
[1] Bonferroni adjustment for multiple comparisons

Further analysis of the medium interactivity Education lectures revealed that there was only one text including one directive utterance with the positive mitigated imperative structure (see Excerpt 6). However, because of the short length of the teacher turn (289 words) in this text, the rate of occurrence became significantly higher than medium interactivity lectures in other disciplines.

Excerpt 6. edubelegrmn188.txt

*T: **please start jotting down some good questions** for the next couple of presentations.*

As for positive personal unmitigated obligation modal directives, results of the simple main effects for discipline showed that there was a significant difference across disciplines in high interactivity lectures, F (5, 142) = 4.293, p = .001 < .0167 (.05/3), partial η^2= .131. Pairwise comparisons of positive personal unmitigated obligation modal directives' mean scores across disciplines in high interactivity lectures (see Table 15) revealed that high interactivity Engineering lectures (M = 210.73, SD =360.90) were significantly different from high interactivity lectures in all other 5 disciplines: Business (M = 7.01, SD = 4.17), Education (M = 8.16, SD = 5.04), Humanities (M = 7.36, SD = 10.26), Natural Sciences (M = 2.21, SD = 2.18), and Social Sciences (M = 3.35, SD = 4.04).

Table 15 – Pairwise comparisons of positive personal unmitigated obligation modal directives' mean scores across disciplines in high interactivity lectures

Interactivity	Discipline (I)	Discipline (J)	Mean Difference (I-J)	Std. Error	p^1
High	Engineering	Business	18.089	4.141	0.000**
		Education	19.318	4.499	0.000**
		Humanities	16.691	4.399	0.003**
		Natural Sciences	17.078	5.656	0.045*
		Social Sciences	15.255	4.473	0.013*

**p* value < 0.05; ***p* value < 0.01
[1] Bonferroni adjustment for multiple comparisons

Simple main effects analyses were also run for interactivity and not surprisingly, there was a significant difference across levels of interactivity in Engineering lectures, F (2, 142) = 9.167, p = .000 < .008 (.05/6), partial η^2= .114. Simple comparisons of positive personal unmitigated obligation modal directives' mean scores across levels of interactivity in Engineering lectures exposed similar results to positive unmitigated imperative directives. The results showed that (see Table 16) high interactivity Engineering lectures (M = 210.73, SD = 360.90) had significantly higher use of positive personal unmitigated obligation modal directives than low interactivity (M = 3.59, SD = 4.31) and medium interactivity Engineering lectures (M = 7.60, SD = 2.90).

Table 16 – Pairwise comparisons of positive personal unmitigated obligation modal directives' mean scores across levels of interactivity in Engineering

Discipline	Interactivity (I)	Interactivity (J)	Mean Difference (I-J)	Std. Error	p^1
Engineering	Low	Medium	4.547	3.002	.396
		High	-15.626	4.099	.001**
	Medium	Low	-4.547	3.002	.396
		High	-20.173	4.804	.000**
	High	Low	15.626	4.099	.001**
		Medium	20.173	4.804	.000**

**p* value < 0.05; ***p* value < 0.01
[1] Bonferroni adjustment for multiple comparisons

Following is an example Excerpt (7) from a medium interactivity Engineering lecture with the highest rate of occurrence of positive personal unmitigated obligation modals. The course was in Electrical Engineering and during the lecture, the professor was using the board to draw circuits and was giving directives on how to do things simultaneously.

Excerpt 7. engeeleldmn271

T: … somewhere else in the circuit we have some I x (exploring) somewhere else in the current in the circuit and down here ***we have to have some constant of proportionality times*** *that I sub x to tell us what the voltage source is going to put out . . .*

The following section presents a summary of the results, implications of the study, methodological contributions, limitations of the study, and suggestions for future studies.

Conclusion

The current study explored the variation in the use of directives in university lectures across disciplines (Business, Engineering, Humanities, Social Sciences, Natural Sciences, and Education), levels of instruction (lower division, upper division, and graduate), and levels of interactivity (low, medium, and high). Results show that imperatives, obligation modals, permission/possibility modals, and intention and desire verbs are among the most frequent structural types of directives. These findings have important pedagogical implications for ITAs and ITA trainers. We could instruct the ITAs to use obligation modals, intention and desire verbs, and performative structures when giving directions by providing them with authentic examples from the corpus.

The analysis also shows that there is a significant interaction between discipline and level of interactivity on predicting the rate of occurrence of positive unmitigated imperatives (e.g., "summarize it"), positive mitigated imperatives (e.g., "please don't write on the margins"), and positive unmitigated personal obligation modals (e.g., "you have to have …"). Further analyses revealed that highly interactive Engineering lectures had significantly higher use of directives with unmitigated imperatives and unmitigated obligation modals. Directives in Engineering lectures were usually used to navigate the students through mathematical analyses, an engineering software, or similar procedures; therefore, the unmitigated use of two of the most direct structural types in Engineering lectures was linked to the procedural nature of the discourse and its fast pace. According to these results, the use of imperative directives could be encouraged in Engineering lectures for procedural purposes.

Despite the significance of the interaction and simple main effects, more data is required to be able to make generalizable claims regarding the positive unmitigated imperatives and positive mitigated imperatives. A more balanced data set might better help with the interpretation of the significant interaction.

One of the main methodological contributions of this study is the development of a computer program to identify and retrieve lexicogrammatically explicit directives, accounting for 78% of all the directives in lectures. The computer program developed for this study could be modified and used in future large-scale studies of directives in various registers. This computerized technique greatly benefits large corpus-based studies by increasing coding speed. It is recommended that researchers use the program script for initial coding of large data and extracting initial findings and subsequently, analyze the extracted utterances using manual coding to increase precision and reliability.

Due to feasibility constraints, precision statistics were only analyzed to evaluate the functionality of the program. In other words, it was examined whether all the instances that the program located matched the algorithms that were given to the program. Analyzing the annotated data revealed that automatic annotation works better with some structural types (e.g., obligation modals) than others (e.g., permission possibility modals). Utterances with permission/ possibility modals (e.g., you can) appeared in many cases as non-directives, with the meaning of ability.

One last limitation of the automatic analysis of directives in this study was the inclusion of a limited set of mitigating devices (e.g., please, just, only, may, might). This was because of the difficulty of finding mitigating devices that could be easily coded through automatic analysis. Further research is needed to explore the possible mitigating devices and incorporate more of these features in the program scripts.

Accordingly, caution must be taken in assuming we can generalize from these findings. Linguistic patterns of directives that emerged from these texts might have resulted from individual differences, such as professors' distinctive speech features. This limitation calls for future research on larger samples, including more disciplines. It is also suggested that future studies conduct a random-effects model instead of an ANOVA to account for individual differences in the data. Despite the limitations, this study is much larger and more comprehensive than any previous study of directives, considering the corpus size, clear description of the precision and recall rates, and automatization of the pragmatic identification of directives.

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