

Discourse, conversation and argumentation: Theoretical perspectives and innovative empirical studies, volume II

Edited by

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Discourse, conversation and argumentation: Theoretical perspectives and innovative empirical studies, volume II

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Editorial: Discourse, conversation and argumentation: Theoretical perspectives and innovative empirical studies, volume II

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argumentation, communicative interactions, conversation, discourse, psychology

Editorial on the Research Topic

[Discourse, conversation and argumentation: Theoretical perspectives and innovative empirical studies, volume II](#)

Although discursive, conversational, and argumentative interactions play an essential role in our lives, there is no integrated area of psychological research on these types of communicative interactions (Arcidiacono et al., 2021). Research on discourse, conversation, and argumentation is conducted in several separate research communities that are spread across disciplines and have only limited intertwinement. This second volume of the Research Topic “*Discourse, Conversation and Argumentation: Theoretical Perspectives and Innovative Empirical Studies*” intends to offer a comprehensive dialogical platform to explore further novel and promising theoretical perspectives to study discursive, conversational, and argumentative interactions from a psychological perspective. In addition, it provides an extensive stand of the latest innovative research investigating discursive, conversational, and argumentative interactions between individuals, groups, and institutions to shed light on the most recent methodological developments in examining these types of interactions.

The Research Topic has thus permitted researchers working in different international psychological contexts to draw together their work within a common forum. Through their contributions, authors present an innovative state-of-the-art of collective evidence in psychological research on discourse, conversation, and argumentation. The numerous contributions focus on psychological perspectives on interactions and empirically supported approaches to analyze them. This panel of outstanding researchers contributes to rendering this second volume of this Research Topic particularly timely and open to colleagues continually exposed to nearly limitless sectorial approaches. In this vein, we hope that the contributions can be challenging for a large scientific audience to support integrated psychological research on discursive, conversational, and argumentative interactions.

The original research proposed by Liu and Zeng analyzes the key syntactic functions and basic grammatical meanings of utterance-middle pragmatic particle *dai* from syntactic positions, utterance functions, and prosodic features. This study demonstrates that *dai* is an overt marker of speakers’ negative affective stance for complaining and criticizing in conversation. Meanwhile, due to the effects of high frequency and speakers’ psychological cognition, also with the prosody, syntax, sequential positions, participants and interactional aims, there are also speakers’ stance for sarcasm, surprise, and sympathy arising from *dai* though speakers’ complaints and criticisms exist in varying degrees.

The paper of [Brocos et al.](#) presents original research offering a better understanding of how the epistemic and socio-relational dimensions of students' argumentative interactions are intertwined. By adopting discourse analysis to examine the interactions in a small group of four 11th-graders, the authors show that students, driven by epistemic aims in high socio-cognitive tension contexts, can refine the conditions they engage in argumentation.

[Lu](#) proposes a study on the use, function, and understanding of extended metaphors in L2 argumentative essays by Chinese learners of English. The function of extended metaphors is analyzed by adopting the bottom-up approach of establishing systematic metaphors from those identified extended metaphors to draw learners' communicative intentions in producing extended metaphors. This article contributes to the knowledge of learners' metaphoric competence in L2, which can, in turn, enrich teachers' metaphor knowledge and draw teachers' attention to learners' creative ways of using metaphors and then raise metaphor awareness in L2 writing, teaching, and learning.

[Ghanbari and Salari](#) propose a study on multiple data sources: students' perceptions of the argumentative texts, writing teachers' views on the students' argumentative writing, and analysis of the structure of the argumentative texts written by the students. Their investigation shows that the failure to develop an argumentative essay by the Iranian undergraduate English majors entails several academic, contextual, and pedagogical grounds.

The paper proposed by [Qin and Wang](#) considers the role of teachers' multimodal competence reflected through their multimodal pedagogic discourse in realizing the ultimate goals of classroom lead-ins. By exploring how two-winner teachers utilize their multimodal ensembles of communicative modes to engage students during classroom lead-ins, the authors show that different communicative modes construct the higher-level action of lead-in and are orchestrated into multimodal ensembles for the specific function of each lead-in move.

Another original research is proposed by [Ji and Zhang](#), who analyze irregular self-selection in Chinese postgraduate EFL learners' conversations from the perspective of multimodal interaction. The authors use multimodal conversation analysis to investigate the detailed process of irregular self-selection. The paper contributes to understanding the detailed process of speakership claims in EFL learners' conversations.

The paper proposed by [Munir Hashmi et al.](#) attempts to provide insights into the argumentation structures in the discussion of Islam on social media involving 14 former Malaysian Muslims. The authors observe that the arguments put forth by former Muslims are loosely constructed rather than attempts to build a robust cumulative argumentation to support their reasons for abandoning the Muslim faith.

The interactive functions of questions in embodied collaborative work involving the manipulation of physical objects are investigated in the paper proposed by [Bietti and Bietti](#). The authors conducted a systematic qualitative analysis of a dataset of 1,751 question-answer sequences to investigate how the questions identified are associated with accomplishing interactional goals and complementary temporalities in collaborative activities.

The opinion article by [Rubinelli et al.](#) points out that it is time for health institutions to invest in persuasive communication to combat low-quality information. Persuasive communication should show

why institutional recommendations are worth being considered, as a way to provide important information that people can consider to engage in informed decision-making. In particular, according to the authors, it is fundamental that health institutions do not communicate to people "top-down," but present their views using sound argumentation and showing precisely the ground of their claims.

The paper proposed by [Shan](#) explores the interaction between the prosodic and pragmatic characteristics of the discourse marker *ni zhidao* ("you know") in spoken Chinese using instrumental methods. This study breaks through the limitations of traditional discourse marker research, which mainly relies on context and discourse characteristics for subjective reasoning, showing not only the part of *ni zhidao* in dynamically constructing and embodying specific contexts but also its communicative functions and the underlying meta-pragmatic awareness behind it.

Another original research is proposed by [Wlodarczak and Heldner](#), who revisits the problem of breathing cues used to manage speaking turns in multiparty casual conversation. The authors propose a new categorization of turn-taking events that combines the criterion of speaker change with whether the original speaker inhales before producing the next talk spurt. This study highlights how the breathing signal can thus be successfully used for uncovering hidden turn-taking events, which are otherwise obscured by silence-based representations of interaction.

[Esbo Agergaard and Nielsen](#) conducted a discourse analysis of posts, comments, and contextual material on three Danish Facebook Pages, all established because of social groups' skepticism of human papillomavirus (HPV) vaccination. Based on a discourse analysis framework, this study shows that HPV vaccination skepticism is mediated through personal, epistemological, social, political, and value-laden discourses. Dealing with one of these dimensions alone, for example, treating HPV vaccination skepticism as an information deficit or a partisan issue, may risk missing the point entirely.

The paper of [Aanesen et al.](#) presents original research exploring how the female athletic body is constructed in the pseudonymous contemporary women's fitness magazine "Xrize." Based on a modified version of Parker's Foucauldian discourse analysis, this study shows that the female athletic body results from a complex nexus of different discourses associated with the powers of economy, sex differences, institutions, and ideological forces.

[Heitmann et al.](#) present a study on students' beliefs about the relevance of discourse and the role of facts. The authors highlight that students perceived the role of facts as highly relevant for science lessons, whereas discursive characteristics were considered significantly less important. This study lends further evidence to the existence of disciplinary school cultures in argumentation that may result from differences in teachers' school-track-specific classroom practice and education.

The paper proposed by [Hansen](#) considers whether young children understand that others may hold false beliefs, proposing a novel account of the logic of conversations about certain mental states. This study provides an innovative contribution to one of the most debated topics in psychology and neuroscience, supporting the view that even young children construe others in adult-like psychological terms.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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If you know something, say something: young children's problem with false beliefs

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Whether young children understand that others may hold false beliefs is a hotly debated topic in psychology and neuroscience. Much evidence suggests that children do not pass this milestone in their understanding of other people until the age of 5 years. Other evidence suggests that they understand already in their second year. This study proposes a novel account of the logic of conversations about certain mental states. By modifying the discourse accordingly, children passed three false belief tasks at 3 years of age while they failed standard false belief tasks. The results support the view that even young children construe other people in adult-like psychological terms.

Keywords: theory-of-mind, pragmatics, language development, social cognition

INTRODUCTION

Children's understanding that people may hold and act on false beliefs, such as looking for the keys in the wrong place, is a milestone in their development towards an adult-like *theory-of-mind*. To attribute a false belief to someone, children must understand that there can be representations of the world that differ from their own accurate understanding (Dennett, 1978). Thus, false belief tasks are benchmarks of children's acquisition of a representational theory-of-mind, without which they are left unable to understand mistaken expectations, misguided actions, or misleading appearances.

On a typical false belief task, children are asked to predict where a puppet, Jill, thinks her chocolate is. The chocolate has been surreptitiously moved from where Jill originally put it, creating a false belief. A typical question could be, "Where does Jill think the chocolate is?" The correct answer is that Jill thinks the chocolate is in the original location. Yet children below 4½ years typically answer that Jill thinks that the chocolate is in the new and actual location (Wimmer and Perner, 1983).

Children's failure is striking because children actually remember the crucial pieces of information, i.e., they know where Jill put the chocolate and that she did not see it being moved. Even more striking is that children as young as 15 months reveal a tacit understanding of false belief on new nonverbal tasks (Clements and Perner, 1994; Garnham and Ruffman, 2001; Onishi and Baillargeon, 2005).

Nevertheless, overwhelming confirmation of the original results in hundreds of false belief studies across many cultures and languages has generally led to the conclusion that children do not develop the cognitive foundation required to understand mental representation until their fifth year (Perner, 1991; Gopnik and Wellman, 1994; Wellman et al., 2001).

I propose an alternative account based on the conversational logic involved in talking about certain mental states. In certain contexts, two speakers may not have *direct* knowledge about the identity or the location of an object. Instead, *indirect* knowledge

may provide the best information. With regard to object identity, this could be appearance, e.g., "What is this?" "It looks like an apple" (Austin, 1962). With regard to location, it could be where a third, absent, person thinks the object is, e.g., "Where is the chocolate?" "Jill thinks it is in the refrigerator" (Willet, 1988).

It follows that the question, "Where does Jill think the chocolate is?" could be interpreted as a request for indirect knowledge about the actual location of the chocolate in certain contexts, rather than always being a unique request for Jill's belief. If children make this interpretation on false belief tasks, everyday conversational logic directs them to respond with the true location rather than with Jill's false belief. They will then fail the tasks irrespective of their understanding of false belief.

Consider a starker example. A firefighter arrives on the scene of a smoking building and asks an office worker, "Where does your manager think the fire is?" This is a plausible way to obtain indirect knowledge about the location of a fire. Crucially, answering such a request is an unremarkable event when neither the first person (the firefighter) nor the second person (the worker) knows the location of the fire. But when the second person knows better than the absent, third person (the manager), everyday conversational logic complicates the answer. Suppose the worker knows that the fire is in fact in the basement, even though his manager believes that it is in the kitchen. Though a *literally* correct answer, it would be uncooperative and even misleading of the worker to answer, "My manager thinks the fire is in the kitchen."

Suppose the firefighter instead arrived on the scene and asked, "Where will your manager look for the fire?" This is another plausible way to request the likely true location of the fire, if the firefighter also here assumes that the office worker does not know from personal experience. The worker could give the literal answer, "In the kitchen." But if he knows that the fire is in the basement, he would have sent the firefighter to the wrong place. Because people's actions reflect their thoughts, an action question can function pragmatically as a belief question.

While the context in the firefighter example is clearly different from that of a false belief task, the point is to illustrate that situations exist where the question, “Where does X think Y is,” is not meant to include, or is interpreted as including, somebody’s false belief. Rather, it requests likely reality. For a variety of reasons, young children may not be sufficiently sensitive to the context to invoke precisely the meaning that is the premise of the false belief task. Thus, the current study experimentally manipulates the conversational context so that it is less equivocal to young children.

Requests for indirect knowledge are common and diverse. People must often solicit absent people’s knowledge to learn about the world on the assumption that none of the present speakers knows the truth from personal experience, e.g., “What would Piaget say?” They are also likely to be familiar to children, e.g., “Please go ask your Mom where the keys are,” or, “Does your Mom know where the keys are?” The same conversational logic applies here. To illustrate, a child would not reply that his mother said that the keys are in the kitchen if the child knows that they are in the basement. Or to the latter question solely give the literal answer, “No,” if the child knows better than his mother. Such answers would be considered uncooperative, jocular, or a sign of undeveloped pragmatic understanding.

A request for indirect knowledge may simultaneously constitute an indirect request. A classic example of an indirect request is asking someone if she can pass the salt. The point is normally *not* to inquire about the respondent’s physical ability, but to actually request the salt (e.g., Searle, 1975). In a similar vein, the child in the preceding two examples is not directly requested to report his mother’s belief about the location of the keys, but most listeners would nevertheless interpret the questions in this way. However, the focus of this paper is not on indirect requests in Searle’s sense but on the conversational logic of requests for indirect knowledge, such as asking about appearances as a path to the identity of an object or requesting someone’s belief about the location of an object as a path to its actual location.

The analysis rests on two interrelated insights into language use from the field of psycholinguistics. First, interpreting a belief question as a request for indirect knowledge requires the assumption that the questioner lacks knowledge. Any conversational context partly consists of a set of assumptions about the other speakers’ state of knowledge, termed the common ground (Stalnaker, 1978). At any point in a conversation, the common ground may determine the interpretation of new statements. Lack of knowledge about a location may be indicated explicitly, e.g., verbally with questions such as, “Where are the keys,” or nonverbally by searching. It may also be assumed implicitly by the listener (Clark et al., 1983). I will consider it the ordinary context because it depends on the least number of conditionals.

In contrast, consider a context with two people staring at some keys. Here it would be redundant to interpret the question, “Where does Jill think the keys are?” as a request for indirect knowledge because the location is already known. I will call this the *conditional context* because it depends on shared knowledge.

Second, certain answers will be deemed uncooperative if they do not fulfill the intended meaning with the request. This is captured by Grice’s account of everyday conversational logic (Grice, 1975). People make inferences, termed *conversational*

implicatures, about a speaker’s meaning based on the assumption that speakers adhere to four maxims that prescribe how to communicate most efficiently and rationally. The maxims belong to a general cooperative principle, under which people recognize a common purpose of a conversation and match answers to requests.

Reporting beliefs as indirect knowledge is mainly regulated by the Maxim of Quantity: Make a contribution no more or no less informative than required. In the exchange, “Son, where are the keys?” “-Well, Mom thinks they are in the cabinet,” the son’s seemingly irrelevant answer is nevertheless intelligible because people may infer that he cooperates with the request, but even at his most informative can only provide indirect knowledge about the location.

The maxim also constrains the son’s answer. Suppose he knows that the keys are on the table but that his mother falsely thinks they are in the cabinet. He would be literally correct in saying, “Mom thinks the keys are in the cabinet.” But this information would be superfluous and therefore uncooperative. People’s false beliefs are uninformative when the common purpose of the conversation is to discover the true location.

The analysis applies to false belief tasks. Suppose young children presume the ordinary context of lack of knowledge about reality on the part of the experimenter, in the sense of, “(I’m looking for the chocolate and I assume you don’t know from personal experience.) Where does Jill think the chocolate is?” The question then implies that the experimenter seeks indirect information about the likely location third-hand, through Jill’s belief. But the point of the false belief task is that children know better than Jill. So if they wish to cooperate with the presumed request for the likely location and avoid violating the maxim of quantity, children must skip the uninformative step of Jill’s false belief and respond with reality. Conversational logic compels children to say the truth if they know it, and leads them to fail the tasks.

To pass false belief tasks, then, children must presume the *conditional* context. In this context, it would violate the maxim of quantity to interpret the test question as a request for *indirect* knowledge about the likely location because both experimenter and child already know it.

It can be argued that children should already be aware of the conditional context. After all, the child and the experimenter jointly witnessed that the object was transferred to a new location. However, children may interpret the test question locally and invoke the ordinary context for several reasons.

First, the pragmatic implication of asking an honest question is lack of knowledge on the part of the experimenter, which for young children may override *any* shared knowledge and indicate the ordinary context. According to a related view (e.g., Siegal and Peterson, 1994), young children have yet to fully understand the conversational requirements of “academic” questioning where the questioner already knows the answer. The current discourse-based account explicates the conversational logic of certain mental-state expressions which is a novel extension of this more general view.

Second, the shell game-like atmosphere of the false belief task, in particular the location task, may suggest to young children that the context remains one of following the ball. A major challenge

for researchers, then, is to design false belief tasks that block the possibility of presuming the local, ordinary context by clearly linking the test question to the preceding discourse.

Some related accounts that integrate the concept of common ground and the Gricean maxims to explain certain mental-state verbs can be found in the linguistic and philosophical literature. They are based on an original proposition by Kiparsky and Kiparsky (1970). These authors proposed categorizing cognitive verbs which take *that* complements into two broad categories. Factives are verbs where the complement can be presupposed to be true, e.g., *know* and *forget*, as in “John knows that it is raining.” Non-factives are verbs where there is no presupposition as to whether the complement is true or not, e.g., *think*, *believe*, and *say*, as in, “John thinks that it is raining.”

Kempson (1975) pointed out that for factive verbs the implication of truth of the complement does not necessarily hold. Her analysis of factivity based on the Gricean maxims and the concept of common ground showed that the implication of truth of the complement is context-dependent rather than a semantic property of the sentence in question. Conversely, in the case of non-factive verbs, Karttunen (1973) points out that non-factives such as *say* can in fact function as factives under certain conditions.

While these proposals support the context-dependent aspects of the discourse-based account in a general manner, it is important to note that to date, the fields of linguistics and philosophy are grappling with the issue of factivity. Numerous authors have identified flaws in the original semantic and logical explanations of the Kiparskys’ proposal and have criticized the accuracy and scope of the distinction itself (for an overview, see Hazlett, 2010). Some authors instead favor a Gricean account like that of Kempson (e.g., Karttunen, 1998; Stalnaker, 1998; Hazlett, 2010). However, the versions of the factivity theory that include a Gricean analysis are presently too narrow to account for our phenomenon of interest. To properly cover children’s understanding of the test questions on a variety of theory-of-mind tasks, such an account must not only include mental-state verbs that take *that* complements, but all types of expressions used on false belief tasks and appearance-reality tasks such as *thinks*, *says*, *looks for*, and *looks like*.

From a developmental point of view, Abbeduto and Rosenberg (1985) conducted the most extensive study based on the Kiparskys’ proposal. They showed that before the age of 4 years, children treat non-factives as factives. The results confirm that the interpretation of *thinks* and *believes* may be difficult for 3-year-olds under circumstances other than the false belief task, but the study is nevertheless of limited relevance to the current account. The authors acknowledged the pragmatic weaknesses of the Kiparskys’ original analysis but opted for ignoring them, thus not allowing a comparison with the broader view of the conversational context that is presented here.

The discourse-based account receives empirical support from its application to another major theory-of-mind task: the appearance-reality task. On this task children are introduced to a deceptive object, such as a sponge that looks like a rock. At test, children below 4½ years of age typically fail, strikingly saying that the object not only *is* a sponge but also *looks like* a sponge. This suggests that they cannot distinguish appearances from reality (Flavell et al., 1986).

Similarly to the false belief task, the key test question, “What does this look like?” may be interpreted as a request for indirect knowledge about object identity in an ordinary context, e.g., “What is this?” “-Well, what does it look like?” (Austin, 1962). As the answer to the last question will provide indirect knowledge about the identity, it is subject to the conversational logic outlined above. For deceptive objects, answering with appearance would be superfluous because appearance is not a clue to their identity. It would violate the maxim of quantity.

To pass appearance-reality tasks, children must understand that the test question is embedded in the conditional context that both speakers already share knowledge of the identity of the object, which frees the child to answer with appearance. On three appearance-reality tasks that emphasized the conditional context, even 3-year-old children gave nearly all-correct appearance responses while they failed the standard versions of the tasks (Hansen and Markman, 2005).

Young children should be similarly successful on false belief tasks that emphasize the conditional context. This would be strong evidence that children’s problems with theory-of-mind tasks are due to difficulties with talking about mental states rather than with understanding the mind.

This hypothesis was tested on three major false belief tasks: (1) A location false belief task; (2) a contents false belief task; and (3) a representational change false belief task. On all tasks, the shared knowledge was emphasized in connection with the test question by simply restating it, e.g., “You and I know that the chocolate is in the basket, where does Jill think it is?” Compared to standard versions of each task, young children should do better in the emphasized context condition and thus demonstrate their knowledge of false belief.

MATERIALS AND METHODS

PARTICIPANTS

Participants were 73 preschoolers from Sydney, Australia (*mean*: 3 years and 11 months, *range*: 3 years and 5 months to 4 years and 7 months). There were 34 boys and 39 girls, all English-speaking and primarily of Caucasian, middle socio-economic background. All participated in two conditions, except 11 children who only participated in one condition to complete the design.

The research was carried out in accordance with the ethical standards of the American Psychological Association for the treatment of research participants. Assent from the children was obtained prior to their participation. Sydney University’s Human Research Ethics Committee approved the experiments.

DESIGN AND MATERIALS

There were three types of false belief tasks: location ($n = 54$), contents ($n = 36$), and representational change ($n = 45$). Each type of task had three conditions with equal numbers of participants in each: standard, emphasized context, and frame control. Each condition contained two similar scenarios acted out by the experimenter with various dolls and containers. Because of the relative similarity of tasks, conditions, and scenarios, children did not participate in all three types of tasks or all three types of conditions. Each child participated in two different types of tasks with an unrelated distractor task in between, and only in one of the conditions from

each task, with the constraint the conditions were not the same. The combination of tasks and conditions was specified on six lists that were cycled through. This yielded a sufficiently counter-balanced pattern of the types of tasks, types of conditions, scenarios, and their respective orders. For example, a child might participate in a block of two similar scenarios of the standard condition of the location task, then receive a distractor task, and then participate in a block of two similar scenarios of the emphasized context condition of the contents task. Each child was seen individually in a quiet area of the preschool.

PROCEDURE

One scenario will be described for each task. Task 1 was a location false belief task. Elmo played with a ball in front of three cups. While holding the ball, he then turned all three cups upside-down and hid the ball in one of them, and then left the stage. Big Bird now surreptitiously moved the ball to another cup. The experimenter then explained that Elmo wanted to play with the ball again. Children in the *standard condition* were asked, “Where does Elmo think the ball is?” Children in the *emphasized context condition* were asked, “You and I know that the ball is in the <color of> cup, where does Elmo think it is?”

It is conceivable that the question frame itself invited children to use a low-level “opposites” strategy in the emphasized context condition such as, “You say one thing, so I say the other.” This tendency might be enhanced by the fact that the two mental-state words *think* and *know* may be somewhat difficult to distinguish for children of 3 to 5 years of age (for a review, see Papafragou et al., 2007). Therefore, the location task included three locations, so even if children keyed off the location mentioned in the question, they could not use this information to select between the remaining two answers.

Additionally, a *frame control condition* was designed to control for this possibility. Children saw Elmo turn over the three cups while holding the ball, hide the ball in one cup, go outside and play, and return to find the ball. As Elmo returned, children were asked: “Elmo thinks the ball is in the yellow cup, where do you and I know it is?” As there was only a true belief, the correct answer was the same location as in the question, i.e., the yellow cup.

Because the phenomenon under investigation is contrastive, a control condition using exactly the same contrastive frame as the emphasized context condition but calling for a *non-contrastive* answer would be pragmatically infelicitous. Asking with a contrast where none can be found, for example in the case of a true belief setup, would not lead to a clear prediction for children’s answers. Recall that on the discourse-based explanation, stating what somebody *knows* has implications for how to interpret the following *think*. However, the reverse should not be true so the solution was to simply reverse the order of these mental-state words in the test question of the frame control condition. If children were using an “opposites” strategy, blindly keying off the option mentioned in the test question in combination with uncertainty about the exact meaning of the mental-state words, they should tend to choose the incorrect answer options.

Task 2 was a contents false belief task (Hogrefe et al., 1986). Children were shown a band-aid box and asked, “What do you think is inside this box?” Most children answered band-aids. Children

then opened the box and discovered that it contained crayons. The experimenter closed the box and introduced the character Dorothy, explaining that Dorothy had never looked inside the box before. Children in the *standard condition* were asked, “What does Dorothy think is inside the box?” Children typically fail answering “crayons” rather than “band-aids,” seemingly unaware of Dorothy’s false belief. Children in the *emphasized context condition* were asked, “You and I know that there are crayons inside, what does Dorothy think is inside the box?”

The *frame control condition* did not include false belief: Dorothy inspected the box with the lid open, so she could see the true contents. Children were then asked, “Dorothy thinks there are crayons in the box, what do you and I know is inside?” The correct answer was the same contents as mentioned in the test question, i.e., crayons. If children were guided by an “opposites” strategy, they should choose the other possible answer, i.e., band-aids.

Task 3 was a representational change false belief task (Gopnik and Astington, 1988). The task is based on the contents false belief task but rather than reporting someone else’s false belief, this type of task requires children to report their own previous false belief. The introduction is the same as in the previous task, but after the experimenter closes the band-aid box, children in the *standard condition* are asked, “What did you think was in the box before you opened it?” Children typically fail by answering “crayons,” seemingly unaware of their own previous false belief.

On a discourse-based account, a question about someone’s past belief can be interpreted as a request for indirect knowledge. Consider the example of a judge asking a police officer, “We have to find the money. Where did you think it was?” If the police officer knows better than she previously did, it would be uncooperative of her to just report her previous belief and withhold the truth.

To ensure that children did not misread the context as one of searching for indirect knowledge in the way of a past, but presumably still valid, belief, children in the *emphasized context condition* were therefore asked, “You and I know there are crayons inside, what did you think was in the box before you opened it?”

In the *frame control condition*, children initially saw the band-aid box with the lid open and were asked, “What do you think is inside the box?” All answered, “crayons.” The box was closed, and children were asked, “Before you thought there were crayons inside the box, what do you and I know is inside?” Since the child had seen the actual contents, there was no false belief and the correct answer was the same contents as mentioned in the test question, i.e., crayons. But if children were guided by an “opposites” strategy, they should not say crayons.

RESULTS

Children’s responses to the test questions in Task 1 to 3 were scored online by the experimenter as correct or incorrect. The analyses were done on the number of correct answers. Because there were two scenarios within each condition, the maximum number of correct answers in each condition is 2. **Table 1** presents the data. Preliminary analyses showed no effects of task, order, gender, or age (split at mean age). As predicted, children’s performance improved significantly on all three tasks when the conversational context of the test question was made clear.

Table 1 | Mean number of correct answers out of 2 to test questions in task 1 to 3.

Type of task	Condition					
	Standard		Emphasized context		Frame control	
	Mean	SD	Mean	SD	Mean	SD
1. False location ($n = 54$)	0.44	0.78	1.17	0.99	1.94	0.24
2. False contents ($n = 36$)	0.08	0.29	1.25	0.97	1.92	0.29
3. Representational change ($n = 45$)	0.40	0.74	1.40	0.83	1.67	0.72

On the location false belief task, children in the emphasized context condition gave 1.17 correct answers (59%) compared to 0.44 correct answers (22%) in the standard condition, $t(34) = 2.43$, $p = 0.02$. Even under the complex verbal circumstances in the emphasized context condition, children performed better than chance, set at 33%, $t(17) = 2.18$, $p = 0.04$.

On the contents and representational change false belief tasks, children in the emphasized context condition gave 1.25 (63%) and 1.40 (70%) correct answers, respectively, compared to 0.08 (4%) and 0.40 (20%), respectively, in the standard condition. Both differences were significant at $t(22) = 4.01$, $p = 0.001$ and $t(28) = 3.49$, $p = 0.002$, respectively.

Children's performance in the emphasized context condition was better than chance, set at 50%, on the representational change task, t -one-tailed(14) = 1.87, $p = 0.04$, but not on the contents false belief task. This may be due to the fact that children's performance in the standard conditions of these two tasks was already low. It was below chance, $t(14) = 3.15$, $p = 0.007$, and $t(11) = 11.00$, $p = 0.001$, respectively, which was not the case for the location false belief task. Additionally, correct performance in the standard condition of all three tasks was generally on the low side of the average proportion of correct answers in Wellman et al. (2001) meta-analysis of hundreds of false belief conditions. Children's performance nevertheless fell within the range of the results that were included in the meta-analysis. Overall, it is impressive that younger children performed better than the standard condition on all three tasks and above chance on two of the three tasks (location and representational change), given the minimal modifications to the inherently pragmatically infelicitous standard tasks.

Despite there being only two answer options on the contents and representational change tasks, children's performance is likely not attributable to a low-level "opposites" strategy. This is partly because children nearly aced the control condition at an average of 1.84 correct answers out of 2 across the three tasks, despite a question frame that might plausibly elicit an "opposites" answer. In planned contrasts, this differed significantly from the above-mentioned chance levels for each task, $t(42) = 24.92$, $p = 0.001$. Thus, children are likely not guided by a conceivable tendency to automatically choose the opposite answer of the one mentioned in the test question. However, the frame control condition was not intended to stand alone but to be considered within the overall pattern of results. The quite similar location false belief task had

not just two but three answer options, between which children still choose correctly. Furthermore, on all three tasks children gave an average of 36% incorrect answers in the enhanced context condition which they would be unlikely to do on an automatic opposites interpretation.

DISCUSSION

Standard false belief tasks may mislead young children because questions about other people's thoughts on reality (including their intended actions which reflect their thoughts) are a perfectly fine way to obtain indirect knowledge about reality in certain contexts such as the ordinary context, e.g., "I'm looking for the chocolate. Where does your Mom think it is?" Such questions require answering with the truth, not beliefs known to be false. If children assume the ordinary context on the false belief task, it places them in a pragmatic bind because they know the truth about the location better than the absent, third person. It would be awkward not to say the truth, so young children do, and fail the standard task.

Young children may assume the ordinary context, perhaps even by default, for a number of reasons. First and foremost, the test question expresses ignorance on the part of the experimenter if interpreted as an honest question, which young children have been argued to do on a number of standard developmental tasks (e.g., Siegal and Peterson, 1994). The perception of an honest question indicates the ordinary context rather than the conditional context. Second, the ordinary context of looking for knowledge about reality is supported by the follow-the-ball atmosphere of the test scenario, especially in the case of the location false belief task. Finally, the ordinary context depends on fewer inferences.

The analysis of the discourse of the false belief task suggested that interpreting the test question as it is meant requires complex pragmatic inferences. Crucially, children must consider how the state of mind of the experimenter is factored into the discourse. In order to understand the test question correctly, children must integrate into their interpretation that the experimenter already knows the location, here called the conditional context. He can therefore not intend to gain indirect knowledge about it from the child, because it would violate normal rules of conversation to ask about something he already knows.

To help young children achieve better integration of the discourse of the false belief task, the experimenter in the present study clearly stated that he was already aware of the location as part of the test question. With this slight modification to the discourse, 3-year-olds were able to pass three false belief tasks, while failing the standard versions. Because the intervention was minimal—no new information was added and the structure of the task was unchanged—these results are quite strong evidence that contrary to current theories (e.g., Perner, 1991; Gopnik and Wellman, 1994), at least older 3-year-olds have the cognitive foundation needed to understand beliefs, which is being masked by the standard false belief tasks because they rely on context-dependent mental-state verbs.

In contrast, clearly non-reality-based mental-state verbs such as *pretend*, *dream*, and *fantasize* do not semantically lend themselves to interpretations as requests for indirect knowledge (see Morgan,

1969; Kempson, 1975). Indeed, young children pass some false belief tasks couched in terms of pretense (Flavell et al., 1987; Woolley and Wellman, 1990). The discourse-based account then solves the puzzle of why even 1-year-olds seem to understand pretend play, which implicates some understanding of mental representation, and pass new nonverbal tests, while young children still fail standard false belief tasks.

A remaining challenge is to account for the developmental change that enables children above 4½ years to pass the standard false belief tasks. The results hint that the core problem for younger children may lie in understanding the pragmatics of how and when to connect current and preceding discourse, in particular factoring the common ground of shared knowledge into their interpretation of the test question. Older children may have achieved a better understanding that the experimenter's seemingly honest question does not negate his previous indication that he already knows the truth. In contrast, younger children may not realize that this shared information is sustained throughout a conversation and even trumps contradictory pragmatic indicators.

Two sources of evidence point to a related development between 3 and 5 years of age in children's ability to sustain preceding pragmatic information when interpreting ambiguous statements.

In one study, Avrutin and Coopmans (2000) investigated which inferences 3- to 5-year-old children made to bridge an ambiguous statement with preceding utterances. For example, children saw a picture of a boy with red pants and a girl with green pants. The boy was eating while the girl was playing. Children heard a puppet say, "There is a boy eating. The pants are green." Children's task was to judge whether the puppet's sentence was true or false. Five-year-olds would bridge the definite reference back to the boy and conclude that the sentence was false, whereas 3-year-olds identified the sentence as true or false at chance. In subsequent studies, the authors found that it took only a slight re-arrangement of the sentence to increase the performance of 3-year-olds. Making the topic of the initial phrase more salient by moving it to the beginning of the sentence, e.g., "A boy is eating. The pants are green," helped most children correctly identify the sentence as false in relation to the picture.

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Another set of studies investigated whether children used the implicit pragmatic suggestions of the discourse setting to infer the topic of a conversation (Shatz, 1978; Bacharach and Luszcz, 1979; Allen, 1991). Here, 3- to 5-year-olds saw pictures that invited comments on an aspect of the picture. The ambiguous request was preceded by comments about either actions or objects. For example, Bacharach and Luszcz (1979), would preface a picture with, "Horses can run. Horses can jump fences. Horses can eat hay. Here's a picture, tell me about it." Or, "A cow is an animal. A rabbit is an animal. A cat is an animal. Here's a picture, tell me about it." Children's answers showed that 5-year-olds, but not 3-year-olds, matched the action setting with action answers and the information setting with information answers.

While the studies of bridging inferences and referential ambiguity are not direct analogues to the current account of the false belief task, the results give some reason to think that younger children may in fact struggle with making the required links to preceding discourse which older children more readily accomplish.

More basic cognitive achievements such as general information processing abilities may contribute to this pragmatic development. Increased processing capacity and an improved ability to inhibit knowledge about current information in favor of more distant information have previously been found to correlate with the standard false belief task (Frye et al., 1995; German and Leslie, 2000; Carlson and Moses, 2001; Andrews et al., 2003). While pragmatic inferences require understanding people's communicative intentions and thus can be described in theory-of-mind terms, the present results do not support the radical change in children's theory-of-mind at the late age of 4½ years proposed by current theories.

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“Learning Science Is About Facts and Language Learning Is About Being Discursive” – An Empirical Investigation of Students’ Disciplinary Beliefs in the Context of Argumentation

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Argumentation is considered crucial in numerous disciplines in schools and universities because it constitutes an important proficiency in peoples’ daily and professional lives. However, it is unclear whether argumentation is understood and practiced in comparable ways across disciplines. This study consequently examined empirically how students perceive argumentation in science and (first) language lessons. Specifically, we investigated students’ beliefs about the relevance of *discourse* and the role of *facts*. Data from 3,258 high school students from 85 German secondary schools were analyzed with multigroup multilevel structural equation modeling in order to disentangle whether or not differences in argumentation across disciplines exist and the extent to which variation in students’ beliefs can be explained by gender and school track. Results showed that students perceived the role of *facts* as highly relevant for science lessons, whereas discursive characteristics were considered significantly less important. In turn, *discourse* played a central role in language lessons, which was believed to require less knowledge of *facts*. These differences were independent of students’ gender. In contrast, school track predicted the differences in beliefs significantly. Our findings lend evidence on the existence of disciplinary school cultures in argumentation that may be the result of differences in teachers’ school-track-specific classroom practice and education. Implications in terms of a teacher’s role in establishing norms for scientific argumentation as well as the impact of students’ beliefs on their learning outcomes are discussed.

Keywords: argumentation, beliefs, disciplinary school culture, language education, science education

INTRODUCTION

Science education is aimed at fostering a variety of students’ competencies, which concern not only the mere acquisition of knowledge but also skills that help students communicate and evaluate scientific knowledge (Baram-Tsabari and Osborne, 2015). Some of these skills are discipline-specific (e.g., planning a scientific experiment in science lessons), whereas others are rather

discipline-general (e.g., reading). In order to describe and understand discipline-specific learning processes, argumentation is considered important because it is needed to formulate reasoned justifications or ideas and, thus, to cope with the increasing complexity of knowledge within a discipline (e.g., Driver et al., 2000; Berland and Hammer, 2012). Engaging in argumentation means constructing and supporting claims by using evidence and reasoning abilities as well as questioning, challenging, and revising one's own and others' claims, evidence, and reasoning (Osborne, 2010; Berland and Hammer, 2012). Evidently, argumentation is an important transversal key competence across all disciplines.

However, the way in which argumentation is taught in lessons might feature discipline-specific characteristics as shown by a recent study on students' written argumentation skills in science and language (Heitmann et al., 2014). One reason for these varying characteristics of argumentation may lie in so-called disciplinary school cultures, which can be described as patterns of thinking, perceiving, and doing. Disciplinary school cultures shape students' and teachers' beliefs about what is a "correct," "authentic," or "accepted" argument in a concrete discipline. According to (Borg, 2001, p. 186), a belief is a "[...] proposition which may be consciously or unconsciously held, is evaluative in that it is accepted as true by the individual, and is therefore imbued with emotive commitment; further, it serves as a guide to thought and behavior." Thus, such beliefs play a central role in learning processes and reflect the manner in which a discipline is typically conceptualized and presented in school settings (Hericks and Körber, 2007). Students may hold different beliefs about the understanding and practice of argumentation in the disciplines, and independent of their cognitive abilities, these beliefs may have a serious impact on students' ability to argue. Differences in beliefs across disciplines can be interpreted as evidence of existing disciplinary school cultures in argumentation.

Given that argumentation is a broad construct, we focused on two important characteristics: *facts* and *discourse*. *Facts* are central to the process of argumentation because they serve as a basis for supporting an argument with data and evidence. *Discourse* relates to communication processes, provides the means for debating or argumentative discussions, and represents the discursive aspect of argumentation. Concerning students' beliefs about *facts* and *discourse*, it makes sense to ask about the extent to which these beliefs are determined by individual and contextual factors. Some studies have suggested that girls and boys hold different beliefs about science and language because language learning, for instance, is often characterized as "soft" or feminine (Willems, 2007), whereas science is considered to be "hard" or masculine (Hannover and Kessels, 2002). In addition, the school tracks that students attend might influence their beliefs about *facts* and *discourse*. This may be due to the differences in teachers' beliefs about argumentation and the educational practices they apply in the classroom, both of which can be the result of different teacher study programs (de Brabander, 2000). As a consequence, variation in students' beliefs about

facts and *discourse* may be explained by gender and school track.

Against this backdrop, the goal of the current research is to investigate the extent to which students' perceive specific aspects of argumentation and whether these beliefs are subject to differences across the two school disciplines of science and language¹. Our primary goal is to examine whether there are differences in students' beliefs about argumentation in these two domains and to determine the extent to which gender and school track shape these differences. Current curricula in nearly all western countries request promoting argumentation in different disciplines. To ensure a systematic competence development in argumentation that enables students to recognize and apply argumentation across and within disciplines, the clarification of students' beliefs about argumentation in different disciplines is helpful. Beliefs influence classroom practices. Thus, knowledge about disciplinary beliefs can be a starting point for the design and the improvement of learning and teaching argumentation in the classroom, for explaining disparate argumentative behavior in the disciplines, and for providing information on potential learning barriers.

THEORETICAL FRAMEWORK

Disciplinary Cultures

The existence and relevance of differences between (scientific) disciplines such as chemistry, sociology, or linguistics has been discussed in various fields of research (e.g., Becher, 1987; Huber, 1990). Empirical research generally supports the view that there are important differences between disciplines or disciplinary groupings (Becher, 1987; Neumann et al., 2002; Multrus, 2005). Each discipline clearly has its own particular characteristics and qualities, and of course these are not purely epistemological. Disciplines are also cultural phenomena: They are embodied in collections of like-minded people, each with their own codes of conduct, sets of values, and distinctive intellectual tasks (Becher, 1981). In this context, the term *disciplinary culture* is used to describe a common set of assumptions, attitudes, conceptualizations, epistemologies, and values held by members of a discipline (e.g., Becher, 1987; Huber, 1990). Disciplinary cultures cover the tradition of a discipline, particularly its fields of knowledge and research, methodologies, practices, scientific issues, and how the results are represented and interpreted (Multrus, 2005). The culture involves the thought patterns, evaluation, and behavior of the individuals who belong to a specific discipline (Green and Dixon, 2002). The traditions of the discipline shape its members and this is again expressed in a professional perception and view of the world (e.g., Kelly and Chen, 1999; Multrus, 2005). Thus, the members of a discipline (e.g., scientists in a particular field, members of a classroom) affiliate over time and create particular ways of talking, thinking, acting, and interacting (Green and Dixon, 2002).

¹In our study, German is the students' first language, which will subsequently be referred to as the discipline of "language."

Characteristics of Disciplinary School Cultures

The concept of disciplinary cultures can also be transferred to the school setting. In this setting, the concept comprises teachers' and students' beliefs about a discipline and how these beliefs influence classroom practices. Disciplinary school cultures reflect the manner in which the disciplines are typically conceptualized and treated in school settings. In the following, unless otherwise noted, the term "disciplines" refers to school settings and covers school subjects such as science, mathematics, history, and language.

In general, beliefs about learning or the nature of a discipline are cultivated through education in school (Wang et al., 2016). The school is often the first contact students get to a discipline. Students and teachers develop ingrained beliefs about the characteristics of a discipline, and these beliefs influence their behavior in terms of, for example, learning and teaching objectives, common and useful knowledge, ways of learning and teaching, students' performances, difficulty of content, popularity, and problems (Bastian and Combe, 2007; Hericks and Körber, 2007). These beliefs result in discipline-specific differences in mindsets (Trautmann, 2005). According to Müller-Roselius (2007), it is important that a common belief exists, regarding, an unquestioned acceptance of the expectation of what counts as "correct," "authentic," or "accepted" ways of learning and teaching in reference to disciplinary school cultures. Thus, disciplinary school cultures can be defined as social constructs that refer to the "rules" that are cultivated in school lessons and that describe students' and teachers' commonalities in thinking or questioning, among others (Hericks and Körber, 2007; Müller-Roselius, 2007). These beliefs are taken for granted and make implications about what counts as scientifically "good," sophisticated, efficient, or typical (Yackel and Cobb, 1996; Carlone, 2004; Partanen and Kaasila, 2015).

Concerning students' beliefs about the facets of knowledge, knowing, and beliefs students are exposed to in their learning environments, researchers often refer to an "epistemic climate" (e.g., Muis and Duffy, 2013). Teachers' beliefs, in particular, play an important role in a school's epistemic climate. For example, in the discipline of science, Kind (2016) stated that "science teachers' (...) beliefs about science may influence those of their students" (p. 9). Jones and Leagon (2014) moved this statement even further into the context of argumentation by claiming that teachers' beliefs about science argumentation are key for promoting the classroom practice of science argumentation. These classroom practices may in turn influence students' beliefs about science argumentation and science in general (Bell and Linn, 2002). Contributing to this line of reasoning, McNeill and Knight (2013) uncovered the relation between teachers' beliefs in science argumentation and how they were educated in K-12 instruction with respect to promoting science argumentation. Whereas, elementary teachers were more likely to connect argumentation in science to similar practices in other disciplines such as language and mathematics, high school science teachers were more likely to focus on the scientific content of argumentation (McNeill and Knight, 2013).

However, it is important to note that disciplinary school cultures cannot be considered to be "pure" disciplinary cultures

in the sense of academic disciplinary cultures. In a school setting, a subject typically involves less complexity in its contents and methods than at universities. In contrast to disciplines at universities, school contexts are, for example, not designed to produce new scientific knowledge (McDonald and Kelly, 2012). In addition, teachers pursue educational goals in order to best help students to understand science, and such goals are not identical to the practices that help scientists develop new scientific understandings (McDonald and Kelly, 2012). Consequently, science classroom learning practices might not be completely authentic in this way.

The Concept of Argumentation

Despite disciplinary differences, existing conceptualizations of argumentation share a common idea, that is, argumentation represents a process through which people engage in proposing, criticizing, and evaluating ideas that are debatable (e.g., Sampson and Clark, 2008). Hence, argumentation is important in order to reveal *why* people think their position is "reasonable" (Kuhn, 1993). For an argument to appear reasonable, grounds have to be stated that show which position an arguer takes toward a debatable idea and how this position is elaborated (Kuhn, 1993; Winkler, 2003). This demand comes along with engaging in argumentative processes and is based on the assumption that claims are deniable (Kuhn, 1993; Walton, 1996).

At the same time, however, various frameworks of argumentation exist that add discipline-specific perspectives on aspects of the argumentative process. In science education, for instance, Toulmin's Argumentation Pattern (Toulmin, 1958) is a prominently applied framework. This framework focuses on the structure of an argument which is characterized by the presence of specific structural components such as claim, data, warrant, backing, and rebuttal. At the same time, several alternative frameworks of argumentation developed to evaluate the content and quality of informal arguments exist (e.g., Walton's dialogue theory; for a review of argumentation frameworks, please refer to Nussbaum, 2011). For example, the content-oriented perspectives on the quality of an argument focus on the underlying content and thus the application of reliable knowledge that has been gained from texts, tables, diagrams, results of experiments, or other sources to undermine an opinion (for a systematic review on assessing arguments in science education, see Sampson and Clark, 2008). In language education, further frameworks focus on linguistic features of an argument as indicators of, for instance, students' knowledge about how to formulate justifications or counterarguments (Winkler, 2003; Feilke, 2010). In light of these different foci on argumentation, it is of interest whether students share common beliefs about argumentation across different school lessons, and, consequently, which disciplinary school culture of argumentation students form.

Characteristics of a Disciplinary School Culture of Science Argumentation

Science and technology influence our society in various ways and shape a significant part of our cultural identity. Science education in schools is therefore aimed at fostering scientific literacy, which enables students to participate in society by developing

the ability to communicate about technical developments and scientific research (e.g., Bybee, 1997; NGSS Lead States, 2013). In particular, students should gain insights into scientific phenomena, which serve as a means of discovering the world and understanding human nature. They should also be able to understand and apply scientific language, comprehend its history, and communicate scientific results. Likewise, students should learn about scientific methods in order to have the ability to acquire knowledge and discuss its limitations.

On this point, there are various kinds of characteristics that are central to learning science. The current paper focuses on two characteristics that are highly relevant to learning science and, at the same time, are immanent within scientific argumentation processes: (a) the acquisition of *facts* or the role of *facts* and (b) the engagement in *discourse* on debatable aspects of knowledge (i.e., discursive characteristics). It is important to note that both characteristics can be considered to be two central facets of argumentation and cannot capture the intricacy of argumentation as a higher-order thinking skill.

In acquiring *facts*, students should use knowledge about basic principles in science and apply them toward arguing about or explaining scientific questions and understanding or evaluating scientific and socioscientific issues. In doing so, science lessons are often characterized by a hypothesis-based approach toward understanding or simulating the scientific process of obtaining data, theories, or concepts (Kuhn et al., 2008). In our study, this characteristic of science lessons is referred to as *facts*. Of course, this represents only one type of knowledge relevant for science lessons among others such as procedural or epistemic knowledge. In terms of scientific literacy, students should learn how *facts* in science evolve over time and thus learn about the (un)certainly of knowledge (e.g., Bybee, 1997; NGSS Lead States, 2013). *Facts* are also immanent in the process of argumentation in science because *facts* support an argument's claim and are components of data and evidence amongst other elements (e.g., Osborne, 2010). Thus, *facts* are important for providing justification. In fact, without argument, the construction of reliable (and also revisable) knowledge would be impossible (Osborne, 2010).

The aspect of *discourse* represents another important but not contrary characteristic of scientific literacy. Science learning is also aimed at engaging students in discourse and interpretive processes (Kelly and Chen, 1999). *Discourse* is a mechanism of communication that is central for justifying, questioning, or evaluating *facts*, theories, and concepts in science (Osborne, 2010). Scientists debate the merits of alternative scientific theories and models, and review one another's work as an integral part of the scientific disciplinary culture. Moreover, discursive abilities are important for formulating ideas, debating justifications, and talking about science with others in science lessons (Olitsky, 2007). In the classroom, students develop a sense of what constitutes a sophisticated or acceptable scientific contribution in order to avoid unproductive discussions (Partanen and Kaasila, 2015).

The process of argumentation focuses on claims that are supported by evidence (on the basis of *facts*) and require the ability to compare, contrast, and distinguish different lines of reasoning with warrants, backings, and so forth (e.g.,

Osborne, 2010). It is of particular interest to link pieces of evidence with claims and other elements in order to formulate a scientifically adequate argument. It is evident that, next to the role of *facts*, *discourse* is another important characteristic of a scientific argument. *Facts* can be seen as a relevant component of a scientific argument, whereas *discourse* constitutes a mechanism of communication within the argumentation process.

However, science is often presented in schools in a “ready-made” form (Latour, 1987), which may lead to the perception of *facts*, and thus, static or undebatable knowledge. In this context, students believe their teachers expect them to act in completely goal- and fact-oriented ways because their work is based on observations and the conclusions drawn from them (Decke-Cornill and Gebhard, 2007). As a consequence, science lessons are often associated with a well-defined body of knowledge and skills to be taught and are perceived as narrowly defined with a strong scientific orientation (e.g., adherence to the rules of good scientific practice, correct use of scientific terms; Grossman and Stodolsky, 1995; Decke-Cornill and Gebhard, 2007). Along these lines, science is constructed as a precise, clearly defined discipline that deals with “pure” ideas (Becher, 1981), and, due to an accumulation of *facts*, it is also regarded as a discipline of “objective truth” (Hericks and Körber, 2007; Willems, 2007). Such beliefs may result in an overemphasis of *facts* in science lessons. This in turn offers only limited opportunities for students to actively contribute to science lessons and therefore to express their scientific personality or identity (Hannover and Kessels, 2002). Science lessons may at the same time be characterized by a lack of discourse at the expense of what we know (Osborne, 2010).

Characteristics of a Disciplinary School Culture of Language Argumentation

Mastering language is an essential educational goal in order to understand, find order in, and shape the world. The national educational standards for language education in Germany, *inter alia*, have formulated the aims of enabling students to handle social demands on the basis of values and norms, to cope verbally with situations, to share their thinking with others (e.g., argue, express feelings, or ideas), and to develop the ability to handle criticism (KMK, 2004). Altogether, language education is aimed at contributing to the development of students' personality (i.e., sense of identity), the ability to share one's sentiments, which involves positioning oneself as an autonomous person, and an awareness of how to handle oneself (Willems, 2007). In the long run, this contribution should increase students' self-confidence, social skills, and ability to work in teams (KMK, 2004). Against this background, it is noteworthy that especially qualitative analytic approaches and hermeneutic-interpretative statements tend to dominate language lessons (Decke-Cornill and Gebhard, 2007).

Language lessons are also characterized by the (a) role of *facts* and (b) the application of *discourse*. The acquisition of *facts* is relevant because students need information about language (e.g., grammar, discourse markers), literature (e.g., different kinds of

genres, structure of texts), media (e.g., different representations, characteristics of information, and entertainment functions), and the topic at hand. For instance, students should know how to structure an argument and also support their arguments with relevant information about a debatable topic; that is, they need to address relevant *facts* (e.g., Winkler, 2003). Besides verifiable evidence, values, or norms, arguments can be built on individual examples or personal experience as long as students present this “subjective evidence” reasonably (Krelle, 2014).

Because methods in language lessons often require an individual approach that leaves room for interpretation, students also need discursive abilities in order to take a position, reflect on the material, and negotiate a consensus (KMK, 2004; Willems, 2007). To achieve this, students should develop skills such as the aptitude to contribute to discussions, the capacity for empathy, or the ability to avoid making a hasty judgment (Willems, 2007). Concerning argumentation, it is pivotal to follow a line of reasoning that consists of, among others, realizing the debatable character of a problem, gathering information, developing and weighing alternative options, and coming to a conclusion or consensus while also considering values and norms (e.g., KMK, 2004; Willems, 2007). In this context, great emphasis is placed on a precise linguistic integration of arguments (Feilke, 2013).

According to Willems (2007), language lessons tend to strongly emphasize personal arguments and can affect students' willingness to adapt their answers to new perspectives. This may result in the downgrading of the importance of specific *facts*. The content can thus be utilized to achieve these aims, which may be due to the fact that the content and the medium of communication are often congruent (Willems, 2007). This strong focus on communicational and linguistic aspects often leads to the belief that language education is a “soft,” subjective, and emotional discipline (Decke-Cornill and Gebhard, 2007; Willems, 2007).

To conclude, argumentative skills related to *facts* and *discourse* are important characteristics for learning in both disciplines (i.e., science and language) but are often treated differently in school lessons in these different disciplines, thus potentially leading to distinct disciplinary school cultures.

Gender Differences in Students' Discipline-Specific Beliefs

There is some evidence that students' belief about a discipline, which influences their attitudes or behaviors in the classroom in terms of learning or interest, differs across gender. Hannover and Kessels (2002) suggested that students' expectations and attitudes toward (the characteristics of) a discipline not only depend on their performance, self-concept, and motivation but are also shaped by the image of a particular discipline. This image is based on socially shared knowledge and reflects stereotypes or prototypes that are associated with the discipline (Hannover and Kessels, 2002). Their study showed that secondary school students perceived science as having strong connotations of gender; in particular, about half of the students considered physics to be a subject for boys (Hannover and Kessels, 2002). Moreover, a study conducted by Willems (2007) revealed that

teachers often characterized boys as more determined and result-oriented than girls. In particular, the successful acquisition of “hard” knowledge (i.e., *facts*) with supposedly objective truth in physics requires characteristics that are often attributed to or preferred by boys (Willems, 2007; Archer et al., 2010). Accordingly, boys should be attached to the role of *facts*.

By contrast, teachers tend to depreciate boys' discursive abilities and instead attribute characteristics such as being a good listener and loving to discuss and exchange views to girls (Willems, 2007). Teachers even tend to assume that girls are naturally gifted with discursive abilities that are independent of their socialization through language education (Willems, 2007). Given that the discipline of language is strongly associated with these skills, it is often characterized as “soft” or feminine (Willems, 2007). Consequently, girls should be attached to *discourse*. However, there are also opposing views on gender differences in the context of discourse and the ways students choose to engage in discourse (e.g., in argumentation). Because argumentation often incorporates competition, which implies disagreement and possibly consternation, it can be hypothesized that female students will consider this competition less attractive than boys and will thus lose interest in science (McDonald and Kelly, 2012). In this line of thinking, girls should be less attached to *discourse*. Nevertheless, because some studies have indicated that teachers make different attributions to their students with respect to the two aspects of disciplinary school culture, this may also affect students' beliefs about the relevance of these characteristics.

Potential Sources of Teachers' Disciplinary Beliefs

Besides explaining differences in students' disciplinary beliefs at the individual level, contextual factors in school may also play an important role in shaping these beliefs. In fact, Archer et al. (2010) argued that the development of students' scientific identities and beliefs about science strongly depends on the context in which learning takes place.

One potential contextual source of these beliefs involves teachers' education and professional development. Haerle and Bendixen (2008) pointed out that teachers' epistemological beliefs are related to their professional development and vary across different teacher training programs. Similar conclusions were drawn in several other studies (e.g., Sadler et al., 2006; Zohar, 2008). Besides the effects of professional development, the university and college cultures in which preservice teachers are educated shape their beliefs about knowledge and the nature of disciplines (Muis and Sinatra, 2008). For instance, this was confirmed in a study by Trautwein and Lüdtke (2007) who found differences in university students' general and discipline-specific epistemological beliefs across different academic environments. Specifically, the authors found that students who were enrolled in mathematics, science, and engineering believed that scientific knowledge was certain to a larger extent than students who were enrolled in the social sciences. It can therefore be hypothesized that teacher education conveys beliefs about knowledge and the nature of disciplines to preservice teachers, and this in turn might

then account for the ways teachers constitute disciplinary school cultures (Grossman and Stodolsky, 1995).

In fact, the German programs for educating future academic and nonacademic track teachers differ greatly², particularly with respect to the number of courses in general pedagogy and their length, subject-specific education, and the subject domains that preservice teachers are offered. Specifically, academic track teachers spend considerably more time studying the actual subject domains such as science or language, whereas pedagogy and educational sciences are in the main focus of nonacademic track teacher education—which is a very typical situation in Germany (e.g., Müller et al., 2008; Kleickmann and Anders, 2013). These differences are a result of the different mandates that academic and nonacademic track education has. Whereas, academic track education is oriented toward developing scientific understanding and competence in order to prepare students for university, nonacademic track education is aimed at providing students with a general, rather practical education that prepares them for the working world (e.g., Baumert et al., 2010; Blömeke, 2016). Given these differences across school tracks, differences in beliefs about science and science argumentation between the teachers enrolled in these two programs may occur.

There is some evidence that teachers with the highest level of teacher education perceive science as an extremely “hard” and highly specialized discipline, whereas language learning represents a “softer” and less specialized discipline to them (de Brabander, 2000). The qualifier “hard” refers to the role of *facts* that is characterized as testable, objective, and established in contrast to everyday knowledge. Hence, our assumption is that students in academic tracks should be more attached to the acquisition of *facts*, especially in the science subjects (Willems, 2007).

Bringing together the main arguments presented in this section—teachers' beliefs are shaped in teacher education at university, may differ with respect to their type of education (e.g., academic vs. nonacademic track), and may affect students' beliefs—it is reasonable to expect students' beliefs about argumentation in science and language learning to vary across school tracks. The current study consequently sought to examine these differences.

RESEARCH QUESTIONS

The goal of the present study was to examine students' beliefs about two central characteristics of argumentation and investigate whether these beliefs differ across the two disciplines of science and language. Students' beliefs within both disciplines were of interest with a focus on (a) the role of *facts* and (b) the relevance of discursive abilities (i.e., *discourse*). On the one hand, these two aspects can be regarded as two relevant characteristics

of learning and on the other hand as two elements that are relevant in the argumentation process in both disciplines. If students' beliefs vary across the two disciplines, this can be interpreted as evidence for the existence of disciplinary school cultures in science and language. The knowledge about existing disciplinary school cultures in turn is relevant for shaping disciplinary and interdisciplinary learning processes in schools, and for developing a reasonable understanding of argumentation in different academic disciplines.

Against this backdrop, we examined three research questions concerning the existence of disciplinary school cultures and their relation to students' and schools' characteristics. The first research question addresses the extent to which students perceive differences between the two disciplines:

- (1) Are there differences in students' beliefs concerning the roles of *facts* and *discourse* between science and language lessons?

In order to describe these differences, we assessed students' beliefs with rating scales and gathered qualitative information from open-ended questions on the relevance of *facts* and *discourse* for argumentation in science and language lessons. Expanding on these differences, Research Questions 2 and 3 investigated school-level variation and the influence of gender and school track on students' beliefs. As described earlier, beliefs about argumentation or specific subjects are shaped by students' learning environment and might therefore be subject to variation therein (Archer et al., 2010). Given that schools vary in the extent to which curricula—both in the domain of science and first-language learning—are enacted or in the extent to which teachers are trained in order to shape adequate beliefs about these domains (e.g., Haerle and Bendixen, 2008), Research Question 2 is primarily concerned with quantifying this variation for students' beliefs about the relevance of *facts* and *discourse*. Research Question 3 takes a step further by focusing on two potential sources that might explain student- and school-level variation in these beliefs.

- (2) To what extent are differences in beliefs about the relevance of *facts* and *discourse* related to the schools the students attend?
- (3) How can the differences in students' beliefs be explained on
 - (a) the student level and (b) the school level?
 - a. To what extent differ students' beliefs about the relevance of *facts* and *discourse* in science and language lessons related to their gender?
 - b. To what extent differ students' beliefs about the relevance of *facts* and *discourse* in science and language lessons related to the school track they attend?

METHOD

Participants

This study focused on students at the end of the lower secondary level in Germany. Participants were 3,258 students in 85 schools. A two-stage sampling procedure was applied. In the first stage, eight federal states were chosen in a way that they form a representative sample of all 16 German federal states. For

²Schools in the German educational system are divided into school types that qualify students to attend technical colleges and universities versus vocational training programs. The former includes the German grammar school (*Gymnasium*) and some parts of comprehensive schools (*Gesamtschule*). The latter includes all other secondary schools (e.g., *Realschule*) but also primary school (*Grundschule*). German teacher training is differentiated in study programs for academic school types (*Gymnasium*) and nonacademic school types.

instance, the sample consisted of urban city states as well as states with large rural areas from several geographical regions. In the second stage, schools within each state and two 10th-grade classrooms within these schools were randomly selected. The resultant sample used in this study was thus as representative for the population of grade 10 German students as possible. Students' average age was 15.5 years ($SD = 0.7$ years) and ranged from 14 to 18 years. About half of the students were female (51.3%).

Because the German school system differentiates between tracks, students attended different school types, of which 45.2% were enrolled in an academic school track (*Gymnasium*), that is, the highest educational track across all federal states, and the other students attended nonacademic school tracks (e.g., *Realschule*).

Data Collection

Data collection took place as part of the German national educational assessment program at the end of the lower secondary level. It was administered in eight federal states and conducted by the Institute for Educational Quality Improvement (IQB). For schools, participation was mandatory; yet, students' participation was not. Although students were encouraged to participate (participation rate was 79.6%), they had the opportunity to withdraw their participation. The study has been approved by the ethics committees of the Federal Ministry of Education in Germany and the IQB. Consent was given by all relevant parties and participants. Data collection was anonymous. The assessment program included a questionnaire on sociodemographic information. The investigation of students' beliefs was integrated into this part of the assessment. Students worked on items that referred to the relevance of *facts* and *discourse* in science and language lessons (quantitative measure). In addition, students had to answer an open-ended question about the relevance of these aspects for argumentation in science and language lessons (qualitative measure).

Study Measures

Quantitative Measure of Disciplinary School Cultures

In order to assess students' beliefs, we administered a questionnaire that consisted of six items (see Supplementary Material S1). Students had to rate these items on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The items addressed two scales: The first scale comprised three items that referred to the perceived role of *facts* in science and language lessons; it was therefore labeled *facts*. The following sample item illustrates the content of this scale: "In science/language lessons, it is important to use technical terms for descriptions or justifications." The second scale comprised three items and was labeled *discourse*. It covered students' beliefs about the importance of formulating one's own standpoint toward controversial issues in school lessons, for example, "In science/language lessons, I am expected to express my opinion about controversial issues." Parallel item wordings were used in order to minimize methodological bias, which can occur with different item formulations across disciplines. The specific items can be found in the Supplementary Material S1.

Table S1 in the Supplementary Material shows the reliability indices for both scales in both disciplines. We computed McDonald's ω (McDonald, 1999) from a confirmatory factor analysis with freely estimated factor loadings in the statistical software *Mplus* 7.11 (Muthén and Muthén, 1995–2013). McDonald's ω represents a measure of internal consistency that outperforms the commonly used coefficient of Cronbach's α (Trizano-Hermosilla and Alvarado, 2016). The reliability was satisfactory for all subscales (i.e., *facts* and *discourse*) across subjects (i.e., science and language), as McDonald's ω ranged from 0.71 to 0.85. Support for the distinction between *facts* and *discourse* within the two disciplines was derived from the item correlations (see Supplementary Material Tables S3, S4). For both the science and language scales, items had homogenous correlations within a factor (black-rimmed box) that were much higher than the item correlations between factors. For instance, item correlations for science *facts* ranged from $r = 0.52$ to 0.60, whereas item correlations across factors ranged from $r = -0.04$ to 0.02.

Qualitative Measure of Disciplinary School Cultures in Argumentation

In addition to using the quantitative measure, we collected students' beliefs about the roles of *facts* and *discourse* for argumentation in science and language lessons in an open-ended item format. The instructions read as follows:

Sometimes you have to formulate a point of view on a controversial issue; that is, you need to generate an argument about a topic in the science subjects (biology, chemistry, and physics) and in language lessons.

Explain what you think is expected of you if you make an argument in science lessons in comparison with making an argument in language lessons.

You can provide examples to illustrate your opinion.

In the present paper, the qualitative data from the open question were used to supplement the quantitative results from the rating-scale questionnaire. We analyzed a subsample of the open answers qualitatively to identify central beliefs about the relevance of *facts* and *discourse* in argumentation in the two disciplines. The development of an exhaustive category system and the systematic analysis of the open questions is reported elsewhere (Schwanewedel and Heitmann, in preparation).

Statistical Analyses

In order to address our research questions, we tested a total of six models in *Mplus* using the robust maximum likelihood (MLR) estimator and continuously treated items. This estimator ensures correct standard errors in cases in which deviations from the normality of observations occur (Kline, 2015) and Likert scales with at least four response categories are used (Beauducel and Herzberg, 2006). Rates of missing data were less than 2% for each item, and the full-information-maximum likelihood procedure was used to handle them.

The purpose of the first four models was to investigate the measurement invariance of the two constructs *facts* and *discourse* between the two disciplines science and language

at the individual (student) level, treating the disciplines as “grouping variables.” This analysis was particularly important for addressing our research questions because we needed to ensure that the measurement of the two constructs was comparable across disciplines. If, in fact, sufficient levels of invariance are not given, differences in students' responses between subjects might be due only to differences in the ways in which the items are perceived (e.g., Rutkowski and Svetina, 2014). This measurement bias may compromise the comparability of the quantitative measures across disciplines. We specified two-group confirmatory factor analysis models in which the two disciplines represented the groups, across which different parameter constraints were imposed. In the first model, the structure of the measurement model was the same in the two disciplines, but the model parameters (e.g., factor loadings, item intercepts) were not constrained across disciplines (*configural invariance*). To identify this model, the factor loading of the first manifest item was set to 1 for each construct, and the means of the latent variables in both disciplines were set to the mean of the means of the manifest items (i.e., 4.39 for *facts* and 2.99 for *discourse* in science; 3.65 for *facts*, and 3.96 for *discourse* in language). In the second model, the factor loadings were constrained to be equal across disciplines (*weak invariance*). In the third model, item factor loadings and intercepts were constrained to be equal across disciplines (*strong invariance*). This implies that the mean of one of our two constructs could be freely estimated; we (arbitrarily) chose to freely estimate the means in language, whereas the means for the science scales remained fixed. Equal factor loadings and equal item intercepts across disciplines formed the prerequisite for comparisons of the factor means across the two disciplines (Research Question 1). In the fourth model, the error variances of the manifest variables were additionally constrained to be equal across disciplines (*strict invariance*).

Building on the strong measurement invariance model (Model 3), we additionally introduced schools as another level in order to address Research Question 2. Given that students reported on their perceptions of argumentation in science and language lessons in schools, a multilevel structural equation modeling approach was taken to approach the research questions. In fact, Marsh et al. (2012) and Wagner et al. (2016) suggested that, in contexts where students' perceptions of school- or classroom-based constructs are assessed, both the individual (i.e., student) and the aggregated level (i.e., schools or classrooms) need to be taken into account. The resulting model (Model 5) represented a two-group (science and language), two-level (students and schools) confirmatory factor analysis model with two latent factors (*facts* and *discourse*). This model allowed us to calculate the intraclass correlation coefficient (ICC), which indicates the portion of the variation that is due to the clustering of students in schools. Factor loadings were additionally constrained to be equal across levels. School weights were used to account for unequal numbers of students in schools. This model formed the basis for answering our first and second research questions. In a final model (Model 6), we added students' gender as a predictor at the student level (0 = *boy*; 1 = *girl*) and school track as a school-level predictor (0 = *nonacademic track*; 1 =

academic track). This model formed the basis for addressing Research Questions 3a and 3b. Following (Enders and Tofghi, 2007) recommendations, we centered students' gender on the schools' means (i.e., group-mean centering) and school track on the overall sample mean (i.e., grand-mean centering). Broadly speaking, this kind of centering facilitates the interpretation of the effects on the different levels.

RESULTS

Measurement Invariance Testing and Model Fit

Table S2 in the Supplementary Material presents the RMSEA and CFI-values for the six models. We chose these two fit indices because they are less sensitive to model complexity and sample size than other indices (Cheung and Rensvold, 2002; Chen, 2007). For the measurement invariance models, the differences in the CFI and RMSEA values from the previous model were computed. As a rule of thumb, the more parsimonious model should be chosen if ΔCFI exceeds .01 (Cheung and Rensvold, 2002; Chen, 2007). The least restrictive configural invariance model (Model 1) fit the data very well (CFI = 0.99, RMSEA = 0.035). The weak invariance model (Model 2) fit equally well ($\Delta\text{CFI} = 0.00$). Model fit decreased just slightly when the intercepts were additionally constrained to be equal (strong invariance, Model 3, $\Delta\text{CFI} = 0.01$). A substantial drop in model fit was observed for Model 4 in which the error variances were additionally constrained to be equal. Thus, strict measurement invariance was not given, and Models 5 and 6 were based on Model 3. The lack of strict measurement invariance was not problematic because strong measurement invariance was sufficient for our analyses. Overall, all models, except for Model 4, fit the data well.

We have divided the presentation of the results on our research questions into two subsections: First, we will address the first research question concerning the existence of disciplinary school cultures of argumentation in science and language lessons (Model 5). We will also include qualitative data from students' answers to the open-ended question to support or differentiate the results from the quantitative analysis. Second, we will report the results for Research Questions 2 (Model 5) and 3 (Model 6) to investigate the differences in *facts* and *discourse* in relation to schools and the covariates gender (student level) and school track (school level).

Disciplinary School Cultures in Science and Language Lessons

Facts

To address the first research question about whether there were differences in how science and language were perceived with respect to *facts*, we compared the differences in this construct between the two disciplines (see Figure 1, bottom; *student* level of Model 5). The mean for the construct *facts* in science was $M = 4.39$, whereas the mean in language was $M = 3.65$; this resulted in a difference of -0.74 ($p < 0.001$), which corresponds to an effect size of Cohen's $d = -1.08$ (calculated with pooled student variances). Science lessons were therefore perceived as

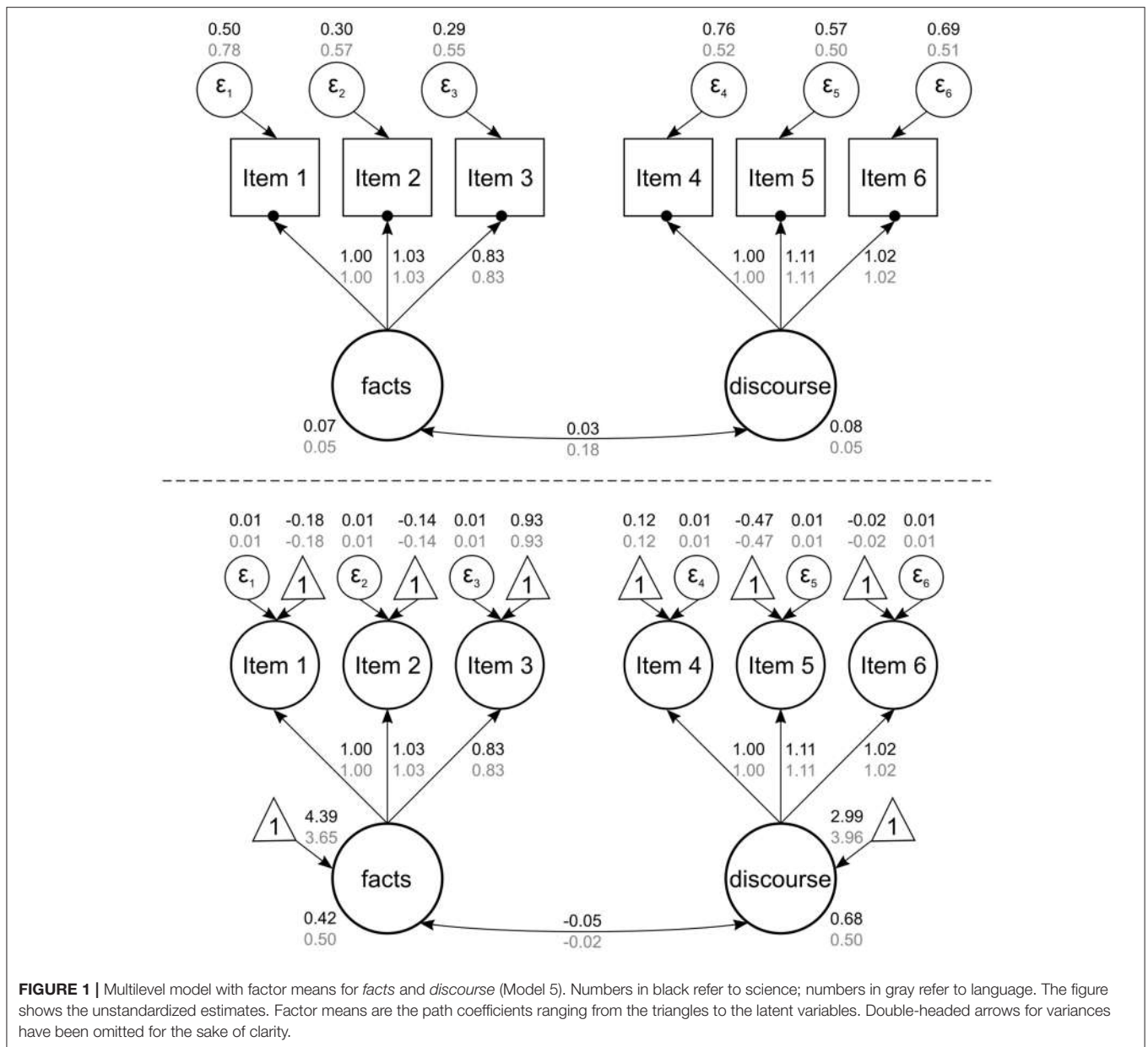


FIGURE 1 | Multilevel model with factor means for *facts* and *discourse* (Model 5). Numbers in black refer to science; numbers in gray refer to language. The figure shows the unstandardized estimates. Factor means are the path coefficients ranging from the triangles to the latent variables. Double-headed arrows for variances have been omitted for the sake of clarity.

much more strongly focused on *facts*. Students reported believing that they need knowledge or skills to memorize *facts* or technical terms in order to succeed in science lessons. Nevertheless, they also reported believing that *facts* are relevant for language lessons, too, but to a lesser extent. This difference in the relevance of *facts* in the two disciplines was also evident in students' written answers to the open questions, as the following examples show: Student A³:

Scientific topics are grounded in approved facts; hence, they are not subjective. How good you can discuss is due to how much you know. In language lessons, everything is subjective; it is grounded in one's own experiences as a human being and

how you view a topic. Consequently, there are many different solutions and not "only the correct one" though.

Student B:

In language lessons, you can enforce your arguments much better than arguments in science because there are specific rules and facts in science argumentation that cannot be changed by arguments.

Student C:

In my opinion, I have to argue with the help of technical terms and technical expressions in chemistry, physics, and biology. In language lessons, I can paraphrase words and I have far more options for expressing my personal opinion.

³Note that the students' responses were translated from German into English.

These responses show that students tended to consider the role of *facts* in scientific argumentation as static, approved, objective, and not in doubt. Of special importance were the correctness and the use of technical terms. These students believed that scientific argumentation heavily depends on the role (and the quality) of *facts*. Moreover, the nature of scientific evidence leads to a rather static way of engaging in argumentation because, in their opinion, these scientific *facts* seem to determine the process and/or the product of argumentation. In contrast to their answers for science, students highlighted the subjective character of *facts* in arguments in language lessons. In their opinion, evidence in a language argument is often based on one's own experiences or feelings, which in turn leads to more options for the process or product of argumentation. In addition, students felt that they had the option to paraphrase words, that is, they did not necessarily have to use specific technical terms.

Discourse

In order to analyze how science and language were perceived with respect to *discourse*, we compared the difference between the disciplines in a manner that was analogous to what we applied to assess *facts*. It is interesting that a different picture emerged (see **Figure 1**). Language lessons ($M = 3.96$) were considered much more focused on discussions about debatable issues than science lessons ($M = 2.99$) with a difference of 0.97 ($p < 0.001$) and $d = 1.27$. The students believed they needed many skills in order to make critical arguments and to ask questions in language lessons, which were perceived as far more focused on discussions. This trend is well-illustrated by the following three examples:

Student D:

If I argue in science lessons, I'll only have to justify why an issue/reaction/etc. is like it is and does not react in another way. An actual argument is not needed. One's own opinion does not matter. There is only one correct solution. In comparison, in language lessons, everybody can have their own opinion about a topic, which will then be discussed with one's classmates. Here, argumentation means you need to make your point of view clear by explaining issues and by trying to communicate your own opinion as persuasively as possible.

Student E:

In science lessons, it's all about finding the correct answer, for instance, for questions about cells, etc. In my opinion, in language, one can play out one's "freedom" better during argumentation. What you think counts. Of course, in the science subjects, too, but you have to argue scientifically.

Student F:

In the subject of language, everybody has their own right and wrong; everybody has their own thoughts and beliefs! Since everybody expresses their own view, there is no right and wrong! But in chemistry, for example, there is mostly one right answer, even if one has a completely different opinion/view.

These examples were quite prototypical of students' open answers on the relevance of *discourse* in the two disciplines. Students

reported believing that discursive elements are a primary component of language lessons. Discussing debatable topics is connected with different valid options in this discipline, which students described as arguing "freely." By contrast, a large number of students reported believing that there is only one correct answer in scientific arguments so that they perceived them as rather ready-made with no or few options to interact. Moreover, some students believed that forming an opinion is not part of science and, thus, there is no room for argumentation in the science subjects at all. Even though the mean for *discourse* for science was substantially lower than the mean for language, it was still about 3 ($M = 2.99$). This suggests that discursive elements are not entirely absent in science, as is also pointed out in the statement of Student E.

Furthermore, there were also students who compared the roles of *facts* and *discourse*, as the following example illustrates: Student G:

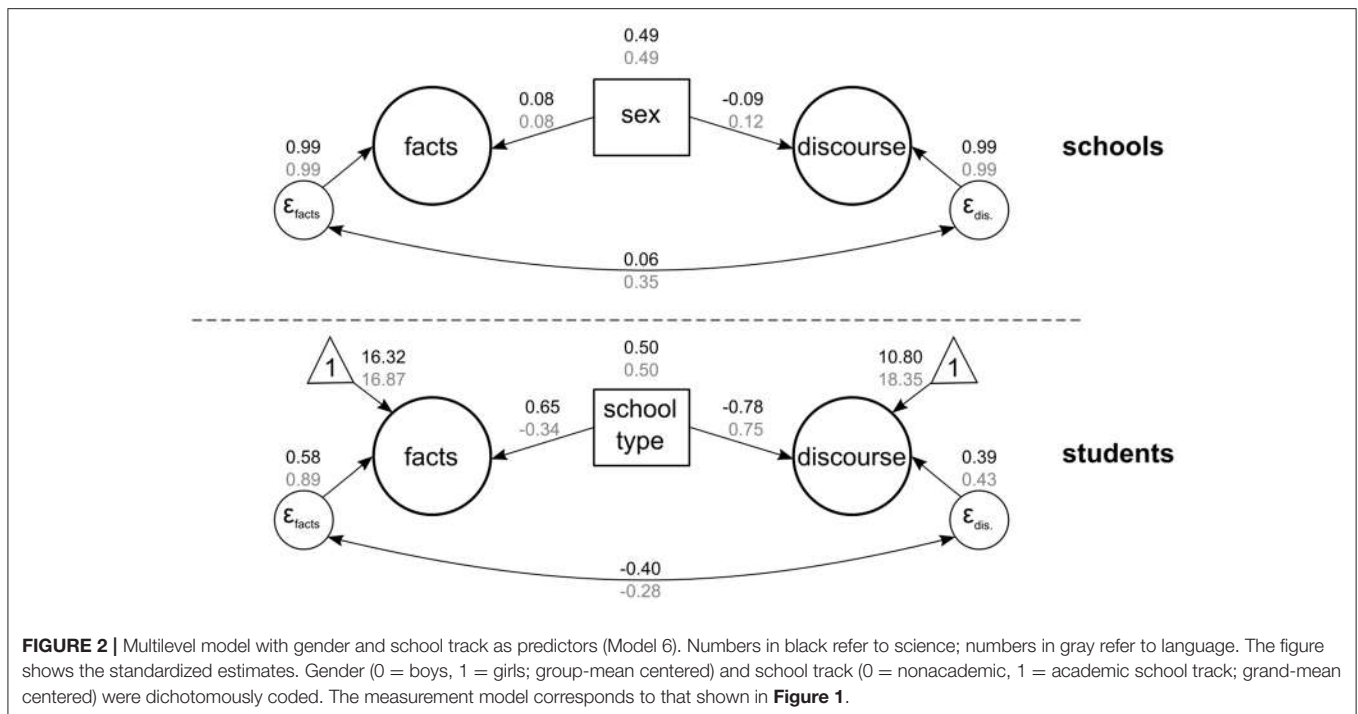
I assume that one has to prove an assertion with, for example, equations or experiments in the science subjects. For language, I can instead justify my assertions with knowledge that I have or knowledge from books in different media. For me, a scientific argument is content-related and requires facts as well as an opinion, which is based on facts. I think in language, an argument is actually the forming of an opinion. It is more individual-related because in my opinion, everybody can have another viewpoint, whereas the sciences are based on facts.

The student compared the role of *facts* and *discourse* in the two disciplines but expressed a similar belief: Argumentation in science is based on *facts*, and, as a consequence, there is no choice to have different viewpoints. By contrast, argumentation in language was considered to be more open because knowledge is available from many resources such as students' pre-existing knowledge. Thus, *facts* seemed to be more a feature of science lessons and discursive characteristics of language lessons.

Gender and School Track Differences in Disciplinary School Cultures

To answer Research Question 2 on the extent to which differences in *facts* and *discourse* were related to the schools, we disentangled schools and students (see **Figure 1**, top; *school* level of Model 5). We calculated the intraclass correlation (ICC) for each discipline (science, language) and construct (*facts*, *discourse*). The resulting ICCs were 0.15 for science on the *facts* factor, 0.09 for language on *facts*, 0.10 for science on *discourse*, and 0.09 for language on *discourse*. This implies that, for example, 15% of the variance in *facts* in science lessons was due to different schools; the beliefs depended to this extent on the school that students attended. Thus, there was substantial variation between schools.

To explain these differences between students and differences between schools (Research Questions 3a and 3b), we added students' gender and school track as predictors (see **Figure 2**) to explain variations in students and schools with the ICCs. The effects of gender were significant (all $ps < 0.001$) but rather marginal in size, as indicated by small amounts of explained variance: 0.08 for science on *facts* ($R^2 = 0.006$, i.e., 0.6% of the



variation in students in *facts* in science was explained by gender), -0.09 for science on *discourse* ($R^2 = 0.008$), 0.08 for language on *facts* ($R^2 = 0.006$), and 0.12 for language on *discourse* ($R^2 = 0.014$). However, school track was a strong and significant predictor of school differences. For science on *facts*, the track effect was 0.65 ($p < 0.001$), indicating that students in academic school tracks were to a large extent oriented toward *facts* in science lessons. The corresponding explained variance was $R^2 = 0.424$, that is, 42.4% of the variation in schools in *facts* in science was explained by school track. Furthermore, science was regarded as much less focused on *discourse* in academic school tracks (-0.78 , $p < 0.001$, $R^2 = 0.614$). For language, the opposite picture emerged: Language lessons in academic school tracks were perceived as much more oriented toward *discourse* (0.75 , $p < 0.001$, $R^2 = 0.566$) than in nonacademic school tracks. Moreover, *facts* were perceived as less relevant in language lessons in academic school tracks (-0.34 , $p < 0.001$, $R^2 = 0.115$).

The results suggest that students had a different understanding of the use and relevance of *facts* and *discourse* in the two disciplines. These differences in both aspects can be interpreted as characteristics of existing disciplinary school cultures and could be an explanation for students' varying argumentation practice, which will be discussed below. In addition, our analyses showed that the differences in students' beliefs were independent of gender. The analyses further showed that school track was a good predictor of differences in students' beliefs at the school level. Differences between the disciplines were especially apparent for students in an academic school track. Academic track students perceived science as more and language as less *fact*-focused than nonacademic track students, whereas for *discourse*, it was the other way around. That is, students in academic tracks tended to

perceive science as less and language as more *discourse*-oriented compared with nonacademic track students.

DISCUSSION AND IMPLICATIONS

Our study was motivated by the question of whether students' beliefs about two central characteristics of argumentation—*facts* and *discourse*—would differ between science and language and what aspects would influence their beliefs. In the following, we first discuss the roles of *facts* and *discourse* with a special focus on science, and thus, what students consider adequate for scientific argumentation as well as how this may affect their argumentation practice. Second, we argue how gender and school track with a special view on German training programs and the role of teachers may contribute to disciplinary school cultures. Third, limitations and suggestions for future research as well as ongoing studies will be outlined.

Disciplinary School Cultures Concerning the Role of *Facts*

Our findings revealed that students' beliefs about the role of *facts* in argumentation vary between the disciplines of science and language. In science, students more often reported believing they were expected to simply memorize *facts* and focus on using technical terms, whereas the role of *facts* in language was perceived as much less relevant. These results suggest that disciplinary school cultures concerning the role of *facts* in argumentation exist. Reasons for these existing disciplinary school cultures may be found in the nature of *facts*, which differs between the two disciplines. In order to help students

acquire a basic understanding of complex scientific topics (e.g., the greenhouse effect or the genetic modification of plants), the presented *facts* are often limited or simplified to certain aspects and perspectives (i.e., didactical reduction) and a well-defined body of knowledge (Grossman and Stodolsky, 1995; Decke-Cornill and Gebhard, 2007). This in turn may create the impression in the science classroom that science content is rarely controversial and that there is only one correct answer to scientific questions (see Hericks and Körber, 2007; Willems, 2007). This corresponds to the fact that science is often presented in schools in a “ready-made” form (Latour, 1987).

Moreover, studies on epistemological beliefs have shown that students often have a rather limited perspective on science (e.g., Conley et al., 2004). Conley et al. (2004), for example, found that students often hold naïve conceptions of the characteristics and development of scientific knowledge and consider it to be certain and rather static. This picture of the nature of knowledge in science has parallels with students' beliefs about the essential role of *facts* in scientific argumentation in our study. Whereas, epistemological beliefs refer to beliefs about the nature of knowledge in general or concerning academic disciplines, disciplinary beliefs refer to concrete classroom situations and patterns of thinking, perceiving, and doing. Prospectively, the relations between epistemological beliefs and beliefs about concrete classroom situations in a discipline are worth investigating. As a desideratum, we need to ask whether epistemological beliefs are influenced or shaped by disciplinary school cultures or vice versa.

Disciplinary School Cultures Concerning the Role of *Discourse*

Compared with *facts*, the opposite picture was revealed for *discourse*. Students considered *discourse* to be a crucial characteristic of argumentation in language and far less relevant in science argumentation. Because there are different beliefs in the two disciplines, it can be concluded that disciplinary school cultures of argumentation exist.

Kelly and Chen (1999) argued that students' appropriation of scientific discourse is related to how the teachers frame the activities and the social practices established in the classroom. Given that the classroom culture in science mostly includes repetitive tasks (e.g., verification processes in laboratory activities, defining terms) and is characterized by instruction that is based on the idea that teaching is the mode of transmission (Carlone, 2004), it makes sense that we found that students perceive science as rarely discursive. It might be reasonable to assume that teachers' instruction and classroom activities in science lessons influence students' beliefs. By contrast, students considered language lessons to be much more focused on discussions about debatable issues than science lessons. This result also appears to be consistent with the results of other studies as well as general aims promoted by language education (e.g., Winkler, 2003; KMK, 2004; Willems, 2007). Nevertheless, students did not consider *discourse* to be absent from science. Elements of discussion in science should thus be enhanced even more.

We then need to ask whether these rather stereotypical disciplinary beliefs are positive for teaching and learning argumentation. In a previous study, Heitmann et al. (2014) found that students produced less elaborated arguments in science and tended to write fragmented, one-sided argumentations in science, whereas language argumentations were far more elaborate and discursive. We would hence expect that perceiving science as not very discursive might negatively influence students' quality of argumentation. However, it would be worth thinking about whether the discussion of characteristics of arguments in language promotes the teaching and learning of argumentation in science.

Gender and School Track Differences in Students' Disciplinary Beliefs

To address possible gender effects in disciplinary school cultures, we investigated the extent to which students' gender influenced their beliefs about *facts* and *discourse*. Our findings revealed that the effect of students' gender was negligible; that is, girls and boys had the same beliefs of each characteristic in both science and language. Consequently, the assumption that girls should be attached to *discourse* (especially in language) and boys to *facts* (especially in science) was not confirmed by our study. Our data suggest that other predictors are more appropriate for describing disciplinary school cultures. Even if teachers may have gender-connoted beliefs as (Willems, 2007) study showed, these do not influence girls' beliefs about the relevance of the two characteristics of argumentation in school lessons compared with boys' beliefs. Of course, we cannot rule out the possibility that gender differences may occur for other characteristics of disciplinary school cultures. Further research will be necessary to explicitly investigate whether gender differences exist, and this may also have an effect on the gender-connoted image of the disciplines (see Hannover and Kessels, 2002).

A different picture emerged for the influence of the school track that students attended. Here, the expectation that students' beliefs would differ by type of school (i.e., academic vs. nonacademic) was confirmed. This finding may have a number of explanations and consequences: First, the disciplinary school cultures were more pronounced in academic tracks such that students perceived science as a “hard” discipline and language as “softer.” Because these beliefs are congruent with what has been found for teachers' beliefs in academic tracks (de Brabander, 2000), it seems possible that students' disciplinary beliefs may evolve at least in part from teachers' disciplinary beliefs. Currently, there is no substantial research on argumentative classroom practices in Germany, especially with regard to different school tracks. Future studies should therefore shed light on this line of research and investigate how many argumentative discussions occur during school lessons. Furthermore, it would be beneficial to know how *facts* and *discourse* become evident in argumentation and to survey its connection to teachers' beliefs with special regard to school tracking.

Second, teachers' academic track education is heavily oriented toward acquiring knowledge and competencies in science in an attempt to make them content specialists so that they can prepare

students for university (Blömeke, 2016). This content-focused mandate of teachers' academic track education seems to influence students' beliefs about the relevance of *facts* and *discourse*, which are perceived as more relevant for science education compared with the beliefs of students from nonacademic tracks. Again, disciplinary beliefs appear to be related to students' teachers and thus the teachers' education. Consequently, the role of the way science is taught at universities and its consequences on teachers' beliefs on argumentation should be analyzed in more detail. It might be that science taught at universities can be interpreted as static and dogmatic and thus is distant from the formal goals of science education in schools. Moreover, students' stereotyped beliefs about science and language can have serious effects on young peoples' career choices. In future studies, it would be interesting to investigate if students' beliefs are linked to the relative low interest in science careers.

Third, another source of school track differences may lie in teachers' perceptions of students' level of ability, which is higher in academic track education. In a qualitative study of 40 teachers, Zohar et al. (2001) found that teachers' beliefs about low-achieving students were associated with their beliefs about the instruction of higher order thinking skills such as scientific argumentation. Specifically, almost half of these teachers believed that higher order thinking was not appropriate for teaching low-achievers. A good 10 years later, Sampson and Blanchard (2012) confirmed this finding and consequently argued that teachers' perceptions about students' ability levels create barriers to the integration of argumentation into science lessons. Given that a number of studies have revealed that students' average achievement levels in science, mathematics, and reading differ significantly across tracks (e.g., Pant et al., 2013), these ability differences may have an impact on teachers' perceptions of students, their instruction in general, and the ways in which they foster the development of scientific argumentation skills specifically. As a consequence, the degree to which teachers incorporate argumentation into their lessons could differ across school tracks and in turn influence students' beliefs about argumentation.

The complexity of teachers' beliefs in this area was further demonstrated in a more recent study in which practicing secondary school teachers completed a questionnaire that tapped into teachers' beliefs about high critical thinking activities and low critical thinking activities for high- and low-advantaged students (Warburton and Torff, 2005). The findings showed that teachers rated both high and low critical thinking activities as more effective for high-advantaged learners than for low-advantaged learners. Another study conducted by Katsh-Singer et al. (2016) supported these findings in a sample of 34 teachers. The authors further found differences in teachers' beliefs about the importance of *discourse* across high, middle, and low socioeconomic status students. Henceforth, we argue that these differences in students' beliefs may be interpreted in light of the role of the teacher, who represents the discipline in school and consequently plays a central role in establishing the norms of scientific and language argumentation in classrooms. As Yackel and Cobb (1996) argued, normative understandings (e.g., scientific arguments) are continually regenerated and

modified by the students and the teacher through their ongoing interactions. So the influence of teachers in contributing to students' beliefs should be analyzed in detail, a topic that needs further attention in research on scientific argumentation. Future studies will need to shed light on this line of research and gather information about teachers' beliefs and instructional practices with a special focus on the relevance of *facts* and *discourse*. Furthermore, the socialization of teachers during their university studies may also be interesting to evaluate with a special look at teacher training in academic and nonacademic tracks.

Implications and Directions for Future Research

We introduced items to measure students' beliefs of the relevance of *facts* and *discourse* in science and language education. A lot of thought and experience went into the development of these items, so we strongly encourage other researchers to use them as well (see the Supplementary Material S1). Nevertheless, researchers should be aware of two limitations: First, in order to improve the reliability of the measures of *facts* and *discourse* in both disciplines, more items need to be developed. Second, although the psychometric properties were satisfactory in our sample, there is no guarantee for this high level of psychometric quality in other studies. One issue is that the items were administered in German, and thus, the English translations might not work as well as the original German items. Still, we are confident that we provided a sound first attempt that can be refined or extended in the future.

Moreover, it is unclear whether science is constructed as a homogenous discipline by students or whether they tend to differentiate between the disciplines of biology, chemistry, and physics, which are traditionally taught separately in German schools. A study by Multrus (2005) showed no differentiation between the three disciplines for disciplinary cultures at universities. All of them could be clustered into a complex of engineering-nature-medicine-economy (vs. an education-culture-social affairs cluster; Multrus, 2005). However, Multrus did not determine whether the disciplines were perceived as distinct in a school setting, so this question needs to be investigated further.

Another point to consider is that disciplinary school cultures and argumentation both appear to be broad multifaceted constructs, so items that capture facets other than *facts* and *discourse* should be developed. In an ongoing study, Schwanewedel and Heitmann (in preparation) are developing an exhaustive system for categorizing responses by applying a systematic analysis of the open question used to supplement the quantitative results from the rating-scale questionnaire. This includes various aspects of argumentation such as the adequacy of language, which includes, for example, the use of discourse markers and the layout of a text (e.g., length, fragments vs. continuous text). Different beliefs about the aim of an argument (persuasion vs. self-clarification; see Winkler, 2003) may be another facet of argumentation where disciplinary school cultures appear.

Finally, future studies should also investigate the impact of students' beliefs on their learning outcomes. The question of interest is: Do the disciplinary beliefs about argumentation promote or hinder students' learning outcomes? Therefore, students' arguments and the quality of their arguments (e.g., aspects of content, structure, and language) should be evaluated and linked with their beliefs about argumentation in the different disciplines. A detailed analysis of this relationship might provide valuable information about non-cognitive aspects of learning and explain the different argumentation strategies for science and language found in a previous study (see Heitmann et al., 2014).

The results of the current study may be fruitful for laying a conceptual and empirical foundation for research on teaching and learning with regard to argumentation and may be used to promote discussion about the relevance of students' beliefs in different disciplines. There is growing interest in analyzing whether discipline-specific beliefs influence the quality of an argument, especially for teachers who need information about how to teach their students to produce adequate arguments. Accordingly, a challenging area of future research would be to identify if and how students' beliefs can be affected in order to have an effect on their argumentation practices. That is, it may be reasonable to focus on the role of teachers and the development of appropriate interventions that can be applied to promote students' framing of their arguments. Regarding implications for the teaching and learning of argumentation in the classroom, approaches using metacognitive elements in

the sense of discussing characteristics of an argument might be worth performing (e.g., Schworm and Renkl, 2007). A guiding question for such an approach could be "What makes a good argument in general, in science, and in language education?" The commonalities as well as discipline-specific characteristics of argumentation could be discussed among students, science teachers, and language teachers in order to make common representations of "good" scientific arguments and, thus, how to argue in order to be successful in science.

AUTHOR CONTRIBUTIONS

Conception and Design: PH, MH, JS. Acquisition of Data: PH, MH. Analysis and Interpretation of Data: MH, RS. Drafting the Article: PH, MH. Revising it for Intellectual Content: PH, MH, RS, JS. Final Approval of the Completed Article: PH, MH, RS, JS.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <http://journal.frontiersin.org/article/10.3389/fpsyg.2017.00946/full#supplementary-material>

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The Re-shaping of Bodies: A Discourse Analysis of Feminine Athleticism

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Slender and skinny body ideals have been associated with psychological disorders such as eating disorders. However, the tendency to promote a “healthier” and more athletic female body ideal has received minimal critical attention. This study aims at exploring the underlying conditions for such an athletic ideal through asking: How is the female athletic body constructed in the pseudonymous contemporary women’s fitness magazine, “Xrzise”? We investigated the object of inquiry through a modified version of Parker’s Foucauldian discourse analysis. We analyzed the interviews of four athletic role models in “Xrzise” and identified four discourses: “Neo-liberal discourse,” “Health expertise discourse,” “Discourse of surveillance and control” and “Discourse of emancipation.” The “Neoliberal discourse” constructs the female athletic body as something that the individual woman should strive for by appropriately managing her own resources, abilities and skills. The “Health expertise discourse” constructs the female athletic body through a homeostatic logic where the individual is responsible and healthcare experts have the mandate to intervene in order to maintain good health. The “Discourse of surveillance and control” constructs the female athletic body as an internalized panoptic stance, disciplining women to accept hegemonic beauty ideals. The “Discourse of emancipation” accentuates that the female athletic body is alleviated from a culturally rigid body image and instead improved physical performance and functionality are considered good ends. The results and discussion indicate that the female athletic body is a result of a complex nexus of different discourses associated with the powers of economy, sex differences, institutions, and ideological forces. We have advocated that magazines like “Xrzise” can have covert disciplinary effects hidden by seemingly well-intentioned motives, which can contribute to women’s objectification of their bodies.

Keywords: discourse, athletic, female body, panoptic, critical, analysis

INTRODUCTION

Women often turn to magazines for advice on how to achieve expected ideals within a society. Body ideals are often addressed in fitness magazines by providing different strategies for bodily self-improvement. Several studies have focused on the relationship between body ideals and eating disorders (Sweeting et al., 2009, 2010; Rosenvinge and Pettersen, 2015). Compared to other forms

of media usage, reading fitness magazines is to a greater extent associated with symptoms of eating disorder and body dissatisfaction (Harrison, 2000). Markula (2001) has noted that women's eating disorders have attracted increased attention by the fitness magazines themselves. Still, these magazines aim at inspiring women by portraying narrowly defined body ideals, which are related to women's body related psychological disorders (Markula, 2001; Duncan and Klos, 2014). These ideals seem to be a part of a larger culture of perpetual self-development. Madsen has described this tendency as the eternal pursuit of the optimal self and questioned whether this is related to the concurrent increase in mental illness in the general population (Madsen, 2015).

Susan Bordo proposed that pathological conditions within a culture are not universal abnormalities, but rather characteristic expressions of that culture (Bordo, 1992). A central question related to this is what sort of mechanisms are at work when a society's beauty standards are imposed on women and influence their self-perceptions (Duncan, 1994). Margaret Duncan argued that Foucault's notion of "panoptic mechanisms" is useful to understand how women objectify their own bodies. Women internalize an ideal which creates self-surveillance leading women to conform to dominant feminine body ideals. Duncan claimed that women think this self-surveillance emanates from their own personal standards. Women thus blame themselves for having a difficult relationship to their bodies, rather than holding social institutions and practices responsible for idealizing an unrealistic feminine body ideal (Duncan, 1994).

Madsen and Ytre-Arne (2012) examined how narratives describing personal or professional change is a central feature of women's magazines, and argued that these narratives about self-change has a therapeutic jargon. As long as women continue to be discontented with how they look, women's magazines and the products they advertise will be in high-demand (Duncan, 1994). Thus, fronting unattainable beauty ideals serve the economic interest of the beauty and fitness industry (Duncan, 1994; Duncan and Klos, 2014). Markula's (Markula, 2001) analysis of fitness magazines supports Bordo's work (Bordo, 1992). By drawing on the medical establishment's presupposition that the individual is the locus of illness, fitness magazines define body dissatisfaction as an individual responsibility, instead of directing attention to the societal standards. Research indicates that many women of normal weight are dissatisfied with their bodies and are trying to lose weight (Ferreira et al., 2016). A review from 2015 found that between 25 and 77% of teenage girls are dieting or are dissatisfied with their body (Rosenvinge and Pettersen, 2015). Although there has been a decline in traditional risk factors, there has been an increase in psychosocial disorders among Western youth (Sweeting et al., 2009). In particular, there is a strong correlation between school performance stress and psychosocial distress among females (Sweeting et al., 2010). This could be seen in relation to Madsen's supposition that the pursuit of the "optimal" and "perfect" creates a state where life can always be improved, which entails a culture where most people feel inadequate (Madsen, 2015).

Some researchers argued that the female body ideal has moved toward a healthier, more muscular and athletic body shape

(Gruber, 2007). Weight training among women has received increased media attention (Independent, 2017; The guardian, 2018). This might suggest a shift in main emphasis from how the body looks to how the body functions. This trend can be understood as an acknowledgment of the beauty ideal's negative impact on women's psychological health. In Markula's (Markula, 2008) work on performative pedagogy of pilates, she analyzes the fitness industry as an educational field, shaped through cultural and political forces. Dominant cultural practices within a society, like pilates, shape women's understanding of appropriate femininity (Markula, 2008). Rich (2005) explores the relevance of feminism in young women's lives. Rich found that women constructed their lives around dynamics of gender, while understanding a narrative of gender inequality as a problem of the past. These narratives were drawing heavily on liberal individualism, and how success and failure are makings of their own choice (Rich, 2005). It seems plausible that discourses of feminism also account for changes in the female body ideals, where cultivating an athletic female body is to choose to be less concerned with how the body is evaluated through the male perspective.

Fitness magazines have been extensively criticized by feminist researchers for having paradoxical expectations for women's bodies, advertising body ideals that no woman can measure up to (Duncan and Klos, 2014). How does an allegedly more healthy, realistic and attainable ideal for women fit into this puzzle, and how do fitness magazines deal with their own contradictory foundation? This paper aims at exploring discourses of the athletic female body, and its societal implications through a critical analysis of the Norwegian fitness magazine *Xrsize*. We used a Foucauldian discourse analysis, which is concerned with the socio-historical conditions of possibility for the studied object of inquiry and its societal implications (Willig, 2013).

MATERIALS AND METHODS

Material

We chose to examine women's fitness magazines. Women's fitness magazines are not limited to specific types of sports or types of training, which made *Xrsize* relevant. According to Norwegian Media Business' Association the magazine pseudonymously called *Xrsize* is the most circulated fitness magazine nationwide (Medianorway, 2020). *Xrsize* markets itself as a "safe authority" of healthy attitudes and aims at increasing young women's self-esteem. For example, the magazine states that it aims to help and inspire readers and not induce feelings of guilt. In doing this, the magazine seems to lack awareness of or disguise their contribution to women's body dissatisfaction.

Our analysis focused on the portrait interviews in the magazine. In each volume, one person is interviewed, and that person is typically portrayed on the front cover. Thus, the interviewee appears as a front figure for the magazine. All the interviewees share a common interest in exercise and diet. In the interviews, they describe how they stay in shape, what their motives are and how they succeeded with exercise in their personal life and/or career. We included the word "athletic" in

the research question because it seems to reflect the content in the interviews; the texts are concerned with an active lifestyle and building bodily strength. The interviewees are presented as inspirational role models, some of them being professional athletes. We also noted that the interviewees' physical appearance conformed to the typical Western feminine ideal by being slender and fit, but still with a feminine, not too muscular, figure.

The primary aim of the analysis is to identify present discursive tendencies and develop some analytical categories helping us understand the suspected contradictory nature of the content in the magazines. In order to make the material manageable we limited the analysis to four volumes of the magazine. Because the selected texts were very rich, and we found the recurring themes across all four volumes, we assumed that we reached data saturation. We also assumed that available discourses in the magazine are relatively stable for a 1-year period. Due to pragmatic reasons we chose four volumes from the past year. The complete text material included 4143 words.

Analysis

The analysis was conducted as a modified version of Ian Parker's discourse analysis (appendix A) (Parker, 1992). We conducted the steps as a reflexive dialog between the researchers, the research material and the research question. The most important analytical steps will be presented briefly.

We used *the athletic female body* as the discursive object in the text material. Initially, all references to the discursive object were identified. As it were, this included almost every single statement in the interviews. In the next step of analysis, we organized all discursive references to *the athletic female body* according to emerging themes or discursive constructions. All features such as "fitness," "dieting" and "active lifestyle," that appeared to be relevant to the issue of cultivating an athletic body, was included in this analytical step. Subsequently, we categorized these themes, and recategorized them as new themes emerged throughout the analysis. In the next step, we identified discourses and certain representations within these different themes or constructions. The aim was to explore which notions of truth that was played out by the discursive constructions, and which rules make these discursive constructions possible? Discourses also create specific types of self or subject positions. The following step in the analysis aimed at exploring these subject positions, which regulates and legitimizes what can be understood or said by someone (Parker, 1992). The next step in the analysis involved exploration of coherent systems of a particular body of knowledge within the text, and the phenomena and worldviews constructed by the discourse.

According to Parker, language can be used as an analytical tool to reflect about language itself as an object (Parker, 1992). This is parallel to the way a discourse can have a reflective capacity about its own content (e.g., a health expertise discourse thematizing some hypothetical negative effects). This reflexivity can be described as a discussion that's driven by the more implicit content in a discourse. Because this reflexivity can be recognized in other texts that are part of the same discourse, we explored other texts to elaborate the more implicit content of the discourses analyzed.

In the last steps of the analysis we examined how discourses are closely connected to institutions, power, and ideology. Discourses can reproduce and support certain institutions through practices. For example, a medical discourse could position a patient's body as a site for medical scrutiny and treatment. Thus, discourses and discursive practices mutually validate and support each other. Increased institutionalizing leads to new forms of governance of people both inside and outside the discourse. For example, a doctor within a medical discourse considers a patient hearing voices as having auditory hallucinations and that this abnormality should be medicated and treated. In a given historic context, a discourse can also have ideological effects in relation to a specific regime of truth. A religious discourse, for example, can under some historical circumstances contribute to a racist worldview (Parker, 1992).

RESULTS

In the following, we present central features of the analysis. For the sake of readability, we present multiple analytical steps together. First, we present different constructions of the athletic female body which emerged as different themes during the initial steps of the analysis. Then, we will continue by presenting the discourses derived from the different constructions, and discuss their implications in the larger socio-historic context.

The Athletic Female Body Constructed as a Self-Realization Project

The athletic female body appears to be constructed as a kind of self-realization project. The athletic female body fulfills life goals, innate talents, and acquired abilities. Three of the four women in the interviews had tried to follow their great passion and made exercise or sports into a livelihood. In the following quote, it is implied that the pride the interviewee takes in what she has accomplished in her career is legitimate: "And however humble Kayla is, she is – fortunately – proud of what she has done." Through statements like "Here, she reveals how to go through a really effective workout." we get the impression that the interviewees reveal their everyday routines and tips, to let the reader be inspired and follow the interviewees' example.

Some statements suggest that the interviewees have biological prerequisites to become good at sports: "And it's not just pigments she has inherited; Amanda claims she has also got a fuming temper from Eastern Europe. In many ways this has come in handy in her training." At the same time, they also have characteristics usually described as psychological, such as great willpower, courage and drive. This is reflected in the statement "It was my passion for exercise and a love for helping people which led me to study to become a personal trainer." Thus, the interviewees are presented as if they differ from other women who are concerned with fitness and exercise, while at the same time acting as realistic role models. The reader is given the opportunity to be inspired and follow the interviewees' example, without necessarily sharing their natural abilities.

The Athletic Female Body Constructed as a Teleological Logic

In addition to including a goal of self-realization, the athletic female body is also constructed as having the potential to realize various benefits such as performing well “when it counts.” There is an expectation that investments in the project will yield returns, and that hard work will return profits qua an improved body. Exercising therefore has instrumental value, where the primary function is to improve the level of performance or to gain a specific desired goal. Afterward, it is often important to recover and rest: “After a show, I don’t even want to see a gym until after a month! I relax, I eat Asian food with my fiancé and do enjoyable outdoor activities.”

The Athletic Female Body Constructed as Maintaining One’s Health

Exercise and physical efforts seem to come at a cost for the interviewees. Exercise can have corrosive effects on the body. These effects make it important to be cautious: “Fortunately, the dancers always have someone with them who make sure they get replenished with the right things, such as tailor-made juices and smoothies.” Thus, the discursive object seems to be constructed as an attempt to achieve a homeostatic balance between physical and mental exertion, and intake of nutrition and rest: “In the most intensive days we have actually been training for up to 16 h. It is super important that I get enough nutrients and that I sleep well.” If there is a persistent imbalance in the homeostatic account, it can lead to fatigue, injuries and illness.

Some of the measures the interviewees take in their everyday life seem to be concerned with safeguarding their mental health. This both entails to calm down mentally and withstand an unhealthy “body pressure” generally prevailing in western culture and quite predominantly within some sub-groups: “In Hollywood, it is impossible to protect yourself from the beauty pressure, but I try to have a healthy relationship to it.”

The Athletic Female Body Constructed as Self-Control and Discipline

The athletic female body seems to be constructed as a project where self-discipline plays a crucial role: “Behind the 2 h of explosive dancing on stage is an endless amount of training and discipline.” An active lifestyle seems to concern something immersive, where exercise is part of a rigid lifestyle requiring commitment: “Eight-hour training 6 days a week, preventive training and a strict diet are all an essential part of Mona’s life.” Training is often linked to willpower, and is described as continuous hard work over a long period of time and strict rules both when it comes to exercise and diet. An indirect example of this is the following quote: “No matter how hard it’s been to get up and get out, I’ve never regretted a workout.” One interviewee acknowledges that she has other interests, but puts these aside to follow her career: “A normal life with man and child would not have been bad either, she admits.”

The Athletic Female Body Constructed as a Dualism

The female athletic body appears to be constructed according to a dualistic logic, where body and mind are separate. These associations are evoked by statements such as “[The interviewee] herself says that her relationship to her own body is exceptionally relaxed.” and “[she has] at the age of 24 began a fitness trend that focuses as much on confidence and an improved self-image as it does on body and strength.” In the statement “It is a routine that my body has developed and which it now enjoys,” the body is described as something almost autonomous, having its own desires. At the same time, the mind seems to have the potential for some sort of superior governing role: “A shoulder injury disabled her for two and a half years, which she fortunately overcame thanks to her strong psyche.”

The Athletic Female Body Constructed as a Counterpart to the Beauty Pressure

The athletic female body was constructed as a challenge to the established norms of how a woman’s body should look like. This is evident in the statement “I actually agree completely that there is no such thing as a bikini body!” The interviewees seem to indirectly make a distinction between the activities they are doing and what is termed as body pressure: “[she] believes (.) that there are some misconceptions in the industry about how to achieve your own health and fitness goals.” Through the statement “There are so many things that are more important than having a six pack. Life is so g*****n short.” an interviewee conveys that strength and health are more important than beauty. This distinction between esthetics and health seems to challenge or replace a previous standard emphasizing beauty, but which has now lost its former value. The new health standard is presented as something better and more genuine: “I don’t believe in a quick fix or transient exercise trends. I believe in healthy lifestyle routines that can be maintained and help women feel happy and good in their own body – all year round!”

Discourses, Power Relations, and Ideology

Neo-Liberal Discourse

According to our analysis and as the table above demonstrates (Table 1), the neo-liberal discourse is an overarching theme throughout the text material. Both the athletic female body constructed as a self-realizing project, teleological logic and self-control and discipline, seems to be made possible by a neo-liberal discourse. The statements imply a view of human nature where the individual’s right and duty to take care of herself is essential to an overall goal of self-realization. This is evident in the statement “This is my job and my passion, and I have had to find my own way to stay healthy.” The process of self-realization can materialize when the individual breaks her own records or competes against others. This can be understood as a process where the individual pushes herself to the limit to become the best version of herself. This, in turn, presupposes that the individual has the capacity to manage her own resources, abilities, and skills in a way that brings her closer to the goal of self-realization. Here,

TABLE 1 | Constructions and discourses.

	Neo-liberal discourse	Health expertise discourse	Discourse of surveillance and control	Discourse of emancipation
<i>The athletic female body constructed as being a self-realization project</i>	x			
<i>The athletic female body constructed as a teleological logic</i>	x	x		
<i>The athletic female body constructed as maintaining one's health</i>		x		
<i>The athletic female body constructed as self-control and discipline</i>	x	x	x	
<i>The athletic female body constructed as a dualism</i>	x		x	
<i>The athletic female body constructed as a counterpart to the beauty pressure</i>	x			x

exercise is primarily conceived as something that yields return: “My favorite exercise is the squat because it is so incredibly good at strengthening the legs, which is extremely important for my sport.” Investments in the form of hard work leads to achieving results: “After much effort, she finally got the gold medal.”

One has, following the principles of market economy, individual responsibility for managing and investing one's own resources in a manner that provides the greatest possible return by actualizing the athletic female body. From the statements we get the impression that the market is “free” and that everyone can get an athletic female body by making rational choices and committing to their goals.

Within a neo-liberal discourse, the interviewees are positioned as individuals who actually have self-actualized. They are often social media influencers, which different brands collaborate with to achieve their marketing objectives. In this context, the female athletic body and its accomplishments are the result of utilizing certain products, such as training methods, exercise equipment and food products. Consequently, athletes, coaches, lifestyle guides, and other “successful” individuals act as front figures and suppliers for the products that can develop the female athletic body. They also appear as role models and ideals for the rest of the population. The audience for such success stories can be understood as consumers within this discourse. Consumers can acquire an athletic body by following the examples of the front figures when it comes to lifestyle choices, as well as consuming products such as training methods and diet plans. This is expressed in the quotation “I hope that women from all over the world can follow me and feel confident that my advice is true and effective.”

The self-help literature is another example of texts that use a neo-liberal discourse. A central feature of the self-help literature is the assumption that the individual's own choices leads to life changes. Self-development encompasses themes such as improving your self-esteem, relationships and everyday productivity. While emphasizing that people are “experts on their own lives,” they are also encouraged to seek advice from the expert authors of the self-help books (Rimke, 2000). The authors are experts due to academic knowledge or a solid track record of achieving success on the given topic.

Identification of a neo-liberal discourse in the analysis seems to be consistent with Madsen and Ytre-Arne's examination

of the therapeutic culture in Norwegian women's magazines. Success stories in women's magazines are meant to inspire the reader, with an underlying notion that making decisions that lead to self-development is good or right. These stories are also accompanied by sales advertising for certain products and lifestyles (Duncan, 1994).

According to Heywood (2006), a neoliberal discourse promotes the female athlete as a kind of «super person» who differs from other women. Heywood also argued that a fit body and athletic performance serves as an outward expression of transcendence of biological limitations associated with being a woman, and in this way transcending gender limitations. However, this can create a cultural anxiety because it violates the fundamental power structures and roles in society. Because of this anxiety, female athletes are constantly reminded of their femininity by a sexualized body focus or by being referred to as mannish or “butch” in the media (Heywood, 2006).

Discourses can also have ideological effects (Parker, 1992). However, Foucault avoided the term ideology and focused on specific regimes of truth and how these are maintained by discourses (Hall, 1997). From our analysis, *liberal individualism* seems to be a prominent ideology in the text. *Liberal individualism* implies that the individual is responsible for their own life situation. Thus, individuals should be blamed if they do not make rational choices that realize their idea of a good life (Hindess, 1993). This applies when *Xrize* offers inspirational reading in the form of “expert advice” related to exercise and diet. This concept is closely related to the discourse of healthism, where health has become a moral imperative, and «healthiness» is synonymous with «goodness» (Crawford, 2006). This is evident in the quote “I look at skincare as important as eating healthy and exercising. Your skin is an organ, similar to the heart and lungs. A healthy skin is an important part of a healthy life.” Achieving a fit body has thus gone from simply being a preoccupation to a responsibility for the individual citizen and a representation of virtue in society: This is my job and my passion, and I've had to find my own way to stay healthy. I have spent a lot of time figuring out which food works for me.” An example of how healthism works through different institutions in society is Evans, Rich and Holroyd's (Evans et al., 2004) research on the role of education in the etiology of eating disorders. Through their research they conclude that school culture, mediated

through the action of teachers, peers and friends, contributes to perfectionism and pressure for girls and young women. One example is that the school environment presented dieting as a resource to cope with the cultural demands or dieting as a commodity in a weight-conscious culture (Evans et al., 2004). A neo-liberal discourse assumes that the realization of the body's potential leads to a better society. Although individual well-being and self-realization seem to be the foremost interest in women's magazines, paradoxically, psychological disorders are more prevalent than ever in the Western world (Madsen and Ytre-Arne, 2012). Thus, one could ask whether the perpetual strive for a better and improved 'self' in a world where everything is potentially achievable, leads to recurring failure, loneliness, and an experience of self-loss that can manifest as mental disorders. This may be particularly prevalent in the younger population, where uncertainty related to identity can pose a greater risk factor in terms of mental health (Eckersley, 2011). External sources, such as body ideals, can constitute important identity markers, and succeeding in living up to these standards becomes the most important parameter for self-worth.

Health Expertise Discourse

Based on the analysis, the athletic female body is constructed as teleological logic, maintaining one's health and self-control and discipline. These constructions can be subsumed to a health expertise discourse. This is partly because the interviewees seem to be concerned with a kind of homeostatic balance with the primary aim of maintaining good health: "I should perhaps have been stricter with myself when it comes to diet, but I think food and snacks taste way too good not to eat. Since I also work out as much as I do, I do not think it is such a big deal if I binge now and then." In this quote, individual responsibility is linked to good health. Good health, in turn, is an important prerequisite for the athletic female body: "Personally, I have rather put another, healthy pressure on myself, which is about having good enough health to be able to perform the best."

In a health expertise discourse, subject positions such as healthy, sick, patient and expert are constructed. The expert subject positions are mainly the positions of doctors, psychologists, nutritionists, physiotherapists, dietary counselors and training experts. For example, in the statement: "Fortunately, the dancers always have someone with them who make sure they get replenished with the right things, such as tailor-made juices and smoothies" you get the impression of the presence of such an expert. A health expertise discourse implies that the experts have the power to set the standards of normality, health and well-being, and the boundaries for when one deviates from the norm. The experts can also encourage the public to follow their advice and recommendations accordingly.

The health experts give advice that the individual is obliged to follow, but can for various reason choose not to. The sick subjects have deviated from an accepted norm, and must rely on expert help to regain health. Thus, they are positioned as subjects lacking power, and partly their autonomy. This is evident in the statement: "A shoulder injury disabled her for two and a half years, something she fortunately got over, thanks to her strong psyche." Healthy individuals are responsible for their

own health and are encouraged to follow the advice of the experts within the discourse. Deviating from expert advice can lead to increased risk of illness. This concurs with Markula's (Markula, 2015) qualitative study on semi-professional dancers' experiences of injuries. Similar to female athletes, the dancers saw injuries originating from their own lack of body awareness and insufficient understanding of their bodies. If the healthy fails to deal with the expert advice, they can be accused of not knowing what is in their own interest and putting their own health at risk.

A health expertise discourse seems to support science as an institution, which assumes that good health is assessed according to some objective goals. The value neutrality of science rests on an underlying assumption that we can know something about the world that can be revealed through empirical observation. The relationship between the researcher as subject and the research objects is not problematic. Practices within the health care system, such as setting standards for healthy and sick, normal and abnormal, therefore lean heavily on the presumed correct knowledge based on objective, scientific approaches. This demonstrated how these discourses are associated with power. In an expert position one part is entitled to advice someone to lose weight solely based on scientific arguments. Those who possess this body of knowledge are health professionals such as doctors, psychologists, nutritionists, and other professions. Thus, being positioned as an expert within this discourse involves the speaking and taking action from a vantage point.

Discourse of Surveillance and Control

The athletic female body constructed as self-control/discipline and dualism seems to be made possible within a discourse of surveillance and control. Self-discipline and the mind's surveillance of the body seem to presuppose a part of the self which monitors and controls another, seemingly distinct, part. This is illustrated in the quotation "Remember that you can allow yourself a cheat meal a week, especially if this helps you not overeating and keep ["cravings"] in check. Personally, I LOVE tiramisu. . .". The use of the word allow may indicate that someone or something is observing our actions and that we are not free to do as we please. In the interviews, the person who monitors and the person being monitored apparently is the same person. This can illustrate the internalization of dominant norms, expectations, and roles in society, which the person strives to conform with. As previously mentioned, such an internalization can be recognized as internalized power by panoptic mechanisms (Duncan, 1994). In an equivalent manner, this is the function of the surveilling part in a discourse of surveillance and control. According to societal norms, individuals may pose a potential threat to themselves and society concerning particular safety parameters such as normal weight, high muscle mass and good health. As a result of self-monitoring through panoptic internalization, the person attempts to comply with what she believes are private standards. This is evident in the quote "I like to know what the food I eat contains (.) I do not like the idea of consuming chemically produced substances, so I always buy organic." Quotations like "I should perhaps have been stricter with myself when it comes to diet" suggests that the

person has an experience of transgressing even though she is not “caught red-handed.”

Transhumanism is also an ideology present in the text material, where an explicit goal is improving humans by the means of modern technology (Harrison and Wolyniak, 2015). Transhumanism therefore involves the assumption that scientifically based claims that improve body, health and lifestyle tantamount morally good knowledge. Transhumanist ideology clearly overlaps with both a discourse of surveillance and control and a neo-liberal discourse: The psyche should have a superior and controlling role over the body’s weaknesses and limitations, and the body has an instrumental value in realizing the person’s goals and ambitions. In particular, this suggests the realization of human potential through scientific innovations. Technological means and its potential become an increasingly naturalized part of daily life, through the use of smartphones and social media to improve fitness (Ferrando, 2013; Meikle, 2016).

Discourse of Emancipation

Constructions of the athletic female body as a counterpart to the beauty pressure can be categorized within a discourse of emancipation. Several of the statements describe creating a distance or challenging some established and popular norms concerning how a fit woman should look and what exercise should be all about. This is evident in the quote “It is much more important to have a healthy body than a body that looks good.” The established norms for the female body and exercise are based on the western traditional beauty ideal. The ideal manifests itself as beauty pressure, a strong force that is difficult to identify and resist: “We are probably many who can recognize feeling a certain pressure to exercise. The urge to constantly check numbers and results, and having to control weight and food intake, can quickly become an unhealthy habit. Therefore, Kayla is clear on why she exercises and eats the way she does.”

A discourse of emancipation seems to construct the subject positions of female rebels/liberators and oppressed women. Beauty pressure entails a project in which women are concerned with making themselves more attractive. In order to assess their own attractiveness, women must take an outsider’s perspective and regard themselves through a masculine gaze. The female rebel is actively in opposition to body pressure. The rebel has the ability to point out errors and flaws in the current established standards of the athletic female body. She can also strive to establish new standards and ideals and argue in favor of these new ideals. Thus, the rebels have the legitimacy to encourage others to follow their example and challenge the old assumptions by embracing new ones. In the quote “Are my cellulites showing now? Amanda asks and laughs.” we get the impression that the interviewee ridicules a superficial beauty-focused ideal. By this, the rebels are situated as having authority to declare themselves non-susceptible to the influence of beauty pressure. Thus, they also have the right to regard the oppressed as “victims.” The awareness being potentially influenced by beauty pressure represents a kind of emancipation. When the individual is “liberated,” she has a responsibility to resist the beauty pressure. Detached from this influence she can, to a greater extent, engage in other more fulfilling and rewarding activities, and contribute

to improving women’s quality of life. Failure to do so may lead to accusations of being weak and impressionable and having a strained relationship with one’s own body. This is particularly evident in the quote: “In Hollywood, it is impossible to protect yourself from the beauty pressure, but I try to have a healthy relationship to it.” Being positioned as the oppressed, one has limited leeway and opportunities for action. It is not an option to resist nor prevent oneself from being influenced by the beauty pressure, and in most cases, one is not even aware of being under such influence.

The discourse of emancipation, like the neo-liberal discourse, strongly coincides with liberal individualism. In the discourse of emancipation women have a large degree of responsibility in not giving in to the existing beauty pressure and encourage women to go their own way. This complies with Markula’s (Markula, 2001) research on women’s body image distortions, where the individual readers are encouraged by the fitness magazines to take responsibility for their own health and the advice on how to prevent eating disorders. Markula argues that this is strongly guided by a dominant medical understanding of eating disorders, emphasizing the role of the women’s own self-perception in developing a disease by perceiving themselves as obese (Markula, 2001).

In a discourse of emancipation, physical strength, functionality and good health are considered more “valid” ideals for exercise and lifestyle choices. Thus, it enables the subjective experience of exercising for one’s own sake and for the right reasons. Exercise as a beautifying project, on the other hand, is dismissed as evanescent, disadvantageous and oppressive. However, it can be questioned whether a discourse of emancipation really is emancipating. First of all, as previously noted, the physical appearance of the women in the interviews does not really oppose the Western standards of beauty. Secondly, in several ways the discourse seems to represent an apparent settlement with a beauty-focused culture. A discourse of emancipation can be considered as an expression of the fact that one has begun to recognize the adverse effects of slender body ideals, which is illustrated by the research on new forms of eating disorders such as orthorexia (Dunn and Bratman, 2016) and the large number of normal-weighted women who want to lose weight (Ferreira et al., 2016). An emancipating discourse within the athletic female body can also be seen as an example of how women negotiate gender roles in fitness, in line with Rich’s (Rich, 2005) and Markula’s (Markula, 2001) research findings. Although a discourse of emancipation speaks for more collective solutions for body pressure as a social problem, it is nevertheless assumed that one should resist beauty pressure and rather set more appropriate personal goals. For example, a health expertise discourse will focus on getting rid of a vulnerability to be influenced by the “wrong” body ideals. Thus, magazines such as *Xrzi* become channels for expressing the “right” type of body focus. Thus, the discourse of emancipation also entails the concept of healthism: being influenced by the beauty pressure is a matter of making poor decisions. This ignores the systemic societal conditions which has been shown to play important role in the health of the population (Davidson, 2015). In this way, the discourse of emancipation seems to contribute to women’s

discontent with their own bodies, rather than counteracting a body focused culture. At best, the emphasis on a more athletic and strong body ideal represents little new. At worst, it is misleading because it is presented as something else entirely; a way for women to free themselves from body pressure to pursue something more empowering.

CONCLUSION

Although identified discourses construct the discursive object in different ways, the various constructs' total effect seems to serve similar purposes. The results from the analysis are related to Duncan's assumption that inspirational media success stories can have disciplinary effects (Duncan, 1994). Since a neoliberal discourse appeals to the idea of actualizing something already existing within the individual, a project of self-realization depicts the process as a 'personal struggle' and can conceal the importance of subtle power structures within our society. Similarly, a health expertise discourse can lead to the invisible disciplinary effects through panoptic mechanisms by offering a legitimate rationale for monitoring the health of the population. However, such effects may be even more difficult to point out when nutritional science and medicine are believed to rest on a value-neutral and empirically based knowledge. The text thus draws heavily on the ideology of healthism, which situated the problem of health and disease at the level of the individual (Crawford, 2006). The discourse of emancipation conveys the impression of disguising the disciplinary effects by undermining beauty pressure and unhealthy body ideals as something women can simply choose not to be influenced by. The analysis also shows that the discourse of emancipation is highly contradictory, constructing superficial body ideals as a thing of the past, and the same time having spokespersons with looks which to a great extent conforms to these "outdated" body ideals.

In the analysis, we have modified Parker's steps in a Foucauldian discourse analysis. In accordance with Foucauldian discourse analysis being concerned with the construction of subjectivity, we acknowledge that the analysis is regulated and limited by the fact that we, as authors of the text, are situated in specific subject positions too. We consider this as necessary for the analytical process because we assume that we uncover the discursive constructions available to us within our socio-historical context (Parker, 1992).

The decision to analyze interviews rather than journal articles made an impact on the analysis. For example, it is feasible that a neoliberal discourse is particularly evident in texts that profile athletes and other "self-realized" individuals. The use of the term "athletic" in the research question may also be a potential weakness, due to the term not being present in the text material. However, we believe that these decisions are informed by the questions we wanted to answer in the analysis. As the face of the magazine, the interviewees act as role-models the reader can idolize and be inspired by, similar to the role of athletes in society.

One potential and valid objection to our discourse analysis could be the fact that the text material is fairly limited. The

inclusion of a greater number of interviews could lead to further nuances of the discursive constructions and possibly several more discourses. This analysis has constituted a good basis for the development of some analytical categories, but call for more research for further elaboration of these discursive tendencies.

Implications

Exercise, diet, and the body image are topics that constantly appear in the clinical context and in the media. These topics are often communicated with implicit assumptions about the concepts of wellness, health, and fitness. There is also a basic understanding that the individual is able to choose her lifestyle and how she relates to her own body. In continuation of this, phenomena such as eating disorders and preoccupation with food and exercise becomes conditions that affect the individual alone and which are treated accordingly. *Xrsize* as well targets the individual reader when the publisher claims that the magazine is passionate about building a good and healthy self-image for young girls. Identified discourses in the analysis suggests that when it comes to self-esteem and body ideals the magazine ultimately is symptomatic of the problem, rather than a solution. Foucault himself would probably characterize *Xrsize* as a subtle form of disciplining. In this context, the use of a discourse of emancipation in the texts will contribute to obscuring the magazine's disciplinary function. This becomes even more subtle when the publisher claims that the magazine is a "safe authority" and a credible communicator of healthy values and clear standpoints. Thus, the magazine declares itself as a neutral actor in an expert position when it comes to a specific "truth."

In a corresponding way to the object of study, *the athletic female body*, we consider the magazine to be part of a complex web of other actors made possible by identified discourses in the analysis, especially a neoliberal discourse. Magazines' interests are mainly commercial, and as Madsen and Ytre-Arne pointed out, there will be a demand for such magazines and the products they advertise as long as self-realization is potentially limitless project and women fail in achieving this goal (Madsen and Ytre-Arne, 2012). In this sense, *Xrsize* is recognized as the materialization of certain power structures, rather than an independent causative factor.

This analysis is an important contribution to an otherwise one-sided focus of knowledge on a very topical issue. Our analysis has shown that the ostensibly more valid and healthier body ideal, the athletic female body, hardly has any different effects from its skinnier antecedents. The results indicate that constructions of the athletic female body do not rest on "fit" and "health" as neutral concepts. Rather, they are associated with institutional guidelines, power structures and ideology in our socio-historical context. More specifically, we have argued that the text has limiting effects on young women, and may contribute to the maintenance of women's objectifying relation to their own bodies. *Xrsize* and similar texts contribute to an individualized understanding of body pressure and eating disorders, which causes women to accuse themselves of having a strained relationship with their own bodies rather than focusing on social, cultural and historical¹ conditions that determine these phenomena.

DATA AVAILABILITY STATEMENT

The datasets generated for this study are available on request to the corresponding author.

AUTHOR CONTRIBUTIONS

The idea of the manuscript was developed in collaboration. SA and RN led roles in the analysis and writing of the manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.01751/full#supplementary-material>

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Breathing in Conversation

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This work revisits the problem of breathing cues used for management of speaking turns in multiparty casual conversation. We propose a new categorization of turn-taking events which combines the criterion of speaker change with whether the original speaker inhales before producing the next talkspurt. We demonstrate that the latter criterion could be potentially used as a good proxy for pragmatic completeness of the previous utterance (and, by extension, of the interruptive character of the incoming speech). We also present evidence that breath holds are used in reaction to incoming talk rather than as a turn-holding cue. In addition to analysing dimensions which are routinely omitted in studies of interactional functions of breathing (exhalations, presence of overlapping speech, breath holds), the present study also looks at patterns of breath holds in silent breathing and shows that breath holds are sometimes produced toward the beginning (and toward the top) of silent exhalations, potentially indicating an abandoned intention to take the turn. We claim that the breathing signal can thus be successfully used for uncovering *hidden* turn-taking events, which are otherwise obscured by silence-based representations of interaction.

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1. INTRODUCTION

The importance of breathing for production of speech needs little justification. It is, after all, the intricate coordinative patterns of the respiratory system that are the main driving force behind much of speech production as well as other vocal communicative behaviors. However, in spite of its importance, breathing has been generally overlooked in speech science. This claim can be easily verified by even a cursory look at standard phonetics textbooks with their focus firmly placed on articulatory phenomena and relatively little attention paid to the glottal and the subglottal systems. Supraglottal aspects of speech production enjoy a similar position of dominance when it comes to studies of communicative aspects of vocalizations in spontaneous conversation. While it is true that the field has enjoyed an increased interest in recent years, the contribution of the respiratory system to signaling speakers' communicative intentions is still far from clear.

In this paper, we present results on breathing turn-taking cues. Specifically, we study the respiratory patterns associated with initiating, holding, and releasing the turn. Unlike the previous studies (reviewed briefly in section 2.1), which focused primarily on properties of pre-speech inhalations, we investigate both inhalatory and exhalatory segments, as well as instances of respiratory holds. We also extend existing accounts by describing respiratory patterns found in overlapping speech. In addition, we present evidence that the respiratory signal can be used to identify turn-taking events which are otherwise obscured by the commonly used silence-based classification of conversational floor state (Jaffe and Feldstein, 1970). These include, above all,

pause interruptions, which coincide with turn-holding silences in interlocutor's speech (Ferguson, 1977; Beattie, 1982; Gravano and Hirschberg, 2011). Since these instances involve no overlapping speech, they ostensibly resemble regular (smooth) speaker changes. We follow Shriberg et al. (2001) in referring to such occurrences as *hidden events*. This concept is further explained in section 2.2.

The study is based on two corpora of three-party spontaneous conversations in Swedish and Estonian. The analysis relies primarily on automatic methods for identification and parametrization of interactional and respiratory phenomena of interest, allowing for reproducible and comparable results across the data sets. The method is described in greater detail in section 3.

The results, presented in section 4, add a new aspect to the sizeable body of work on turn-taking cues in conversation (see e.g., Bögels and Torreira, 2015 for a recent review). They also contribute to the body of work on the role of respiratory cues in coordination and regulation of turn-taking (McFarland, 2001; Rochet-Capellan and Fuchs, 2014; Ishii et al., 2016; Włodarczak and Heldner, 2016b, 2018; Włodarczak et al., 2017) by including a wider range of interactional and respiratory phenomena. Additionally, in describing respiratory markers accompanying hidden turn-taking events, the study demonstrates how the respiratory signal might help overcome some of the deficiencies of using pause-delimited interactional units (Włodarczak and Wagner, 2013) by including speakers' unrealized intentions. Finally, given the latest developments in using the acoustic signal for tracking speech activity (Nallanthighal et al., 2019) as well as increasing availability of a wide range of sensors for remote tracking of breathing (Massaroni et al., 2018; Regev and Wulich, 2020), the findings can also inform models of turn-taking implemented in speech and interaction technology systems. We discuss these and other implications of the present work in section 5.

2. PREVIOUS WORK

2.1. Respiratory Turn-Taking Cues

As indicated above, studies of respiratory mechanisms employed in production of spontaneous speech are rare. Even less frequent are studies of respiratory patterns underlying management and coordination of turn-taking. For instance, while Winkworth et al. (1995) characterized respiratory patterns in spontaneous speech, their study was predominantly concerned with variability of breath patterns, location of inhalations with respect to linguistic structure, and the influence of emotional state, rather than with turn-taking *per se*. Consequently, their material consisted of conversations with an experimenter "designed to maximize the number of subjects' utterances by providing appropriate questions and prompts" (p. 127) rather than eliciting natural turn-taking behavior. In addition, the conversations they investigated were relatively short (about 4 min) and involved subjects who were immobilized by means of shoulder straps, footrests, and hands held clasped on the lap.

By contrast, the first description of respiratory turn-taking cues proper was done by McFarland (2001). In this work, he

examined duration patterns in breathing accompanying listening and speaking in dyadic situations, and compared them with quiet breathing (without any interlocutor present). The data included two dyadic situations: scripted dialogue (10 dyads, about 50 min) and spontaneous conversation (same 10 dyads, about 2 h 30 min), as well as quiet breathing (same 20 participants, about 40 min). With respect to the comparison of quiet breathing with the dyadic conditions, he found longer inhalations and shorter exhalations in the quiet breathing condition. Interestingly, he also noted a more speech-like respiratory pattern during listening than in quiet breathing (cf. Conrad and Schönle, 1979). With respect to the comparison of listening and speaking, he found a tendency to shorter inhalations in speaking than in listening, but this difference reached significance in the scripted dialogue condition only. Furthermore, he found a tendency to longer exhalations in speaking than in listening, but this difference was significant only in the spontaneous conversation condition. He also mentions a tendency toward longer exhalations in preparation for speaker change as well as longer exhalations in the first respiratory cycle following the speaker change. Thus, this work provides some support for longer exhalations and shorter inhalations (in potential next speakers) as a preparation of the respiratory system for speech production and speaker change and hence as turn-taking cues, but the results were not unambiguous.

Rochet-Capellan and Fuchs (2014) investigated the hypothesis that breathing "could be specifically involved in turn-taking and could constitute a coordinative unit for turn-exchange" (p. 3). To this end, they collected a series of short 2.5 min dyadic conversations between 11 participants and 2 confederates (for a total of about 4 h 35 min) and classified the turn-taking events according to a version of the scheme proposed by Gravano and Hirschberg (2011). This scheme included characterizing pause-delimited utterances as either backchannels, turn-holding or turn-taking. The turn-taking category was further subdivided into (1) non-competitive *smooth transitions* occurring after complete turns, (2) competitive *interruptions*, in which the incoming speaker successfully grabs the floor from the interlocutor, and (3) competitive *butting-ins*, in which the incoming speaker fails to interrupt the interlocutor¹. They identified onsets of inhalations and exhalations automatically using velocity criteria and corrected them manually when needed. From these respiratory events, they calculated inhalation, exhalation and breathing cycle durations, breathing cycle asymmetries, and breathing rates, as well as the temporal alignment of the inhalation onset to the respiratory cycle of the other speaker. Furthermore, by combining the respiratory events with the utterance segmentations, they calculated the position of the speech onset in relation to the exhalation phase. They found most turns to be completed within one breathing cycle and almost all in fewer than four. As expected, the great majority of turns were initiated early in the exhalation (over 50% of cases fall within the initial 25% of its duration), with butting-ins occurring generally later. They also identified

¹Notably, the interruptive character of incoming speech was independent of presence of overlap. Thus, pause interruptions and interruptions accompanied by overlap were not distinguished.

differences regarding durational properties, with turn-holding being characterized by shorter respiratory cycles than turn-taking, and showed that this was predominantly due to a reduction in inhalation duration. By contrast, visual inspection of their **Figure 4** suggests that inhalation durations in turn-taking are comparable to those in listening (cf. McFarland, 2001). Furthermore, butting-ins resulted in shorter cycles than smooth turns and interruptions were more systematically coordinated with the end of the interlocutor's exhalation phase than smooth transitions. However, these observations are likely side effects of the premature termination of the incoming turn (for butting-ins) or the previous turn (for interruptions) rather than planning on the part of the incoming speaker. Thus, this work provides support for shorter inhalations (in current speakers) as turn-holding cues. However, it did not provide any definite evidence for breathing profiles differentiating competitive from non-competitive turn-takings.

In further analyses of the same material, Rochet-Capellan et al. (2014) noted a tendency that the shorter inhalations in turn-holding were also accompanied by shorter silent intervals before as well as after the inhalation (i.e., between offset of speech and onset of inhalation, and between offset of inhalation and onset of speech). Thus, the entire "breath pause" was temporally compressed in turn-holding.

Within a more constrained domain of question and answer sequences ($N = 171$) in Dutch, Torreira et al. (2015) reported that almost 47% of answers were not preceded by an inhalation (i.e., the inhalation occurred before the question onset), however, pre-speech inhalations were more common before longer answers than before shorter ones. Additionally, answers preceded by an inhalation were delayed with respect to the previous utterance to a greater extent than answers produced on residual air, suggesting that the latter strategy might be employed to avoid long between-speaker silences. When present, the inhalations started most commonly shortly (15 ms) following the question offset, although a large variation was present. The results were, thus, consistent with the utterance planning model, according to which planning of the next utterance starts early but is triggered by turn-final yielding cues ("go-signal") (Levinson and Torreira, 2015; Barthel et al., 2016, 2017).

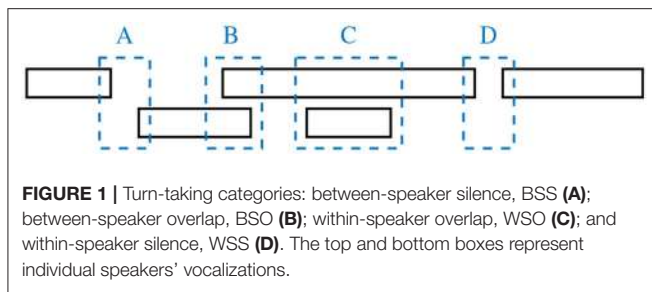
All the studies referred to above studied turn-taking in dyadic conversations, which can be thought of as the simplest form of turn negotiation. Indeed, a scenario involving two participants leaves open only the question of *when* speaker change is going to occur, and not *which* of the several competitors for the turn is going to claim it. By contrast, turn competition between two or more potential next-speakers in multiparty conversation is likely to result in more complicated turn-taking patterns, which, in turn, might be reflected in interlocutors' breathing behavior. This possibility was investigated by Ishii et al. (2016), who recorded respiratory activity in eight spontaneous four-party conversations (for a total of 1 h 36 min) and looked for patterns signaling turn-holding, turn-yielding as well as an intention to initiate a new turn. Utterances, turns and turn-taking events were segmented and classified manually. Intervals of overlapping speech as well as backchannel-like "supportive responses" were excluded from the analyzed material. The respiratory features

described the inhalations only. Onsets and offsets of inhalations were identified automatically using the sign of the derivative of a low-pass filtered respiratory signal (however, at the cost of a substantial data loss). Inhalation duration, amplitude, and slope as well as timing relative to one's own preceding and following speech were estimated using these landmarks.

The paper reported a great number of comparisons, only some of which are relevant and meaningful for modeling of turn-taking mechanisms. Overall, post-speech inhalation amplitude was found to be larger in turn-holding than in turn-yielding. The authors also observed the temporal compression reported previously by Rochet-Capellan et al. (2014) and Rochet-Capellan and Fuchs (2014) during turn-holding, that is, a generally shorter "breath pause" between utterances in turn-holding. With respect to respiratory markers of claiming the turn, results were weak. There were no differences in inhalation duration in next speakers, and only marginally larger amplitudes. The authors conclude the paper by proposing a three-step prediction model which at every pause-delimited utterance offset: (1) discriminates between turn-keeping and turn-yielding, (2) in the latter case, predicts the next speaker, and (3) predicts the silence duration. The model was demonstrated to improve on the baseline model based on average silence duration in turn-keeping and turn-yielding.

A more realistic method of evaluating the relative contribution of the respiratory signal to prediction of speech activity in multiparty dialogue was used by Włodarczak et al. (2017). Instead of discriminating between turn-keeping and turn-yielding at utterance offset, their model predicted whether or not a particular participant will be speaking within the next 100-ms window, based on this participant's 1-s speech activity and respiratory history. The results showed that respiratory information improved prediction of incipient speech activity, compared to a baseline model trained on speech activity alone (rather than a simple majority class, as was done in Ishii et al., 2016). By contrast, interlocutors' respiratory patterns offered no predictive advantage, which suggests that breathing history of a conversation participant is only helpful for predicting this participant's future vocalization but not that of their conversational partners. In other words, conversational partners do not seem to orient to each other's breathing for effecting speaker change. In addition, z -normalized respiratory slope within a 100-ms window was found to be the best performing feature among those compared.

As should be apparent from the above overview, even though studies of breathing and turn-taking have been rather rare they differ widely with respect to the amount and type of data used (scripted dialogues, short interactions with confederates, question-answer pairs, multiparty conversations), data acquisition choices (one or two belts) and the aspects of the respiratory signal selected for analysis. These differences notwithstanding, the studies provide evidence for systematic variation in breathing in the vicinity of turn-taking events, with the shortening of the inhalation in turn-holding being the most robust cue found. By contrast, breathing patterns related to claiming or releasing the turn were less consistent. Even though the effects were generally weak, the breathing



signal was demonstrated to improve prediction of turn-taking in technical systems.

2.2. Classification of Turn-Taking Events

In order to characterize turn-taking events, they first have to be identified as such. Several approaches to the classification of turn-taking events have been used in the past. The speaking turn, as introduced in the seminal work by Sacks et al. (1974), is defined in terms of projectable units whose syntactic, semantic and prosodic completeness can be inferred from the ongoing stream of speech. These predictable completion points (or transition-relevance places, in Conversation Analysis speak) are locations where speaker change can occur according to a set of rules whereby the previous speaker selects the next, the next speaker self-selects or, barring other turn-contestants, the previous speaker continues. Conceived of in this way, the turn consists of prosodically, syntactically and pragmatically complete units which need to be identifiable in a reliable and time-efficient way if Sacks et al.'s system is to be applied to the task of corpus segmentation. These aspects become particularly crucial in large-scale corpus studies.

An alternative approach to dialogue segmentation rests on interactional units identified in a fully mechanistic fashion based on the notion of *speaker change*. This technique goes back to the method of interactional chronography, introduced by Norwine and Murphy (1938) and developed further by Brady (1968) and Jaffe and Feldstein (1970). Briefly, the method consists of identifying talkspurts or interpausal units, that is intervals of speech (or voice activity) delimited by pauses longer than a predefined threshold². The possible turn configurations are then defined by application of two criteria: (i) presence of overlapping speech (contrasting silences and overlaps), (ii) presence of speaker change (contrasting between- and within-speaker intervals). The resulting system thus comprises four categories, depicted schematically in **Figure 1**: within-speaker silence (WSS), within-speaker overlap (WSO), between-speaker silence (BSS), and between-speaker overlap (BSO).

Interactional chronography has clear benefits: it is automatic, fully reproducible and efficient. However, since it also decouples the task of turn segmentation from the notion of speakers' intentions, it is unable to distinguish between *competitive* and *non-competitive* (or problematic and non-problematic)

speaker changes (Schegloff, 2000, 2001). For instance, it cannot distinguish *pause interruptions*, in which the incoming speaker starts speaking during what was intended as a turn-holding pause by the previous speaker, from regular *smooth speaker switches*. In a chronogram they look the same. Even though such distinctions have been incorporated into turn-taking labeling schemes, notably in the scheme initially proposed by Ferguson (1977) which was later adapted first by Beattie (1982) and then by Gravano and Hirschberg (2011), and used in corpus studies (Gravano and Hirschberg, 2011; Rochet-Capellan and Fuchs, 2014), their identification requires manual annotation. In this paper, we follow Shriberg et al. (2001) in referring to such interactional events obscured by a particular representation of the phenomenon under study as *hidden events*.

While pause interruptions are the archetypal example of a hidden turn-taking event, they are by no means the only one. It is the same situation with speaker switches involving overlapping speech, where non-competitive *overlaps* and competitive *interruptions* (Gravano and Hirschberg, 2011) cannot be distinguished based on chronograms. Furthermore, a speaker might want to release the turn but nevertheless find herself having to continue in the face of no other turn contestants. Similarly, a potential speaker might be getting ready to start a turn but might be prevented from speaking by a faster interlocutor. However, these eventualities have so far received little attention in turn-taking literature, not least because of the difficulties in identifying them reliably.

In our earlier work (Włodarczak and Heldner, 2018), we analyzed kinematic properties of post-speech breathing patterns and found a number of between-speaker silence intervals in which the first speaker produced more speech after the second speaker's utterance without making an inhalation. We hypothesized that these cases correspond to instances of pause interruptions and demonstrated that the respiratory characteristics of these intervals was consistent with this idea. Namely, we showed that these intervals have similar respiratory characteristics to turn-holding silences, uninterrupted by another speaker. Specifically, they have a less steep slope, are started higher in speaker's respiratory range and are longer than exhalations accompanied by a speaker change. In fact, exhalations coinciding with these pause interruptions were the longest of all the categories we investigated, suggesting that the previous speaker might be holding their breath while waiting for the incoming speech to end.

To the best of our knowledge, the only other respiratory study which considered interruptions as a separate category was Rochet-Capellan and Fuchs (2014). In that work, the authors differentiated between *smooth turns*, successful *interruptions* and failed *butting-ins*, and found that butting-ins were associated with shorter and less asymmetrical respiratory cycles. They also occurred later in the exhalatory phase than the other two categories. Notably, the analysis was based on manual classification of turn onset types and the analyzed classes pooled speaker changes accompanied by silence and overlap.

In this paper, we revisit the idea of pause interruptions from Włodarczak and Heldner (2018) using a larger multilingual data set, comprising Swedish and Estonian conversational material.

²Existing studies use threshold values ranging widely from 50 (Gravano and Hirschberg, 2011) to 500 ms (Shriberg et al., 2001), with the perceptual threshold on pause perception estimated at around 120 ms (Heldner, 2011).



FIGURE 2 | Recording setup in the Stockholm University Respiratory Lab.

Unlike Rochet-Capellan and Fuchs (2014), our analysis does not rely on manual labels of interruptions. Instead, we try to identify interruptions based on respiratory features of selected interactional events. Because we are primarily interested in whether the previous speaker has yielded the floor, we focus on features of the post-speech exhalatory segment rather than the inhalation preceding the incoming talkspurt. We also extend the analysis in Włodarczak and Heldner (2018) in several ways: (i) we include an automatic annotation of breath holds, and (ii) we analyse respiratory patterns of between-speaker overlaps and demonstrate that they also show the expected pattern of interruption. In addition, we propose a method for identifying the abandoned intention to take the floor, where the speaker was planning to initiate a turn but produced no speech. Namely, we identify silent cycles which involve a respiratory hold in the top portion of the exhalatory phase.

3. METHOD

In total, 18 three-party conversations were used in the study: 8 in Swedish and 10 in Estonian. All subjects were native speakers of the respective languages and, with the exception of a single Swedish conversation, knew each other prior to the recording. The subjects were instructed to engage in a casual conversation on a topic of their choice for about 20 min. All conversations were recorded using an identical setup in the Phonetics Laboratory at the Department of Linguistics, Stockholm University. The subjects were recorded standing at a round bar table (105 cm in height) to minimize distortions in the respiratory signal. Speech was recorded using directional close-talking condenser microphones (Sennheiser HSP 4) to reduce the amount of cross-talk.

Respiratory activity was measured using the Respiratory Inductance Plethysmography (RIP) method (Cohn et al., 1978; Watson, 1980), as implemented in the RespTrack system

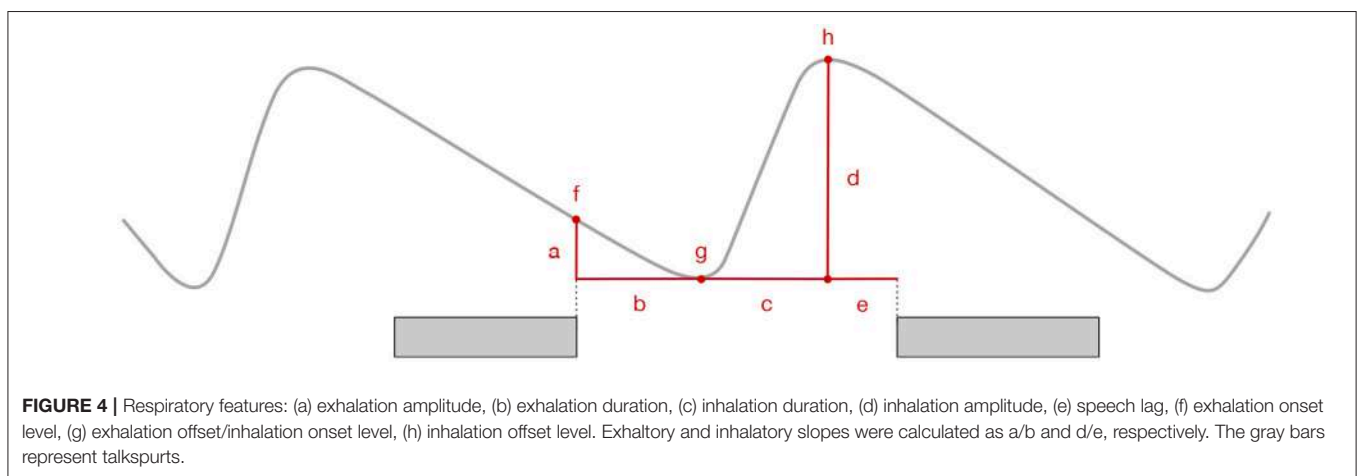
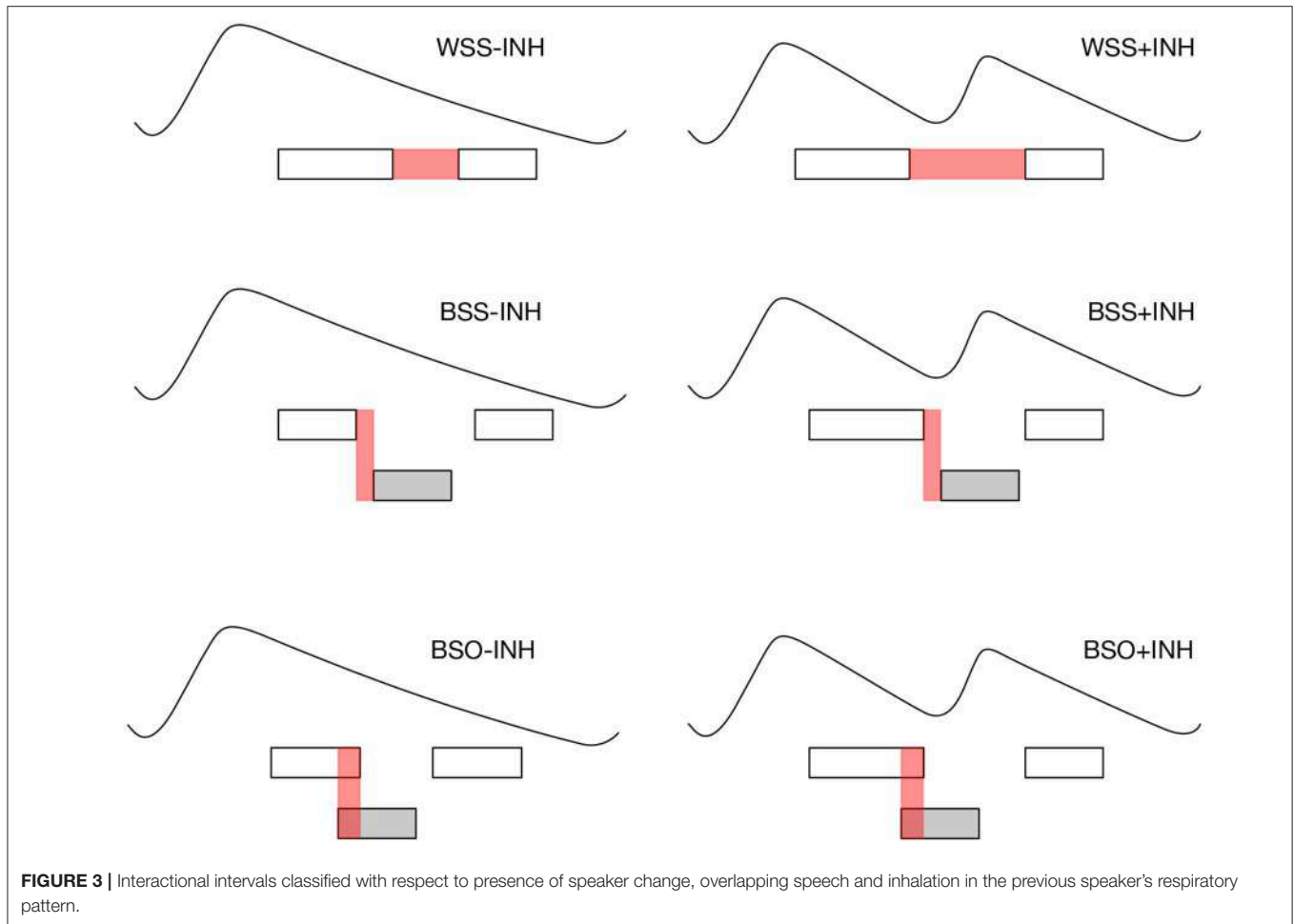
developed in the Phonetics Laboratory at Stockholm University (Heldner et al., 2019). Very briefly, the RIP method uses two elastic inductive belts worn around the chest and the abdomen to trace respiratory movements (see **Figure 2**). Inhalations and exhalations alter the circumference as well as the inductance of the belts. The belts are connected to electronics that convert the varying inductance into (analog) direct current (DC) signals with amplitudes that are approximately proportional to the changes in circumference. In addition to the individual signals from the rib cage and abdomen belts, the RespTrack system provides a weighted sum of these signals, allowing a direct estimation of lung volume change. Correct weighting is obtained by instructing the subject to close the glottis, and then to repeatedly contract and relax the abdominal wall, while the experimenter adjusts a potentiometer knob on the RespTrack main unit so that the summed signal remains flat when air is moved from the abdomen to the chest. This is the so called *isovolume manoeuvre* (Konno and Mead, 1967). A slightly higher weight to the rib cage belt is usually required (Banzett et al., 1995). An important feature of the RespTrack system given the objectives of this study is the method used for correcting DC offset in the belt signals. Unlike many other RIP systems, RespTrack does not use high-pass filtering for this purpose, which permits distinguishing breath holds from periods of slow exhalations. The RIP as well as the microphone signals were digitized with an integrated data acquisition system (PowerLab 1635 hardware and LabChart software from AD Instruments).

Talkspurts were identified automatically, using the voice activity method described in Laskowski (2011) with the standard 100-ms frame and time step. The minimum pause duration between two adjacent talkspurts was set at 200 ms. Subsequently, interaction chronograms (including turn-taking events) were created using TextGridTools, a Python toolkit for working with Praat TextGrid files (Buschmeier and Włodarczak, 2013). Intervals of laughter were identified using the method by Ryokai et al. (2018) with the code and models accompanying the paper³. The authors report a per-frame accuracy of 88% on a held-out Switchboard test set, which is comparable to state-of-the-art performance of audio-only automatic laughter recognizers (Cosentino et al., 2016).

The respiratory signal was processed using RespInPeace, a Python toolkit for analysing RIP data (Włodarczak, 2019). Specifically, segmentation into inhalatory and exhalatory segments was done by locating peaks and troughs in the z-scored respiratory signal separated by at least one standard deviation⁴. Similar to our previous work (e.g., Włodarczak and Heldner, 2016b), each participant's lung volume used for speaking (henceforth, *speaking volume*, SV) was calculated as the interval between the 5th and 95th percentiles of all peak and trough values, and resting expiratory level (REL) was estimated dynamically as the median value of troughs within a

³<https://github.com/jrgillick/laughter-detection> (accessed August 13, 2019).

⁴A manual resegmentation of the Estonian data set (not used in this work) resulted in adjustment of 12.6% of the automatic boundaries. Since no manual segmentation was available for the Swedish data, we chose to use the automatic method for the sake of consistency.



60-s window. In addition, breath holds were identified using the method proposed by Noto et al. (2018) for airflow recordings, adapted to the RIP signal and also included in the RespInPeace toolkit. Briefly, since a respiratory hold shows up as a plateau in the RIP signal, the method looks for prominent peaks in histograms of the RIP signal values in each breathing cycle and then identifies the time interval when the signal stays

within some margin around the peak. In addition we set the minimum hold duration to 250 ms and the minimum gap between two holds to 150 ms. Given that the method often mistakes speech segments, which also produce slowly decaying regions approximating plateaus, for breath holds, only hold candidates produced during periods of silent exhalations were included. Noto et al. (2018) evaluated the original breath hold

detection method using simulated data, the 95% confidence intervals for average breath hold duration coinciding with inhalations or exhalations were very narrow, spanning between 0.006 and 0.02 ms.

For the purpose of the present study, we further classified the WSS, BSS, and BSO intervals depending on whether the following utterance by the original speaker was preceded by an inhalation (+INH) or directly followed the exhalatory segment (-INH), see **Figure 3** for an illustration. For the category not involving speaker change (WSS) it is simply a matter of whether the speaker inhales before continuing. For the categories involving speaker change (BSO and BSS), we search for the next utterance by the original speaker and check whether it is preceded by an inhalation. Thus, for instance, the WSS-INH class comprises those instances of within-speaker silences in which the speaker continues without breathing in and the BSS+INH class includes between-speaker silences in which the original speaker inhales before producing her next talkspurt. Given that our automatic method of segmenting the respiratory signal sometimes misses small inhalatory segments, possibly inflating exhalation durations of the BSO-INH and BSS-INH intervals⁵, we manually checked whether there was, in fact, no inhalation present. Cases of missed inhalations ($N = 73$) were excluded from the analysis. Also excluded were all intervals in which edges of the speech segments coincided with an inhalation ($N = 4,521$)⁶ or which included laughter ($N = 1,801$).

For the remaining intervals, we extracted amplitude (expressed in units of SV), duration (in \log_2 s), slope (in SV per second), speech lag (the duration between the inhalation onset and speech onset, in \log_2 s⁷), and lung volume (as fractions of SV) at the onset and the offset of the exhalatory segment following the previous speaker's talkspurt (for WSS intervals, we took the exhalation following the pre-pausal talkspurt). In addition, for [+INH] intervals, we extracted features of the inhalation (duration, amplitude, slope, and offset level) preceding the next talkspurt of the previous speaker. For between-speaker intervals, the same features were extracted from the inhalation preceding the talkspurt produced by the next (incoming) speaker, further classified according to whether the between-speaker interval involved a silence, TT(S), or an overlap, TT(O). The measures are illustrated in **Figure 4**.

Since backchannels are generally assumed not to claim the conversational floor (Yngve, 1970), all the turn configurations (both between- and within-speaker) involving at least one backchannel were excluded from the analysis ($N = 5,055$). Also excluded were inhalations and exhalations with extreme values

TABLE 1 | Frequencies of the analyzed turn-taking categories, alongside the percentage of instances in each category coinciding with a respiratory hold.

Category	Exhalations		Inhalations
	Frequency	% holds	
WSS-INH	578	2	—
WSS+INH	230	1	248
BSS-INH	35	10	—
BSS+INH	461	6	495
BSO-INH	35	8	—
BSO+INH	207	3	216
TT(S)	—	—	441
TT(O)	—	—	203

See section 3 for explanation of the categories.

of slope (at least three standard deviations away from the mean, $N = 94$). In this work, we operationalized backchannels as talkspurts shorter than 1 s. This criterion, proposed by Heldner et al. (2011) was previously demonstrated to be an accurate proxy for the backchannel/non-backchannel distinction. The frequencies of the analyzed intervals are listed, separately for inhalations and exhalation, in **Table 1** alongside the percentage of instances in each category coinciding with a respiratory hold.

Additionally, we identified abandoned speech candidates as silent cycles accompanied by a respiratory hold occurring in the top 20% of the exhalation amplitude. In other words, these are the cases where a conversation participant holds their breath right at the beginning of an exhalation which does not coincide with their own speech⁸. For these intervals we extracted inhalation duration and amplitude, and compared them against silent cycles without respiratory holds. This procedure identified 221 abandoned initiation candidates, which were compared against 6,121 silent cycles not coinciding with respiratory holds.

The inhalatory and exhalatory features were modeled separately using multinomial logistic regression in R, using the *mlogit* package. Models were built step-wise by adding one predictor at a time and checking whether including the predictor significantly reduces $-2 \times \log$ -likelihood of the resulting model.

The breathing data as well as the code used for feature extraction, preprocessing as well as statistical analysis is available online at <https://doi.org/10.5281/zenodo.4054803>.

4. RESULTS

This section gives an overview of some of the breathing patterns related to floor management in multiparty casual conversation. We start with breath holds and exhalatory features, which have received very little attention to date, continue onto the more familiar ground of inhalatory properties and conclude with the rather peculiar phenomenon of breath holds found in the middle of silent breathing cycles.

⁸Admittedly, the 20% cutoff was quite arbitrary and was chosen as a trade-off between selecting the most likely abandoned speech candidates, located toward the top of the exhalation range, and ensuring an acceptable sample size.

⁵This is less of a problem for WSS-INH since in those cases the next talkspurt of the previous speaker coincides with the end of the silent interval. By contrast, for BSO-INH and BSS-INH intervals the next talkspurt of the previous speaker might not occur until much later in the conversation.

⁶We feel that the relatively high number of excluded cases can be attributed primarily to inaccuracies in breath segmentation (although see footnote 4 for a comparison with a manual resegmentation of a subset of the data) and the low time resolution (100 ms) in the voice activity detection used, which increased the chances for a speech segment to spill over into the inhalation on either side.

⁷Note that speech lag is undefined for BSS+INH since in those cases the following breathing cycle of the previous speaker need not include a speech segment.

TABLE 2 | Coefficients of the exhalatory model.

		B	exp(B)	95% CI		p
				LL	UL	
BSO+INH	Intercept	-1.65	0.19	-1.96	-1.33	0.00
	Offset level	-11.12	0.00	-12.69	-9.55	0.00
	Slope	-9.93	0.00	-11.74	-8.11	0.00
	Hold = True	1.04	2.84	-0.03	2.11	0.06
BSO-INH	Intercept	-2.84	0.06	-3.40	-2.29	0.00
	Offset level	-0.81	0.44	-2.73	1.10	0.40
	Slope	-1.85	0.16	-5.09	1.38	0.26
	Hold = True	1.70	5.45	0.34	3.05	0.01
BSS+INH	Intercept	-0.65	0.52	-0.90	-0.40	0.00
	Offset level	-11.82	0.00	-13.20	-10.44	0.00
	Slope	-8.66	0.00	-10.28	-7.04	0.00
	Hold = True	1.58	4.84	0.73	2.43	0.00
BSS-INH	Intercept	-2.81	0.06	-3.36	-2.26	0.00
	Offset level	-0.94	0.39	-2.87	0.99	0.34
	Slope	-1.70	0.18	-4.93	1.53	0.30
	Hold = True	1.97	7.19	0.74	3.21	0.00
WSS+INH	Intercept	-1.49	0.22	-1.80	-1.19	0.00
	Offset level	-9.16	0.00	-10.64	-7.68	0.00
	Slope	-9.75	0.00	-11.51	-8.00	0.00
	Hold = True	-0.37	0.69	-1.95	1.21	0.64

The reference category is WSS-INH.
 $R^2 = 0.18$ (McFadden), model $\chi^2_{(20)} = 826.54$, $p < 0.01$.

4.1. Breath Holds in Turn-Taking

Co-occurrence of respiratory holds with the analyzed turn-taking categories is shown in **Table 2**. Notably, only 1–2% of WSS intervals involved a respiratory hold, suggesting that respiratory holds are not routinely employed for maintaining possession of the conversation floor. Conversely, the category with the highest likelihood of coinciding with a respiratory hold was BSS-INH (10%), which, as we indicated above, is likely to involve some degree of turn-competition. The same is at least partly true for its overlapped counterpart, BSO-INH, which coincided with a respiratory hold in 8% of cases.

In order to verify to what extent breath holds are used proactively and to what extent they are produced to ward off (or wait out) an interlocutor’s interruption, we calculated conditional probabilities of speaker change depending on whether or not a respiratory hold is present. If respiratory holds were used as an effective turn-holding signal, the probability of a speaker change in their presence, $P(\text{speaker change}|\text{hold})$, should be low compared to the probability of a speaker change not accompanied by a hold, $P(\text{speaker change}|\text{no hold})$. Conversely, if they are used in response to interlocutor’s interruption, the opposite should be true. We find that the probability of a speaker change is much higher (0.74) when a silence coincides with a respiratory hold than when it does not (0.38), suggesting that holds are produced predominantly reactively, in response to incoming speech.

4.2. Exhalatory Features

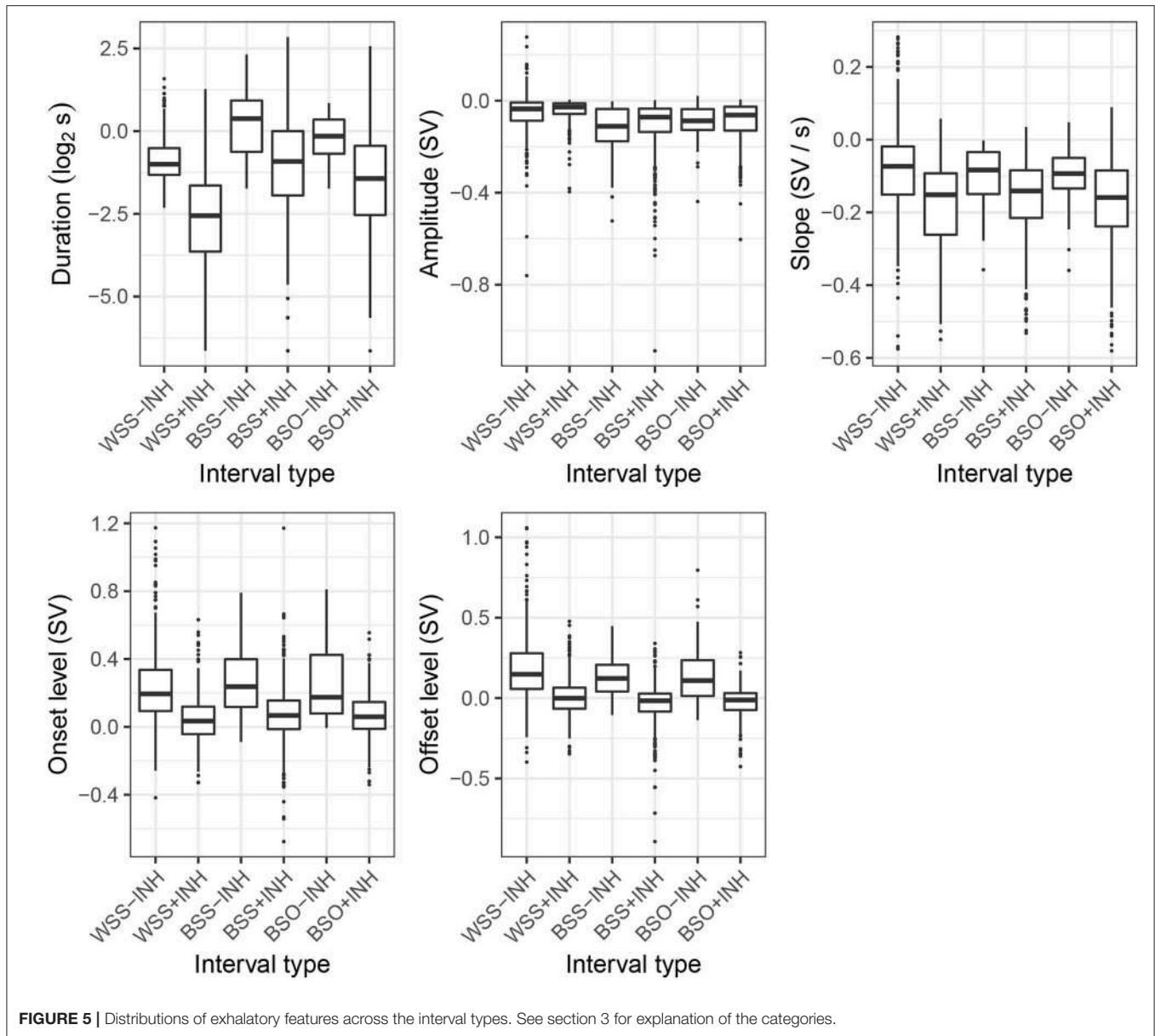
Distributions of exhalation duration, amplitude, and slope as well as onset and offset levels in the six interval types are plotted in **Figure 5**. For all features, with the exception of amplitude, the categories form two separate groupings for intervals accompanied with an inhalation [+INH] and intervals in which the previous speaker’s next talkspurt directly follows the exhalatory segment [-INH]. Specifically, exhalations in the latter category start and end higher in the respiratory range (and generally above REL, corresponding to 0 on the ordinate), unlike the [+INH] intervals which, predictably, end in the vicinity of REL. The [-INH] intervals are also characterized by less steep slopes. Notably, the fact that the distributions of these features for BSO-INH and BSS-INH are similar to the turn-holding WSS-INH suggests that the presence of speaker change in the absence of an inhalation might indicate that the previous speaker did not intend to release the turn and the incoming speech is of an interruptive character.

The distributions of exhalatory duration show a similar grouping with [-INH] intervals being generally longer than their [+INH] counterparts. In addition, several effects previously attested in the literature are also apparent in that plot. For instance, as observed in several studies (Rochet-Capellan and Fuchs, 2014; Ishii et al., 2016; Włodarczak and Heldner, 2016b), the short exhalations in WSS+INH are a strong correlate of turn-holding. What is more interesting in the context of the present study is that the between-speaker [-INH] intervals (i.e., BSO-INH and BSS-INH) show the longest durations of all the categories, followed by BSO+INH. We interpret this finding as evidence of turn-competition at these junctures in the conversations and come back to this point in the Discussion below.

By contrast, exhalation amplitude shows a different grouping where within-speaker intervals, whether or not accompanied by an inhalation, involve a shallower exhalation than the other interval types.

The contribution of individual features to prediction of interval type was assessed using multinomial logistic regression. Due to high collinearity between duration, amplitude and slope, only slope was used as composite feature. Onset and offset levels were also highly correlated; consequently, only the latter was used as a predictor. All the resulting predictors (slope, offset level, presence of respiratory holds) significantly improved fit of the resulting model (indicated with likelihood ratio test) and were included in the final model, summarized in **Table 2**. WSS-INH was used as the reference category due to of its unambiguously turn-holding character.

The results of the logistic regression are largely in line with the two-way grouping suggested in **Figure 6**. Neither BSO-INH nor BSS-INH are significantly different from the WSS-INH category as far as slope and onset level are concerned. By contrast, all [+INH] categories are significantly different from the reference, whereby higher offset levels and higher (less negative)



slope values reduce the odds of the [+INH] classes. Presence of respiratory holds was a significant predictor for all categories, except for WSS+INH and (marginally) BSO+INH. In all other cases, respiratory holds increase the odds of the predicted category compared to the reference. McFadden’s pseudo- R^2 for this model equals 0.18; if the duration and onset level are also included in the model⁹, the value goes up to 0.25, indicating very good model fit, with values between 0.2 and 0.4 being equivalent to R^2 values of 0.7–0.9 for linear functions (McFadden, 1978; Louviere et al., 2000).

⁹The reader is reminded that presence of correlated predictors adversely affects parameter estimates and their associated p -values but not the overall model fit (Harrell, 2001).

4.3. Inhalatory Features

We now turn to properties of the inhalations. **Figure 6** presents distributions of five inhalatory features: amplitude, duration, slope, offset level, and speech lag. Obviously, these features were only calculated for the [+INH] as well as the turn-taking intervals, TT(S), TT(O). Speech lag was only calculated for WSS+INH, TT(S), and TT(O). Onset level was not included since it is equal to exhalation offset level (see **Figure 4**).

Overall, there was very little amplitude and offset level variation across the five categories. In particular, there was no marked difference between the turn-releasing BSO intervals and the TT intervals. We return to this point in the discussion.

The distributions of slope, duration, and speech lag show primarily the familiar temporal compression pattern attested previously in literature: turn-holding WSS intervals are

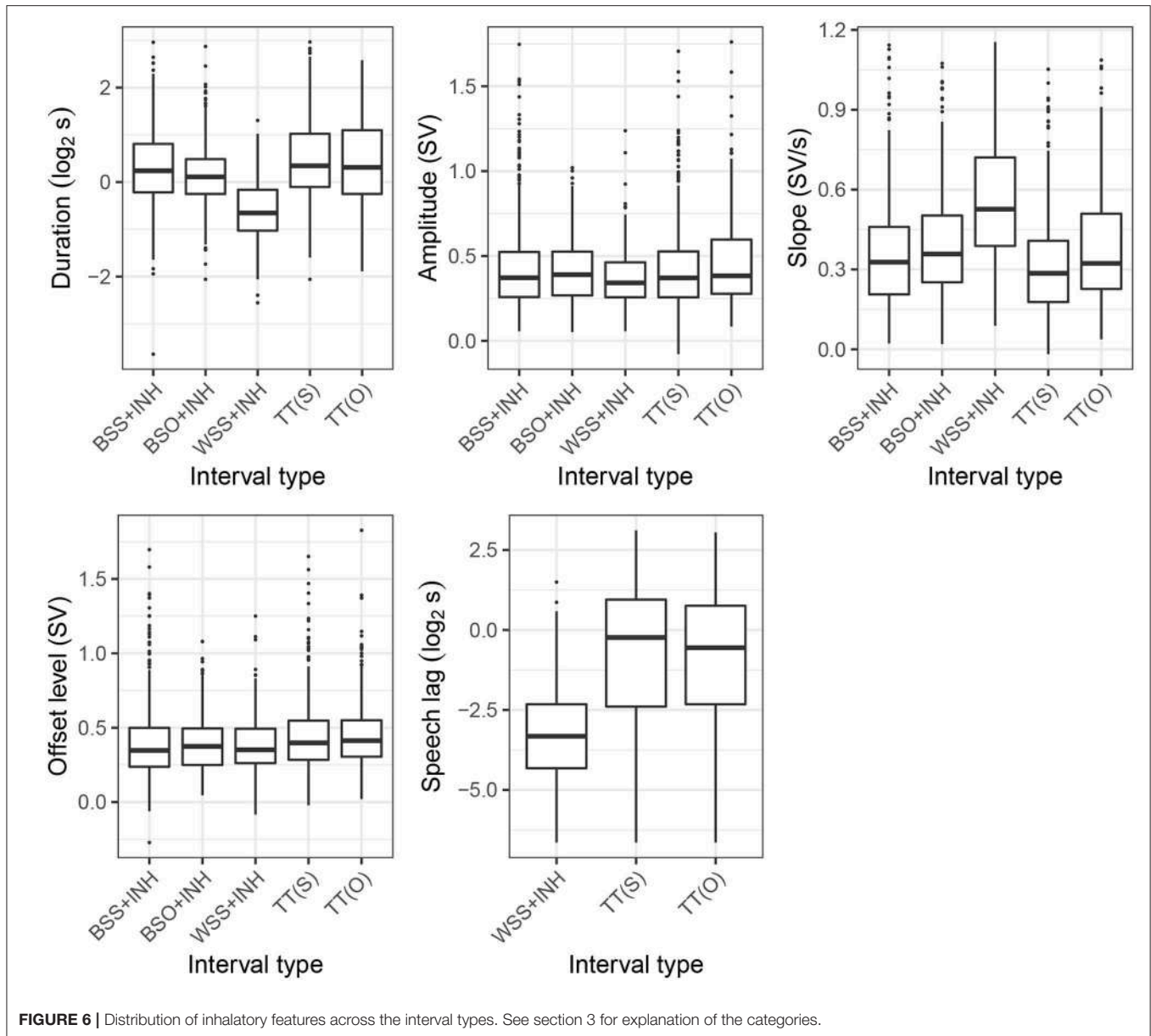


FIGURE 6 | Distribution of inhalatory features across the interval types. See section 3 for explanation of the categories.

characterized by steeper (more positive) and shorter inhalations, which are followed much more quickly by speech. Again there is no substantial difference between BSO and TT intervals, and only slightly steeper slopes in intervals involving overlap, BSO+INH and TT(O), than in those coinciding with silence, BSS+INH and TT(S).

The contribution of the inhalatory features to prediction of interval type was assessed again using multinomial logistic regression. Similar to exhalatory features, only slope was included in the model due to high collinearity between slope, amplitude, and duration. Given that speech lag was defined only for a subset of intervals, we fitted two separate models. First, we fitted a model which included slope and offset level using all five interval types. Next, for WSS+INH, TT(S), and TT(O) intervals, we fitted a

model which additionally included speech lag as a predictor. The results of these models are summarized in **Tables 3, 4**. In both models, WSS+INH was used as a reference.

In the first model (**Table 3**), fitted on the whole data set, an increase in offset level (i.e., completing the inhalation higher in the respiratory range) is associated with higher odds of the predicted category against the reference. This is particularly true for the turn-taking categories, TT(O) and TT(S). Conversely, higher (more positive) values of inhalation slope increase the odds of the reference WSS+INH category. McFadden’s pseudo- R^2 of this model equalled 0.06. When duration was added as a predictor, this value changed only slightly to 0.07.

The second model (**Table 4**), which only includes WSS+INH, TT(O), and TT(S) intervals reflects the same effects for slope and

TABLE 3 | Coefficients of the inhalatory model for all intervals involving an inhalation.

		B	exp(B)	95% CI		p
				LL	UL	
BSO+INH	Intercept	0.72	2.05	0.25	1.19	0.00
	Offset level	1.98	7.26	0.93	3.04	0.00
	Slope	-3.45	0.03	-4.36	-2.54	0.00
BSS+INH	Intercept	1.76	5.84	1.35	2.18	0.00
	Offset level	2.68	14.56	1.75	3.61	0.00
	Slope	-4.77	0.01	-5.59	-3.96	0.00
TT(O)	Intercept	0.40	1.49	-0.08	0.87	0.11
	Offset level	3.83	45.99	2.81	4.85	0.00
	Slope	-4.82	0.01	-5.82	-3.82	0.00
TT(S)	Intercept	1.65	5.19	1.22	2.07	0.00
	Offset level	4.19	66.08	3.24	5.14	0.00
	Slope	-6.67	0.00	-7.60	-5.74	0.00

The reference category is WSS+INH.
 $R^2 = 0.06$ (McFadden), model $\chi^2_{(12)} = 297.43$, $p < 0.01$.

TABLE 4 | Coefficients of the inhalatory model for WSS+INH, TT(O), and TT(S) intervals.

		B	exp(B)	95% CI		p
				LL	UL	
TT(O)	Intercept	1.43	4.18	0.83	2.03	0.00
	Offset level	3.03	20.73	1.86	4.21	0.00
	Slope	-3.85	0.02	-4.98	-2.71	0.00
	Speech lag	0.54	1.71	0.42	0.66	0.00
TT(S)	Intercept	2.61	13.55	2.04	3.17	0.00
	Offset level	3.41	30.18	2.30	4.51	0.00
	Slope	-5.53	0.00	-6.61	-4.46	0.00
	Speech lag	0.52	1.69	0.42	0.63	0.00

$R^2 = 0.21$ (McFadden), model $\chi^2_{(8)} = 389.75$, $p < 0.01$.
 Unlike the model in **Table 3**, this model includes speech lag as a predictor, which is undefined for the other intervals. The reference category is WSS+INH.

offset level but additionally indicates that increased speech lag increases the odds of the predicted category against the reference. McFadden’s pseudo- R^2 of this model equalled 0.21, compared to R^2 of 0.14 for a model with slope and offset level as the only predictors. This relatively high R^2 value compared to the model in **Table 3**, which included the same predictors, is likely due to the somewhat better separation of the TT(O) and TT(S) categories as well as the reduced number of predicted classes. Addition of inhalation duration to the final model did not substantially improve the model fit ($R^2 = 0.22$).

4.4. Breath Holds in Silent Breathing

In the present section we turn to the problem of identifying abandoned speech initiations. To that end we identified breath holds during silent breathing (i.e., breath holds found in exhalations not coinciding with speech). In **Figure 7**, we plot

their relative position in the exhalation duration (along the abscissa) and the exhalation amplitude (along the ordinate). As is evident both from the scatter plot and the marginal distributions, breath holds occur primarily toward the end (and the bottom) of the exhalation. This grouping is expected given that the silent breathing pattern often exhibits flattened valleys near REL.

Of more interest to our present goal is the smaller concentration of respiratory holds toward the beginning (and the top) of the exhalation. This indicates that speakers sometimes hold their breath right after an inhalation. This behavior is illustrated in **Figure 8**, which clearly shows the speaker holding their breath for about 500 ms right after the inhalation offset and exhaling without producing any speech. The pattern is rather surprising and might indeed suggest that the speaker was getting ready to produce speech but his or her intention was frustrated, for instance because another participant was able to take the turn faster. The frequencies of such silent holds across speakers and languages are shown in **Figure 9**. Overall, while some speakers seem to produce them more often than others, it is rather uncommon to observe more than five silent holds per speaker and conversation. There were no substantial differences between the two languages.

In **Figure 10**, we plot inhalation durations (in \log_2 s) and inhalation amplitude (as a fraction of the speaker’s respiratory range) in silent cycles split depending on whether or not they coincide with a hold, as well as in turn-taking cycles accompanied by silence, TT(S). Overall, the TT(S) category is characterized by both increased inhalation duration and amplitude, with the values for the Hold class placed in between the other two. These tendencies are also reflected in the results of the multinomial logistic regression in **Table 5**, where increased inhalation duration is associated with a decrease of the odds of a silent cycle and an increase of odds of the TT(S) category. The effect of amplitude was only significant for the TT(S) category, whose odds increase with an increased inhalation depth. However, the differences are very small, which is also reflected in the resulting R^2 values. Even though both inhalation amplitude and slope significantly improve the model fit, McFadden’s pseudo- R^2 is quite low (0.03) indicating the predictive power of these features for discrimination between the three categories is limited.

5. DISCUSSION AND CONCLUSIONS

In this paper, we have aimed to provide an overview of respiratory patterns related to several floor management strategies. The basic analytical categories used in the present work were formulated in terms of between- and within-speaker silences and overlaps (Jaffe and Feldstein, 1970). These categories, based entirely on the mechanistic criteria of presence of overlapping speech and speaker change, were further divided into subcategories depending on whether the previous speaker inhaled before producing her next talkspurt. The motivation for these augmented categories was an attempt to uncover pragmatic categories which are normally obscured by purely silence-based representations of interactions, such as pause

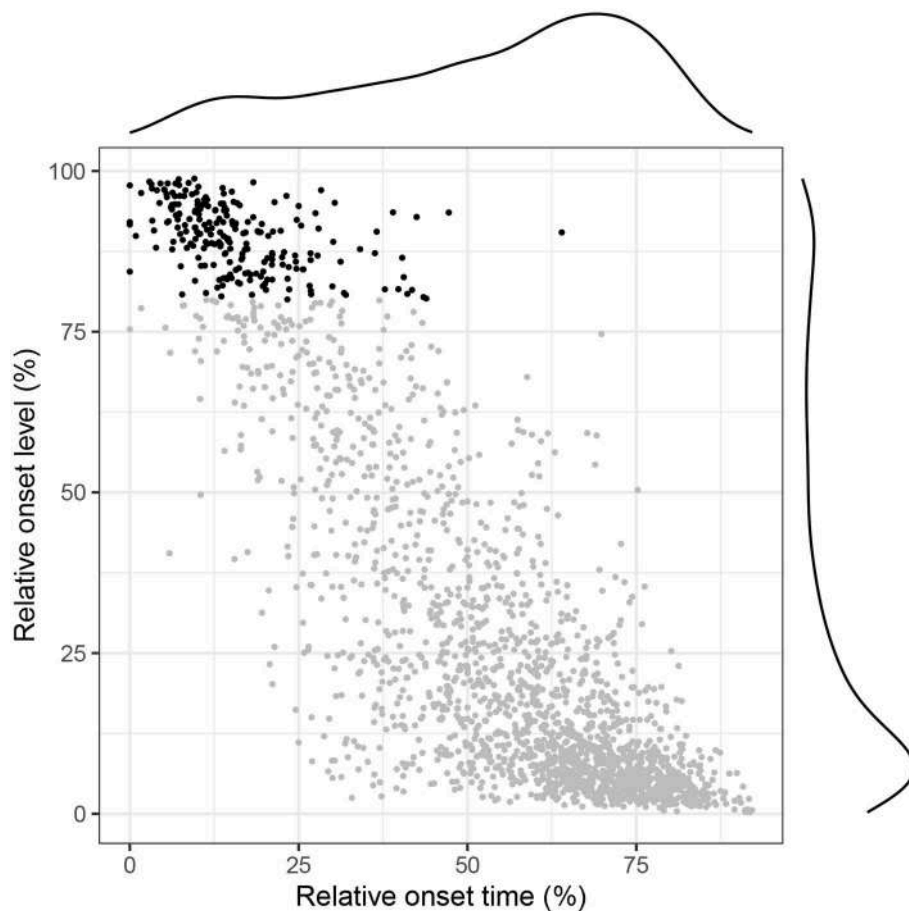


FIGURE 7 | Distribution of holds within the exhalation in silent breathing. Holds occurring in the top 20% of the exhalation amplitude are plotted in black.

interruptions or abandoned turn-yields. Here, we assumed that lack of inhalation might be used to mark turn-incompleteness in the previous speaker.

The results summarized in the previous section are largely in line with this assumption. This was particularly true of exhalatory features, which have so far been routinely overlooked in studies of interactional functions of breathing. Specifically, in terms of onset level and slope values, the [-INH] categories all behaved similarly: they were initiated higher in the respiratory range and involved less steep exhalations than the intervals associated with an inhalation, in line with the hypothesized incomplete character of the preceding speech. By contrast, the [+INH] intervals were generally terminated around REL, which is the physiologically motivated point to start an inhalation and (given some degree of linguistic planning) is also the expected endpoint for pragmatically complete breath groups.

At the same time, the BSO-INH and BSS-INH intervals were characterized by the longest exhalations of all the analyzed categories. Given that these intervals, alongside BSO+INH, also had the highest likelihood of coinciding with a respiratory hold, the results are consistent with the idea that these cases involve

turn-competition, whereby the previous speaker is trying to keep the turn.

Notably, the WSS-INH intervals were not associated with a high likelihood of a respiratory hold, with speaker changes being more likely in the presence of a respiratory hold [$P(\text{speaker change}|\text{hold}) = 0.74$] than in its absence [$P(\text{speaker change}|\text{no hold}) = 0.38$]. This suggests that respiratory holds do not function as a proactive turn-holding resource, as proposed by Local and Kelly (1986). Rather they are employed reactively to maintain possession of or reclaim the conversational floor in the presence of interlocutor's interruption.

By contrast, the analysis of inhalatory features was relatively less revealing. Here, we were mainly able to reproduce the temporal compression effect noted in earlier studies (Rochet-Capellan and Fuchs, 2014; Rochet-Capellan et al., 2014; Ishii et al., 2016), and the associated differences in slope in within-speaker (WSS+INH) intervals. Interestingly, and unlike (Ishii et al., 2016), we found little to no difference between inhalations following between-speaker intervals and those preceding speech in the turn-taking categories. The inhalatory features were also found to have lower predictive power than exhalatory features

as quantified by McFadden’s pseudo- R^2 of multinomial logistic regression models.

Notably, much of the variation in the exhalatory features would have been completely lost if the respective [+INH] and [-INH] categories had been collapsed. The rather marked grouping visible in **Figure 5** suggests, therefore, that our proposed sub-categorization of the interactional events is pragmatically justified. It is also a promising extension of our

earlier attempts at combining turn-taking and respiratory categories. We discuss these briefly in the hope that our unsatisfactory solutions will help the reader learn from our mistakes. In Włodarczak and Heldner (2016b), we proposed a simple finite-state model which included all possible transitions between subsequent respiratory cycles of a single speaker depending on whether they coincided with silence, utterances shorter than one second or longer stretches of speech (**Figure 11**). While this representation allowed us to find some of the interactional effects, such as the time compression in WSS intervals, it was essentially unilateral and did not take any account of the interlocutors’ actions. We improved on this deficiency in Włodarczak and Heldner (2018), where exhalations in WSS and BSS intervals were subdivided depending on whether they were followed by an inhalation. Our present approach is thus an extension of that representation to include inhalatory features and intervals with overlapping speech.

Unlike the [\pm INH] dimension, presence of overlapping speech, which is another routinely overlooked aspect in studies of breathing in turn-taking, played little role discriminating between the categories. With the exception of slightly increased inhalation slope values in TT(O) and BSO+INH in comparison to TT(S) and BSS+INH, the differences were practically nonexistent. In other words, incoming speakers’ breathing behavior is not substantially altered by presence of overlapping speech, possibly indicating that the latter is not a reliable indicator of turn competition.

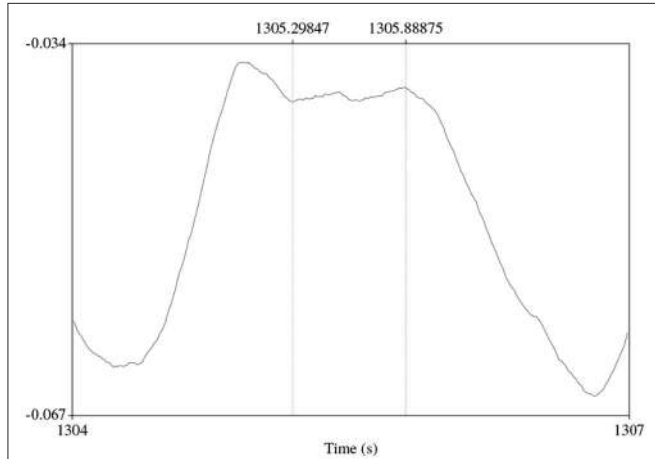


FIGURE 8 | An abandoned initiation candidate: a silent cycle with a respiratory hold (indicated by vertical lines) in the top part of the exhalatory phase.

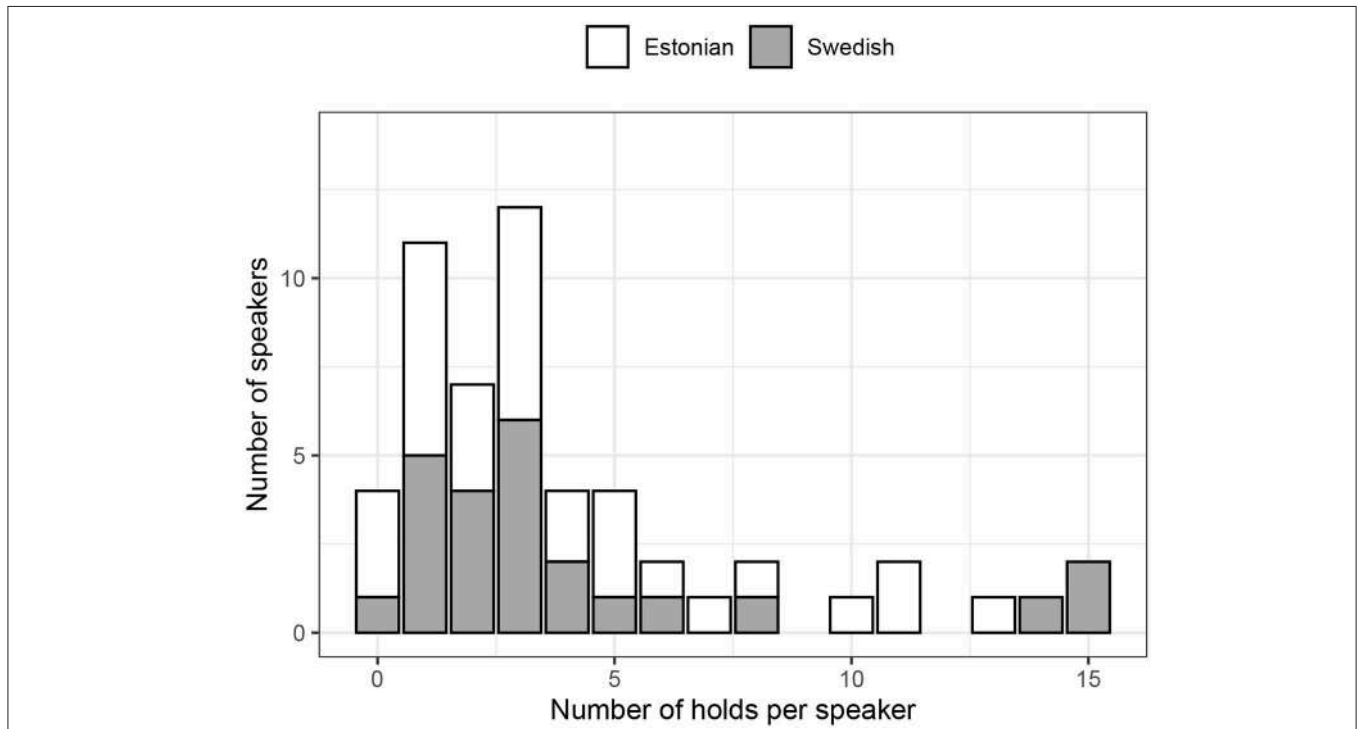


FIGURE 9 | Distribution of silent holds in the top 20% of the exhalation amplitude across speakers and languages. The reader is reminded that each conversation took approximately 20 min.

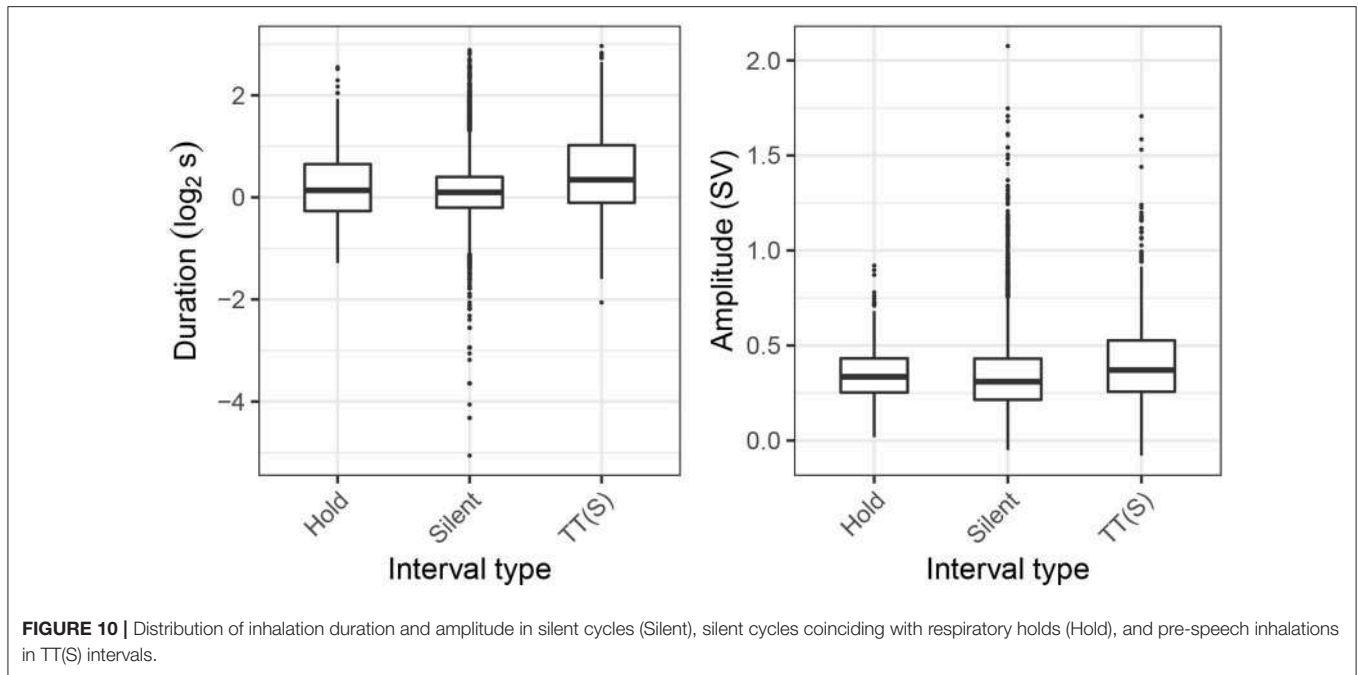
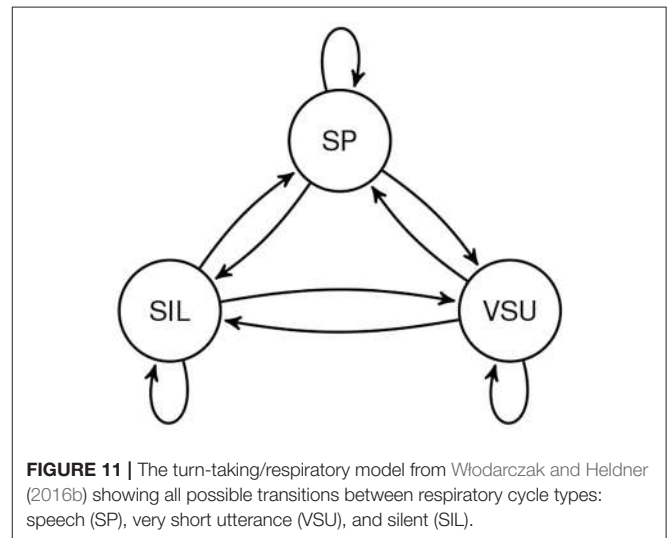


TABLE 5 | Coefficients of the inhalatory model for Silent, Hold, and TT(S) intervals.

		B	exp(B)	95% CI		p
				LL	UL	
Silent	Intercept	3.46	31.67	3.18	3.73	0.00
	Amplitude	-0.26	0.77	-0.97	0.45	0.47
	Duration	-0.23	0.80	-0.44	-0.02	0.03
TT(S)	Intercept	0.19	1.21	-0.13	0.51	0.25
	Amplitude	0.94	2.55	0.14	1.73	0.02
	Duration	0.37	1.45	0.12	0.62	0.00

$R^2 = 0.03$ (McFadden), model $\chi^2_{(6)} = 144.86$, $p < 0.01$.
The reference category is Hold.

In addition to respiratory patterns in the vicinity of speech, we also investigated occurrences of breath holds in silent cycles with a view to identifying abandoned attempts at taking a turn. Indeed, recent evidence (Aare et al., 2020) suggests that breath holds might be useful for spotting other hidden phenomena such as transitions between chat and chunk phases in casual conversation (Slade, 2007). Overall, the distribution of breath holds exhibited two peaks, toward the beginning and the end of the silent exhalations. This observation is in line with the results reported in Aare et al. (2019), based on manually labeled breath holds in the Estonian subset of the present data. Subsequently, we focused on silent cycles with breath holds early in the exhalation as potential abandoned attempts at taking the turn and compared the properties of the preceding inhalation with those found in other silent cycles and in (realized) turn initiations. While some significant differences were found, the effects were very small and the overall fit of the model poor. At the same time, the



difference between the latter two categories was also minor¹⁰. In addition, we claim the very presence of a respiratory hold coinciding with a silent breathing cycle can be interpreted as a strong indication that the participant was preparing to produce speech. Additionally, if these cycles are used as a signal that an interlocutor is keen to take the conversational floor, it is

¹⁰Somewhat surprisingly, unlike Ishii et al. (2016), in this work we were unable to find evidence for substantial differences in inhalation amplitude between the analyzed categories. Whether this might be an result of the character of our data or the analysis method used is unclear. It should also be noted that Ishii et al. (2016) used only a single (abdomen) belt and consequently their volume-related estimates might be unreliable.

also possible that they are rendered perceptually prominent by increasing loudness of the inhalation (cf. Włodarczak and Heldner, 2016a, 2017; Trouvain et al., 2020), for instance by producing a narrower constriction in the vocal tract.

In conclusion, the present work has made several non-trivial contributions to its field of study. First, the paper provides a comprehensive overview of respiratory patterns employed in management of casual conversations, including dimensions which have so far been largely overlooked, such as breath holds, exhalations, and presence of overlapping speech. Second, the analyses were based on a larger amount of material than used in most previous studies of respiratory turn-taking cues, collected with a custom built RIP system using two belts for estimation of lung volume change. Third, we used a pipeline for automatic analysis of respiratory signals with only minimal manual adjustments. Given that we were able to reproduce many of the earlier findings reported in literature, this suggests that the method used in this study, as well as the RespInPeace toolkit developed by the first author, is a promising way of analysing respiratory RIP signals. Fourth, we proposed an extended classification of interactional events which involves longer sequences than just transitions between interlocutors' adjacent talkspurts and which incorporates respiratory information (presence of inhalation in the previous speaker) for getting closer to competitive/non-competitive speaker changes without the need for an explicit analysis of interlocutors' communicative intentions. Fifth, using these categories, we were able to shed light on *hidden events* in conversations whose identification otherwise requires time-intensive manual analysis of speech content, possibly in connection with other non-verbal cues such as posture shifts, gaze patterns etc.

To the best of our knowledge, this is the first study which attempted to identify unrealized turn-taking intentions using a fully automatic method. By comparing breathing features of hidden event candidates with their overt counterparts (e.g., pause interruptions, i.e., intended pauses within an ongoing turn, with actual within-speaker intervals) we hope to have shown that inclusion of additional data streams can be helpful for this task and we are looking forward to seeing other multimodal data (e.g., gaze) being used for this purpose. At the same time, even though this method provides support to the hypothesized character of the identified events, an independent qualitative investigation of their pragmatic function is certainly warranted, including the question as to whether the identified patterns are actually used by conversation partners for turn-management. Furthermore, analysing patterns of respiratory holds in the vicinity of overlapping speech might be useful for solving the thorny problem of discriminating between collaborative and competitive overlaps (Kurtić et al., 2013; Kurtić and Gorisch, 2018). Notably, prediction and identification of hidden events is crucial for designing of conversational agents capable of human-like turn-taking behavior. Such systems should be able to detect that, for example, the user is about to start speaking or is going to continue their turn after a brief turn-internal

silence. The results presented in this work are only a step in this direction. The growing availability of remote breathing sensors, mentioned in section 1, as well as results indicating that visualization of breathing is an important part of embodiment in machine interfaces (Watanabe et al., 2004) suggest that breathing might indeed be helpful for designing truly sociable interaction technology.

In future work, we are planning to investigate prosodic characteristics in the vicinity of the hidden-events identified in this study. In addition, we are conducting an EEG study of preparatory markers of turn-taking (including failed starts), using a hyperscanning paradigm including several conversational partners in parallel. The results will allow evaluating and augmenting the neural evidence for speech planning in conversation (Bögels et al., 2015), which has been based so far on partly controlled experiments, in a fully interactive context.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: <https://doi.org/10.5281/zenodo.4054803>.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

MW and MH: conception and design of the work, acquisition, analysis, and interpretation of the data, drafting the work, and final approval of the version to be published. All authors contributed to the article and approved the submitted version.

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Loss, Doubt, and Betrayal: Strands of Vaccination Skepticism on Three Facebook Pages Involved in the Controversy Over Human Papillomavirus (HPV) Vaccination

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This study conducted a discourse analysis of posts, comments, and contextual material on three Danish Facebook Pages, all established because of social groups' skepticism of human papillomavirus (HPV) vaccination. The researchers of this study accessed most administrator posts and visitors' comments, and pursued additional information through links provided on the Pages, supplementary media coverage, and available knowledge about the development of the controversy over HPV vaccination in Denmark. Using the discourse analysis framework, discourses of loss, doubt, and betrayal were identified. Associating important existential, propositional, and value assumptions affiliated with HPV vaccination, these three interconnected discourses embody important strands of vaccination skepticism. The loss discourse emerged from the personal stories about losing one's mobility or quality of life, which then mobilized expressions of sympathy and a genuine wish that things would improve. The doubt discourse was affiliated with posts and comments questioning the evidence behind HPV vaccination. Administrators and visitors doubted the information provided by the health authorities for many reasons. Some were skeptical of the epistemic value of studies showing HPV vaccination to be safe, and others simply did not trust the health authorities for sound medical advice. Finally, the betrayal discourse underlying the HPV vaccination skepticism was connected to statements that accused the health authorities of betraying all those who have experienced personal loss in relation to HPV vaccination. This discourse established a difference between "us" and "them." The "we" indicated all those afflicted by suspected adverse events, and all those taking a critical stance on HPV vaccination. The "they" were all those in favor of HPV vaccination, particularly the health authorities, pharmaceutical companies, and the Danish Cancer Society. Based on the study findings, it can be concluded that HPV vaccination skepticism is mediated through discourses that are personal, epistemological, social, or political, and value-laden in nature. Dealing with one of these dimensions alone, for example treating HPV vaccination skepticism as an information deficit or as a partisan issue, may risk missing the point entirely.

Keywords: HPV vaccination, Facebook pages, Denmark, vaccine skepticism, discourse analysis

INTRODUCTION

Human papillomavirus (HPV) is a group of common viruses mainly transmitted through sexual contact, some of which are known to cause cancer. The first HPV vaccine, marketed by Merck & Co. under the trade name Gardasil[®], became available in 2006, followed the year after by another HPV vaccine, Cervarix[®], developed and manufactured by GlaxoSmithKline. With the availability of two vaccines, many countries implemented publicly funded HPV vaccination, typically as part of their existing national immunization programs, including vaccine safety monitoring schemes. However, some countries have also witnessed the rise of HPV vaccination skepticism related to the fear of increased promiscuity and/or suspected adverse effects following HPV vaccination. In Denmark, skepticism seemed to have revolved mainly around issues of vaccination safety and effectiveness. The HPV vaccination skepticism has attracted public attention in traditional news media and on social media, and is associated with low acceptance or uptake of HPV vaccination by parents who need to consent to the vaccination of adolescents (Suppli et al., 2018; Hansen et al., 2020).

This study aims to understand vaccination skepticism afforded by three Danish Facebook Pages (henceforth Pages) dedicated to providing a forum to voice skepticism about HPV vaccination (see introduction to the three Pages below). Facebook today is a major outlet for global conversations about health, allowing for public and private conversations about complex health issues such as vaccinations and debates surrounding those. Facebook is the most popular social media site among the Danes, with around 77% of all Internet users having a Facebook profile in 2019 (Slots- og Kulturstyrelsen, 2020). During the controversy over HPV vaccination that emerged in late 2012 and early 2013, major health organizations in Denmark and the Danish health authorities saw Facebook as the most important outlet for HPV vaccination skepticism.

We, too, see Pages as an important part of the communication environment that orients individuals as they make up their mind about HPV vaccination (Kahan, 2017). It is important to understand that Pages are distinct from other Facebook features, such as Profiles and Groups. Pages serve as the public profile of a single person, group, organization, business, and public authority, to mention a few. Anyone with a Facebook profile can create a Page, and thus become the first Page administrator (Admin). Admins can assign roles, such as Editor or Moderator, to other users, but only Admins and Editors can create posts. Moderators can respond to and delete comments and posts on the Page. Everyone on Facebook can like or follow Pages, and visitors to Pages can write comments or post reactions.

As the controversy over HPV vaccination grew stronger in force, many actors, institutions, and the media became involved, and they all interacted in complex ways. In Denmark, the three Pages dedicated to HPV vaccination skepticism could have served as mediators between the public debate in the traditional news media, the specific agendas of Admins, Editors, and Moderators (henceforth Admins for short), and the visitors' individual concerns. Posts on Pages that address issues in the public debate

often refer to media coverage from the point of view of the Admins, whereas comments and reactions allow visitors to state their subjective views, or tell their own story if the Admins approve. In a previous study, we conducted a content analysis of selected posts published by the Admins. We found that they focused on suspected adverse events and the alleged failure of the health care system to respond adequately to the afflicted girls and to acknowledge the risks associated with HPV vaccination. To construct their central message that the authorities were too eager in their endorsement of HPV vaccination, the Admins assembled media coverage with personal narratives, scientific information, political assertions, and more (Agergaard et al., 2020).

In this study, we aim to survey prevalent discourses in posts and visitors' comments. Discourses are relatively durable structures of meaning that emerge in social interactions, such as the ones that have taken place on the Pages dedicated to critical debate about vaccination that we study (Fairclough's, 2003). Discourse analysis, moreover, entails the establishment of connections between patterns of meaning-making in specific forums and the wider social context. Obviously, the three Pages that we study function within a much larger communication environment. They are, in Fairclough's (2003) terminology, "intertextual." We attended to different kinds of recurring assumptions about HPV vaccination found in posts, visitors' comments, and intertextual elements to answer our central research question:

- RQ: What are the overarching discourses on the three Pages dedicated to skepticism about HPV vaccination?

BACKGROUND

Vaccination Skepticism and Social Media

Anti-vaccination attitudes or vaccination skepticism have caused concerns that the vocal few perpetuating misinformation online may cause collapsing the global vaccination rates (Vanderslott, 2019). Following Browne (2018), vaccination skepticism can be understood as an attitudinal continuum that captures different degrees of doubts regarding the safety, efficiency, necessity, and general advisability of vaccination. Overt opposition to vaccination in general belongs to the extreme end of the spectrum. Vaccination skepticism is not a new phenomenon, but the spread of the Internet has made all kinds of information and debates about vaccination much more accessible. Social media affords billions of users the opportunity to access health information and to interact socially around health issues. There seems to be an online competition between pro- and anti-vaccination views as well as a tendency for users to select information that confirms prior beliefs (Schmidt et al., 2018; Johnson et al., 2020). Recently, health researchers, medical professionals, and health care authorities have worried about the spread of all sorts of vaccination information online and the potential threat it represents to global health (Larson, 2018; Burki, 2019; Ghebreyesus, 2019).

Researchers from many different fields have taken an interest in online vaccination skepticism. Early studies tended to focus on

static content published on homepages and blogs (Wolfe et al., 2002; Bean, 2011; Kata, 2012; Moran et al., 2016). With the increased popularity of social media, research to an increasing degree seemed to have turned to social media sites such as Twitter (Tomeny et al., 2017), YouTube (Yiannakoulis et al., 2019), Instagram (Basch and MacLean, 2019), and Pinterest (Guidry et al., 2015). Content analysis is one of the most prevalent methods used, but researchers have also used issue mapping to connect anti-vaccination content to user interaction patterns on Facebook (Smith and Graham, 2019). People and topics tend to cluster around shared opinions and underlying assumptions about safety, effectiveness, and responsibility of vaccination (Hoffman et al., 2019). For example, Ma and Stahl (Ma and Stahl, 2017) performed a multimodal critical discourse analysis of anti-vaccination information on a public Facebook group to find that the group preferred sentimental content to scientific research and statistical evidence.

Studies such as these are important to advance our knowledge about content, sentiments, and patterns of interaction that define online vaccination skepticism. Many studies evoke the idea of an anti-vaccination movement, yet the sum of what we know seems to be that vaccination skepticism takes many different forms, and tends to be highly contextual. We find support in Ortiz et al. (2019) systematic review of social media content about HPV vaccination, which showed a wide variety of content and content producers. Cluster analysis may reveal overall patterns, but if we examine closely what occurs in specific social media or online groups, the whole notion of a coherent and collective “movement” around shared beliefs and attitudes appears problematic.

Contributions from ethnography, rhetoric, and medical humanities that approach vaccination skepticism from a situated point of view corroborate this point. Leach and Fairhead (2007) talked about “vaccine anxiety” to capture parents’ (mostly mothers’) fraught decisions to have their children vaccinated or not—decisions that required careful and individual weighing of personal, social, political, and scientific arguments. Similarly, Carrion (2018) explored “maternal epistemology” as the personal balance achieved between scientific expertise and maternal experience in making up one’s mind about vaccination. The mothers in these two studies were not “anti-vax,” anti-science, or ignorant about vaccination, but people with genuine concerns, which they felt were not being fully addressed by the health care system.

Hausman (2019) rhetorical analysis of the public debate over vaccination in the United States questions the whole idea of an anti-vaccination movement as a media construct, and a straw man for those who think that there is a direct link between scientific evidence and human behavior. Using a similar approach, Lawrence (2020) also demonstrates the complexity of vaccination skepticism, and argues for the need for more nuanced public discourse. We should stop treating anti-vaccination as a national or even global issue, but approach it at the local level to understand “the contextualized nature of vaccination decisions” (Lawrence et al., 2014, p. 111; see also Reich, 2016).

Moreover, Ward (2016) study of the controversy over swine flu vaccination in France showed that individuals and groups

rarely mobilize against vaccination as such, but tend to focus on specific problems associated with specific vaccines, specific vaccination campaigns, and/or broader cultural or political issues. What characterizes vaccination skepticism and ultimately vaccination controversies tend to differ between different geographical and temporal contexts and the vaccine(s) at issue. Ward et al. (2016, p. 1,926) recommends that analysts “pay closer attention to what distinguishes the different strands of vaccine criticism regarding both what they dislike about vaccines (or about a given vaccine), and how this issue is integrated in a more general political or cultural cause.”

Social media is a set of platforms owned by large multinational corporations that often emphasize the use of their platforms for global conversations and global connectivity. However, significantly, social media is shaped by content providers and users at the local level who all have their own goals and all belong to specific cultural settings (Miller, 2016). Studying strands of vaccination skepticism on social media platforms, therefore, is a way to explore vaccination skepticism in national and local contexts, and thus to find out what is at stake regarding specific vaccines in specific circumstances (Ward et al., 2015; see for example, Okuhara et al., 2018; Orr and Baram-Tsabari, 2018). In the following paragraphs, we first provide a global outlook on HPV vaccination followed by a presentation of the Danish controversy over HPV vaccination. We emphasize the importance of taking a contextual approach to HPV vaccination skepticism.

A Global Outlook on Attitudes and Behaviors Relating to HPV Vaccination

Attitudes and behaviors related to vaccination are complex and context-dependent. The WHO advisory group on vaccination emphasized that personal, social, and practical issues may affect vaccination rates (WHO, 2020): what people think and feel, social norms, and technological affordances that impact conduct and communication, availability of vaccines, inconveniences in accessing vaccines, and much more. The Wellcome Global Monitor 2018 (Gallop, 2019) surveyed over 140,000 people in 144 countries to find that higher degrees of vaccination skepticism, specifically concerns over safety, more typically appeared in high-income regions compared to low-income regions, although there were significant national variations in this pattern. The level of education also influenced perceptions of vaccine safety differently in different regions. In Northern Europe and Northern America, people with higher levels of science education were more likely to agree that vaccines are safe, whereas in Eastern Europe, Central Africa, and Southern Africa, the opposite was true.

Some studies of national or local communication environments have identified social, moral, and/or political issues that have influenced public attitudes and behavior toward HPV vaccination. For example, concerns about sexuality and gender have been marked in a few countries, most notably in the United States, where attitudes were also found to be politically polarized (Kahan et al., 2010; Fowler et al., 2012; Casciotti et al., 2014; Gollust et al., 2016; Daley et al., 2017). Later, Beavis et al. (2018), using the 2010–2016 annual vaccine monitoring surveys

conducted by the Centers for Disease Control and Prevention in the United States, found that parents chose not to have their children vaccinated because of safety concerns, lack of necessity, and lack of knowledge about the potential health consequences of HPV.

In most other countries, public controversies over HPV vaccination have revolved around the safety and effectiveness of HPV vaccination. The Japanese HPV vaccination crisis, for example, followed sensational news stories about a cluster of adverse events suspected to be linked to HPV vaccination. The government subsequently suspended its recommendation of the national HPV immunization program, and the vaccination rate dropped to nearly 0% (Tsuda et al., 2016; Okuhara et al., 2018). Ireland also experienced a decline in national HPV vaccination rates, which were linked to widespread concerns over suspected adverse events reported in the press, on social media, and in a TV documentary aired in December 2015 (Corcoran et al., 2018; Mynthen and Sørensen, 2019). The same story can be told for countries such as Romania, France, and Denmark (Fagot et al., 2011; Penta and Baban, 2014; Suppli et al., 2018), but not for Australia, which seems set to be the first country to completely eliminate cervical cancer (Hall et al., 2019). Germany, Italy, Norway, the United Kingdom, and, in fact, most high-income countries for various reasons report less-than-adequate HPV vaccination uptake; yet, globally, national income level remains a strong determinant for HPV vaccination acceptance and uptake (Bruni et al., 2016).

The Danish Debate Over HPV Vaccination

In 2008, the Danish Parliament (Folketinget), following the advice of the Danish Health Authority (Sundhedsstyrelsen), introduced HPV vaccination into the Danish childhood immunization program. The process leading up to the decision involved a 2007 medical technology assessment report produced by an interdisciplinary team (Sundhedsstyrelsen, 2007). The report emphasized cervical cancer risk prevention as the main reason for introducing HPV vaccination. It estimated that successful implementation of HPV vaccination could prevent ~70% of all cases of cervical cancer, which led to approximately 175 deaths annually in Denmark. By January 1, 2009, the quadrivalent HPV vaccine Gardasil® was freely available to girls aged 12 years (cohorts born in 1996 or later). In addition, HPV vaccination was offered to girls aged 13–16 years (cohort born 1993–96) in a catch-up campaign.

The HPV vaccination initially received favorable press coverage, and the vaccination rate was high compared to other developed countries (European Centre for Disease Prevention Control, 2012). Then, in 2013 and again in 2015, critical stories about HPV vaccination began to emerge (Smith, 2018). Journalists reported on general physicians, named as well as unnamed, who openly recommended HPV vaccination, but also received payments from two pharmaceutical companies producing HPV vaccines, namely Safino Pasteur (through their joint venture vaccines operation with Merck & Co.) and GlaxoSmithKline. In addition, stories about suspected adverse events, reported by some of the girls who had received vaccination, began to appear from April 2013 onwards.

On March 26, 2015, TV 2, a national public broadcasting service of Denmark, aired a documentary about suspected adverse events following HPV vaccination. The documentary called “The Vaccinated Girls – Sick and Betrayed,” attracted almost 500,000 viewers, which is a substantial share for a small country like Denmark with just 5.7 million inhabitants as of 2015. The documentary and subsequent news stories on TV 2 focused on a group of named Danish girls, 47 in total, who all reported symptoms that are normally associated with postural orthostatic tachycardia syndrome (POTS) or complex regional pain syndrome (CRPS). All the girls claimed that their symptoms began or significantly worsened after HPV vaccination.

Reports about adverse events dominated the Danish media coverage of HPV vaccination throughout 2015 (Smith, 2018). In November 2015, the European Medicines Agency published a review of HPV vaccination and suspected adverse events. The review, produced at the request of the Danish Health Authority, concluded that the available evidence did not support the conclusion that POTS and CRPS are caused by HPV vaccination (European Medicines Agency, 2015). The debate over vaccination safety, however, persisted, and vaccination rates continued to decrease. Statistics produced by the State Serum Institute (Statens Serum Institut, SSI) in early 2017 showed that by 2016, only 54% of the 2002 cohort (due to HPV vaccination in 2015) and only 29% of the 2003 cohort (2016) had completed the full dose HPV vaccination schedule (Statens Serum Institut, 2017).

In response to what was perceived as a national crisis, the Danish Health Authority with the Danish Cancer Society (Kræftens Bekæmpelse) and the Danish Medicines Agency (Lægemiddelstyrelsen) in May 2017 launched a campaign under the heading “Stop HPV, stop cervical cancer” (in Danish, “Stop HPV, stop livmoderhalskræft”). Around the same time, there was a change in media coverage (Smith, 2018). Most news articles reported favorably on the “Stop HPV” campaign, recommending the effort to do something about the decline in the HPV vaccination rate. Some journalists took a critical stance on the media’s coverage of HPV vaccination, and criticized TV 2 for their 2015 documentary, although the documentary previously had been nominated for the Cavling Prize, a prestigious Danish journalism award (Lynard, 2018). Vaccination rates began to rise in 2017, and the trend continued in 2018 (Statens Serum Institut, 2019).

The “Stop HPV” campaign was based on a general concern about the spread of misinformation, particularly on social media. Søren Brostrøm, Director of the Danish Health Authority, worried that the Internet and social media spawned post-factual tendencies skewing the debate about HPV vaccination. Brostrøm said: “When I look into my crystal ball to see the future of health services, I clearly see the post-factual society as one of the biggest challenges we face right now. You should not underestimate how big a challenge this is. It worries me.” (Rasmussen, 2017, authors’ translation).

References to the post-factual condition pervaded the public discussion about what is wrong with the HPV controversy. The notion of post-factual was closely linked to the idea that the social media spread sentimental and counter-factual information,

which led to the decline in HPV vaccination uptake (Andersen, 2017). Facebook, the most widely used social media platform in Denmark, was depicted as one of the main sources of (mis)information. “Much of the debate about the HPV vaccine takes place on Facebook, and this is where many parents get their information,” explained Louise Hougaard Jakobsen, consultant to the Danish Cancer Society (quoted in WHO, 2018). The “Stop HPV” campaign, therefore, had to be particularly visible on social media such as YouTube and Facebook to counter post-factual tendencies.

MATERIALS AND METHODS

Sampling

We aim to study the strands of criticism related to HPV vaccination on selected Pages in Denmark. To narrow our object of study, we identified in the following way what we believe are the three most prominent Pages that have been vocal in the debate over HPV vaccination. First, we typed in simple keywords, “hpv” and “hpv adverse event*” (in Danish, “hpv bivirkning”), and browsed the results for Pages that would meet both of the following two criteria:

- Primary subject matter is HPV vaccination (treatment of other vaccines or vaccination in general should be secondary to HPV vaccination).
- Skepticism to HPV vaccination is the dominant attitude.

We located several relevant Pages that failed on one of the two criteria. The “Stop HPV” Campaign mentioned above certainly has HPV vaccination as its primary subject matter, but Admins mainly post messages aimed to counter skepticism about HPV vaccination. Another Page, “Make HPV vaccination free to ALL citizens” (authors’ translation of “Gratis HPV-Vaccine til ALLE statsborgere”), criticized the government’s original decision to limit the HPV vaccination scheme to girls of a certain age group, but the Page in general was very positive about HPV vaccination. Finally, we excluded Pages such as “Vaccination Forum” (authors’ translation of “VaccinationsForum”) that featured skeptical views about vaccination in general, but did not specifically focus their skepticism on HPV vaccination.

We were able to identify only three Pages that met both criteria. Apart from these, we also identified some groups that seemed to apply to both criteria. All, except for one, were closed groups, meaning that access to the content could only be granted if Admins allowed. To respect the privacy of the visitors, we excluded the closed groups. As this left us with only one additional group, we decided to exclude this one as well to keep the data material as simple as possible by focusing on Pages only.

The three Pages that we identified were all created by Danish groups, or organizations that emerged during the early days of the HPV controversy. All the three Pages focus exclusively on HPV vaccination, and all call for a skeptical attitude toward HPV vaccination. However, the skeptical views offered are diverse. In the following paragraphs, we first describe the three Pages, that is, our sources, and the three social groups or organizations that administer them. We then proceed to describe in detail how we have made sense of the diversity of the three Pages’ skeptical posts

and comments. For the sake of simplicity, we refer to the three groups as Groups A, B, and C, and to their Pages as Page A, B, and C, respectively.

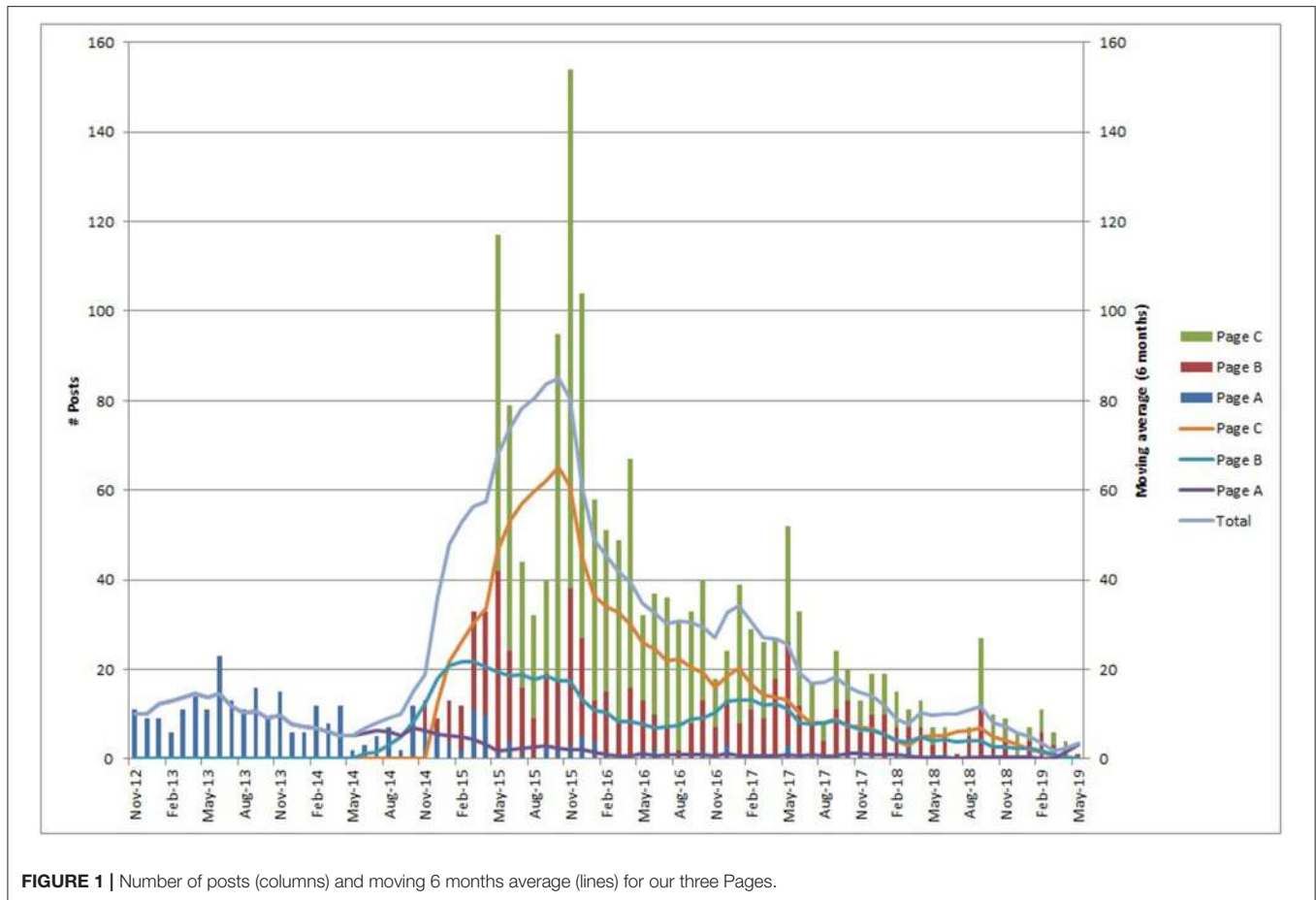
Sources

We accessed the three Pages in May 2019. We collected information about the number of all Admin posts from the Pages’ respective launch date up until May 2019 (see **Figure 1**). In a previous study, we coded around one-third of the posts using quantitative content analysis. The results have been reported elsewhere, enabling us to discern differences between the Pages as well as prevalent topics and means of communication on the three Pages (Agergaard et al., 2020). We found that the three Pages’ Admins and Editors assembled many different sources—media reports, personal narratives, scientific information, political assertions, and more—to construct their central message about HPV vaccination. They were all skeptical of the way in which the Danish health authorities responded to the legitimate concerns over the safety of HPV vaccination and to the demands for proper treatment voiced by the girls afflicted, their families, and many others. We also found that the posts were highly contextual in nature as they remained closely related to actors, events, and opinions in the unfolding Danish controversy. Despite their common cause, the three Pages also differed significantly.

Page A belongs to Group A, known as “HPV Vaccine Info—Fighting for Just Information about the HPV Vaccine” (authors’ translation of “HPV Vaccine Info—Til Kamp for Retfærdig Oplysning om HPV-vaccinen”). The group consists of an unknown number of “passionate writers” (HPV Vaccine Info, 2020, authors’ translation). The group emerged due to alleged censorship on behalf of the Danish Cancer Society, which did not allow skeptical views about HPV vaccination on its Facebook Page. Group A accuses the Society of manipulation of facts about HPV vaccination, arguing that the Society intentionally and systematically disregards critical information about the lack of effect of HPV vaccination and the high rates of adverse events. Group A also suggests that the Society has conflicts of interests, and will not allow information that could “impact the revenue of the Society’s business partners in the pharmaceutical industry” (HPV Vaccine Info, 2020, authors’ translation).

Group A launched Page A in November 2012. In June 2013, activity on Page A peaked at 23 posts. Since May 2015, the number of posts per month has remained below six, and months have gone by with no posts at all. We last accessed Page A in May 2019, where it was still moderately active, and had about 5,900 likes. Posts on Page A most frequently announced new articles on Group A’s homepage, which typically discusses suspected adverse events following HPV vaccination and alleged conflicts of interests between main stakeholders such as public authorities, patient organizations, and pharmaceutical companies.

Group B and C, respectively, are “HPV Update” and “The National Association for Those Afflicted by HPV Adverse Events” (authors’ translation of “HPV update” and “Landsforeningen HPV-Bivirkningsramte”). In contrast to Group A, they were both established by family members for patients who suspected HPV vaccination to have led to adverse events. In early



2015, Group B gained recognition as a special group under the Danish Association of the Physically Disabled (Dansk Handicapforbund), a Danish NGO working to ensure rights and accessibility for all persons with physical disabilities (HPV-update, 2020). Group C remained independently associated (Landsforeningen HPV Bivirkningsramte, 2020). Both the groups disseminate information about HPV vaccination and its suspected adverse events to patients, their relatives, and the public.

Group B launched its Page in November 2014. Page B activity peaked in May 2015 with 41 administrator posts. When we last accessed Page B in May 2019, it had about 1,700 likes, and administrator posts appeared regularly. Posts on Page B usually spoke out about the difficult position that the girls afflicted with suspected adverse events found themselves in, trying to ensure that they were heard in the debate. Page B became a mouthpiece for the political and epistemological representation of the community around the girls.

Group C launched its Page in May 2015. Page C was by far the most active of the three Pages studied. Activity peaked in November 2015 with 116 posts. Although the activity level has dropped significantly since then, the Page was still active till May 2019 with about 8,100 likes. Posts on Page C, like those on Page B, focused on the girls afflicted with suspected adverse events.

Page C also served for community-building purposes by sharing personal content such as narratives and images. Posts on Page C emphasized that the “afflicted” community deserved recognition and respect.

Data

For the present study, we accessed all the posts and comments on the three Pages. We carefully read as many posts and comments as necessary to identify what we considered as stable semantic discourses through a process of saturation: discourses were considered stable when we were unable to locate posts and comments that would allow us to develop new assumptions and thereby new discourses (see section below).

We also accessed information about the pertinent social context. This entailed a lot of reading “beyond” the material provided on the Pages. We systematically tried to access contextual information about public actors and events mentioned in the posts and comments. Out of ethical concerns (see below), we did not pursue more information about any individuals mentioned. We followed the links provided in the posts and comments, and we consulted relevant media coverage using Infomedia, the leading Danish provider of full-text electronic articles from all Danish newspapers, broadcast media, and online media.

To follow the Pages chronologically, we also placed posts and comments on the controversy's timeline as indicated by the number of posts in **Figure 1** and the amount of media coverage provided by Suppli et al. (2018). The posts and comments in correlation with contextual data allowed us to proceed with the discourse analysis.

Discourse Analysis

Using posts, comments, and contextual data, we performed a discourse analysis of the material. According to Fairclough (Fairclough's, 2003), discourse refers to the relatively durable semantic structures of language that form a part of the relatively durable social structures and relations. We focused our discourse analysis on the range of recurring meanings that we were able to locate in our corpus of posts and comments on the three Pages. We also attempted to interpret these meanings in relation to what we know about the groups and organizations behind the Pages and in relation to the key actors and events in the wider social context. In doing so, we relied on Fairclough's (2003) concepts of underlying assumptions and intertextuality as tools to connect posts and comments to the larger communication environment.

Following Fairclough's (2003), we sought to identify discourses that hold assumptions about what exists (existential assumptions), what is or can be or will be the case (propositional assumptions), and what is good or desirable (value assumptions). We operationalized our discourse analysis in the following way. In our data, we first identified the existential assumptions in the statements referring to personal experiences with HPV vaccination, one's own or others', the existence of which should be taken for granted. We then identified the propositional assumptions in the statements that are concerned with assessing possible future developments in relation to HPV vaccination, that is, statements that are more political in nature. Finally, we identified value assumptions in the statements that emphasize social relations (including parent-child relations) defined or affected by HPV vaccination, and the values that such relations imply. We discussed all the assumptions identified in this way, and then gradually articulated and adjusted in a recursive manner that we agreed were the most important and meaningful assumptions until we reached a point of saturation.

We grouped all assumptions into overarching discourses, broad enough to accommodate existential, propositional, and value assumptions. This was probably the hardest part of the discourse analysis. Several iterative processes of definition, description, and discussion are required. For each set of assumptions, we identified several exemplary posts and/or comments. We sought to define discourses that would not only apply to our examples, but also make meaning for many more posts and comments.

As mentioned, the proliferation of discourses takes place in a communicative environment, which is potentially relevant for the configuration of meaningful discourses. We paid particular attention to intertextuality by identifying connections from our Pages' comments to other means of communication, such as the news media or information on HPV vaccination provided by the health authorities. Following Fairclough's (2003), we approached intertextuality as a way of producing difference

and/or dialogue. Differentiating, that is, using language to mark a difference, is a semantic tool essential to the construction of meaning. Establishing dialogue means the inclusion of other voices through direct, indirect, implicit, or even absent reference. All discourses have their blind spots, and it is important that we as discourse analysts look at what is being said, but also at what is not being said.

We operationalized the notion of intertextuality as follows: for each of our discourses, we would identify several intertextual elements such as links, images, stories, and/or videos. These elements were located in posts and/or comments. We assessed the intertextual elements as integral to our discourses, which meant that they would support the meaning built into the underlying assumptions.

Data Ethics

By default, Pages are visible to anyone on the Internet. The data used in this study are publicly available, and we did not collect personal data on individuals. Public accessibility, however, is not an excuse to ignore ethical assessments of using social media data. Even in a public forum like Pages, there is a reasonable and valuable expectation of privacy on behalf of social media users and visitors (Zimmer, 2010; Nissenbaum, 2011). Following Townsend and Wallace (2016), we took steps to protect the anonymity of the Pages' visitors by paraphrasing rather than quoting comments with potentially vulnerable information, such as details about visitors' health condition. Furthermore, we omitted all personal information that could be used to identify individual visitors both in this article and in our datasets. We made no attempts to seek information about the named individuals encountered (except for public actors such as politicians, researchers, etc.) beyond the Pages that we studied.

RESULTS

We were able to identify three overarching discourses of HPV vaccination skepticism: loss, doubt, and betrayal. Before we present our results about each of these in turn, we will try to clarify the underlying basis of the three discourses in terms of existential, propositional, and value assumptions.

We classified the following observations as existential assumptions about HPV vaccination: what had happened to some girls just after HPV vaccination; close ties between the health care providers and the pharmaceutical companies; and the systematic failures of the health care system and the political actors leading to the exclusion of critical discussion or outright skepticism. Reports about what was commonly referred to as the "afflicted" girls were often narrative accounts about individuals, often named girls, and they occurred in both the Admin posts and visitors' comments. The stories all confirmed that these girls had been struck by an "affliction" changing their lives for the worse. The HPV vaccination was most often depicted as a crucial turning point in the narrative, and the health care system failed to acknowledge the affliction. Moreover, the health care system was often depicted as being immune to criticism,

and all people expressing skepticism regarding HPV vaccination were marginalized.

Propositional assumptions included statements about the potential outcome of individual and institutional decision-making processes. At the individual level, such assumptions were often tied to the narratives of afflicted girls and the question of how parents would make decisions about HPV vaccination. Some Admin posts and visitor comments expressed worry that the available knowledge and advice were insufficient, implying that the established means of knowledge production and dissemination were lacking. At the institutional level, propositional assumptions were linked to broader problems in the health care system. The assumption that the health care system and, in particular, the health authorities could not be trusted, was a prevalent feature of many posts, comments, and intertextual elements. Two reasons, both of which were related to the two existential assumptions mentioned above, were given: first, there was an unsound alignment of interests between public health care providers and pharmaceutical companies; second, the health care system failed to provide due care to the afflicted girls.

In terms of value assumptions, we identified three different values. First, basic human values were important to posts and comments that expressed sympathy or compassion in relation to the afflicted girls. Trust in the narratives about afflicted girls was stipulated as a basic value, which then led to moral appraisal of the fundamental necessity for human relationships and dependencies for human existence. Second, epistemological values included the expression of doubts about certain kinds of expert advice and evidence. As Carrion (2018) observed in her study of mothers' arguments about vaccination, we found tensions between experts' and lay people's ways of knowing that seemed to promote a kind of standpoint epistemology: parents' intuitions about vaccination should be valued because they are intimately tied to the lifeworld of their children. Third, social value assumptions were established in posts, comments, and intertextual elements that made judgments about the proper functioning of the health care system. There was a broad consensus that the health care system had failed to provide proper treatment for afflicted girls, but focused too much on cancer treatment and the commercial interests of pharmaceutical companies.

The Discourse of Loss

The discourse of loss pertained to the many posts and user comments on the three Pages that addressed the lived experiences of the girls who reported feeling seriously ill after HPV vaccination. Posts and related comments reported on, but also referred to, other reports about individuals and often named girls, many of which originated from the news media. All the reports had one feature in common, namely the portrayal of HPV vaccination as a crucial turning point in the girls' lives. Admins or Editors posted news media reports with headlines such as the following: "Rebecca wanted to protect herself from cancer—crippled by the vaccine;" and "Simone was vaccinated against HPV: I feel pain every single day." At the heart, such reports dealt with the disabling loss of a good life as an existential condition.

Page A and Page C especially provided links to many first-hand reports from afflicted girls and their relatives. Some administrator posts contained lengthy quotations from private letters or posts from private Facebook accounts, reporting intimate stories about the consequences of personal loss. The intertextuality of the loss discourse, therefore, was not limited to the incorporation of news media on the Pages. One post on Page A shared a private Facebook status from a mother who reflected upon the moment when a homeopath told her that her daughter's symptoms had been caused by HPV vaccination. Suddenly, she said, her daughter's loss made sense. She added that HPV vaccination had made her daughter's life miserable.

The personal stories about losing one's abilities and quality of life also appeared in the visitors' comments—again on Page A and C in particular. One common denominator of such stories was an existential assumption stemming from bodily experienced events. At some point in time, the girls in question had lost physical and/or mental capabilities such as strength, energy, memory, or, in some cases, even mobility or vision. The experienced loss was real, and, therefore, had to have a real cause. "It is possible that HPV vaccination has caused my symptoms," one visitor said, after reporting on her newly emerged visual impairment, the diagnosis for which her physician had been unable to come up with. Such statements, we argue, related HPV vaccination to the experience of loss, but also to the process of making sense of the loss.

As indicated by the interrogative structure of the comment in this example and others, we noted that some visitors were careful not to make claims that affirmed HPV vaccination as a certain cause of their own or their family members' symptoms. Regardless of whether comments were committed to strict causality, we nevertheless found that all individual reports on adverse events reiterated the same temporal chain of events. In other words, all comments reporting on the girls' lived experiences shared the same narrative structure before and after HPV vaccination. All such comments associated the "before" with the bodily experience of being fit, active, and happy, whereas the "after" was rendered distinctively negative as a state of illness, dissolution, and sometimes even helplessness. In this temporal narrative elucidating chains of events, HPV vaccination demarcated the "before" and the "after." It was the narrative point of no return in the discourse of loss.

The discourse of loss consisted of individual reports on loss, but also included elements of shared social values and even proposals for political action. Recognizing and understanding loss thus became much more than an individual affair. Some of the stories about the afflicted girls connected loss to values of compassion and parenting. For example, comments included compassionate expressions in response to a post with a status update from a private Facebook profile, where a young woman told her story about the life she led before (happy and active) and after HPV vaccination (sick and frustrated). Visitors on Page C reacted to the post by calling it a sad, yet important message. One visitor stated that their heart was bleeding for anyone suffering badly.

Parenting values, such as care and responsibility, featured prominently in what we understand as the discourse of loss. Visitors who commented on the girls' and their parents' loss made

clear that the decision to be vaccinated against HPV infection was not a technical or a calculated decision, but a decision based on a heartfelt desire to do what is best for one's own daughter. Mothers (and the occasional father) expressed a pronounced sense of responsibility for making the decision in the first place and for dealing with what they identified as consequences. For example, we found several statements of parents who regretted having their daughter vaccinated, and who, therefore, instructed other parents to seek alternatives to HPV vaccination. We believe that such statements exhibit such values of responsibility. One visitor said that not a single day went by without her regretting having brought her daughter to the doctor to get the HPV vaccine. The same visitor carefully described her daughters' symptoms, recommending to others that they should rely on cervical screening rather than HPV vaccination to save their daughters from cervical cancer.

Individual responsibility, as also pointed out by Leach and Fairhead (2007), is closely connected to questions pertaining to the responsibilities of health authorities. Talking about what the authorities should and could do introduces a political element into the loss discourse. Typically, political issues made their way into the Pages that we studied through links to news stories posted by Admins and Editors. These posts provided an opportunity for visitors to comment on the ongoing debate about HPV vaccination, and some called for more action on behalf of the established health care system. In Page A's comment, a mother described her daughter's symptoms and her repeated attempts to cry out for help. She said that the family had been let down by their physician, the health authorities, and the government, concluding that something had to be done. Although the mother did not go into details about which political actions were needed, we would argue that the discourse of loss implies making personal experiences and shared social values political.

There are many things that are not included in the discourse of loss. We particularly note the limitations of the discourse of loss due to its narrative organization with a "before" and an "after" the point of no return aka the vaccination event. In such narratives, there is no before "before," nor an after the "after." In comments referring to the sick girls, all the girls lived good lives before HPV vaccination and bad (or at least worse) lives after. These two existential assumptions were never questioned. This may be due to the strong feelings of loss, compassion, care, and responsibility involved; the discourse of loss seemed to imply that the two states, before and after, were narrowly defined in terms of good and bad, respectively. We found no comments providing more nuanced information on the girls' condition. All the comments build on the assumption that the girls were doing fine before and much worse after HPV vaccination.

The Discourse of Doubt

Doubt lies at the heart of vaccination skepticism. We certainly found many doubts regarding the three Pages where Admins and visitors tried to assess HPV vaccination in the light of conflicting information from different sources. Some posts and comments, however, seemed to go beyond HPV vaccination. We found doubts that arose in connection to the three types of assumptions underlying discourses:

existential, propositional, and value assumptions. This indicates that the kind of vaccination-related doubt that informs vaccination skepticism should be seen in the context of more extensive doubts.

Some visitors' comments indicated just how difficult it was to assess and decide about HPV vaccination based on the wealth of information available, including the information that already appeared on the Pages. It often happened that the visitors addressed this decision-making process explicitly. For example, some visitors stated that the stories about the afflicted girls had led them to the decision of postponing their daughter's HPV vaccine until "they" had found out if HPV vaccination was really harmful or not, with the pronoun "they" often referring to the health care system as such. Other visitors' comments indicated that the conflicting information had caught them in a decision-making limbo, and some of them expressed their struggles in interrogative phrases like "what to do?"

The question raised pertains to individual decision-making, expressing propositional doubts about the right course of action. It also has social, even existential, ramifications. Positioning the health care system as "they" establishes an existential "we," which potentially includes everyone concerned about HPV vaccination. "They" provide decisive information on the safety and performance of HPV vaccination based on "their" objective evaluation of evidence. "We" assess that information, making sense of it in the context of "our" individual lives. This indicates that "we" all find ourselves in the same position, where it is necessary to process scientific assessment while having to engage in extended negotiations with friends, family, other parents, health professionals, and many others (see Leach and Fairhead, 2007; Lawrence et al., 2014). Here, these negotiations also seemed to involve strangers or near-strangers on Facebook.

Some users, on the other hand, explained how they had found ways to go about the propositional question of "what to do?." The solution was to build special kinds of trust relationships that stemmed from underlying value assumptions. If doubt feeds on complexity and uncertainty, trust should be a way to reduce complexity and uncertainty (Luhmann, 2017). This means that trust and doubt are not mutually exclusive, but often appear together in a codependent relationship. Some comments, in fact, seemed to address this entanglement of trust and doubt. One visitor on Page A said that she used her "gut feeling" to make the decision about whether to have her daughter vaccinated, even though her husband insisted that they should follow their physician's advice.

We see "gut feeling" as a way of expressing the complex interaction between trust and doubt in the face of uncertainties about HPV vaccination. Doubts emerged due to conflicting information, and gave rise to a kind of self-trust, namely "gut feeling." The stories about suspected adverse events only seemed to confirm what the visitor already knew, namely that the health care system had been wrong all along when "they" introduced HPV vaccination. Doubt, self-trust, and trust in the community of HPV vaccination doubters then turned into shared value assumptions when other visitors gave social credits, like, to public expressions of doubt, followed by statements of "gut feeling" to confront medical advice mediated by the husband. In fact, the

comment in mention was the most liked by other users on Page A in September 2013.

We generally found that highly opinionated and often short comments received most of the reactions from other visitors. For example, when a post on Page A in September 2015 announced that Gardasil® would be replaced in the Danish vaccination program by the Cervarix® vaccine, most comments voiced the opinion that the replacement would not make any difference, and that HPV vaccination should be halted completely. One visitor compared HPV vaccination to playing Russian roulette, while another accused the company behind Cervarix® of “bribing” its way into the Danish childhood immunization program. These negative statements, which clearly expressed doubts about HPV vaccination and the pharmaceutical companies behind the vaccines, received 15 or more likes from other visitors, far more than other, less categorical comments.

While doubts about the safety, effectiveness, and necessity of HPV vaccination were most prominent, we also observed that a small portion of visitors challenged Admins’ and other visitors’ skepticism. On Page B, this share of users began to appear more and more systematically from around the beginning of 2017 onwards. During some periods, the number of pro-vaccine comments superseded doubtful or skeptical comments. The visitors in favor of HPV vaccination challenged the skepticism perpetrated by Admins and other users by referring to epidemiological studies that found no evidence of adverse events such as POTS and CRPS after HPV vaccination (e.g., Arnheim-Dahlström et al., 2013; European Medicines Agency, 2015; Feiring et al., 2017). They claimed that doubts about HPV vaccination were unfounded since such claims were based only on second-hand information, typically anecdotes, and not on what was often referred to as proper research or real science. Importantly, these comments only countered the value assumption built into the discourse of doubt, namely that the most trustworthy sources are oneself and the community around the afflicted girls and their families, but not the existential assumption of an “us” against “them,” nor the propositional assumption that we all need to educate ourselves, and make an individual decision regarding vaccination (see also Reich, 2016).

Some visitors responded negatively to the introduction of scientific studies into discourse. They retaliated that the science was still incomplete, perhaps even unreliable, since scientific experts had not yet been able to come up with robust explanations for the symptoms of the afflicted girls. Or, as a visitor put it in a comment: the negative reaction of bodies is the facts. Other comments, often with support from Page Admins and Editors, referred to other studies, indicating that science cast doubt on the safety and effectiveness of HPV vaccination. For example, Admins on Page B posted a link to the webpage Med Science Research stating as follows: “There are thousands of scientific studies in the medical literature on the dangers of vaccines.” Under the tab “Gardasil” the homepage listed many studies reporting adverse events after HPV vaccination.

Visitor comments to this post varied significantly. Some visitors suggested that Page B from the outset was biased against HPV vaccination, and, therefore, chose to highlight studies to this effect. Others countered that the established science was

corrupt. Both sides seemed to place value on scientific objectivity, but there was disagreement about which side could claim to possess it. As we see, this discussion revolves around the value assumption that science should be trusted. It is a corrective to the value assumption described above that only a small community of people and oneself should be trusted for reliable information to inform personal decision-making. It adds to the diversity of vaccination skepticism that some Admins and visitors would place trust in science, albeit a marginalized part of the scientific community (Reich, 2016; Carrion, 2018). It also indicates that in this case, science seemed to maintain and even enhance, rather than reduce, doubt.

The Discourse of Betrayal

Many posts and comments on the three Pages discussed the role the health care system played in the controversy. As the controversy unfolded, a sense of betrayal became increasingly apparent in these posts and comments. As one of our previous examples also shows, some comments used an unspecified “they” to imply the entire health care system, including the government, public health authorities, pharmaceutical companies, physicians, and/or medical research institutions. The existential assumption was that “they” had let down the afflicted girls and their families by not taking their symptoms and stories seriously enough.

In fact, some comments suggested that “they” had let down the girls twice: first, by including HPV vaccination into the immunization program; and second, by failing to understand the girls’ suffering and to offer help. This implied that the first failure led to the second failure. Some visitors’ comments speculated that the real reason “they” were so reluctant to recognize and treat the girls’ symptoms was a mix of financial and political interests, perhaps even moral failure. One comment on Page A argued, for example, that a reason for the lack of recognition of adverse events following HPV vaccination could be the financial compensation that “they” would have to pay the afflicted girls. The comment thus implied that “they” would do anything to avoid such expenses. Another comment on Page A addressed the issue of conflicts of interests by rhetorically asking whether, according to the Hippocratic Oath, physicians ought to help the pharmaceutical industry rather than the patients.

The existential assumption is failure and corruption on the part of the health care system. We found statements to that effect in all our samples, but they became particularly prominent on Page C in the later stages of the debate. Here, Page Admins and many visitors suggested that an alliance or coalition existed, consisting of the Danish Health Authority, the Danish Cancer Society, and other actors involved in the government-supported campaign for HPV vaccination “Stop HPV.” Furthermore, Admins consistently referred to the Danish Cancer Society as being partly financed by the pharmaceutical industry, and labeled the information provided by the health care authorities as “propaganda.”

In both posts and comments on the Page, the existence of a coalition backed by the public, non-profit, and private organizations had negative values. The coalition represented a technocratic regime with the power to enforce certain medical truths and technologies. From September 2017 onwards, the

Admins included the following part in an auto-text message in all their posts, depicting the group behind the Page as the underdog or suppressed opposition to the alliance: “We are not supported by the pharmaceutical industry; so, with a budget of 1/1,000 of what The Cancer Society and the National Board of Health spend on their propaganda program, we are engaged in an uneven fight for equity for our many seriously ill young persons.”

Betrayal seemed to breed the need for resistance. Some comments extended the notion of an uneven fight to other issues. Particularly on Page A, we found reference to oppressed truths about GMOs and alternative medicine. One visitor even argued that the Danish media coverage of HPV vaccination bore resemblance to the coverage of the events in New York City on September 11, 2001, where Danish journalists “were not critical when the WORLD TRADE CENTER was teared down by NANO THERMITE and not BIN LADEN.” This comment probably made an implicit reference to a Danish retired engineer who, in September 2013, went to court trying to prove that the third World Trade Center tower collapsed due to the presence of a compound known as nanothermite.

Such comments aside, we propose that comments lamenting the existence and dominance of a technocratic health care regime belong to the discourse of betrayal. The main reason we propose this term is the underlying propositional assumptions about the political power exercised by the regime on individuals. The weight of evidence and the socioeconomic resources invested in the immunization programs direct individuals toward HPV vaccination. The discourse of betrayal implies that if individuals are betrayed by those directing them, meaning that their bodies experience adverse events and thus betray the confident and powerful statements about the safety of HPV vaccination, opposition is required. Thus, betrayal has turned the question of HPV vaccination into a power struggle. As more power, more knowledge, more rules and regulations, and more money will be invested to block opposition, the betrayal becomes even more evident, and thus even more resistance is needed, so goes the argument that is fundamental to the discourse of betrayal.

DISCUSSION AND CONCLUSION

Our discourse analysis of posts and comments on three Danish Pages dedicated to HPV vaccination skepticism identified three overarching discourses of loss, doubt, and betrayal. All the three discourses are founded on the underlying existential, propositional, and value assumptions that we extracted from posts and comments provided by Admins, Editors, and visitors to the Pages. We believe that these discourses, taken together or separately, provide important insights into vaccination skepticism in Denmark. We also propose that these discourses have been integral to the controversy, which means they have been closely related to the public conversation about HPV vaccination. In other words, they afford strands of skepticism related to HPV vaccination that are not exclusive to the three Pages, nor in any way exhaustive of the debate about HPV vaccination.

The three discourses were built on a variety of assumptions. Existential assumptions included personal experiences of loss, the difference between “us” (the afflicted) and “them” (experts, medical professionals, and pharmaceutical companies), and failure and corruption of the health care system. Propositional assumptions ranged from assertions over the distribution of power in society to the need and complexity of personal decisions, the potential effects of HPV vaccination, and the communal recognition of shared experiences and shared purpose. Values assumptions had to do with shared human relations, such as parenting and care, and the crucial importance of doubt and opposition. All these assumptions interacted in complex ways. The three discourses that we have distilled should be a tentative result in the joint effort to make sense of HPV vaccination skepticism that seems to be growing on social media around the world.

The strands of HPV vaccination skepticism offered by the three Pages fed on—and into—the ongoing controversy over HPV vaccination in Denmark. We observed that many posts and comments were directly related to current events. In other words, the three Pages would probably not have existed without the public and critical attention given to the safety and effectiveness of HPV vaccination. As the controversy gradually disappeared, and pro-vaccination views became more prominent in the press and on social media, the activity on the three Pages waned. At the same time, we also believe that the three Pages served as important channels of communication for those who already experienced or sensed loss, doubt, or betrayal. Rather than seeing Pages such as these as drivers of skepticism or sources of misinformation, we propose to understand them as integral elements of the total communication environment that people use as they make decisions and deliberate about HPV vaccination.

Skepticism of HPV vaccination can take many forms. The concern over anti-vaccination views spreading on social media across the world may be well-founded. We identified diverse forms of skepticism on just three Pages in Denmark that all depended to a high degree on the national debate and national media. We venture that it is important to see vaccination skepticism not as a uniform force such as implied by terms such as “anti-vaccination movement,” but to understand the specificities of actors posting skeptical content online, the actual content of posts and comments, the cultural and political struggles that inform their communicative actions, and the underlying assumptions that create meaningful discourses.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

TA and KN made substantial contributions to the conception and design of the work. TA and KN performed the analysis,

drafted the work, and approved the publication and agree to be accountable for all aspects of the work. TA accessed the data.

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The Interactive Functions of Questions in Embodied Collaborative Work

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Researchers have been interested in the investigation of the interactive functions of questions in conversational contexts. However, limited research has been conducted on the interactive functions of questions in embodied collaborative work, that is, work that involves the manipulation of physical objects. This study aimed to identify the interactive functions of questions in embodied collaborative work. To do so, we conducted a systematic qualitative analysis of a dataset of 1,751 question-answer sequences collected from an experimental study where pairs of participants ($N = 67$) completed a collaborative food preparation task. The qualitative analysis enabled us to identify three functions of questions: *anticipation questions*, *exploration questions*, and *confirmation questions*. We have discussed in this study how the types of questions identified are associated with: (i) the accomplishment of interactional goals and (ii) complementary temporalities in the collaborative activities.

Keywords: questions, functions, embodied collaboration, work, interaction

INTRODUCTION

Questions are one of the most important linguistic and embodied resources giving structure to social interactions, from human interaction in every day (Fox and Thompson, 2010) and institutional (Murtagh et al., 2013) settings to human-animal interaction (Mondémé, 2020) and human interactions with virtual agents (Liao et al., 2018) and social robots (Pitsch et al., 2017). Questions have specific interactive functions, including requests for information (Couper-Kuhlen, 2012) and confirmation (Hayano, 2014); seek for help (Erkelens et al., 2021) and agreement (Heritage and Raymond, 2005); perform assessments (Lindström and Mondada, 2009); make suggestions, proposals, and offers to others (Stevanovic, 2012); and make other-initiated conversational repairs (Schegloff, 2000).

Stivers and Enfield (2010) proposed a basic differentiation between content (Q-word) questions (e.g., What did you eat for breakfast?), polar questions (e.g., Did you go to the movies yesterday?), and alternative questions (e.g., Are we going for a walk or do you prefer to stay at home?). Such initial differentiation responds to lexical, morphological, syntactical, and prosodic features (Couper-Kuhlen, 2012) that vary depending on the particularities of language families investigated, allowing their (almost) effortless identification in face-to-face conversations.

Questions embedded in embodied collaborative work (e.g., assembling IKEA furniture with a partner) rely on the coordination of bodily resources such as manual gestures, gaze, posture, and facial expressions to achieve shared goals. The joint accomplishment of shared goals goes

beyond the coordination of verbal and non-verbal behaviors in a synchronized manner over time. Collaboration influences the action and planning of interacting partners and shapes interactive outcomes, such as when partner A asks “What should we do with this (while pointing to a bag of flour)?” B replies: “we must put half of that in this bowl (while touching the bowl),” and A acknowledges B: “Alright, I see it now.” This short question-answer sequence illustrates how the intentions, plans, and goals of each interacting partner come into play in embodied collaborative work.

This study aimed to identify the interactive functions of questions in embodied collaborative work involving the manipulation of physical objects. To do so, we conducted a qualitative analysis of a dataset of 1,751 question-answer sequences collected from an experimental study where pairs of participants ($N = 67,134$ participants) completed a collaborative food preparation task. Case studies have been used to investigate the interactive functions of questions in embodied collaborative work (e.g., Bietti and Baker, 2018a,b). To our knowledge, no research has provided a systematic identification of the interactive functions in embodied collaborative work where the manipulation of physical objects becomes essential in a large sample.

First, we reviewed the literature focused on the investigation of the interactive functions of questions in conversational contexts. Second, we described the experimental task where the 1,751 question-response sequences analyzed here were collected. Third, we presented a description of the methodological aspect of the study. Fourth, we identified the main types of questions observed in the question-response sequences and showed their distribution in the dataset. Fifth, we presented illustrative examples of each of the type questions identified, including multimodal analyses of each question-response sequence. We finally discussed how the types of questions identified here are linked to the accomplishment of interactional goals and to complementary temporalities in the embodied collaborative activities.

BACKGROUND

Questions are recipient-designed and oriented toward interacting partners, that is, the speaker who poses the question assumes that the recipient possesses the information requested. The study of adjacency pairs (e.g., Sacks and Schegloff, 1973; Sacks et al., 1974; Schegloff, 2007) has enabled the systematic investigation of the interactive functions of question-response sequences in conversations. Adjacency pairs are units of conversation composed of two turns or pair parts (in the present case: Question \Rightarrow Answer); each pair parts have to come from a different speaker (A and B), be placed adjacently (1. A: Question \Rightarrow 2. B: Answer) unless separated by an insertion sequence (1. A: Question \Rightarrow 2. B: Request for clarification \Rightarrow 3. A: Answer [turns 2B and 3A is the insertion sequence] \Rightarrow 4. B: Answer) and the second pair part is identified as functionally related and relevant (Hutchby and Wooffitt, 2008) to the first pair part (e.g., A: “Where did we buy these glasses?” B: “At the flea market”). Questions (first pair part) impose special

constraints on answers (second pair part). In engaging in such sequences, interacting partners impose constraints on one another and hold each other accountable, to produce coherent and intelligible courses of action in relation to relevant actions and events. Questions requesting for information (first pair part) may have multiple responses (second pair part). However, there are generally two types of responses to such questions, either accepting or declining the request (Schegloff, 2007). Accepting or declining the request for information involves different kinds of interactional work. Accepting the request comes with no cost for reputation and may even increase the reputation of the interacting partner providing the answer. In contrast, declining the request for information may lead to reputational risks that are often introduced by delays in responses (e.g., “well”) and followed by accounts aimed at mitigating the refusal (e.g., “well, I don’t remember exactly because I wasn’t paying attention when she gave the explanation”). Thus, accepting the request for information is considered to be a case of preferred response, whereas declining it is considered to be a case of dispreferred response (Heritage, 1984).

Researchers have investigated the interactive functions of questions in everyday conversations (Tannen et al., 2007; Bietti, 2010, 2013; Bietti and Galiana Castello, 2013; Fox and Thompson, 2010; Rossano, 2010; Bova and Arcidiacono, 2013; Goodwin and Cekaite, 2013), children peer-to-peer conversations (Baucal et al., 2013; Stivers et al., 2018), clinical populations (Goodwin, 1995; Antaki, 2013; Laakso, 2015; Anglade et al., 2021), medical consultations (Heath, 1986; Heritage and Robinson, 2006; Murtagh et al., 2013; Mayor and Bietti, 2017), police interrogations (Stokoe and Edwards, 2008; van Charldorp, 2014), job interviews (Bangerter et al., 2014; Brosy et al., 2016), classroom interactions (Margutti and Drew, 2014; Hosoda, 2016; Ishino, 2017), service encounters (Fox, 2015; Mondada and Sorjonen, 2016; Lindström et al., 2019), helpline services (Butler et al., 2010), guided tours (Mondada, 2017), team meetings at the workplace (Svennevig, 2012), and political (Gialabouki and Pavlidou, 2019) and immigration interviews (Channon et al., 2018). Several of these studies adopted a multimodal perspective to the analysis of question-response sequences (e.g., Stivers and Rossano, 2010).

The study of the interactive functions has also been studied in embodied collaborative work involving the manipulation of physical and digital objects in a variety of contexts, including operating theaters (Hindmarsh and Pilnick, 2007; Bezemer et al., 2016), design (Bietti et al., 2016; Bietti and Baker, 2018a), and architectural (Murphy, 2004; Bietti and Baker, 2018b) studios, and radio stations (Risberg and Lymer, 2020). These studies have shown the multiple ways in which questions redirect the attention of team members to objects and actions. For example, Bietti and Baker showed that reminders in the form of questions (e.g., A: “When did they tell us the deadline for this was? Because I am not sure whether it was Friday or Saturday,” B: “It was Friday,” A: “Great, thanks!”) redirected the attention of professional designers to objects (e.g., computer screens) and actions (e.g., product delivery to client) in the design studio. Bietti and Baker found that questions acting as reminders scaffolded future planning and collaborative decision-making

among professionals designers at the design studio. Research on the interactive functions of questions at the workplace has been conducted exclusively in real-world situations using case studies. To our knowledge, no research has provided a systematic identification of the interactive functions of questions in embodied collaborative work using a large sample of participants. This is important if we are interested in gaining a better understanding of the multiple ways in which different types of questions structure social interaction in collaborative work beyond specific cases, activities, and settings.

THE CURRENT STUDY

This study aimed to identify the interactive functions of questions in embodied collaborative work involving the manipulation of physical objects. To do so, we examined 1,751 question-response sequences in a dataset taken from an experimental study on the cultural transmission of cooking skills. In part of the experiment from where we extracted the question-response sequences, participants were asked to prepare the highest number possible of ravioli in pairs (refer to description of Task below). The data collected were in French. The only constraint involved in the collaborative ravioli-making task was time duration (refer description of Task below). Hence, group members could freely interact while making the ravioli, as it would occur in a comparable real-world situation.

METHODS

Participants

A total of 134 participants (67 pairs; 76 men) were recruited from the student population of the University of Neuchâtel, Switzerland (age $M = 23.2$; $SD = 4.04$). They were fluent speakers of French and reported having limited previous cooking experience. They had previous practice of simple skills like combining and heating ingredients but had not mastered more complex skills (e.g., preparing a pie from scratch). Participants received 25 CHF compensation each for half an hour of their time along with an incentive of 0.25 CHF per pair for each produced ravioli of good quality.

Task

The task consisted of two kinds of sessions, namely, performance sessions and transmission sessions. The question-response sequences analyzed in this study were collected from performance sessions only where participants prepared ravioli together in pairs. Their goal was to produce as many good-quality ravioli as possible in 10 min. Each pair had at their disposal a ball of 150 g of dough, 200 g of filling made of ricotta cheese and concentrated tomato paste (for easy detection of leaks and imperfections when evaluating ravioli quality), a 24-hole ravioli mold with zigzag sealing for easy release, a pasta maker, a rolling pin, a cutting board, 2 pizza cutters, 2 knives, 4 teaspoons, 2 kitchen cloths and kitchen paper, 250 g of flour, and a stopwatch. The collaborative food preparation task had 10 consecutive

phases listed as follows: (1) divide the dough in two, (2) add flour to the dough, (3) use rolling pin to flatten the dough, (4) use pasta maker to flatten the dough, (5) cut dough in half, (6) put the first layer of dough over the mold, (7) add the filling, (8) cover with second layer of dough, (9) flip over the mold, and (10) cut ravioli. Immediately after the time was up, the ravioli was assessed by the experimenter.

Coding

The identification of questions followed the coding scheme for question-response sequences in conversation developed by Stivers and Enfield (2010). Their coding scheme is empirically grounded in a comparative project on question-response sequences in ordinary conversation in 10 languages. The coding scheme considers the interactive functions of questions as well; from information and confirmation requests, assessments, and suggestions to other initiation of repairs (e.g., What?) and rhetorical questions. It also accounts for the question-response sequences in which the answer corresponds to a visible action (e.g., head shakes, nods, shrugs, pointing gestures, and eyebrow flash) which is regarded as a relevant response. This is an essential feature for the throughout coding of question-response sequences in embodied collaborative work.

In French, content (Q-word) questions include interrogative pronouns such as *qui/who*, *que/what*, *lequel/which*, *où/where*, *quand/when*, and *combien/how much*. They can be followed by noun phrases, which form a syntactic constituent. Polar questions can be accompanied by a finite verb, a negative adverb, adverb of frequency, a clitic, or a subject. In alternative questions, each of the alternatives in the question is stressed. Any positive polar question can be turned into an alternative question by adding *ou/or* and the interrogative final particle *hein/not*. Declarative syntax ending with an interrogative intonation is the more frequent way in which questions are composed in French (Mondada, 2017).

Categorization

We started the categorization procedure following well-established interactive functions of questions (e.g., request for information, request for confirmation, and seek for help) reported in the literature. Data were transcribed in InqScribe™ for later synchronization with multimodal annotations in ChronoViz (Fouse et al., 2011). Transcriptions followed standard conventions in conversation analysis (Jefferson, 2004; Mondada, 2018). The synchronization of transcripts with multimodal annotations facilitated the familiarization with the data.

RESULTS

The familiarization with the data and the initial coding resulted in the differentiation between questions related to the collaborative task and questions that were not. We found that 84% ($n = 1,521$) of the 1,751 question-response sequences initially identified were task-related. New rounds of coding and revision of codes led to the categorization of the questions opening the 1,521 question-response sequences into three distinguishable themes.

The interactive functions of questions in the collaborative food preparation task were as follows: (1) anticipation questions, (2) exploration questions, and (3) confirmation questions. *Anticipation questions* were requests for information about embodied actions that participants should perform in the next phases of the collaborative task while completing the present phase. *Exploration questions* were requests for information about embodied actions that the participant posing the question should execute to successfully progress in the ongoing phase of the task. *Confirmation questions* were requests for confirmation about embodied actions that were just performed or about to be performed in the ongoing phase of the task. Anticipation questions corresponded for 26% ($n = 394$), exploration questions corresponded for 41% ($n = 618$), and confirmation questions corresponded for 32% ($n = 491$) of all the task-related questions that initiated the 1,521 question-response sequences that we analyzed. Twenty percent of the 1,521 question-response sequences ($n = 304$) were double-coded. Inter-rater agreement for the three types of questions was very good ($kappas \geq 0.79$). Disagreements across coders were resolved through discussion.

Below we present an example and description of each type of question-response sequence taken from the dataset to illustrate how they operated in practice.

Anticipation Questions

Example 1 shows the coordination of an anticipation question with embodied actions and transition phases in the collaborative task (refer Methods for description of task phases).

P1 made a polar question (1) acting as an anticipation question. This is the first element of the adjacency pair. He made it while pressing the first layer of the already flattened dough against the ravioli mold with his hand palms (**Figure 1A**). The response of P2 (2), accepting the request of P1 was the second element of the adjacency pair. Almost immediately P1 told P2 what he planned to do afterward (3), in the next phase of the collaborative task. He did it while placing the ravioli mold closer to P2 (**Figure 1B**). The goal of the embodied action of P1 was to place the ravioli mold in the visual attention field of P1. Placing for action (Clark, 2003) and change in gaze directions of P1 toward the half ball of dough (**Figure 1C**) closed the question-response sequence initiated by the anticipation question (1). The change in gaze direction of P1 predicted what he planned to do next in order to flatten the second layer of dough to cover the first layer, to which P2 was about to add the filling.

Exploration Questions

Example 2 presents an occurrence of an exploration question that one participant posed while performing an embodied exploration of the pasta maker. Dyads were instructed to carefully pass the dough through the pasta maker, which had two rollers that could be adjusted using the knob on the side. This allowed making the dough gradually thinner. Each time before passing the dough through the pasta maker, dyads had to turn the knob to switch levels (six levels, as shown in **Figure 2C**).

P3 changed the gaze direction toward the pasta maker while making explicit what they should do in the next phase of the task (1). The change in gaze direction of P3 toward the pasta maker

directed the attention of P4 toward the same object (**Figure 2A**). Directing to the action of P3 (Clark, 2003) created a shared focus of visual attention and grounded mutual knowledge about the next phase of the task (Clark and Schaefer, 1989; Clark and Brennan, 1991). P4 agreed with the directing to action of P3 (2) and then P3 leaned forward to adjust the rollers of the pasta maker using the knob on the side (**Figure 2C**). She spent more than 5 s trying to figure out how the knob worked (3). The problem was that the knob had to be slightly pulled out; otherwise, it will not turn. P3 posed the content (Q-word) question because of having failed to learn how the knob worked (**Figure 2B**). The eureka moment came after a short silence: trial and error enabled her to learn how to turn the knob. P4 acknowledged P3 for solving the problem (4). Such acknowledgment overlapped with the embodied demonstration and response of P3 to her own exploration question (3).

Confirmation Questions

Example 3 illustrates a question-response sequence about joint decision-making that was initiated by a confirmation question. The sequence shows participants deciding where they should trim the excess dough so it could successfully cover the entire surface of the ravioli mold.

The polar question of P5 (1) acted as a request for confirmation that opened the question-response sequence. P6 confirmed the decision of P5 to trim the excess dough where she had previously planned. However, he did it quietly using reduced speech volume (2) which did not seem to be very convincing for P5. As a result, P5 made a second confirmation question (3) as she had to be completely sure about how much excess dough she had to trim off. Having removed too much dough may have resulted in a shorter layer of dough that did not cover the complete surface of the mold. After a short silence, she lifted her head and looked at P6 (**Figure 3B**). The change in head position and gaze direction of P5 reinforced the accountability of P6 as he responded to her confirmation question (Goodwin, 1994; Bavelas et al., 2002; Stivers and Rossano, 2010). P5 trimmed off the excess dough immediately after receiving the affirmative response of P6 (4). She was already removing the excess dough when P6 added that they could do it again later (**Figure 3C**).

DISCUSSION

We investigated the interactive functions of content (Q-word) questions, polar questions, and alternative questions in a dataset of 1,751 question-response sequences collected in an experimental study in which 67 pairs of participants completed an embodied collaborative task in the laboratory. We did it using a collaborative food preparation task. The kind of task chosen aimed at increasing the ecological validity of the experimental design (Bietti et al., 2017, 2019). Food preparation is a social activity taught and learned across cultures and societies that currently attracts a lot of media attention. This is reflected in the increasing number of cookbooks that are sold annually, TV shows, online courses, and tutorials available on the subject.

P1: Tu t'occupes de mettre la fa:rce? (.2) Y ont mis [un tou:t p'tit peu et pis
Do you take care of the stuffing? They put a little bit and then
presses the dough with two palms Fig.1a

P2: [Là je comme:nce =
I'm starting

P1: = Moi (.2) du coup hum >je commence à r'faire un autre bout<
So, um, I'm starting to do another part
pushes ravioli mold towards P2..... Fig.1b
changes gaze direction towards half ball of dough Fig.1c

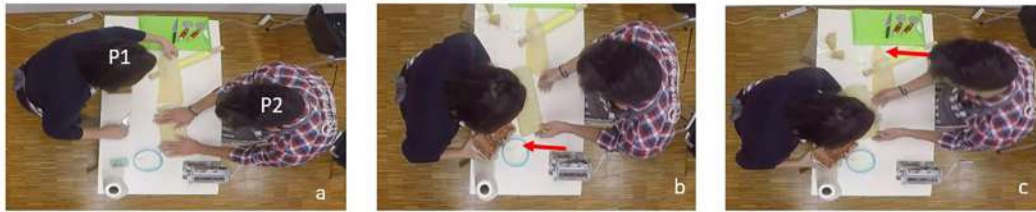


FIGURE 1 | Example of anticipation question and coordination of embodied actions.

P3: Du coup après alors (.4) ils expliquent qu'il faut mettre sur 1 =
So then they explain that you have to put it on 1
changes gaze direction towards pasta maker Fig.2a

P4: = Oua:is
Yeah

P3: Alo:rs (3.4) Comment on tourne ce tru:c? (1.4) a:: [comme ça] (.) sur 1 ok
So. How do we spin this thing? Ah like that, on 1, ok
leans forward.....
tries to turn the knob..... Fig.2b

learns how to turn it

P4: [°Ok°]



FIGURE 2 | Example of exploration questions while learning how to use tools.

Food preparation is a meaningful real-world task that can boost creativity (McCabe and de Waal Malefyt, 2015) and have a positive impact on the self-esteem of people (Farmer et al., 2018). When food preparation occurs collaboratively, it strengthens social bonds by reinforcing family relationships, initiating and

underpinning friendship (Wrangham et al., 1999). No previous observational or experimental study has examined the interactive functions of questions in embodied collaborative work in which the manipulation of physical objects played a central role in a large sample of participants.

P5: Je coupe là?
Shall I cut there?
 is about to cut the dough Fig.3a

P6: °Eu:h ouais°=
Uh yeah

P5: = On est d'acco:rd? (.4)
Do we agree?
 lifts head and looks at P6 Fig.3b

P6: Ouais (.2) >sinon on refera après<
Yeah, Otherwise we will do it again after
 nods
 P5 cuts the dough..... Fig.3c



FIGURE 3 | Example of confirmation question in joint decision-making.

We made a distinction between task-related and non-task-related questions (e.g., What do you study?) and observed that a significant proportion of questions were task-related. Then, we identified the interactive functions of task-related questions using the coding scheme developed by Stivers and Enfield (2010) and discovered that they had three main functions, that is, anticipation, exploration, and confirmation.

The three illustrative examples we presented showed the multiple ways in which the three types of questions were linked to the accomplishment of interactional goals: (i) planification of future collaborative activities (example 1), (ii) learning how an essential tool for the successful completion of the collaborative task works (example 2), and (iii) decision-making about an embodied action that would negatively affect group performance if it were done inaccurately. Interestingly, such goals referred to complementary temporalities in the activity. While example 1 (Figure 1) referred to a future phase of the task (e.g., add filling to the dough), examples 2 and 3 were related to the ongoing phase. Example 2 (Figure 2) was linked to an action (e.g., turn the knob) that dyads must perform to progress in the task (e.g., to flatten the dough in the pasta maker). Example 3 (Figure 3) was associated with an action, that if done inaccurately, would increase the risk of having a poor task performance (i.e., reduce the number of good quality ravioli produced). Questions presented in examples like 2 and 3 were coded differently because they reflected distinct levels of participants' certainty. In cases like example 2, participants used trial-and-error methods to solve task-related problems. Such methods were

not successful at first; therefore, participants decided to seek for help from their partner by making exploration questions. On the contrary, in cases like example 3, participants requesting confirmation from partners knew what the preferred course of action was. They suddenly decided to interrupt what they were doing to invite their partners to participate in the decision-making process. Thus, exploration questions presented a lower degree of participants' certainty than confirmation questions. Anticipation questions were used to plan future phases of the collaborative task while still working on the current phase. On the contrary, exploration and confirmation questions often led to an interruption of the collaborative activities taking place within the task phase. Our results complement findings reported in ethnographic observations obtained through the careful analysis of video-recorded data in naturally occurring interactions.

The exploratory nature of the study did not allow us to define *a priori* hypotheses to test. For example, to have tested whether anticipation questions predicted higher performance in the number of good quality ravioli produced in comparison with exploration and confirmation questions would not have been appropriate considering that we did not have a condition for each type of question to calculate how each affected the performance individually. Another limitation of this study was the fact that we did not analyze the temporal distribution of questions in relation to their interactive functions throughout the embodied collaborative task. For example, it may have been the case that exploration questions were more frequent at the beginning of the task when participants had to figure out the functions of the

cooking utensils that they had available. These are the kind of hypotheses we plan to test in further studies.

Future experimental studies will enable researchers to make predictions about what types of questions may lead to an increase in the quality of embodied collaborative work (e.g., performance) across tasks and large samples. This is important if we want to propose interventions to improve collaborative work involving the manipulation of physical and digital objects.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at the Open Science Framework (OSF): <https://osf.io/5wdgt/>.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics Committee, University of Neuchâtel, Neuchâtel, Switzerland. The participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

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AUTHOR CONTRIBUTIONS

LB: conceptualization, data curation, formal analysis, investigation, methodology, project administration, and writing original draft. FB: investigation, formal analysis, and writing original draft. Both authors contributed to the article and approved the submitted version.

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On the Psychology of Argument: A Structural Analysis of Former Muslims' Postings Within Malaysian Social Media

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This research attempts to provide insights into the argumentation structures in the discussion of Islam on social media involving 14 Malaysian former Muslims. The social media accounts of the participants were observed for 12 months, from January to December 2019. A total of 368 postings put forth arguments related to Islamic authoritative discourse, the Quran and “Sunnah” of the Prophet Muhammad, to justify their renunciation of the Muslim religion. The analysis revealed that the Level 2 argument, which includes the claim, data to support the claim, and the warrant, was identified as the most common argument structure. Level 5, which has more than one rebuttal, was the least common argument structure. The analysis shows that most argument structures were at the lower levels (1–3) in that they offered no strong, clearly identifiable rebuttals. This study concludes that the arguments put forth by former Muslims, in the main, are loosely constructed rather than attempts to build a strong cumulative argumentation to support their reasons for abandoning the Muslim faith.

Keywords: Toulmin model of argument, Islamic teachings and practices, former Muslims' postings, social media, argument levels scheme, Malaysia

INTRODUCTION

Social media has provided safe spaces offering freedom of expression to people who feel marginalized socially, politically, or religiously (Altoaimy, 2018). In addition, they have the opportunity to communicate and interact with friends and peers freely, due to the user's privilege to presume (produce and consume at the same time) opinions on social media. The most common social media such as Facebook, Twitter, and Instagram have shaped the narratives and practices of religious authority, religious identity, and religious community (Kgatle, 2018) where traditional offline religiosity is transformed through more subjective religious views and experiences (Campbell, 2012; Scardigno and Giuseppe, 2020).

The reflections from several recent studies have shown the use of social media as a multifunctional tool beyond the prevailing notion that social media is engaged merely for entertainment and information sharing (e.g., Kgatle, 2018; Tan Meng, 2019; Thomas et al., 2019; Hashmi et al., 2020; Scardigno and Giuseppe, 2020). Posting, sharing, liking, and commenting

on religiosity have added to the functionality of social media such as creating online religious communities (Hashmi et al., 2020). Scardigno and Giuseppe (2020) pointed out that social media offered new spaces of confidence to the believers, which has attracted more subjective religious practices and the overt expression of personalized religious views. Performing religiosity within social media has become a dominant way of seeking satisfaction by the believers in Muslim majority countries (Thomas et al., 2019). Some believers anchor the religiosity within selected religious texts by invoking sacred text into their postings; some others invoke religious sermons by the preachers (Hashmi et al., 2020), whereas some cyber-believers are more flexible with the religious views (Campbell, 2012); this third category of the believers demonstrates mostly the personalized religiosity with decentralized interpretations and meanings of the religious teachings as compared to the set offline patterns of religiosity (Hashmi et al., 2020). Therefore, social media offers the users with online safe spaces that enable the users to express personalized views and interpretation of the religious teachings and subjective religious experiences, which is often a sensitive matter in the offline spaces (Tan Meng, 2019; Scardigno and Giuseppe, 2020; Hashmi, 2021).

On the other hand, believers' performance of traditional and culturally embedded religiosity is often contested by some social media users' flexible religion-related engagement and religion-related subjective opinions. According to Crawford (2002), people in different cultures have different practices and habits deeply embedded in their normative beliefs. There are also people from the same background who oppose, criticize, and challenge such normative beliefs and the practices associated with them in a particular culture. They may also engage in argumentation to disrupt or challenge these normative beliefs but the force of their argumentation and its persuasiveness depends upon the discursive space in which they construct their arguments. Taking on board Crawford's claim, we perceived the potential of finding argumentation examples in social media postings that criticize and challenge certain normative cultural beliefs and the religious practices associated with them in particular societies. This study aims at identifying and analyzing the argument structures in Malaysian former Muslims' postings on social media wherein they challenge Islamic authoritative discourse. Former Muslims in this study refers to individuals who were Muslims once, however, they lost faith in Islam and becoming an atheist (self-proclaimed) they reject all the religions that are claimed divine religions.

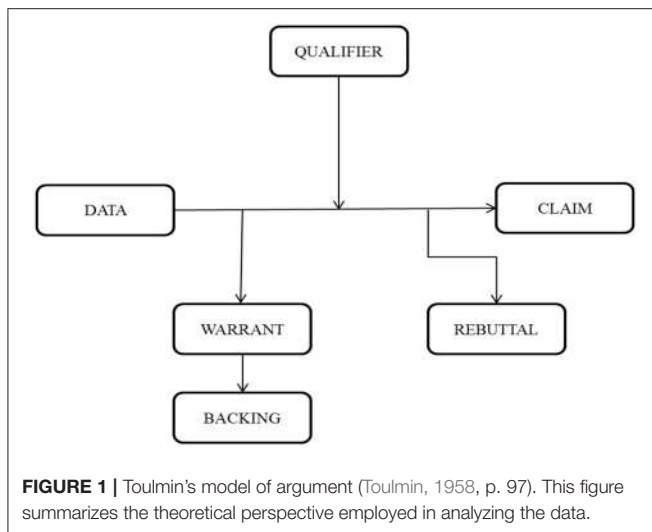
Malaysia is an Islamic country where several legal provisions restrict or otherwise criminalize alleged blasphemy to religion or religious figures, beliefs, or principles such as Section 298 and 298A (1) of the penal code, Section 3(1) and 4(1) of the Seditious Act 1948, Section 233 of the Communication and Multimedia Act (CMA), and Section 7(1) of the Printing Presses and Publications Act 1984. Section 233(1) (a) of the Communication and Multimedia Act is mostly deployed to criminalize alleged offenses on social media. It deals with inappropriate or offensive use of social media against those who allegedly insults Islam or Prophet Muhammad or any other religion as it proscribes "any comment, request, suggestions, or other communication which is obscene, indecent, false, menacing or offensive in character with

intent to annoy, abuse, threaten, or harass another person"; and the punishment for this offense is up to one year's imprisonment, a RM 50,000 fine, or both (CMA, 1998, p. 78). For example, Malaysian authorities arrested Alister Cogia and convicted him under Section 298A of the Penal Code and Section 233(1) (a) of the Communications and Multimedia Act 1998 for posting offensive content on social media that was allegedly insulting to Islam and the Prophet Muhammad. He was sentenced to 10-year imprisonment and a RM 50,000 fine. His imprisonment was later on reduced to 6 years (Tawie, 2019). This shows how all Malaysians, including former Muslims or non-believers, have no offline safe space to express themselves and opine overtly in Malaysia due to the Malaysian Civil Law (Thaib, 2013; Hamid, 2017). Hence, in the past, before the advent of social media, dissenting Malaysians would have concealed any opinions and beliefs that were anti-Islamic (Mohamad et al., 2018). However, social media provides an opportunity for such closeted Malaysians to freely communicate, interact, and express their world views while masking their real identities. They post and comment on others' postings, not only to put forth their own views and beliefs of religion but to construct a discourse to justify and support their standpoint. Their postings are not simply a sharing of views; they try to use language strategically to make their postings logical. Researchers such as Mohamad et al. (2018) and Rashid et al. (2018) have pointed out that religiously marginalized people (e.g., former Muslims and non-believers) in Malaysia who appear on Facebook and Twitter use social media for several reasons such as entertainment, information dissemination, information seeking, seeking and providing social support, academic purposes, expressing their beliefs and standpoint concerning their renunciation of Islam, and criticizing Islamic teachings and Muslim beliefs. In order to justify their renunciation of the Muslim faith and to express their viewpoint, they construct arguments through their posts on social media. This study strives to examine the strategic construction of posts by former Malaysian Muslims on social media through the framework of the Toulmin Argument Pattern (TAP) and Erduran, Simon and Osborne (2004) argument-level scheme. TAP provides guidelines to help trace different argument structures, while the argument-level scheme focuses on the strength of the components of argument, whereby clearly identifiable rebuttal is considered the strongest form, and an argument with more than one such rebuttal is considered the most forceful argument. Toulmin model of argument structure is an old-fashioned model but it has been enjoying a consistent revival over time because of its utility in the research studies on argumentation. Several researchers such as Metaxas et al. (2016), Kathalia and See (2016), Pedemonte and Balacheff (2016), Moon et al. (2017), and Drury et al. (2019) used the Toulmin model to identify weaknesses and strengths of argument structures in the context of students' classroom discussions.

THEORETICAL FRAMEWORK

Toulmin's Model of Argumentation

Toulmin (1958) proposed six components of argumentation; the first triad (Claim, Data, and Warrant) is crucial for the basic formation of an argument, while the second triad (Backing,



Rebuttal, and Qualifier) is sometimes explicit, but mostly implicit in the argument. In either case, it strengthens the argument and tends to extend it (Toulmin, 1958). Toulmin (1958) illustrates the functioning of each component in this model as shown in Figure 1.

Claim

A claim is an assertive statement that embodies the main purpose of the argument (Toulmin, 1958).

Data

The information offered as the basis for the argument is called data (Toulmin, 1958). In some scenarios, additional claims are made to support the central claim of the argument; such claims function as data for the main claim (Hoeken et al., 2012).

Warrant

The most important element of the Toulmin model is the warrant; the statement that is used as a standard, concept, principle, or license for a conclusion; it functions as a link between the data and the claim. The warrant is an implicit or explicit rule or grounds that demonstrate the validity of the data to the claim (Toulmin, 1958). Sometimes, there is no need for additional criteria in arguments to distinguish between what counts as data and warrants. In this situation, implicit details can be used to distinguish between data and warrants in a particular argument (Toulmin, 1958; Simosi, 2003). Each assertion is considered part of the evidence for the argument in question when a statement is used to interpret the condition/situation concerned. To show the importance of certain information to the argument when different arguers use the (same or similar) statements, these statements take on the role of warrant in that specific case.

Backing

According to Toulmin (1958), an inference that supports the warrant is called *backing*. The backing can be a piece of factual information (e.g., previous observations) or a concept,

value, or opinion, which is derived from past experiences or perceptions in the context of the arguer's personal or institutional background.

Rebuttal

Toulmin (1958) describes rebuttal as a statement addressing any limitations to the claim, which may genuinely apply, e.g., exceptions. Finocchiaro (2012) further explains that rebuttals can have several functions in the Toulmin model. For example, rebuttals may identify circumstances in which the authority of a particular warrant should be put aside. Hence, a rebuttal provides exceptions to the applicability of the warrant or limits the generalizability of the warrant and claim.

Qualifier

The qualifier shows how good the data bound into the warrant is, and to what extent it can restrict the universal application of the specific claim (Toulmin, 1958). Phrases or words conveying the author/speaker's level of certainty regarding their claim are identified as qualifiers in the Toulmin model of argument analysis (i.e., hedges such as some, most, maybe, almost, probably, likely, certainly, and apparently).

RECENT STUDIES ON ARGUMENT ANALYSIS USING TOULMIN'S ARGUMENT PATTERN

Toulmin's (2003) theory of argument patterns provides a clear process for the evaluation of arguments (Metaxas et al., 2016). The integration of Toulmin's model with other analytical approaches such as the argument-level scheme has the potential to lead to the ability to define many facets of argument in different fields (Simon, 2008). Several researchers have utilized Toulmin's model of argumentation in their studies to analyze and illustrate different aspects of argument (e.g., Simosi, 2003; Simon, 2008; Hoeken et al., 2012; Kathpalia and and See, 2016; Metaxas et al., 2016; Pedemonte and Balacheff, 2016; Moon et al., 2017; Drury et al., 2019).

Kathpalia and and See (2016) focused on 100 university student blogs written before instruction concerning argumentation and after instruction on argumentation during a classroom writing course. The results showed that more than half of the students improved their argument structures and the quality of their argumentation in the blogs written after receiving instruction about using the Toulmin model. Pedemonte and Balacheff (2016) evaluated the role of individual conceptions for evidence-building in Mathematics education by designing an enriched model based on the Toulmin scheme of integration to analyze the relationship between the warrant and backing of the claim in mathematical problem-solving. Moon et al. (2017) analyzed students' argumentation in a classroom setting through the Process-Oriented Guided Inquiry Learning (POGIL) approach using the Toulmin model of argumentation. The researchers identified two argumentation objectives: persuasion and consensus, in the argumentation of students. The findings showed that most students were able to construct persuasion arguments with two-component structures, whereas consensus

two-sided argument structures lacked additional rebuttals (Moon et al., 2017).

Erduran, Simon and Osborne (2004) research report illustrates the analytical affordance of Toulmin (1958) argument pattern (TAP) in the analysis of argumentative discourse in science classrooms. This research report is based on a longitudinal research project “Enhancing the Quality of Argument in School Science” carried out from 1999 to 2002, so focused on classroom interactional discourse and the dynamics for initiating and sustaining argumentation. Erduran et al. (2004) proposed two methodological approaches for the analysis of interactional argumentative discourse. The first deals with TAP’s usefulness for quantifying arguments generated in the context of teacher-students’ whole-class discussions. It also provides some qualitative insights into argumentation by comparing the dynamics of the arguments generated in different lessons over time. The second approach deals with TAP as a measure of students’ use of rebuttals in small group discussions. Rather than using TAP as a statistical tool, the researchers adapted the technique and applied TAP to the same individual lesson taught by the same teacher in two successive years. The researchers drew TAP profiles for each teacher’s discourse practices while conducting the same lessons in year one and in the following year, which indicated whether the teachers had improved the quality of their argumentation during the same lesson in the following year. The comparisons of the teachers’ TAP profiles showed that they were similar for the same lesson—the first taught in the first research year and the other in the second research year. But the TAP profiles of the individual teachers were different. Such qualitative comparisons showed how the teachers’ argumentation in classroom discourse differed and which aspects of the discourse needed corrections to improve the quality of the argumentation.

Erduran, Simon and Osborne (2004) argument-level scheme mainly focused on the rebuttals and the strength with which the students countered each other’s arguments. According to this system, the strength of the argument depends on the presence or absence of rebuttals as well as the nature of the rebuttals, whether weak rebuttal or clearly identifiable strong rebuttals. Erduran, Simon and Osborne (2004) study showed the methodological potential of TAP as an indicator of the quality and quantity of the arguments in classroom discourse.

RECENT STUDIES ON LEAVING RELIGION WITH A SPECIAL REFERENCE TO ISLAM

Enstedt et al. (2019) argue that the question of what “leaving religion” entails is difficult to answer precisely in isolation because the process of leaving religion involves different social, political, cultural, and religious factors. Though, former Muslims may offer and express blatant critique due to their own lived pathetic experiences yet some social norms and practices that are deeply influenced by Islam continue to shape their life patterns (Larsson, 2018; van Nieuwkerk, 2018). In an academic study of religion, “apostasy” is considered an appropriate equivalent of “leaving religion.” Lewis (1993), a renowned scholar of Islamic

studies, argues that “apostasy” entails “leaving Islam” by overtly declaring it or it is conferred by the Muslim community and religious authorities upon a person who denies any of the fundamental beliefs in Islam such as Quran and Sunnah of Prophet Muhammad. Islamic exegetes Imam Ahmad Ibn Hanbal, Imam Abu Hanifah, Imam Malik, and Imam Shafie agreed upon the capital punishment for apostasy (Ismail and Awang Mat, 2016), whereas in view of several classical Islamic jurists such as Ibrahim Al-Nakhaie (d. 95 A.H), Sufyan Al-Thauri (d. 162 A.H), Al-Tabari (d. 923), Ibn Taymiyyah (d. 1328), and Al-Shawkani (d. 1834), apostasy in Islamic traditions is socially a crime only if it is accompanied by the treason against the community, leadership or the state; otherwise, it is religiously an obnoxious sin for which there is no temporal capital punishment (see El-Awa, 1993; Akhtar S., 2011; Ismail and Awang Mat, 2016). “Sin,” in this context, entails that the apostate is damned and doomed in this world and the world hereafter (Hamid, 2017). In the contemporary Muslim majority countries, an apostate is considered a treacherous and traitor of the community in which he/she enjoyed loyal relations, participation, and acceptance as a member, for which he/she becomes “a dead limb to be excised” (Lewis, 1995, p. 229). The above discussion shows that leaving Islam in the individual capacity is not a temporal crime for which state authorities can intervene unless the apostate tries to commit or ignite treason.

The term “former Muslim” entails that a person who once believed in the Muslim faith, Islam, and then renounced his/her faith in Islam is considered an apostate who is liable to face conviction and legal consequences in the Muslim majority countries (Lewis, 1993; Warak, 2003). To understand the Malaysian former Muslims’ criticism of the religion, it is necessary to briefly contextualize the laws of apostasy in Malaysia. Malaysia is an Islamic country with a federal constitutional monarchy. Nine states have their respective hereditary rulers where the respective rulers of Selangor, Terengganu, Kelantan, Pahang, Johor, Kedah, and Perak are constitutionally recognized as sultans; the rulers of Perlis and Negeri Sembilan are recognized as Raja and Yang Di Pertuan Besar, respectively, whereas, the rulers of the states of Penang, Malacca, Sarawak, and Sabah are appointed by the Yang di-Pertuan Agong (Head of the State) for a period of 4 years and are constitutionally recognized as Yang di-Pertua Negeri. These 13 rulers frame the constitutional monarchy in Malaysia (Article 38(1) Constitution 2003). The nine hereditary rulers have the constitutional provisions of electing among themselves, a Yang di-Pertuan Agong (Head of the State) for the reign of 5 years on rotation based system. The sultans are the head of Islam in their respective states that adds the characteristics of Islamic monarchy to the constitutional monarchy in Malaysia (Hamid, 2017). For the status of “the head of Islam,” they are highly revered in their states. Malaysian Constitution ensures the special status of the monarchy. Loyalty to the King and the rulers of the states becomes a tradition and custom to the Malay community. The constitution bestows special privileges to the monarchy in Malaysia such as appointing judges, civil servants, 40 members of parliament, etc. (Federal Constitution 1957., 2010). Being head of Islam, the rulers of nine states have immunity from any type of criticism. They have

a powerful role in establishing, preserving, and ensuring the implementation of sharia laws in the country (Fernando, 2006; Abdullah, 2009).

There are two types of former Muslims in Malaysia: the apostates who were Malay born and bred and the apostate who were converted Muslims. The Malays enjoy a special and privileged status in Malaysia, whereby Article 160 (2) of the Federal Constitution of Malaysia (1957) states that “Malay means a person who professes the religion of Islam, habitually speaks the Malay language, confirms to Malay custom and, (a) was before Merdeka Day born in the Federation or in Singapore or born of parents one of whom was born was born in the Federation or in Singapore, or is on that day domiciled in the Federation or in Singapore; or (b) is the issue of such a person” (p. 142). Being constitutionally a Muslim, rejection of the faith by a Malay person is considered the most heinous crime legally and socially compared to the former Muslims who were new converts formerly (Mohamad et al., 2017; Hamid, 2018). To avoid conviction under Islamic laws in Malaysia, Malaysian citizens who want to leave Islam to need to get confirmation from the “Shariah court,” which has jurisdiction of Islamic laws (Hamid, 2017, 2018; Salleh et al., 2017; Hashmi et al., 2020). The consequences of leaving Islam in Malaysia include dissolution of marriage, distribution of the jointly-acquired property during the marriage, cancelation of the Malay title of the land, and the revocation of children’s guardianship and custody (Dahlan and Faudzi, 2016; Ismail and Awang Mat, 2016; Ismail and Al-Subaihi, 2020). Several studies (e.g., Fernando, 2006; Abdullah, 2009; Shuaib, 2012; Daniels, 2017) pointed out that Shariah laws and the jurisdiction of Shariah court are demarcated to Muslims only, but Shariah court more or less has been under the influence of the agenda of political Islam by the main political parties. Malaysian Islamic Development Department [JAKIM] has been a subject of severe criticism by the human rights activists in Malaysia, mainly due to its allegedly ultra-Islamic stance on Lesbian, Gay, Bi-sexual, and Transsexuals (LGBTs), apostates, and the critics of political Islam in Malaysia (Zulkffli and Ab Rashid, 2016, 2019). LGBT hold the institutionalized discrimination and misconduct toward them, responsible for their severe critique of the religion in Malaysia mainly due to the JAKIM’s criminalization of non-normative gender expression (Tamilchelvan and Rashid, 2017; Ghoshal, 2021). Another vital factor that invited severe criticism of the religion is the confusion of the jurisdiction of Federal court and that of Shariah court, which has made the procedure for application to leave Islam impractical in spite of the fact that the Federal Constitution 1957 (2003) ensures that civil law is superior to the sharia law (Abdullah, 2009; Human Rights Watch., 2014; Ismail and Awang Mat, 2016). In light of the above discussion, this study argues that the former Muslims cannot overtly express themselves and are criminalized in Muslim majority countries. Human Rights Watch. (2014) has also reported that LGBTs have long been denied their right to free choice and freedom of speech due to the supremacy of political Islam in Malaysia. That is why, in the online safe spaces of social media, they structure arguments to express their viewpoint attempting to justify their criticism of the religion and Shariah laws. This study adopts

a purely linguistic perspective of the argumentation to analyze former Muslims’ argument structures within their social media postings. The objective of this study is neither to contest former Muslims’ anti-religion discourse and nor to reject the justifications of renouncing Islam; rather, it attempts to provide insights into how the necessary linguistic units of one’s stance can be identified and sequenced to construct a high level of argument structure to achieve linguistically attractive and complete micro-argumentation in the limited space of micro-blogging within social media.

METHODOLOGY

This study took a qualitative approach to identify and analyze the argument structures in the social media postings of former Muslims. Facebook with 91.7% and Twitter with 37.1% of Malaysian users are two famous social media platforms for content sharing in Malaysia (Malaysian Multimedia and Communication Commission [MCMC], 2020). Fourteen social media users who self-identified as former Muslims born and brought up in Malaysia as Muslims, and later on renounced Islam and declared that they were atheists on social media, were recruited to participate in this study. For this purpose, Malaysian social media users who had managed to seek asylum abroad after facing many death threats in Malaysia due to their rejection of Islam, and use their real identity on the site, were identified. Using the snowball technique, the potential participants were identified. All of them were contacted to seek their informed consent.

To ensure and assure all the participants of their protection, the researchers took necessary measures such as using pseudonyms for all 14 participants and removing all personal data from the excerpts presented in this article. This study argues that the former Muslims are not hiding within social media, and they have been postings for years. The construction of their postings is strategic enough to avoid being considered criminal; that is why the authorities have not shut down their social media accounts. With the consent of the participants, their social media postings in the back-dates from January to December 2019 were observed to avoid the potential desirability of being a part of this study and to ensure the generation of data from naturally occurred postings by the participants.

The participants put more than 2,200 posts on Facebook pages and Twitter groups. These posts consisted of a variety of topics ranging from social, cultural, political to personal opinions. Most of the time, posts were retweeted and shared by other members of the community. However, 368 posts discussed the Islamic authoritative discourse (Quran and Sunnah of the prophet Muhammad) that serves as the data for this research article.

SELECTION AND ANALYTICAL PROCESS

In the first phase, the thematic scrutiny of the data was undergone to distribute it under different topical categories such as challenging worship practices, challenging authenticity of Islamic authoritative discourse, criticizing traditional Muslim women,

endorsing Theory of Evolution, challenging the criminalization of LGBTs, expressing Atheism, proving Islam as a religion of extremism, and demanding freedom of speech. We selected the postings for presentation based on degradations and contrasts among all the postings. The postings made by Malaysian former Muslims, and frequently shared and re-tweeted by the former Muslims from other nationalities; comparatively more insightful postings; and in contrast to the implicit expressions, the postings explicitly challenge the religion was chosen for the presentation. As an example, we explain the selection process of Adams' Tweet 11 that explicitly rejects Islamic authoritative discourse on LGBTs, criticizes Malay laws of criminalizing LGBTs, and urges legal reforms. Out of the 54 postings touching on the topic of LGBTs, Adams post was identified as unique due to its meticulous content and potential of the serious challenge as Adams informs that he works in the global context of criminalizing LGBTs, implying that the scope of his challenge is not limited to Malaysia only and that makes this posting unique among the other postings expressing personal experiences and with limited scope. In the fashion of discourse papers, to avoid length constraints, it is a common practice to present selected extracts from a large data because the presentation of the whole analyzed data takes up lots of space. To ensure the validity of the findings, the topical categorization was reconfirmed by the two co-authors, whereas the findings were discussed with an inter-coder, a senior researcher in the field of argumentation; he agreed that there were overlaps of argument structure in the identified postings, which helped us to identify the major structure and level of argument in each of the postings and then add to the findings.

The data analysis involved the Toulmin model of argumentation to identify the argument structures in the postings and simultaneously Erduran, Simon and Osborne (2004) analytical lens were used to analyze the level of the argumentation. Erduran, Simon and Osborne (2004) framework is based on the Toulmin model, which categorizes argument structures into five levels.

1. **Level 1** argumentation has a simple claim against a counterclaim, a claim against a claim.
2. **Level 2** argumentation consists of a claim with data, warrants, and backing but lacks any rebuttal or refutation of a claim.
3. **Level 3** arguments have a series of claims supported by data, warrants, or backing commonly or separately, including the occasional weak rebuttal.
4. **Level 4** arguments have a claim with a clearly identifiable rebuttal and are considered strong arguments. Level four arguments may contain within them a series of claims and counterclaims.
5. **Level 5** argumentation is the strongest type, displaying an extended argument with two or more rebuttals.

(Erduran et al., 2004, p. 928)

Codes were assigned to the participants' postings on the respective social media platforms, Twitter and Facebook. Examples of the codes are as follows:

[Zik, FB. 7] refers to the seventh Facebook posting by Zik in the data set.

[Aris, T. 153] stands for Tweet 153 by Aris in the data set.

ANALYSIS AND DISCUSSION

The researchers applied the Toulmin model of argumentation deductively to the social media posts in which the participants challenged Islamic authoritative discourse that is Quran (Holy book of the Muslims) and Sunnah (traditions set by Prophet Muhammad). **Figure 2** presents an overview of the identified argument structures in the participants' postings. In this graphical illustration, the percentages indicate the overall occurrence of each argument pattern identified in the data.

The percentage of strong arguments (i.e., Levels 4 and 5) is combined in the fourth bar in the above diagram (20.6%). In contrast, the first three bars show the different structures of the weaker argumentation. The following are examples of different argument structures identified in the participants' social media postings, and their respective argument levels, according to Erduran, Simon and Osborne (2004) argument-level scheme.

Extract 1

1. Having lived as a Muslim I have known it as a strategy of Muslims
2. that good Hadith proves the greatness of Muhammad and
3. bad Hadith is always declared to be weak and nonfactual.
4. Similarly, good parts of the Quran are considered proof of the greatness of Islam
5. whereas, bad parts are always justified by saying that they have been taken out of context and
6. as a result, you are declared an islamophobe.

[Zik, FP. 6]

The above extract is part of an argument challenging Islamic authoritative discourse, which claims that the Quran and the Hadith of the Prophet Muhammad are two flawless sources containing a complete code of behavior for humanity. In Islamic terminology, Hadith is a "report of the words and deeds of Muhammad and other early Muslims; it is considered an authoritative source of revelation, and it stands second only to the Quran" (Oxford Islamic Studies Online, 2021). The argumentation in this extract consists of assertive statements which Toulmin (1958) uses to refer to claims as components of argumentation. Hence, the argumentation traced in this extract is a series of claims without any supporting data or warrant. The first claim (line 2) and the second claim (line 3) together challenge the flawlessness of Muhammad's Hadiths. The flawlessness of the Quran is challenged in the third and fourth claims (lines 4 and 5). Past experiences and observations to support the main claim or the warrant are considered as "backing" from the perspective of Toulmin's argument pattern (Simosi, 2003; Simon, 2008). In line with this proposition, the opening part of the argument (line 1) is considered as weak backing for these claims. The backing is considered weak because it is not a shared experience and cannot be generalized. Line 6 presents a fifth claim, which concludes the argument but is different from the four other claims as it refers to the Muslim claim of Islamophobia.

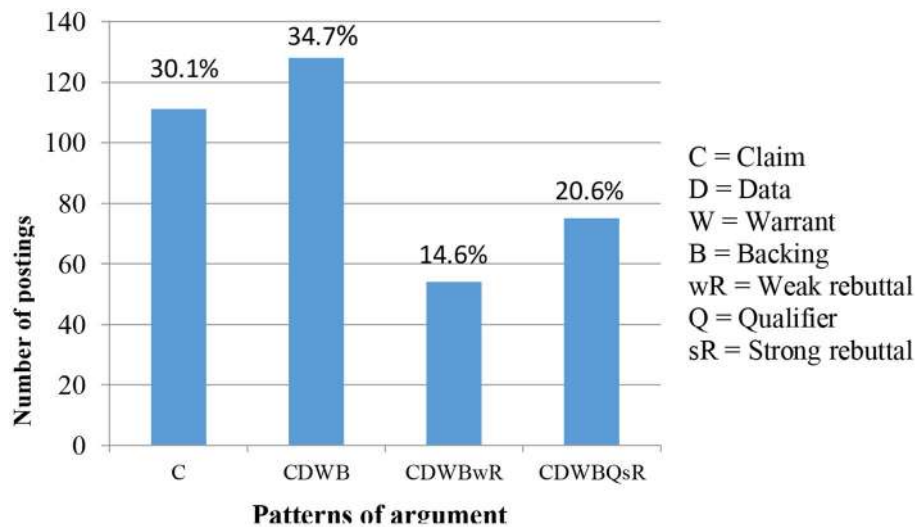


FIGURE 2 | The percentage of the argument patterns. This figure shows the percentage of the argument patterns identified in this study.

In order to see the qualitative strength of such argumentation, we applied the argument-level scheme proposed by Erduran et al. (2004). The argument based on a simple claim or series of claims arguing against another claim, counterclaim, or series of claims, is considered to be a Level 1 argument (Erduran et al., 2004). Thus in light of the argument-level scheme, Extract 1 provides a Level 1 argument, which, according to Erduran et al. (2004), demonstrates the weakest frame of argumentation.

The following extract is a Tweet by Lily (pseudonym) in which she argues about women's oppression. The nature of its structure is similar to the argumentation presented in Extract 1.

Extract 2

1. It's always women of privilege who talk the loudest about how Islam never oppresses women.

[Lily, T. 75]

Extract 2 presents an assertive statement, which according to Toulmin (1958) is a claim in argument terms. The claim in this argument serves as a counterclaim because it challenges Muslim claims that Islam protects women's rights. In this way, the argument in this extract put forwards a counterclaim challenging an earlier claim (Islam protects women's rights), which according to Erduran et al. (2004), is a Level 1 argument (i.e., the weakest form of argument due to the absence of data, warrant and backing). The following extract presents a social media posting by Hubert in which he argues against the creation theory of Islam and defends Darwin's Theory of Evolution.

Extract 3

1. If you were tasked with designing the human eye completely from scratch, would you have purposely incorporated a blind spot?
2. Octopus eyes evolved separately from human eyes, and because of this, octopuses don't really have a blind spot.
3. A truly great example of convergent evolution.

[Hubert, FP. 94]

The argumentation in Extract 3 consists of a claim, data, and warrant. Toulmin's model requires researchers to look deeply into argumentation to trace the implicit components of the argument (Simosi, 2003). In line with this, the data (line 2) and warrant (line 3) implicitly put forward a claim (line 1), which can be identified as the *blind spot* (an imperfection in the human eye cannot have been created on purpose). Islamic authoritative discourse claims that God is the creator of everything and all his creations are perfect. In the light of the creationist theory of Islam, the counterclaim from the above argumentation can be boiled down to *God is not the creator of everything today – creatures evolved in different ways over time*. The data (line 2) supports this claim well and the warrant (line 3) embarks on the strong relationship between data and claim by introducing the license of "convergent evolution" to explain differences. Based on Toulmin's (2003) model of argument, three components, claim, data, and a warrant can be identified in the structure of argumentation in Extract 3.

Level 2 argument consists of a claim supported by data and a warrant (Erduran et al., 2004). This level argument is considered a common argument as it embodies the first triad of components (Toulmin, 1958; Erduran et al., 2004). According to Erduran et al. (2004), the argument presented in Extract 3 measures up to the requirements of a Level 2 argument and is considered a common argument form, lacking strong rebuttal. The following extract demonstrates a short argument by Adams. He challenges Islamic teachings and Muslims' behavior toward LGBTs.

Extract 4

1. Being LGBT cannot be a crime.
2. Humanity is diverse,
3. Tolerance of difference is needed
4. and respect for all.

5. We cooperate globally to reform the laws where being LGBT is still considered a crime.
6. We would like to engage with Malaysia toward achieving this goal.

[Adams, T. 11]

Extract 4 offers an argument consisting of a general, explicit counterclaim (line 1) that challenges the Islamic authoritative discourse on LGBT. According to Toulmin (1958), universal truth provides a license for a relevant persuasive statement and is considered as a warrant in his argumentation pattern. "Humanity is diverse" (line 2) is a universal truth and can be categorized as a warrant for the data (lines 3 and 4). The argument structure then provides a backing statement (line 5), which serves as factual information to support the warrant (Toulmin, 1958). Finally, the arguer presents an implicit claim (line 6) that is specific, unlike the general claim (line 1). The implicit specific claim in line 6 can be glossed as "Being LGBT is illegal, a crime in Malaysia so, Malay laws about LGBT need to be reformed." In line with Toulmin's (2003) model of argumentation, the argument in Extract 4 has four components: general and specific claims, data, warrant, and backing.

According to Erduran et al. (2004), an argument containing claim(s) with supporting data, warrant, and backing can also be considered a Level 2 argument, a common argument frame, lacking the contextual qualitative strength infused by the rebuttal, such as the context in which the claim stands being strong and with no exceptions where the claim does not apply (Erduran et al., 2004). The following extract is a social media posting by Sonia. She defends the atheists' point of view and their rights in this argument.

Extract 5

1. Atheists are wrongly considered arrogant for rejecting funny and absurd stories from Islam like the
2. the world was created in 7 days; the first woman was made from Adam's rib and ate magic fruit from Satan; a couple of each animal species in the world went to the Middle East to get on a boat made by an 800-year-old man etc.
3. It is absurd that if you believe in such stories it's ok, otherwise you are arrogant because you ignore the realities and prefer your own opinion.
4. But atheists are arrogant in some ways, I won't deny it.

[Sonia, FP. 139]

Islamic authoritative discourse asserts that all those who do not believe in God are arrogant due to their ignorance. Sonia put forwards a counterargument to challenge this specific authoritative discourse. The assertive statement (line 1) is an explicit counterclaim, which is followed by data (line 2) and a strong warrant (line 3). According to Toulmin (1958), a rebuttal is a word or statement that presents exceptions to the claim or expresses the limitations of the claim. The strength of the warrant and backing is also affected if limits are placed on the claim under certain circumstances (Simosi, 2003). In the above-mentioned argument, a weak rebuttal is presented (line 4). It is considered a weak rebuttal because it does not offer clear exceptions or limitations to the claim.

According to Erduran et al. (2004), argumentation with one or more claims supported with data, a warrant, and a weak rebuttal, demonstrates Level 3 argument. In light of this proposition, the argument structure identified in Extract 5 fulfills the requirements of a Level 3 argument. Erduran et al. (2004) say that a Level 3 argument has a stronger persuasive quality than a Level 2 argument. The following extract presents a posting from Kris. It is a long argument challenging Islamic authoritative discourse on the Muslims' call to prayer (Adhan) (أَذَان) that is recited on loudspeakers five times a day to invite the Muslims to join prayer with other Muslims at the mosques.

Extract 6

1. You know, just because most people don't complain about the call to prayer (Adzhan) and because of that you think "it doesn't bother people", that doesn't necessarily mean that it's "really not" (a bother).
2. I know that there are people who are dissatisfied with how loud Adzhan is, especially in a Muslim majority country like Malaysia, but they're not brave enough (and it's understandable) to complain, because that would count as "blasphemy against Islam".
3. A few rare cases have happened related to this, where a person complained that the Adzhan is too loud,
4. and it bothers people especially those who want to sleep and to rest, and what's really unfortunate is when their house is very near the mosque.
5. Sometimes the Adzhan that comes from the mosque can use maximum volume for literally no reason.
6. I too have experienced this in my younger days. But I didn't have the guts to say anything against Adzhan, although deep down, it annoys me, especially when I'm about to sleep and have a rest.
7. We live in an era where we can install apps that remind you of the call to prayer and the exact time for the five times a day prayers. Isn't that enough?
8. On the other hand, I have nothing against Adzhan when it's Friday prayers, but please don't use maximum volume for no reason.

[Kris, FP. 218]

This long argument consists of two claims (lines 1 and 5) supported by data (lines 2 and 4). The relationship between the data and claims is justified with a strong warrant (line 7), and backing (lines 3 and 6) has been provided to enhance the supportive potential of the warrant. The arguer also uses qualifiers *few*, *rare* (line 3) and *sometimes* (line 5), which brings clarity to the scope of the claims. The argument concludes with a weak rebuttal (line 8) in which the arguer offers the exception of his claim for the call to Friday prayer. The rebuttal in this argument is considered weak because the whole argument revolves around the disturbance created by the call to prayer but the arguer does not clarify why he excludes from rebuttal the remaining calls to prayer four times a day. This complicated argument does not measure up to Toulmin's (2003) pattern of argument. Although the arguer presents a claim (line 1) and provides data (line 2), the observation and experience-based

statements (lines 3 and 6) are essentially the “backing,” which, according to Toulmin, should be provided after the warrant in order to support it. However, in this argument, the warrant (line 7) comes after the backing statements, which becomes a separate claim without a warrant and disrupts the whole argument.

At the same time, analyzing the argument using Erduran, Simon and Osborne (2004) lens of argument levels, it is a Level 3 argument, similar to the argument presented in Extract 5. In spite of the similarity of components, the argument in Extract 6 is different and weaker than the argument identified in Extract 5 in terms of its pattern.

Azurey is the arguer in the argument presented as Extract 7. She challenges the Muslims’ claim that Islamic teachings are for promoting harmony and peace.

Extract 7

1. You claim harmony and peace
2. but your Quran teaches not to accept others except those having the same belief as yours,
3. otherwise kill them.
4. You say that the Bible is a corrupted book
5. sometimes you say most of the Bible is corrupted
6. and still, you use its references to prove your beliefs.
7. how do we know which part of the bible is corrupted or not? >basically, if a particular chapter in the bible mentions the prophet Muhammad, that chapter is not corrupted.
8. Everything else is corrupted.
9. You check the Bible in light of the Quran but not vice versa.
10. You say some parts of the Bible are correct. hmmm what an accurate method of determining which part of the bible is corrupted. *applause*.
11. And if one says most parts of the Quran are against human rights, and in order to prove it wrong, you are taught to kill the people.
12. It is ok some of the verses support women and human rights but most are dangerous to humanity.
13. Why don’t you follow and preach what supports human rights for the sake of harmony and peace? Isn’t it in the Quran?

[Azurey, FP. 255]

From Toulmin’s (2003) perspective, the argumentation in Extract 7 contains all the key components of an argument. In the series of claims, the first counterclaim (line, 2) challenges the Quranic teachings and the Muslims’ belief that the Quran teaches harmony and peace (line 1). The data (line 3) partially explains that Muslims are taught to kill non-believers. It implicitly refers to the early Islamic concept of Jizyah as the early history of Islam witnessed that non-believers were invited to embrace Islam or to pay a tax (Jizyah), where the purpose of jizyah was made clear in the light of the Quran, Surah Al-Taubah verse 29, stating that against the paid jizyah, the non-Muslims are given life protection in an Islamic state such as security of their lives and property, comfort and convenience in dealing with Muslims, and social welfare (Ghozali and Nugroho, 2021). Sometimes the warrant is hypothesized as generally known to others and is left implicit; such implicit reasoning must be taken into account in analyzing argument structure (Simosi, 2003). The researchers

here consider this implied information as the warrant. On the one hand, Muslims’ claims about the Bible (lines 4 and 5) provide backing for the counterclaim (line 2) that the Quran teaches not to accept others, rather than preaching harmony. On the other hand, there is the claim (lines 4 and 5) of contradiction in Muslims’ beliefs. This contradiction is elaborated with data (line 6) that a corrupt book cannot be used to support beliefs. The warrant (line 9) supports the data by confirming that the parts of the Bible which support Muslim beliefs are correct. The backing (lines 7 and 8) present an example, which is the most quoted by Muslim scholars, that Muhammad was mentioned in the Bible (see Dawud, 1978; Badawi, 2005), so this part of the Bible is correct, but everything else in the Bible has been corrupted. The satirical statement (line 10) also extends the backing. In terms of the counterclaim (line 2) that the Quran does not teach harmony and peace, a strong warrant (line 11) points out that Muslims are free to declare the Bible a corrupted book, but someone points out the verses of the Quran that are against human rights, Muslims are taught to kill them to prove them wrong. In light of the above data, warrant and backing another claim is leveled in line 12, which says that most of the verses of the Quran are dangerous to humanity. A strong rebuttal (line 13) agrees that Quran has some parts that support human rights wherein the qualifier *some* limits the generalization of the rebuttal. In this way, the limitation of the claims and counterclaims is expressed through a rebuttal. At the same time, the rebuttal paves the way for suggesting that harmony and peace can be achieved by Muslims through preaching and focusing on the teachings of the Quran which believers and non-believers have in common. According to Stapleton and Wu (2015), the argument with strong rebuttal is perceived as highly persuasive and ranked as having a high argumentation profile. The argument in this post is a strong persuasive argument.

The researchers then applied Erduran, Simon and Osborne (2004) argument-level scheme, which claims that an argument consisting of several claims and counterclaims supported with data and warrant, and with a strong rebuttal is a Level 4 argument, a strong argument (Erduran et al., 2004), which can have extended argumentation if comparatively more robust rebuttals are provided (Simon, 2008). The following extract shows Cathy’s post on Facebook in which she challenges the Islamic teachings about leaving Islam and argues strongly for equal human rights, especially in Malaysia; a country where Islamic laws are enforced.

Extract 8

1. It’s sad to see that there is no realistic individual freedom for Malays in Malaysia to
2. question their faith, to convert, or to leave religions altogether.
3. The fact that the majority of Malay Muslims are indeed fine (with the fact) that they are not granted
4. individual freedom and strictly prohibited from thinking freely for themselves
5. because they seek help from Islamic scholars on whatever issue there is, including
6. science and mental health
7. which is incredibly worrying and manipulative.

8. Years of brainwashing people are the cruelest thing you can do to an individual
9. who was born as a person who knew nothing at first (was innocent).
10. To see that other people enjoy freedom, while the Malays are prohibited from it
11. and the fact that the majority of them have no problem about being trapped and judged
12. under the name of the so-called characteristics of how to define a Malay
13. is the major key point that people need to start to realize how cancerous it is.
14. Once they are given freedom and the realization that there are many faiths and religions and still want to follow Islam, it is their right and we, the free thinkers, will respect their choice
15. if they don't threaten others' freedom.

[Cathy, FP. 307]

In Extract 8, we can identify an extended argument in terms of its components and pattern. According to Toulmin (1958), a comprehensive claim may have constituent claims in it that are considered a series of claims. This argument contains a series of claims: (1) that Malays are oppressed in Malaysia (line 1); (2) Malays accept religious oppression (line 3); (3) Islamic scholars have social power and Malays ignore this (lines 5 and 6); and (4) the situation is worsening and alarming (line 7). The arguer provides data that supports the series of claims: the Islamic education of children by their parents and the government (line 8); and that everyone is born innocent but can be brain-washed (line 9). This data to the series of claims leads to the implicit warrant (line 12) that according to Simosi (2003) can be traced and completed in light of the data and backing. Thus, the implicit warrant is “a Malay child does not choose to be a Muslim by himself, rather the government and parents make the child a Muslim in the light of the definition of being Malay in the Federal Constitution of Malaysia.” The backing (line 10) strengthens the warrant by the information that Islamic laws and education are specified for Malays but other nationalities are free from religious oppression. A rebuttal is a statement that limits the generalizability of the claim or informs of exceptions to the claim, by including *other-side* information, helping the arguer maintain the impression of neutrality and avoid so-called *myside bias* (Wolfe et al., 2009). This extended argument offers more than one rebuttal; the first rebuttal (lines 11 and 12) limits the strength of the claim that Malays are religiously oppressed (line 1) by saying that Malays have no problem with being trapped by the constitutional definition of a “Malay” that conditions them to be a Muslim in Malaysia. The second rebuttal (line 14) strengthens the first rebuttal by addressing the issue of free choice. Here the arguer assumes the possibility of free choice and suggests that if Malays were left free to choose Islam without the fear of losing “Malay” status that is constitutionally linked to Malay identity, and they still chose Islam, the free-thinkers would respect that. The third rebuttal (line 15) informs of the limitations of the second rebuttal. Erduran et al. (2004) point out that an earlier presented limitation of a rebuttal strengthens the argument. In this way, the previous rebuttal serves as the claim for the current

rebuttal. The second rebuttal in this argument (line 14) serves as the claim for the third rebuttal when lines 14 and 15 are read in concert. Those free thinkers who would respect Muslims (line 14) become a claim for the rebuttal ‘if they respect others freedom of choice’ (line 15).

In the argument-level scheme proposed by Erduran et al. (2004), a pattern of extended argument with more than one rebuttal is a Level 5 argument. The qualitative strength of such an argument stands way above all the other levels of argumentation. The components derived and the identified pattern of argument in Extract 8 measure up to Level 5 argumentation. This indicates that the argument presented in Extract 8 is the most potent form of argument in the argument level schema.

CONCLUSION

Social media provides a space to express one's view of a particular topic freely. People who feel marginalized such as former Muslims and atheists in Muslim majority countries can have the opportunity as social media affords to share and express their views. They use language strategically in their postings to construct arguments that challenge Islamic authoritative discourse and to explain their renunciation of the religion. The analysis shows that the arguments identified in the ex-Muslims' postings challenge several Islamic teachings of which the most popular topics are God as the creator; Muhammad as a prophet; Quran as a perfect book; women rights in Islam; Islam as a religion of peace and harmony; life hereafter; the call for prayer and fasting during Ramadan, and blasphemy. The arguments presented in their social media postings vary in terms of structure and strength. Using Toulmin (1958) model of argumentation to analyze the participants' postings above has illustrated the variety of argument structures employed in the postings, the main ones being: C (claim), CDW (claim, data, and warrant), and CDWB (claim, data, warrant, and backing). The least used argument structures include CDWBR (claim, data, warrant, backing, and rebuttal) and CDWBQR (claim, data, warrant, backing, qualifier, and rebuttal). The persuasiveness of the participants' argumentation was analyzed using Erduran, Simon and Osborne (2004) argument-level scheme, categorizing the arguments into five levels, ranging from Level 1 to Level 5. Most of the arguments were at Level 2 (CDW and CDWB). The next most common arguments measured were Level 1 (C), then Level 3 (CDW R [weak rebuttal] and CDWB R), Level 4 (CDWBR and CDWBQR [one strong rebuttal]), and Level 5 (CDWBQR [more than one rebuttal]). The majority of the argumentation was at the lower levels (Levels 1, 2, and 3), i.e., with weaker levels of argumentation in the participants' postings. The strongest argument levels (Levels 4 and 5) had fewer identified arguments from the research data due to the technical limitations of micro-blogging on Twitter. Extended argumentation was found only on Facebook postings as Twitter posts have a 40-word limit, possibly why fewer Level 4 and Level 5 arguments were found in the research data overall. Hence, in this study, the limitations and generalizability of results are partly due to the varied nature of social media platforms and the amount of space they offer to the

users; second, the argumentation strength could be investigated in a more sophisticated way by including comments on the postings, which are not the part of data due to the demarcation of only Malaysian participants in this study. Finally, the dimension of the discursive construction of former Muslims' argumentation does not fall in the scope of this study that can provide new insights into the strength of argumentation in this study.

Though some social media data carry the risk of inauthenticity, in this study, the authenticity of data can be argued as the recruited participants do not hide their identity and are in the limelight. Furthermore, using the snowball technique further confirmed Malaysian participants were recruited. The strength of this study can also be argued in terms of the authenticity of data due to the avoidance of the participants' potential desirability of postings for this study as this study collected back-dated postings; second, the strength of this study also emerges from the importance of social media against the state censure policy as social media has no power to censure the postings that provided more expressive data as compared to offline expressions related to the religion in a Muslim majority country.

Contribution

Social media postings by former Muslims are not merely the account of expression and entertainment; rather, the postings serve as arguments through which discourse is constructed to justify the abandoning of the Muslim faith. This specific discourse demonstrates the strengths and weaknesses

of argumentation on behalf of which the justifications of renouncing the religion are offered.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Investigating the Interaction Between Prosody and Pragmatics Quantitatively: A Case Study of the Chinese Discourse Marker *ni zhidao* (“You Know”)

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This study briefly describes the prosodic and pragmatic characteristics of the discourse marker *ni zhidao* (“you know”) in spoken Chinese. It mainly explores the interaction between its prosody and pragmatics using instrumental methods. It is the first attempt to use acoustic and statistical analysis to examine the prosodic parameters and prosody-pragmatics interaction of a Chinese discourse marker. The corpus includes 71 interview conversations totaling more than 30 h, in which 490 discourse marker tokens of *ni zhidao* were found. *Ni zhidao* mainly fulfilled four broad pragmatic functions of initiating a topic when occurring sentence-initially, of holding the floor when appearing within clauses, of marking coherence when making its presence between clauses, and of projecting attitudes and feelings when showing up sentence-finally. Drawing on the algorithm of random forest in R, the acoustic and statistical analysis of the performance of *ni zhidao* in these four functions showed that its prosodic features, including duration, tempo, pre-pause, post-pause, F_0 , and intensity, significantly relate to and thus imply its pragmatic functions, that the interaction between its prosody and pragmatics can be modeled statistically, and that the established pragmatics classification model based on prosody can be utilized to predict the pragmatics of *ni zhidao*. These findings seem to strengthen the hypothesis that prosodic variables play a role in deciphering the different pragmatic functions of *ni zhidao*. This study uses prosodic evidence to more objectively reveal not only the part of *ni zhidao* in dynamically constructing and embodying specific contexts but also its communicative functions and the underlying meta-pragmatic awareness behind it. This study breaks through the limitations of traditional discourse marker research, which mainly relies on context and discourse characteristics for subjective reasoning.

Keywords: discourse marker, prosody, pragmatic function, interaction, prosody-pragmatics model

INTRODUCTION

In essence, discourse markers (e.g., *ni zhidao*, *you know*, etc.) are linguistic items to guide the communicator’s understanding of the discourse during the communicative process. They both indicate the purpose of the speaker’s discourse accurately and guide the listener to understand it, thus effectively realizing the communicative intent. Related studies (e.g., Blakemore, 1987;

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Fraser, 1987; Schiffrin, 1987; Chen, 2002; He and Mo, 2002; Ran, 2002; Fang, 2005; Wu, 2005; Tanno, 2018; Rhee, 2020) have analyzed the syntactic distribution, communicative process, causes of formation, and development process of discourse markers. These researches reveal their syntactic features, discourse functions, grammaticalization, and pragmaticalization, thus deepening the academic understanding of this pragmatic phenomenon.

The pragmatic functions of discourse markers have traditionally been the focus of scholarly attention. To date, researchers (e.g., Blakemore, 1987; Fraser, 1987; Schiffrin, 1987; Chen, 2002; He and Mo, 2002; Ran, 2002; Fang, 2005; Wu, 2005; Tanno, 2018; Rhee, 2020) have primarily relied on context and syntax to examine the multiple pragmatic functions of specific discourse markers in different contexts, or to analyze how discourse markers perform certain discourse functions in specific contexts within some theoretical frameworks. These investigations need to be further developed and refined for four reasons: (1) over-relying on abstract communicative contexts for subjective reasoning; (2) lacking sufficient linguistic evidence due to investigation into only a small number of examples; (3) failing to statistically investigate the interaction between “tangible” prosody and “intangible” function of discourse markers; (4) mainly using elicited conversations as data and paying little or even no attention to spontaneous speech.

Although context can be used to identify the pragmatic functions of discourse markers, prosody can undoubtedly provide another objective and easily accessible evidence to facilitate listeners' understanding. The crucial functional load of semantically unspecified discourse markers is carried by prosodic variation (Gravano et al., 2007; Lai, 2009). However, the prosodic realization of discourse markers has received little attention (Wichmann et al., 2010) because they are more typical of spoken than written language (Brinton, 1996). Although claiming that the prosody of discourse markers performs some pragmatic functions, studies in this respect (e.g., Schegloff, 1982; Ward and Tsukahara, 2000; Ward, 2006; Gravano and Hirschberg, 2009; Buschmeier et al., 2011; Nadeu and Prieto, 2011; Nebot, 2021) fail to substantiate this prosody-pragmatics interaction with quantitative, acoustic-prosodic evidence. Realizing this neglect and failure, some linguists (e.g., Matzen, 2004; Braga and Marques, 2004; Wichmann et al., 2010; Volín et al., 2016; Didírková et al., 2018) have investigated what an analysis of prosody can reveal about the pragmatics of discourse markers. However, they neither investigated the prosody-pragmatics interaction of discourse markers statistically nor modeled this interaction and then used the model to predict pragmatic functions.

Given the current state of research, this study aims to statistically examine and model the interaction between the prosody and pragmatics of the discourse marker *ni zhidao* in Chinese spontaneous speech based on a corpus of media interview conversations totaling more than 30 h. To this end, six prosodic parameters, including duration, tempo, pre-pause, post-pause, F_0 , and intensity, were chosen, and the pragmatic functions of *ni zhidao* were impressionistically identified through careful listening to the audios. The hypothesis underlying this

study is that prosodic variables play a role in encoding and deciphering different pragmatic functions of *ni zhidao* in diverse utterance positions. This hypothesis draws on the literature concerning the correlation between prosody and position on the one hand and the interaction between prosody and pragmatics on the other hand. The existent researches (e.g., Vaissière, 1983; Cai et al., 1998; Xu, 1999; Zhong et al., 2001; Hirschberg, 2002; Wu, 2002; Ward, 2004; Braga and Marques, 2004; Wang, 2011) confirmed the impact of position on F_0 . The discourse component at the beginning of the turn is higher in pitch, which is usually used by the speaker to take over the turn (Braga and Marques, 2004), because the speaker draws the listener's attention to the subsequent discourse by raising the pitch (Ward, 2004). The pitch of the phrase initiating a new topic is higher than that of other components in the same turn (Hirschberg, 2002). The phrase at the end of the sentence has a narrower F_0 range, a slower pitch, and a faster tempo (Hirschberg, 2002), which is the final lowering effect, that is, the sentence-final phrase carries the lowest pitch (Wang, 2011), due to compression of the pitch range during the last half-second or so of an utterance (Caspers, 1998). The aforementioned literature justifies the possibility that prosodic cues of *ni zhidao* could be predicted by its positions. “Different positions are responsible for subtle changes in meaning or function.” (Hansen, 1997: 156) Therefore, it is reasonable to hypothesize that the prosodic cues of *ni zhidao* can reliably be used to classify its pragmatic functions. As has been proved in previous studies, systematic prosodic variation is functionally extrinsically motivated (Volín et al., 2016). Prosodic patterns are basically composed of different functional layers (Xu, 2004). The crucial functional load of discourse markers is carried by their varying prosodic patterns (Gravano et al., 2007; Lai, 2009). Prosodic parameters interact intricately to convey various communicative functions, and multi-parametric variations in F_0 , timing, and intensity result in basically consistent form-function mappings (Volín et al., 2016). The prosodic elements are integrated to produce tailored discourse markers serving specifically intended communicative functions (Ward, 2006). Therefore, it is well-grounded and feasible to use prosodic clues of *ni zhiao* as solid evidence for its pragmatic categorization.

It is the first attempt to use acoustic and statistical analysis to probe the prosodic parameters and prosody-pragmatics interaction of Chinese discourse markers. Specifically, the present research analyzed the syntactic, prosodic, and pragmatic distribution of *ni zhidao*, the correlation between its prosodic variables, and ultimately its prosody-pragmatics correlation through the machine learning algorithm (Random Forest in R). The syntactic, prosodic, and pragmatic analyses were designed to reveal its actual syntactic and prosodic performances statistically and its pragmatic functions intuitively for investigating the potential correlation between its prosody and pragmatics in different positions eventually. On the basis of these statistical and impressionistic analyses, the Random Forest algorithm was meant to project variations in prosody onto functional categories to find the significance of prosody to encoding and deciphering pragmatics statistically and construct a prosody-pragmatics model which can be applied to predict pragmatics, thus providing statistical evidence for

the traditionally intuitively-claimed pragmatic functions and prosody-pragmatics interaction. As such, the investigation of *ni zhidao* first explored the prosody-pragmatics interface of Chinese discourse markers statistically and visually, using “visible” prosodic evidence rather than “invisible” context to more objectively reveal not only the part of *ni zhidao* in dynamically constructing and embodying specific contexts but also its communicative functions and underlying meta-pragmatic awareness. This study, therefore, breaks through the limitations of traditional discourse marker research, which primarily relied on context and discourse characteristics for subjective reasoning, putting discourse marker studies on a more objective and scientific footing.

REVIEW OF LITERATURE

Studies of Discourse Markers

Research on discourse markers generally presents five representative perspectives: (1) Coherence model (e.g., Schiffrin, 1987, 1994, 2003; Chen, 2002; He and Mo, 2002) explores the role of discourse markers in displaying the semantic coherence between discourse segments and the discourse coherence mode; (2) Relevance model (e.g., Blakemore, 1987, 2002, 2011; Ran, 2002; Shan, 2014a; Li et al., 2018) focuses on relevant inference, studying how speakers use discourse markers to guide or restrict listeners to find relevance between discourse segments; (3) Syntactic-pragmatic model (e.g., Fraser, 1987, 1999, 2009, 2015; Akar and Öztürk, 2020) examines the syntactic features and pragmatic functions of discourse markers, arguing that the function of discourse markers is to guide the listener to correctly interpret the logical relationship between the preceding and following discourse segments; (4) Grammaticalization/pragmaticalization model (e.g., Fang, 2005; Wu, 2005; Maschler, 2009; Dong, 2010; Li, 2014; Fedriani and Sanso, 2017; Tanno, 2018; Rhee, 2020) probes into the evolution of discourse markers and the contributing factors behind this; (5) Prosody-pragmatics model (e.g., Hirschberg, 2002; Matzen, 2004; Braga and Marques, 2004; Wichmann et al., 2010; Beňuš, 2012; Abuczki, 2014; Cabarrão et al., 2015; Gonen et al., 2015; Volín et al., 2016) draws on prosody as an objective factor to identify and characterize discourse markers or as an immediate and readily accessible feature to reveal the functions of discourse markers and how people comprehend them. Some of these studies have shifted from the traditional syntactic-semantic perspective to the pragmatic-cognitive or even prosodic dimension. Some researchers (e.g., Wu, 2005; Dong, 2010; Li, 2014; Wang, 2017) have investigated Chinese discourse markers.

Ni zhidao among other Chinese discourse markers has relatively been under-explored, relative to discourse markers in other languages. Representative studies investigated the distinctive morphological features and attention-arousing and communication-checking functions of *ni zhidao* (Tao, 2003), attention-focusing, background-providing, and identification-seeking modes of *ni zhidao* (Liu, 2006), cognitive context-constructing, attitude-projecting, and

inference-manifesting functions of *ni zhidao* (Shan, 2014a), discourse-constructing functions of *ni zhidao* and the internal mechanism and external motivation for its evolution (Shan, 2014b), and the prosody of *ni zhidao* in different positions (Shan, 2015). These researches neither made a statistical analysis nor constructed a model by integrating position, pragmatics, and prosody. In the same vein, among studies of discourse markers in other languages, some (e.g., Blakemore, 1987; Fraser, 1987; Schiffrin, 1987; Tanno, 2018; Rhee, 2020) examined the pragmatic functions of specific discourse markers relying on context and syntax, and some mainly focused on the multifunctionality of discourse markers (e.g., Schiffrin, 1987; Brinton, 1996; Jucker and Ziv, 1998; Lenk, 1998; Erman, 2001; Aijmer, 2002) and/or their syntactic positions (e.g., Fraser, 1990; Redeker, 1991; Hansen, 1997; Schourup, 1999; Schiffrin, 2001; Halliday and Matthiessen, 2004), without mapping pragmatic functions onto syntactic positions statistically. In this research state, a statistical analysis of the utterance distributions and pragmatic roles of *ni zhidao* and the mapping of the former onto the latter in particular can provide new insights into the intuitively-inferred correlation between the position and pragmatics of discourse markers that “different positions are responsible for subtle changes in meaning or function” (Hansen, 1997: 156). Another factor making the study of *ni zhidao* unique is that Chinese belongs to a language family different from the language families of most languages investigated in the literature. Thus, more cross-linguistic comparisons will be possible and the questions of universality of some characteristics will be addressed (Volín et al., 2016).

The phonological features on discourse markers mainly discussed in the literature are pauses, phonological reduction (Schiffrin, 1987; Brinton, 1996; Tabor and Traugott, 1998), and intonation (Hirschberg and Litman, 1987, 1993; Romero-Trillo, 2015). A pause before the discourse marker is usually expected if the discourse marker occurs initially in an intonation unit, and a pause after the discourse marker is frequent, and it is hinted at by the syntactic detachment (Schiffrin, 1987) of the discourse marker and by the “comma intonation” (Tabor and Traugott, 1998: 254). The pauses on both sides of the discourse marker form a separate intonation unit, or “an independent breath unit carrying a special intonation and stress pattern” (Traugott, 1995: 60). Hirschberg and Litman (1993) found that the English *well* proved to be prosodically independent in only 50% of cases. Der and Marko (2010) discovered that a discourse marker is not necessarily preceded and, or followed by a pause.

Prosodic features, including accent, intonation, tone, and pauses, are significant to realizing the speaker’s communicative intent (Searle, 1969). An intimate relationship exists between prosody and pragmatics (Ward, 2004). Turner (2002) classified the discourse marker *you know* in his corpus data into nine prosodic variants and studied their functions and distribution in various positions. Rendle-Short (2003) revealed the way the discourse marker *so* occurs in specific contexts with specific prosodic features and functions according to its position in the seminar. Braga and Marques (2004) identified some standard pragmatic functions for syllabification, duration, loudness, pitch height, pitch slope, and creaky voice in non-lexical sentences.

He concluded that each of these prosodic features bears a reasonably consistent core meaning. Petukhova and Bunt (2009) have studied prosodic features such as pitch, energy, voicing, speaking rate, and segment duration. Matzen (2004) provided a descriptive analysis of the relationships between prosody and function for a discourse marker *so*. The results show that prosodic features distinguish the functional categories of *so* and that prosodic features can distinguish multifunctional tokens of *so* from those performing only one function. The conclusion is that prosodic features, in combination with context, are beneficial for elucidating the structure and usage of *so*. Wichmann et al. (2010) described the functions and prosodic realizations of *of course* in present-day spoken British-English and explored the relationship between prosody and grammaticalization. Their findings relate to structure, meaning and use, and prosody. In respect of construction, there is a clear preference for *of course* to occur in the initial position as part of the thematic material, followed by a medial position as a post-thematic marker to highlight the theme. In semantic terms, there is strong evidence of grammaticalization with more literal meanings occurring alongside subjective and inter-subjective development. It was predicted that semantic change involving a loss of semantic weight favoring pragmatic meaning would also include a loss of prosodic prominence. “Prosodic choices—segmentation, accent placement, and tone choice—convey abstract meanings that can be related only indirectly to lexical items and are motivated in part by convention, but largely by the often conflicting demands and constraints of the semantic, pragmatic and discursal functions that discourse markers fulfill” (Wichmann et al., 2010:47). Didirková et al. (2018) found that the silent pause duration before the discourse marker, as well as the whole duration of the discourse marker itself, were used by the speaker to differentiate between the core meaning of the discourse marker and its less predictable meanings. Moreover, prosodic cues were not used redundantly, and the discourse markers did not systematically constitute a separate prosodic unit.

Much of the research on discourse markers, especially in computational linguistics, is concerned with the possible cues for disambiguation. Hirschberg and Litman (1987, 1993) studied *now*, aiming to identify its use as a “cue phrase” intonationally. According to them, prosody is the only feature that provides adequate information to distinguish between *now* as a cue phrase and a non-cue *now*. In the case of *like* and *well*, position in the sentence and the presence of a pause before or after the words in question were found helpful for the identification of discourse markers (Popescu-Belis and Zufferey, 2011). Other prosodic features have been studied in this direction too. Matzen (2004) found clear connections between the functions and prosody of *so*, considering length, pitch contour, sound, and position in the sentence. Stress was shown to be a diagnostic for discourse markers by Dehé and Wichmann (2010a,b). They found that the different functions of *I think* and *I believe* were distinguished by accent placement, while as discourse markers, these phrases were unstressed. The duration of the *like* in its various functions was explored by Gray (2010). Der and Marko (2010) attempted to identify the positional and/or acoustic

properties aiding the listener in perceiving the function of a word. Beňuš (2012) looked at the relationship between the prosody and discourse/pragmatic meanings of Slovak feedback vocalization corresponding to the word *no*. The finding is that the function of back-channel/continuer is the most easily disambiguated by the pitch contour, duration, and other features. In contrast, other functions require more sophisticated multi-factor analyses for identifying the best disambiguating features. Van Zyl and Hanekom (2012) discovered that *okay* with a neutral agreement differs in prosody from *okay* with a reluctant agreement in the same discourse position. Gonen et al. (2015) and Hirschberg and Litman (1987, 1993) found that prosodic information facilitates the hearer distinguishing a discourse marker from its literal counterpart.

Some linguists have also studied non-English discourse markers. Abuczki (2014) found that the duration of the discourse marker was one of the two defining features distinguishing the different functions of the Hungarian discourse markers *mondjuk* (“let’s say”), *ugye* (“is that so?”), and *amúgy* (“otherwise”). Cabarrão et al. (2015) used prosodic features to categorize discourse markers in two speech corpora of European Portuguese. Gonen et al. (2015) described the discursive characteristics of the discourse marker *axshav* (“now”) in spoken Hebrew and explored its prosodic features. The finding is that most discourse markers had characteristic intonation contours, including a sharp decrease in the frequency inside the second syllable. It was also discovered that the duration of the performance of *axshav* as a discourse marker was shorter, both for the performance of the first syllable and the overall duration of the word, compared with its performance as a temporal adverbial. Volín et al. (2016) examined the prosodic forms that expressed eight pragmatic functions of the Czech discourse marker *jasní* [“sure,” “agreed,” “of course,” “okay,” “(al)right” or “fair enough”], including resignation, reassurance, surprise, indifference, or impatience. They proposed multi-parametric differences between *jasní* realizations in terms of their F₀, timing, and intensity patterns, which gave rise to generally consistent form-function mappings.

As is shown in the literature above, the prosodic investigations of discourse markers either only scrutinized some prosodic variables, like accent, intonation, tone, and pauses, or merely examined certain parameters, including F₀, duration, and intensity, which were used to distinguish communicative functions or disambiguate between discourse markers and their literal counterparts. However, these researches did not map prosody onto pragmatics statistically. Recent studies tried to fill this gap. The most representative, Volín et al. (2016), made a step further, exploring the form-function mappings through statistics and modeling, but they only probed a turn-initial discourse marker. The current study of *ni zhīdao* attempts to go even further in this direction by integrating six overriding prosodic parameters into the examination of four functions of *ni zhīdao* in four utterance positions. Such an analysis is likely to shed new light on future discourse marker studies not only in terms of a panoramic view but also with regard to cross-linguistic evidence for linguistic peculiarity and universality, thus allowing to “further

simplify the complex form-function links in discourse markers” (Volín et al., 2016).

Studies of Prosody

As one of the intrinsic properties of discourse, prosody usually refers to three speech characteristics, including pitch, duration, and intensity (Wang, 2011). It constructs the context in which discourse intentions are interpreted, having a significant impact on the construction of discourse meaning and the interpretation of discourse functions. Studies in this respect (e.g., Li, 2002; Lin, 2002; Wu, 2002; Cao, 2003; Local and Walker, 2004; Dehé and Wichmann, 2010a,b; Sohn and Kim, 2014; Ma, 2017) have mainly explored the phonological characteristics of accent, intonation units, prosodic words, prosodic facets, and prosodic chunks based on small-sized corpora of daily speech. Only a few studies (e.g., Hirschberg and Swerts, 1998; Terken and Swerts, 2002; Xiong, 2003; Xiong and Lin, 2004) have examined the relationship between prosody and pragmatics. These studies argue that the prosodic features of discourse are primarily constrained by its communicative functions. The communicative functions of speech are, to some extent, achieved through the prosodic features.

Lucien Brown is a crucial player in prosody research successfully incorporating mainstream linguistic research on prosody into present-day pragmatics. According to Winter et al. (2013), politeness is not only expressed by honorific lexical forms commonly employed in Korean but also by speech acoustics. Brown et al. (2014) found that politeness does not merely reside in verbal markers but is co-signaled by phonetic cues. Brown and Prieto (2017) looked at how (im)politeness is communicated through prosody. They found that multiple acoustic features pattern with politeness-and impoliteness-related meanings, including fundamental frequency (pitch), duration (length), intensity (loudness), and various aspects of voice quality, including breathiness.

These studies of prosody reveal the tone and mood of the speaker with sound waves, speech spectrum, pitch and intensity lines, and the corresponding data. They reflect the mechanisms and intentions underlying the discourse, but they fail to probe the prosody of discourse markers. The speaker's tone, attitude, and emotions can change the prosodic characteristics of discourse markers, and this change precisely reflects the speaker's mind and psychology. Discourse markers, as essential components of meta-language, are more reflective of the speaker's meta-pragmatic awareness compared with other discourse components. Examining the prosody of discourse markers can essentially reveal the discourse motivation behind the choice of discourse components. Therefore, the prosody of discourse markers should be incorporated into the study of prosody as a whole.

Corpus-Based Computational Studies of the Usage of Language

Many empirical studies of language usage based on large-scale authentic corpora have been conducted across the world. These studies calculate and display information on language

usages, such as lexical collocation and semantics (e.g., Gao and Wei, 2017; Gries, 2017), semantic prosody (e.g., Fujisaki and Sudo, 1971; Wei, 2006), syntax (e.g., Wang, 2003), literary texts (e.g., Fang, 2016; Liu and Wang, 2017), translation styles (e.g., Liao, 2000; Hu and Xie, 2017), academic language (e.g., Hyland and Tse, 2012; Wang and Liu, 2017; Wei, 2017), and language teaching (e.g., Wang and Zhu, 2005; He, 2010; Chen and Liang, 2017). These typical case studies reveal the internal mechanisms for, and external influences on, certain language features. The results uncover some actual language usages and the meanings, functions, and thoughts conveyed by them. Based on sufficient evidence, these results of empirical studies are sound and convincing.

Statistical analyses based on corpora represented essential breakthroughs in research methodology. Such analyses have also updated the frameworks for language description and the views on language. They have put empirical studies of language usages on the footing of combining quantitative, qualitative, and interpretative approaches. However, none of the existing statistical analyses have focused on discourse markers and their prosodic features. Prosody as an essential part of speech (Wang, 2011) and discourse markers as distinctive features of natural discourse should carry weights in the empirical studies of language usages. Phonetic techniques and computational statistics can analyze the prosody and pragmatics of discourse markers in the form of spectrograms, statistical reports, and models. Therefore, the abstract and elusive meta-pragmatic awareness can be visualized to a large extent, and the rationale for using discourse markers can be revealed more objectively.

However, “finding statistical models appropriate for dealing with the complexities of human speech is an ongoing challenge for the field of linguistics,” and “this is a much-needed area of future research, which in turn would be highly beneficial to the investigations of the function and prosody of discourse markers” (Matzen, 2004).

EXPERIMENTS AND METHODS

The existing leading Chinese language corpora, including the Modern Chinese Corpus designed by the China National Language Commission, the Modern Chinese Corpus established by Peking University, the BCC Chinese Corpus of Beijing Language and Culture University, and the Media Language Corpus of China Media University, do not contain speech corpora. The Mandarin Speech Corpus for Four Major Dialects and the Media Speech Corpus are designed to fill this gap, but these two audio corpora are still under construction and cannot be used for this study. Drawing on the construction methods for these two corpora, the present study drew on ten representative media interview programs, such as PEOPLE IN THE NEWS, KE FAN QING TING, FEI CHANG DAO, MING REN MIAN DUI MIAN, QIANG QIANG SAN REN XING, etc., to create an audio corpus¹ of more than 32 h. This corpus involves 71 interview conversations and 102 speakers,

¹All the interviews in the form of videos were recorded in the studios of the interviewing programs, where the recording levels were set and controlled by the

consisting of 12 interviewers and 90 interviewees. An overall of 536 tokens of *ni zhidao* was found, among which 490 discourse marker tokens (91%) and 46 non-discourse-marker tokens (9%) were identified by the author and verified by an expert team of five doctors majoring in syntax and five doctors majoring in pragmatics, based on the defining characteristics of discourse markers proposed by Schiffrin (1987: 328). Of the 490 discourse marker tokens, 91 (18.6%) were uttered by 10 interviewers, and 399 (81.4%) were produced by 73 interviewees. The profile of the corpus can be shown in Tables 1, 2.

From this audio corpus, sentences² embedding 490 discourse marker *ni zhidao* tokens were manually extracted as the subject of research, the corresponding audio of which totals 1 h 30'23", the related texts were manually transcribed, and the pragmatic and prosodic features were manually annotated and marked up. The annotation and mark-up of pragmatic features was the annotation and mark-up of the functional factors that affect the prosodic characteristics of discourse. It covered three dimensions: turns (the progression of turns and the types of turn-taking), discourse functions (the functions

professionals in charges of video recording. I downloaded from the official websites of the interviewing programs the videos, from which Cool edit Pro 2.1 was used to extract and save as waveform files the fractions of audios containing the DM *ni zhidao*. And then Praat 5304 was employed to analyze the extracted fractions of audios.

It can be seen in all of the videos that all speakers used microphones which were pinned on their clothes about 20 centimeters below their mouth, which was maybe stipulated by the working professionals in the studio.

Therefore, the difference in the recording settings (including distance to microphone and recording levels) can be overlooked in this study.

²In this research, merely the 490 *ni zhidao* tokens and their embedding sentences were segmented from the audios for analysis. When deciding the boundaries of the sentences embedding *ni zhidao*, we took into full consideration the context, the meaning of the sentences preceding and following the sentences containing *ni zhidao*, and the indexical functions of *ni zhidao*.

The indexical functions of *ni zhidao* provide textual coordinates, which focus on "prior text vs. upcoming text: markers index their containing utterances to whatever text precedes them (proximal), or to whatever text is to follow (distal), or to both" (Schiffrin, 1987: 323).

All the sentences containing *ni zhidao* segmented for analysis have been checked and adjusted by five doctors majoring in syntax and five doctors majoring in pragmatics, who consulted the original audios for reference during checking and adjustment.

of turn-composing and non-turn-composing linguistic units), and paralinguistic information (mood, attitude, etc.) (Xiong, 2003). In the annotation and mark-up of prosody, Praat speech analysis software was used to characterize prosodic parameters, such as duration, tempo, pause (speech break-off), pitch, and intensity. On this basis, all discourse marker tokens of *ni zhidao* were identified and extracted from the corpus and then classified according to their discourse positions. Subsequently, the discourse functions and prosodic features of all *ni zhidao* tokens were examined in detail.

"The courts, education, police, social services, medicine, business meetings, and mass media have all been major areas of institutional talk research during the past 20 years" (Heritage, 1997: 106–107). The data of this research was selected from one distinct category of institutional talk, interview speech, which is institutional by nature and thus relatively formal. The institutional talk takes place in social institutions of various walks of life. The defining characteristics of institutional talk lie in the fact that the interactions in institutional settings are conducted between laypeople and representatives of public institutions. Thus, the institutional talk features the following attributes: the interaction targets goals tied to relevant identities in institutional organizations; the interaction exerts particular constraints on allowable contributions to the business at hand; the interaction involves special inferences particular to specific contexts (Heritage, 1997: 106). As a result, the activities of the conversationalists tend to be strongly influenced by such restrictions of goal orientation, special constraints on contributions, and special inferences. In this respect, there is little "stylistic" difference between different speakers in the data.

In addition, since all of the conversations from which the data was extracted are media interviews, the participants fall into two groups according to their roles: hosts/interviewers and guests/interviewees. The hosts function as the monitors and controllers of the talk flow. They "despite differences in style are all adept at managing outrage, encouraging the telling of secrets, cooling off the proceedings if they threaten the continuity of the show, shutting off boring guests, putting people on the spot, summing up with clichés and platitudes complex situations making the audience feel comfortable witnessing private matters" (Abt and Seesholtz, 1994: 211). They have to elicit the guests' account of personal experiences and viewpoints on specific topics by establishing enough rapport with the guests so that discourse is facilitated instead of being hindered. The guests, under the hosts' elicitation, narrate their personal experiences in a vernacular style due to the stressful situations of interviews and their emotional display. So, the stylistic differences that should be considered are speaker roles (interviewers vs. interviewees) and speakers' emotional states. Besides, speaking styles caused by the speakers' physiological variations ought to be considered. These factors will be discussed in section "Results and Discussion."

Combining computational statistics and modeling, modern speech technology, and discourse analysis, we conducted an empirical study of the actual usage of *ni zhidao*. The specific procedures of the experiments involved the analysis

TABLE 1 | Profile of the interview programs.

Media channels	Programs	Number of Host (s)	Number of Guests
CCTV-1	XIAO CUI SHUO SHI	2	16
	PEOPLE IN THE NEWS	1	4
Dragon TV	KE FAN QING TING	1	9
	YANG LAN ONE ON ONE	1	5
Hunan Satellite Television	HER VILLAGE	2	10
Phoenix Satellite Television	LU YU YOU YUE	1	9
	MING REN MIAN DUI MIAN	1	9
	QIANG QIANG SAN REN XING	1	11
MSN	FEI CHANG DAO	1	4
	XING YUE DUI HUA	1	13
Total	10	12	90

TABLE 2 | Profile of the audio data of 71 interview conversations.

Programs	File name	Duration	Overall <i>ni zhidao</i> tokens	Tokens by interviewer	Tokens by interviewee
XIAO CUI SHUO SHI	Wav.1	9'02"	2	2 by interviewer 1 0 by interviewer 2	0 by interviewee 1
	Wav.2	14'55"	2	0 by interviewer 1 0 by interviewer 2	0 by interviewee 2
	Wav.3	17'48"	6	0 by interviewer 1 0 by interviewer 2	2 by interviewee 3 2 by interviewee 4
	Wav.4	21'55"	6	3 by interviewer 1 3 by interviewer 2	0 by interviewee 5
	Wav.5	22'54"	4	0 by interviewer 1 0 by interviewer 2	2 by interviewee 6 2 by interviewee 7
	Wav.6	23'30"	6	6 by interviewer 1 0 by interviewer 2	0 by interviewee 8
	Wav.7	11'57"	5	2 by interviewer 1 0 by interviewer 2	3 by interviewee 9
	Wav.8	18'32"	10	0 by interviewer 1 0 by interviewer 2	8 by interviewee 10 2 by interviewee 11
	Wav.9	23'12"	7	3 by interviewer 1 0 by interviewer 2	4 by interviewee 12
	Wav.10	22'44"	12	0 by interviewer 1 0 by interviewer 2	12 by interviewee 13
	Wav.11	18'35"	4	0 by interviewer 1 2 by interviewer 2	2 by interviewee 14
	Wav.12	19'56"	4	4 by interviewer 1 0 by interviewer 2	0 by interviewee 15
PEOPLE IN THE NEWS	Wav.18	20'39"	8	2 by interviewer 3	6 by interviewee 16 0 by interviewee 17 0 by interviewee 18
YANG LAN ONE ON ONE	Wav.13	10'44"	3	3 by interviewer 4	0 by interviewee 19
	Wav.14	24'29"	10	2 by interviewer 4	8 by interviewee 20
	Wav.15	22'21"	9	3 by interviewer 4	6 by interviewee 21
	Wav.16	23'48"	11	4 by interviewer 4	7 by interviewee 22
	Wav.17	10'50"	3	0 by interviewer 4	3 by interviewee 23
KE FAN QING TING	Wav.19	20'57"	8	0 by interviewer 5	8 by interviewee 24
	Wav.20	12'53"	5	0 by interviewer 5	5 by interviewee 25
	Wav.21	12'17"	6	0 by interviewer 5	6 by interviewee 26
	Wav.22	13'59"	6	0 by interviewer 5	6 by interviewee 27
	Wav.23	5'46"	5	2 by interviewer 5	3 by interviewee 28 0 by interviewee 29
	Wav.24	18'23"	7	0 by interviewer 5	7 by interviewee 30
	Wav.25	27'52"	9	0 by interviewer 5	9 by interviewee 31
	FEI CHANG DAO	Wav.26	20'23"	10	0 by interviewer 6
Wav.27	17'52"	6	0 by interviewer 6	6 by interviewee 33	
Wav.28	1 h 8'11"	32	0 by interviewer 6	32 by interviewee 34	
LU YU YOU YUE	Wav.29	21'20"	7	0 by interviewer 7	7 by interviewee 35
	Wav.30	21'23"	6	0 by interviewer 7	6 by interviewee 36
	Wav.31	9'15"	4	0 by interviewer 7	4 by interviewee 37
	Wav.32	31'10"	4	0 by interviewer 7	4 by interviewee 38
	Wav.33	29'07"	9	0 by interviewer 7	9 by interviewee 39
	Wav.34	32'07"	10	0 by interviewer 7	10 by interviewee 40
	Wav.35	1 h 35'18"	38	2 by interviewer 7	36 by interviewee 41
QIANG QIANG SAN REN XING	Wav.36	21'23"	6	0 by interviewer 8	6 by interviewee 42 0 by interviewee 43
	Wav.37	21'22"	5	0 by interviewer 8	5 by interviewee 44 0 by interviewee 45
	Wav.38	21'08"	6	4 by interviewer 8	2 by interviewee 46 0 by interviewee 47

(Continued)

TABLE 2 | Continued

Programs	File name	Duration	Overall <i>ni zhidao</i> tokens	Tokens by interviewer	Tokens by interviewee
	Wav.39	3'06"	1	1 by interviewer 8	1 by interviewee 48 0 by interviewee 49
	Wav.40	22'15"	12	8 by interviewer 8	2 by interviewee 50 2 by interviewee 51
	Wav.41	21'30"	4	3 by interviewer 8	1 by interviewee 52 0 by interviewee 53
	Wav.42	22'01"	5	0 by interviewer 8	5 by interviewee 54 0 by interviewee 55
	Wav.43	8'08"	4	1 by interviewer 8	3 by interviewee 56 0 by interviewee 57
	Wav.44	21'07"	8	5 by interviewer 8	3 by interviewee 58 0 by interviewee 59
	Wav.45	20'53"	9	4 by interviewer 8	3 by interviewee 60 2 by interviewee 61
MING REN MIAN DUI MIAN	Wav.46	23'32"	3	1 by interviewer 9	2 by interviewee 62
	Wav.47	23'09"	6	0 by interviewer 9	6 by interviewee 63
	Wav.48	23'09"	5	0 by interviewer 9	5 by interviewee 64
	Wav.49	23'51"	3	0 by interviewer 9	3 by interviewee 65
	Wav.50	24'44"	4	0 by interviewer 9	4 by interviewee 66
	Wav.51	24'19"	6	0 by interviewer 9	6 by interviewee 67
	Wav.52	24'50"	4	1 by interviewer 9	3 by interviewee 68
	Wav.53	16'31"	5	0 by interviewer 9	5 by interviewee 69
HER VILLAGE	Wav.54	20'34"	7	5 by interviewer 10 0 by interviewer 11	2 by interviewee 70
	Wav.55	18'22"	9	1 by interviewer 10 0 by interviewer 11	5 by interviewee 71
	Wav.56	38'14"	12	4 by interviewer 10 0 by interviewer 11	8 by interviewee 72
	Wav.57	19'28"	6	2 by interviewer 10 0 by interviewer 11	4 by interviewee 73
	Wav.58	27'34"	9	1 by interviewer 10 0 by interviewer 11	3 by interviewee 74 5 by interviewee 75
	Wav.59	18'33"	8	0 by interviewer 10 0 by interviewer 11	8 by interviewee 76
	Wav.60	19'47"	7	4 by interviewer 10 0 by interviewer 11	2 by interviewee 77 1 by interviewee 78
XING YUE DUI HUA	Wav.61	4'52"	2	0 by interviewer 12	2 by interviewee 79
	Wav.62	9'58"	6	0 by interviewer 12	6 by interviewee 80
	Wav.63	4'57"	3	0 by interviewer 12	3 by interviewee 81
	Wav.64	7'35"	7	1 by interviewer 12	6 by interviewee 82
	Wav.65	7'15"	6	0 by interviewer 12	6 by interviewee 83
	Wav.66	4'59"	3	0 by interviewer 12	3 by interviewee 84
	Wav.67	9'45"	5	0 by interviewer 12	5 by interviewee 85
	Wav.68	7'33"	4	0 by interviewer 12	4 by interviewee 86
	Wav.69	8'07"	5	0 by interviewer 12	5 by interviewee 87
	Wav.70	4'57"	3	1 by interviewer 12	2 by interviewee 88
	Wav.71	18'36"	8	0 by interviewer 12	4 by interviewee 89 4 by interviewee 90
Total	71 wave files	32 h 2'47"	490	91 by 10 interviewers	399 by 73 interviewees

of its prosodic parameters, the investigation of its pragmatic functions, and the examination of the interaction between its prosody and pragmatics.

In analyzing the prosody of *ni zhidao*, we drew on Praat speech technology to visualize and

label the prosodic features and output results (see **Figure 1**).

In this process, we first inputted the wave files into Praat and obtained the sound spectrograms. In these spectrograms, we separated *ni zhidao* from the rest of its embedding sentence

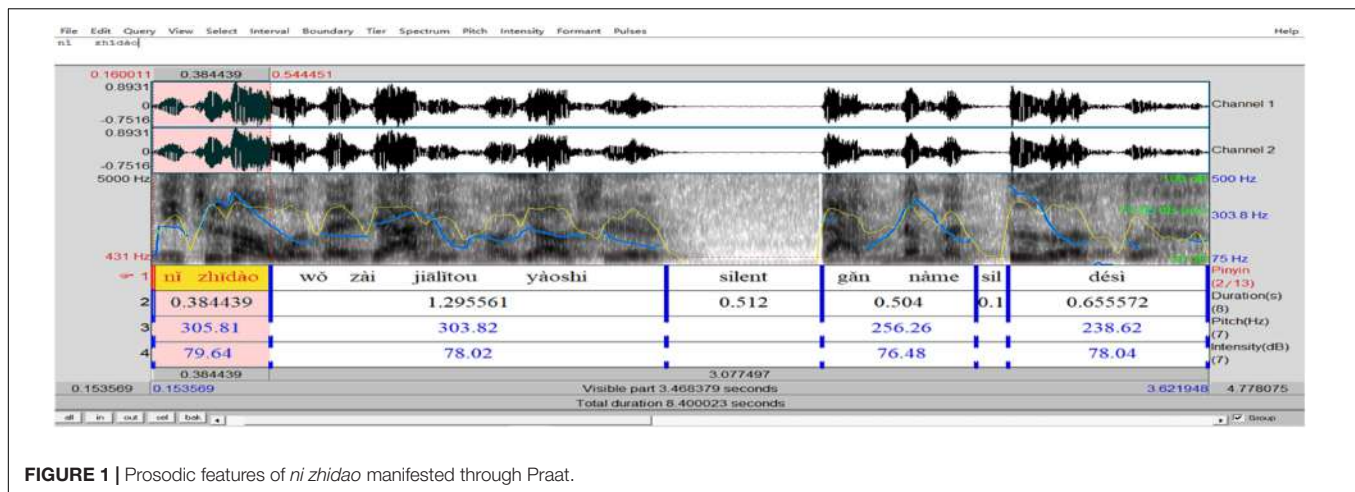


FIGURE 1 | Prosodic features of *ni zhidao* manifested through Praat.

by acoustically determining its onset and offset³. Then we added scripts in Chinese *pinyin* and duration (and pauses, if they did occur) manually. Based on duration, we got the tempo⁴ values. After that, we used Praat “Pitch” and “Intensity” functions (shown at the top of **Figure 1**) to collect the values of F₀ and intensity semi-automatically. In these functions, there are sub-functions, including “Pitch listing,” “Get pitch,” “Get minimum pitch,” and “Get maximum pitch,” which can provide the corresponding value (s) of the selected audio part. “Pitch listing” is used to obtain a list of pitches corresponding to any point of time during the duration of *ni zhidao* in time sequence in a new automatically pop-up window; “Get pitch” is used to show the mean pitch of *ni zhidao* during its duration in a new automatically pop-up window; “Get minimum pitch” is used to display the minimum pitch of *ni zhidao* over its duration in a new automatically pop-up window; “Get maximum pitch” is used to get the maximum pitch of *ni zhidao* over its duration in a new automatically pop-up window. In the same vein, the mean, minimum, and maximum intensity of *ni zhidao* can be obtained through “Intensity listing,” “Get intensity,” “Get minimum intensity,” and “Get maximum intensity” functions. Besides, once *ni zhidao* and the pause before and after it is selected, the value of its duration and pre-pause and post-pause will automatically be shown at the bottom panel of the Praat window. All values of the collected prosodic parameters were checked and adjusted by three doctoral students majoring in phonetics and their supervisor. Finally, based on the values obtained, we used the R boxplot to plot the distribution of prosody (see **Figure 2**).

In the pragmatic investigation of *ni zhidao*, we relied not merely on context, Schiffrin (1987), and Matzen (2004) as the main determinants of pragmatic functions (see **Figures 6–8**), but

³As with the determination of the onset and offset of *ni zhidao*, we drew on acoustic recognition, as well as the characteristics of the sound spectrogram, to determine the boundary of phonemes and/or syllables.

⁴There are, generally, two ways of measuring tempo: calculating the mean duration of syllables contained in a sentence, or calculating the number of syllables uttered in a second (Cao, 2003; Li, 2006). Considering that Chinese is a “syllable-timed” (Keller and Zellner, 1996) language, the present study adopts the first approach.

on position and prosody as supplementary references as well. Subsequently, we invited four doctors of pragmatics to verify the pragmatic functions inferred.

In terms of the correlation of prosody and pragmatics of *ni zhidao*, we used the random forest in R to construct a pragmatics classification model based on prosody (see **Figure 11**) to find out the importance of prosody to the performance of pragmatic functions (see **Figure 12**), and then to use the model constructed to predict pragmatic functions. Subsequently, based on the statistical evidence, we objectively interpreted the interaction between the prosody and pragmatics of *ni zhidao*.

This corpus-based research used prosodic evidence to objectively reveal not merely the role of *ni zhidao* in dynamically constructing and embodying specific contexts but also its communicative functions and the meta-pragmatic awareness underlying it. Such a study can, to a large extent, break through the limitations of traditional discourse marker research, which mainly relies on context and discourse characteristics for subjective and intuitive reasoning. Therefore, the method for discourse marker studies can be made more rigorous, the scope

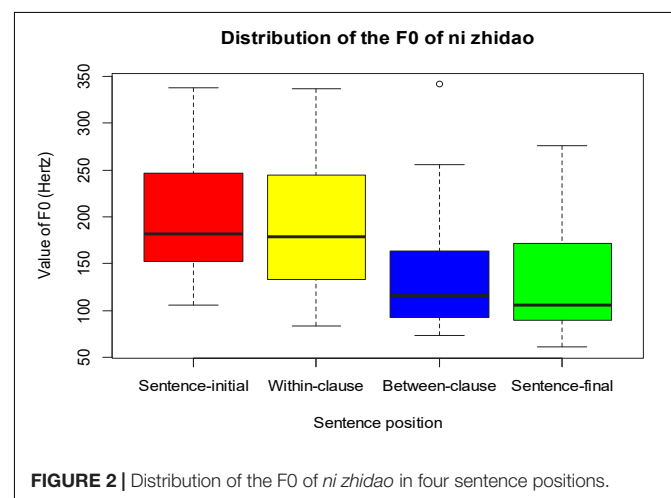


FIGURE 2 | Distribution of the F₀ of *ni zhidao* in four sentence positions.

of research can be made more extensive, and the findings can be made sounder.

RESULTS AND DISCUSSION

Sentence Positions of *ni zhidao*

It was found that the 490 tokens of *ni zhidao* were used in four sentence positions: 50 at the beginning of sentences, 108 within clauses, 170 between clauses⁵, and 162 at the end of sentences. **Figure 3** illustrates this distribution.

As **Figure 3** shows, most *ni zhidao* tokens were used in the middle (within-clause and between-clause) and at the end of sentences. This discovery indicates that the findings of some studies (e.g., Schiffrin, 1987; Fraser, 1990; Hansen, 1997; Schourup, 1999) need to be updated, which advocate that occurring at the beginning of a sentence (initiality) is one of the defining features of discourse markers.

Distribution of Prosodic Parameters of *ni zhidao*

Figure 4 summarizes the values of *ni zhidao*'s prosodic parameters, including their minimum and maximum values,

⁵In this paper, "clause" merely refers to that within the same sentence where each token of *ni zhidao* is embedded. So, between-clause tokens only refer to those inserted between two clauses embedded in the same sentences. Sentence-initial tokens and sentence-final tokens should not be regarded as between-clause, for the former are merely pragmatically indexed to the clause(s) following them, and the latter are only pragmatically indexed to the clause(s) preceding them.

mean values, median values, and 1st and 3rd quartile values, in the dataset as a whole. When occurring in different sentence positions, *ni zhidao* displays different ranges of values regarding duration, tempo, pre-pause, post-pause, F₀, and intensity, as is illustrated in **Figure 5**.

Table 3 shows the mean values of *ni zhidao*'s prosodic parameters in four sentence positions.

Figure 5 and **Table 3** show specific correlations between the prosodic parameters and sentence distribution of *ni zhidao*. Clearly, from the sentence-initial to sentence-final positions, the duration of *ni zhidao* shortened gradually, its tempo sped up gradually, and its F₀ and intensity decreased gradually; sentence-initial *ni zhidao* had the most extended duration, the slowest tempo, the highest F₀, and the most vigorous intensity. These findings confirm some existing findings: in general, F₀ is positively correlated with duration (Cai et al., 1998; Xu, 1999; Zhong et al., 2001; Tao, 2001); higher pitch, more vigorous intensity, and longer duration generally focus on the same discourse component (Vaissière, 1983); the discourse component at the beginning of the turn is higher in pitch, which is usually used by the speaker to grab or take over the turn (Braga and Marques, 2004); the speaker draws the listener's attention to the subsequent discourse by raising the pitch (Ward, 2004); the pitch of the phrase initiating a new topic is higher than that of other components in the same turn (Hirschberg, 2002); intensity increases or decreases automatically as F₀ increases or decreases (Wu, 2002); the phrase at the end of the sentence has a narrower F₀ range, lower pitch, and faster tempo (Hirschberg, 2002); there is the

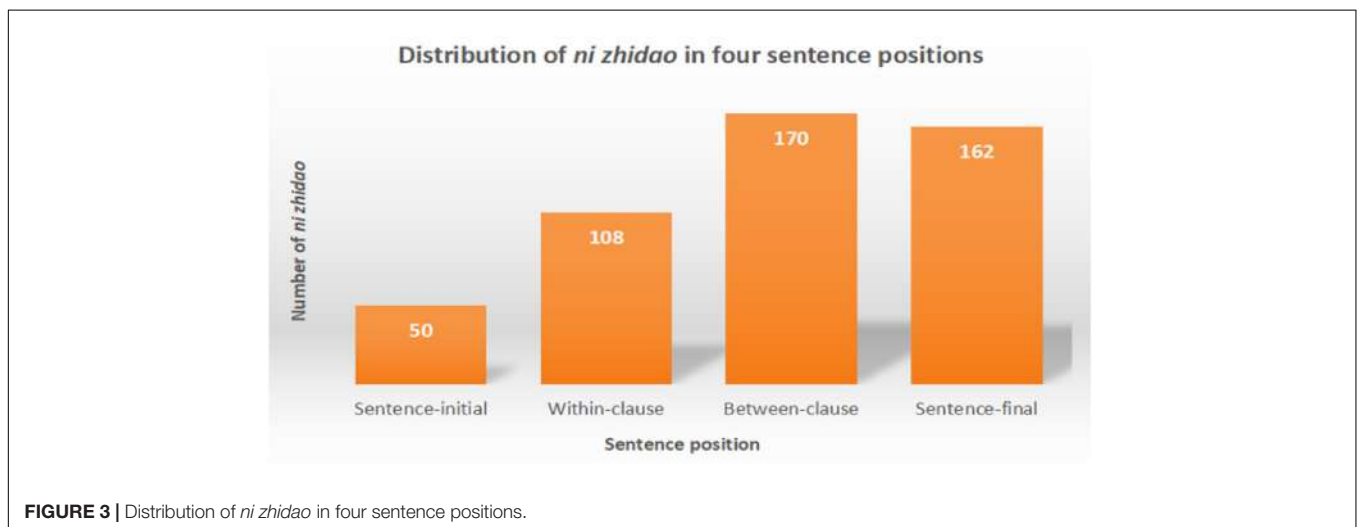


FIGURE 3 | Distribution of *ni zhidao* in four sentence positions.

Duration	Tempo	Pre.pause	Post.pause	F0	Intensity
Min. :0.1230	Min. :0.0310	Min. :0.0000	Min. :0.00000	Min. : 61.03	Min. :51.42
1st Qu.:0.3070	1st Qu.:0.0920	1st Qu.:0.0000	1st Qu.:0.00000	1st Qu.: 97.12	1st Qu.:70.21
Median :0.3850	Median :0.1130	Median :0.0000	Median :0.00000	Median :134.24	Median :76.23
Mean :0.4081	Mean :0.1161	Mean :0.2589	Mean :0.09401	Mean :153.28	Mean :74.38
3rd Qu.:0.4930	3rd Qu.:0.1370	3rd Qu.:0.4480	3rd Qu.:0.08200	3rd Qu.:166.52	3rd Qu.:79.59
Max. :0.7770	Max. :0.2080	Max. :1.6010	Max. :0.84700	Max. :341.28	Max. :89.67

FIGURE 4 | Profile of values of prosodic parameters of *ni zhidao* in four sentence positions.

effect of final lowering, that is, the phrase at the end of the sentence displays the lowest pitch (Wang, 2011). The package “PerformanceAnalytics” in R was used to demonstrate the correlations between the six prosodic variables of *ni zhidao*, as is illustrated in Figure 6.

The matrix in Figure 6 makes the binary variable correlation well pronounced. The diagonal shows the histograms of the data

for the six prosodic variables. The upper right cells (above the diagonal) show the correlation coefficients⁶ for any two variables

⁶Correlation coefficient: A positive correlation coefficient indicates a positive relationship between variables; a negative correlation coefficient indicates a negative relationship between variables; the closer the data is to 1 or -1, the greater the correlation between variables is.

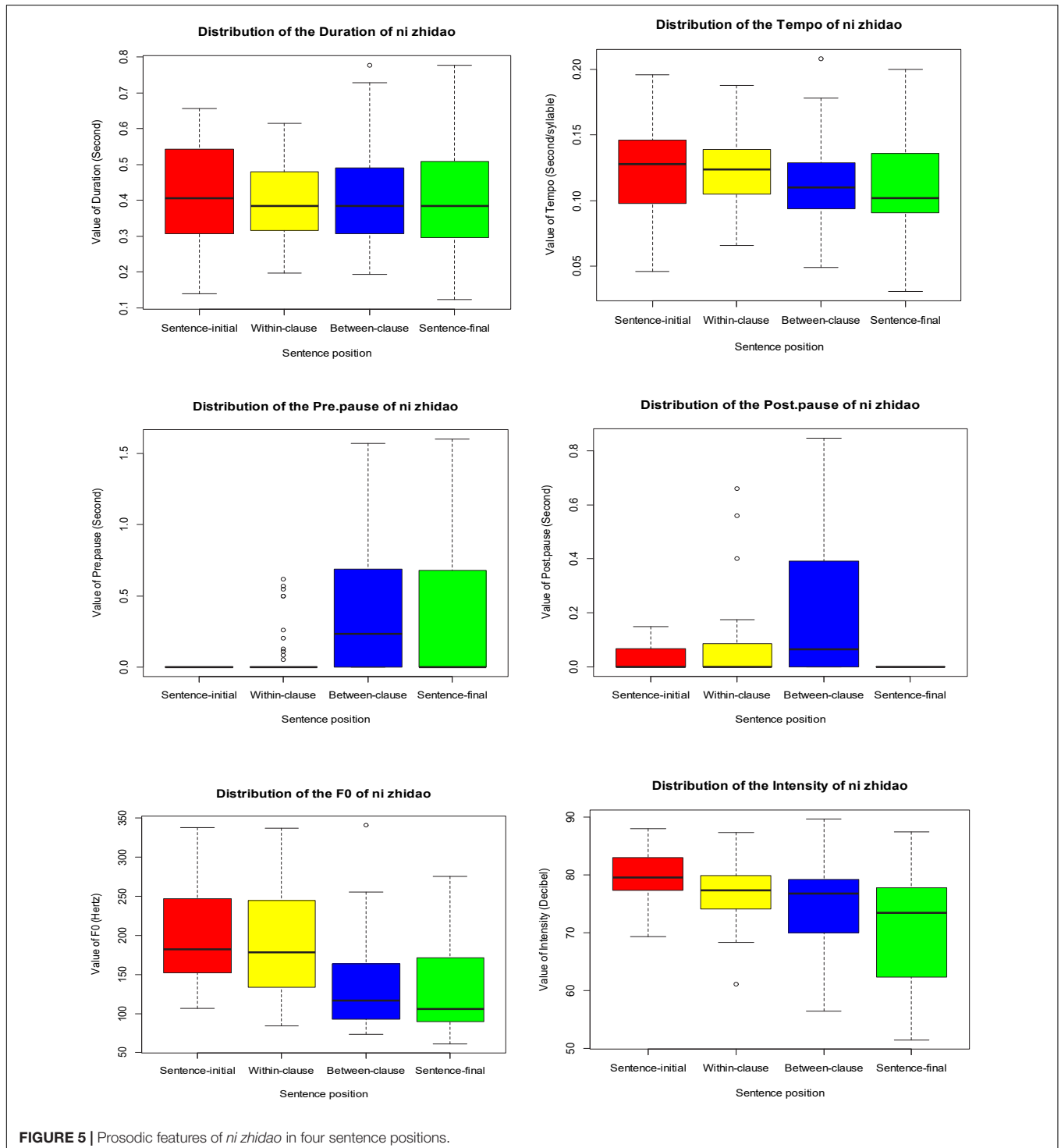


FIGURE 5 | Prosodic features of *ni zhidao* in four sentence positions.

TABLE 3 | Mean values of prosodic parameters of *ni zhidao* in four sentence positions.

Prosodic features	Positions			
	Sentence-initial	Within-clause	Between-clause	Sentence-final
Mean pre-pause (second)	—	0.093	0.371	0.328
Mean post-pause (second)	0.194	0.082	0.261	—
Mean duration (second)	0.384	0.372	0.360	0.336
Mean tempo (second/syllable)	0.128	0.124	0.120	0.112
Mean F ₀ (Hz)	196.733	185.053	142.822	131.872
Mean intensity (dB)	79.041	76.920	75.033	70.300

and significance levels⁷. The lower left cells (below the diagonal) show the scatterplot of any two variables with the fitted lines⁸.

The scatterplot and fitted lines, correlation coefficients, and significance levels all show that there is a significant correlation between any two of the five variables, including duration,

⁷Level of significance: the higher the number of asterisks * is, the more significant the correlation between variables is. The absence of an asterisk * indicates a weak correlation.

⁸Fitted line: The closer the distribution is to the fitted line, the more significant the correlation between two variables.

tempo, pre-pause, F₀, and intensity and that there is no significant correlation between post-pause and the four variables of intensity, duration, tempo, and pre-pause, and post-pause is only significantly correlated with F₀.

As is statistically proved in **Figure 6**, the F₀ of *ni zhidao* is positively correlated with its duration, tempo, and intensity, and negatively correlated with its pre-pause and post-pause; the existent studies (e.g., Vaissière, 1983; Cai et al., 1998; Xu, 1999; Zhong et al., 2001; Hirschberg, 2002; Wu, 2002; Ward, 2004; Braga and Marques, 2004; Wang, 2011) confirms the impact of intensity, duration (and tempo), position, and final lowering effect on F₀. Therefore, both the statistical evidence and the findings in the literature can somehow explain the wide range of the mean values of *ni zhidao* from 61.03 to 341.28 Hz. *Ni zhidao*'s pitch contours of greatly varying ranges revealed in the acoustic experiment, such 75.30–105.17 Hz, 80.91–99.46 Hz, 123.85–192.53 Hz, 146.63–236.91 Hz, 209.16–266.06 Hz, 185.54–277.47 Hz, 182.71–311.54 Hz, 217.89–397.14 Hz, 120.52–407.84 Hz, etc., also justify this wide range to some extent. There is a rich linguistic tradition characterizing variation in overall pitch contour in many different ways: syntactic mood, speaker attitudes, and speaker beliefs (Bolinger, 1989). Some inherent meaning has often been sought in particular contours-often modulated by context (Liberman and Sag, 1974).

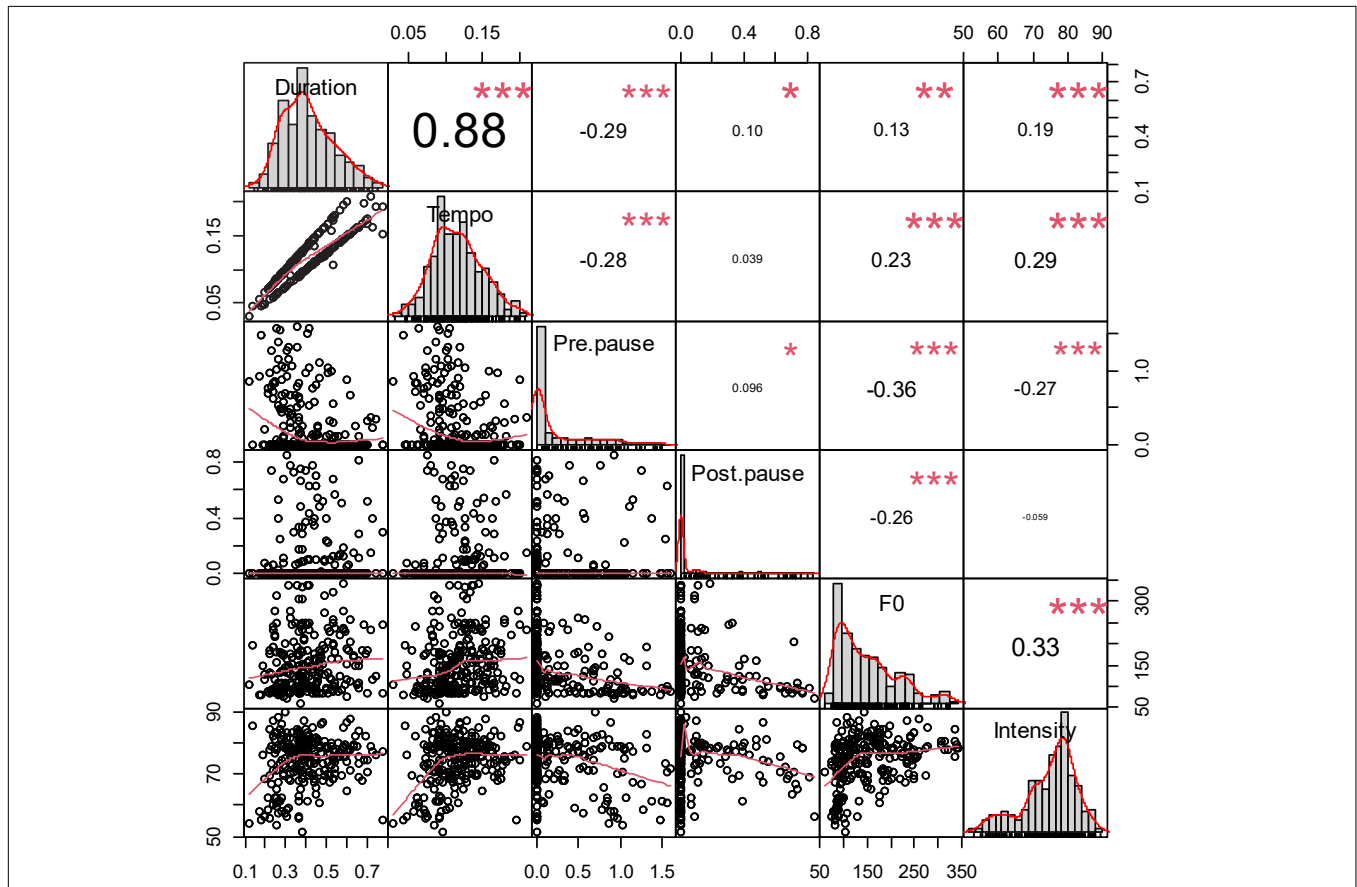


FIGURE 6 | Correlation between the prosodic features of *ni zhidao* in four sentence positions.

The expressive content of prosody, including the identity of the speakers, their attitude, mood, age, sex, sociolinguistic group, and other extralinguistic features (d’Alessandro, 2006), is likely to influence the pitch contour produced. Additionally, this wide range may be attributed to the diverse emotional states of the speakers, that is, the correlation of prosodic features with emotional speech (Hirschberg, 2002), typically exemplified by speakers 37, 39, 42, 65, etc., and to their distinct speaking habits caused by diversified physiological attributes. The fact that word boundaries, morphological and phonological word structures, and juncture phenomena may all contribute to determining F₀ contour (Vaissière, 1983: 63) can be counted as another contributor.

Such associations deepen our understanding of prosody, and thus, to some extent, overcome the subjectivity and limitation of judging prosody merely from context. Besides, this can also provide quantitative and visual clues for investigating the pragmatics of *ni zhidao*.

Pragmatic Functions of *ni zhidao*

Based on some previous studies (including Schiffrin, 1987; Lenk, 1995, 1998; Aijmer, 1996, 2002; Brinton, 1996; Hansen, 1998; Jucker and Ziv, 1998; Erman, 2001), Shan (2014a) and Shan (2014b) explored the pragmatic functions of *ni zhidao* on the interpersonal plane and the textual plane. On the interpersonal plane, *ni zhidao* constructs cognitive context, projects mental attitudes or checks the hearer’s comprehension/attention, and make relevant inference ostensive from the perspectives of cognition, psychology, and social interaction. Specifically, *ni zhidao* implies not only the speaker’s attitudes, evaluation, judgments, expectations, and demands, but the nature of the social exchange, the role played by the speaker, and the role assigned to the hearer as well. In this

way, it indicates the speaker’s intentions, wishes, and emotions, and in the meantime, takes into consideration the hearer’s face, feelings, and social status. On the textual plane, *ni zhidao* helps to ensure the fluent progression of a particular stretch of discourse by creating coherence between the preceding and following sentence segments, by eliciting new topics/turns, and by emphasizing topics. Therefore, *ni zhidao* provides coordinates within the context by indexing sentences either to the texts (textual functions) or to the participants (interpersonal functions) (Schiffrin, 1987: 316–317).

Concerned with the communicative function of *ni zhidao* in simultaneous speech, this study only focuses on its interpersonal functions. Turn position serves to differentiate functional categories (Matzen, 2004). When occurring sentence-initially, -medially (within clauses and between clauses), and -finally, *ni zhidao* displays “subtle changes in meaning or function” (Hansen, 1997: 156). The functional load of discourse markers is embedded in dialog context; humans are better at identifying the communicative functions of discourse markers when they are judged in combination with corresponding dialog sections: “even a very limited context appears to suffice” (Gravano et al., 2007: 804). Drawing on the context in data analysis and based on Schiffrin (1987) and Matzen (2004), the current research found that *ni zhidao* mainly fulfills four categories of pragmatic functions, including that of initiating a topic (by grabbing/taking over the turn) when occurring sentence-initially (see Figure 7), of holding the floor when appearing within clauses (see Figure 8), of marking coherence when making its presence between clauses (see Figure 9), and of projecting attitudes and feelings when showing up sentence-finally (see Figure 10). The distribution of the 490 *ni zhidao* tokens among these four pragmatic categories is illustrated in Figure 11.

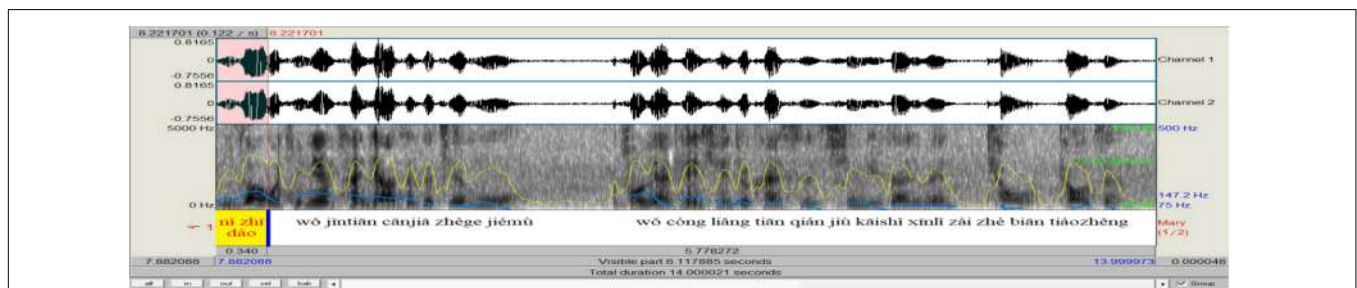


FIGURE 7 | Praat analysis of sentence-initial *ni zhidao*.

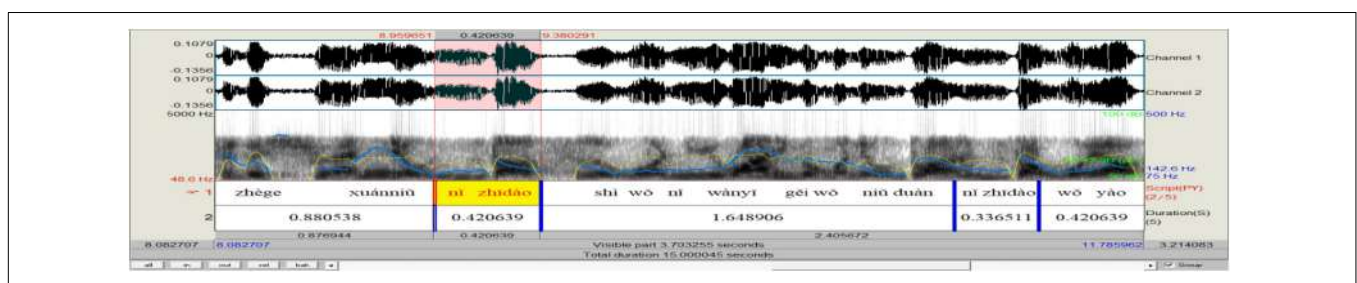


FIGURE 8 | Praat analysis of within-clause *ni zhidao*.

It needs to be pointed out that each of these four broad functions can be divided into specific sub-functions. Take the floor-holding function for instance. This umbrella function will likely consist of the sub-functions of stalling time for thinking (lexical/content search), marking the false start, indicating reformulation, etc. These sub-functions will be studied in separate papers devoted to examining the sentence-initial *ni zhidao*, the within-clause *ni zhidao*, the between-clause *ni zhidao*, and the sentence-final *ni zhidao*, respectively. In these prospective examinations, the minute prosody-pragmatics correlations of these sub-functions will be scrutinized, as claimed by Schegloff (1982); Ward and Tsukahara (2000), Gravano and Hirschberg (2009), and Buschmeier et al. (2011). The current study only makes an initial attempt to probe one broad prosody-dependent function at each of the four given sentence positions, that is, the topic-initiating function of the

sentence-initial *ni zhidao*, the floor-holding function of the within-clause *ni zhidao*, the coherence-marking function of the between-clause *ni zhidao*, and the emotion-projecting function of the sentence-final *ni zhidao*. These impressionistic pragmatic categories based on immediate context and careful listening can be substantiated by acoustic data (Volín et al., 2016) in the following section.

Importance of Prosodic Variables of *ni zhidao* to Its Pragmatics and Modeling of Its Prosody-Pragmatics Correlation

Pragmatic functions, such as holding the floor, embodying thought hesitation, managing interpersonal relationships, and expressing emotions and attitudes, rely heavily on prosody (Braga and Marques, 2004). Thus, it can tentatively be argued

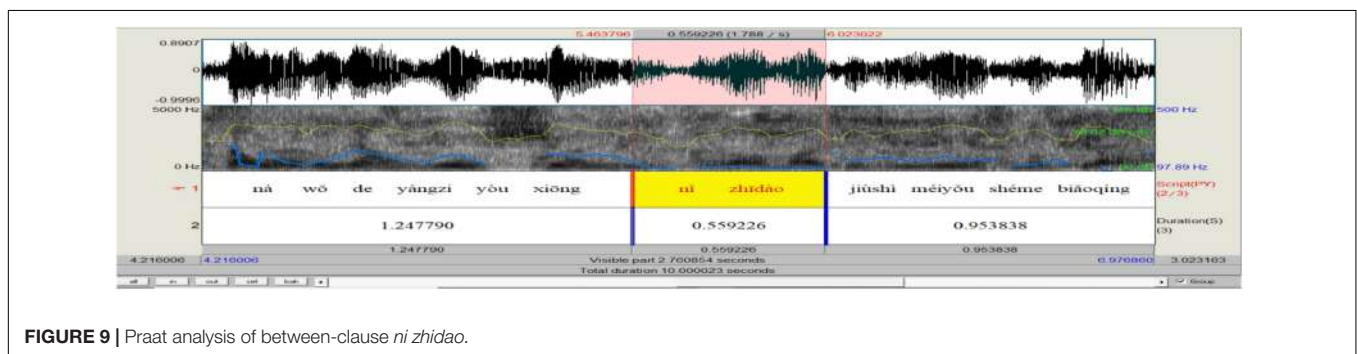


FIGURE 9 | Praat analysis of between-clause *ni zhidao*.

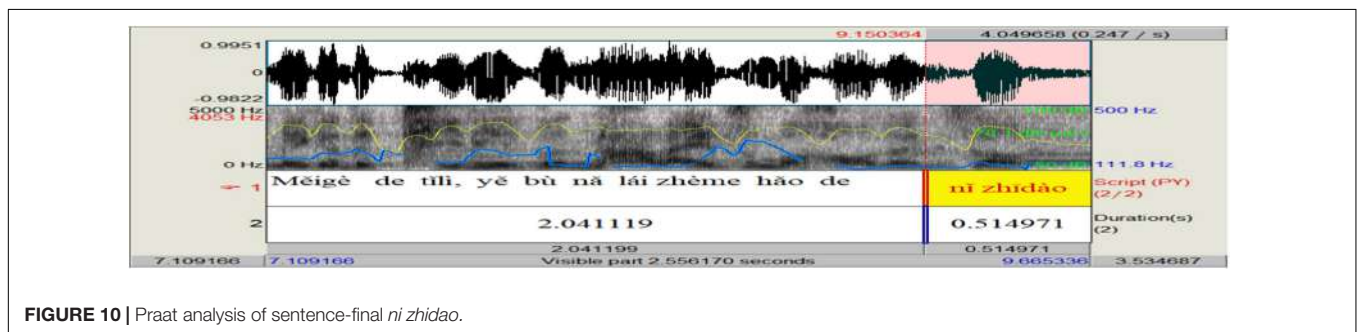


FIGURE 10 | Praat analysis of sentence-final *ni zhidao*.

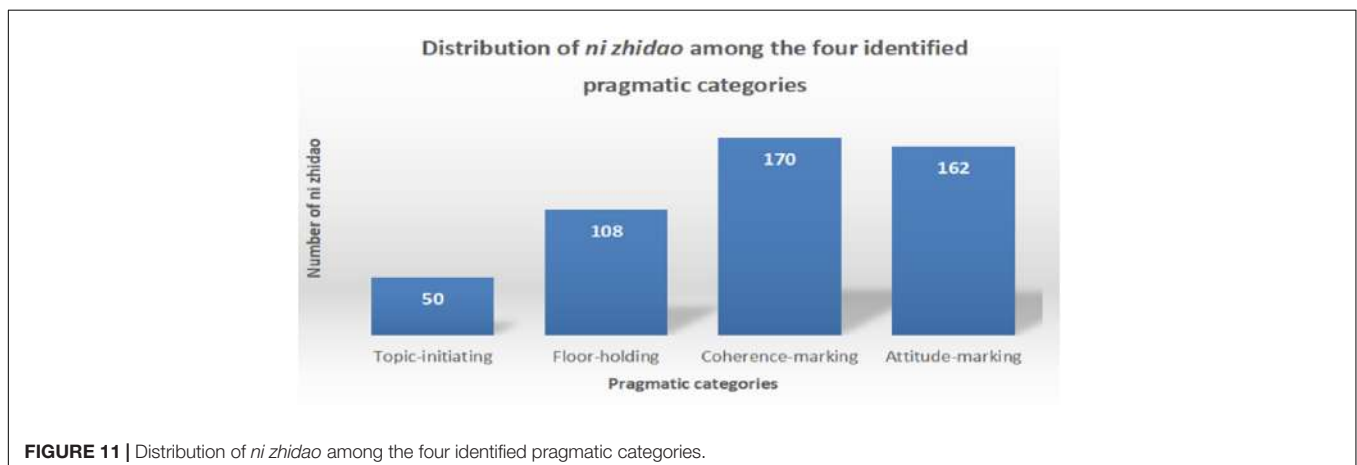


FIGURE 11 | Distribution of *ni zhidao* among the four identified pragmatic categories.

that the prosodic features of *ni zhidao* jointly reflect the communicative intent of the speaker and the underlying meta-pragmatic awareness involved. The four categories of pragmatic functions fulfilled by *ni zhidao* showed acoustic properties which were sufficiently specific to allow the Random Forest algorithm to distinguish them from each other statistically (Volin et al., 2016).

In this section, the Random Forest⁹ classification model¹⁰ (see Endnote i for the script) in R is used to test the importance of the prosodic variables of *ni zhidao*, including duration, tempo, pre-pause, post-pause, F_0 , and intensity, to the performance of its pragmatic functions, to build a pragmatics classification model based on prosody, and to use this model to predict the pragmatic

functions of *ni zhidao*. The first five rows of the dataset (“Ni zhidao.csv”¹¹) below provide an overview of the research data:

Position	Duration	Tempo	Pre-pause	Post-pause	F_0	Intensity	Pragmatics
1 Sentence-initial	0.294	0.098	0	0	200.437	78.449	Topic-initiating
2 Sentence-initial	0.261	0.087	0	0.036	106.316	87.978	Topic-initiating
3 Sentence-initial	0.384	0.128	0	0	305.818	79.646	Topic-initiating
4 Sentence-initial	0.656	0.164	0	0.114	149.297	73.517	Topic-initiating
5 Sentence-initial	0.412	0.137	0	0.108	337.744	79.253	Topic-initiating

During the building of the random forest classification model, “Pragmatics” was set as the dependent variable, and “Duration,” “Tempo,” “Pre-pause,” “Post-pause,” “ F_0 ,” and “Intensity” were nominated as the independent variables. **Figure 12** illustrates the established pragmatics classification model based on prosody.

From **Figure 12**, it is seen that the “OOB estimate of error rate” is 0%. The confusion matrix indicates that the classification error of the random forest classification model is 0. In other words, this classification model can perfectly explain all the data in the dataset because no function is attributed to the wrong class, as is displayed in the “Confusion matrix,” particularly in the column of “class.error.” This result, therefore, shows that the established model functions effectively at this stage of statistical analysis.

In this model, the importance of the independent variables was statistically tested and visualized through **Figure 13**. This figure shows that the six prosodic variables (“Duration,” “Tempo,” “Pre-pause,” “Post-pause,” “ F_0 ,” and “Intensity”) are all important¹² to the performance of the four pragmatic functions of “coherence-marking,” “emotion-projecting,” “floor-holding,” and “topic-initiating” respectively and collectively. Specifically, these variables contribute to each of these four functions differently, which is illustrated by the different heights of the individual bars. As is proved by “MeanDecreaseAccuracy” and “MeanDecreaseGini,” “Post-pause,” “ F_0 ,” and “Intensity” are overall more important than “Duration,” “Tempo,” and “Pre-pause.”

Given that the classification model established above has been proved effective and the six prosodic variables have all been proved important in the model, this model can be applied to predict the pragmatics of *ni zhidao* (see **Figure 14**). In this figure, the “Confusion Matrix and Statistics” shows that the “Prediction” perfectly matches the “Reference,” that is, none of the four categories of functions is inaccurately predicted; the “Overall Statistics” indicates that the overall accuracy rate of prediction by the pragmatics classification model based on prosody is 100%; the “Statistics by class” displays that the “Balanced Accuracy” of each class of function is also 100%. This means that the constructed model can perfectly predict the pragmatic functions of *ni zhidao*.

Next, the K-fold cross-validation (see **Figure 15**) is used to validate the performance of the established classification model. As can be seen, the dataset of the current study is divided into

⁹The GAMM, the multinomial regression, and the random forest were used as algorithms for categorization, to construct the pragmatics classification model, and the random forest was eventually adopted because it provided the best result of classification.

¹⁰#The script for random forest:

```
rm(list=ls()) # clear all variables
graphics.off() # Close all figure window(s)
cat("\014") # clear console

# read data
Data <- read.csv("Ni zhidao.csv", header=T, stringsAsFactors = TRUE)
n <- nrow(Data)

# random forest

library("randomForest")
set.seed(9999);
RF <- randomForest(Pragmatics ~., Data, importance = T, localImp = T, proximity = T)
# full data
RF
RF$confusion
Imp <- RF$importance
par(mfrow=c(2,3)) # figure of the variable importance
for(i in 1:6){
  barplot(Imp[i,], main=colnames(Imp)[i])
  par(mfrow=c(1,1)) # figure of the local importance
  matplot(1:(ncol(Data)-1), RF$local, type='l', xlab = 'Variables', ylab = 'Local Importance')
}

RF.pred <- predict(RF, Data)#, type="class")
library("caret")
CM.RF <- confusionMatrix(RF.pred, Data$Pragmatics) # confusion matrix etc.
CM.RF

## K-fold cross validation
source("Fold.r")
kfold <- 10
mm <- Fold(kfold, Data, 7, 6666)
error <- matrix(0, kfold) # to assign initial value 0
set.seed(9999);
for(i in 1:kfold){
  m <- mm[[i]]
  RF_cv <- randomForest(Pragmatics ~., data = Data[-m,])
  error[i] <- sum(Data[m,7] != predict(RF_cv, Data[m,]))/length(m)}

error_bar <- mean(error) # average of error
Accuracy <- 1-error_bar
error_bar
```

NB: “Fold.r” in this script is a function defined by the authors to divide the dataset randomly. It is designed to ensure the balance between the 10 sub-datasets of data during the K-fold cross-validation.

¹¹The dataset “Ni zhidao.csv” and the script used for this research have been uploaded to GitHub at <https://github.com/victorsyhz/Raw-Data-script> for reference.

¹²The higher the values are, the more important the variables are.

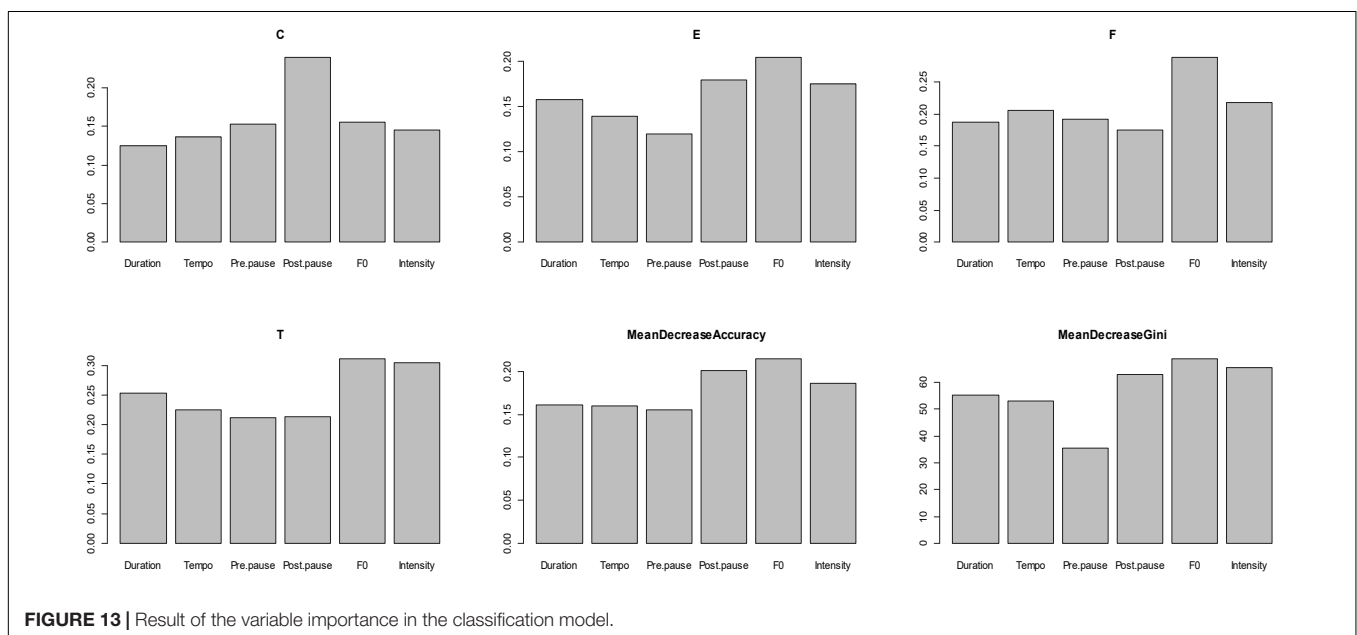
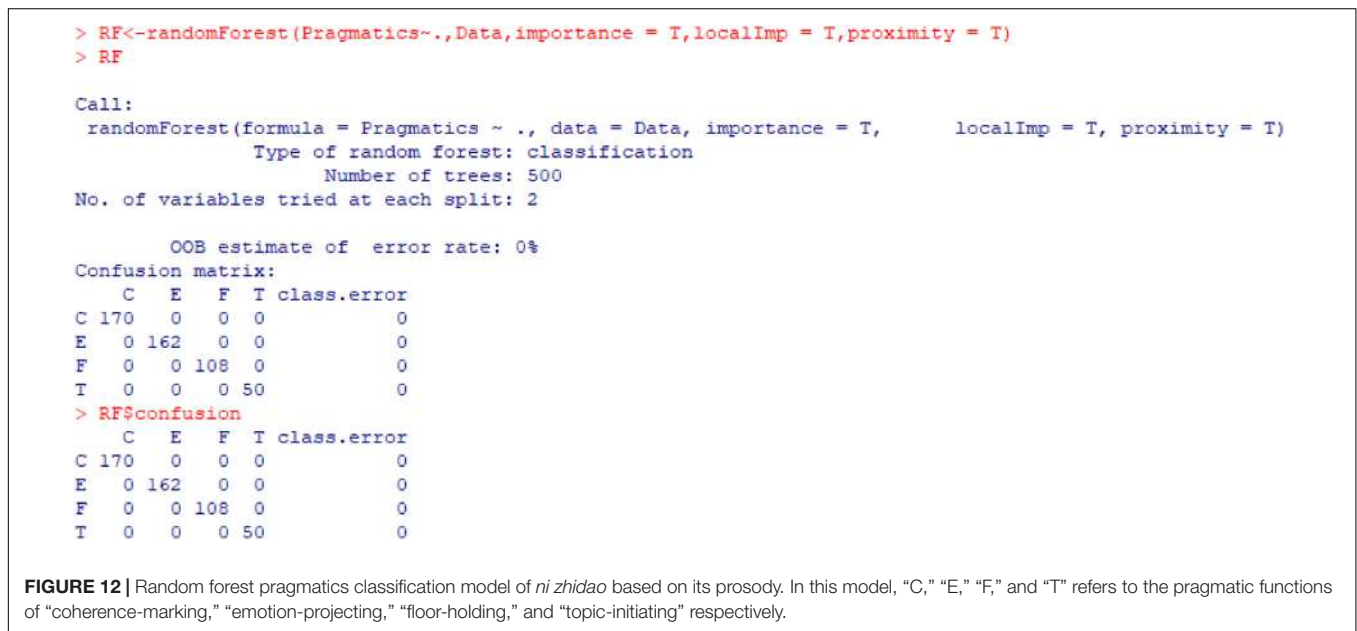
ten sub-datasets, each of which is used as a testing set and the remaining nine of which are used as a training set in a recycling manner. In this way, the error of the 10-fold cross-validation (just below 0.045) is finally worked out. By drawing on all the data in the dataset, this way of validation can most accurately evaluate the performance of the established model when it is used on the test set. The reasonably low error indicator of just below 0.045 shows that the constructed model performs satisfactorily, and thus there is no need to improve the model.

Discussion

The prosodic features of a sentence are primarily constrained by its communicative functions, and the latter can be realized

through the former to some extent (Xiong and Lin, 2004: 116). As the results of the random forest algorithm in section “Importance of Prosodic Variables of *Ni Zhidao* to Its Pragmatics and Modeling of Its Prosody-Pragmatics Correlation” indicate, the six prosodic parameters of *ni zhidao* are significantly related to its pragmatic functions, and thus its pragmatics can objectively be revealed and understood through its prosody.

Sentence-initial *ni zhidao* is designed to initiate a topic. To this end, the speaker mainly resorts to duration, F₀ and intensity, as is statistically proved in **Figure 13**. The acoustic experiment showed that sentence-initial *ni zhidao* is characteristic of a contour of a sharp rise followed by an abrupt fall, usually with a reset. Statistics in **Table 3** show that sentence-initial *ni*



```

> RF.pred<-predict(RF,Data)#,type="class")
> CM.RF<-confusionMatrix(RF.pred,Data$Pragmatics)
> CM.RF
Confusion Matrix and Statistics

          Reference
Prediction C  E  F  T
   C 170  0  0  0
   E  0 162  0  0
   F  0  0 108  0
   T  0  0  0  50

Overall Statistics

           Accuracy : 1
           95% CI   : (0.9925, 1)
   No Information Rate : 0.3469
   P-Value [Acc > NIR] : < 2.2e-16

           Kappa   : 1

   Mcnemar's Test P-Value : NA

Statistics by Class:

                Class: C Class: E Class: F Class: T
Sensitivity          1.0000  1.0000  1.0000  1.000
Specificity          1.0000  1.0000  1.0000  1.000
Pos Pred Value       1.0000  1.0000  1.0000  1.000
Neg Pred Value       1.0000  1.0000  1.0000  1.000
Prevalence            0.3469  0.3306  0.2204  0.102
Detection Rate       0.3469  0.3306  0.2204  0.102
Detection Prevalence 0.3469  0.3306  0.2204  0.102
Balanced Accuracy    1.0000  1.0000  1.0000  1.000

```

FIGURE 14 | Result of confusion matrix in the prediction of pragmatics.

```

> source("Fold.r")
> kfold<-10
> mm<-Fold(kfold,Data,7,6666)
> error<-matrix(0,kfold)
> set.seed(9999);
> for(i in 1:kfold)
+ {
+   m<-mm[[i]]
+   RF_cv<-randomForest(Pragmatics~.,data = Data[-m,])
+   error[i]<-sum(Data[m,7]!=predict(RF_cv,Data[m,]))/length(m)
+ }
> error_bar<- mean(error)
> Accuracy<-1-error_bar
>
> error_bar
[1] 0.04490476
~

```

FIGURE 15 | Result of K-fold cross-validation of the performance of the established classification model.

zhidao is uttered with the highest mean F_0 among *ni zhidao* in the four sentence positions. It was also found that the mean F_0 of sentence-initial *ni zhidao* is higher than that of other components in the same sentence, which is in tune with the finding in Hirschberg (2002). This high-pitched *ni zhidao* serves the speaker's communicative purpose of grabbing or taking over the turn (Braga and Marques, 2004). By raising the pitch, the speaker intends to draw the listener's attention to the subsequent discourse in the new topic to be initiated (Ward, 2004). We believe that the highest mean F_0 value of sentence-initial *ni zhidao* is also related to the speaker's evaluation of the importance of the speech content: when the speakers think the speech content is important, they will raise the pitch, and otherwise, they will lower the pitch. The sentence-initial *ni zhidao* exhibits the most prolonged mean duration, the highest mean intensity, and the slowest tempo among the four categories of *ni zhidao*. This is because "intensity seems to share some of the functions of both F_0 variation and durational variation" (Vaissière, 1983: 62), F_0 is positively correlated with duration (Cai et al., 1998; Xu, 1999; Zhong et al., 2001), higher pitch, more vigorous intensity, and longer duration usually focus on the same discourse component (Vaissière, 1983), and intensity increases or decreases automatically as F_0 increases or decreases (Wu, 2002). This relationship between intensity and F_0 has a physiological basis. They are regulated by the same mechanisms (increase in pulmonary effort and subglottal pressure, the tension of the vocal folds, etc.) (Vaissière, 1983). It was found that out of 50 tokens of sentence-initial *ni zhidao*, 32 (64%) are not followed by pauses, and 18 (36%) are followed by pauses. In natural speech, pauses can appear anywhere in the sentence (Goldcourse markeran-Eisler, 1968) due to three needs: grammar, expression of meaning, and breathing (Guo, 1993). As a prosodic word, *ni zhidao*'s syllables sound closely connected, "prosodically separate" (Wichmann et al., 2010: 40) from the following utterance components, as they are of an F_0 variation group and carry only one word stress (Wang, 2011). Therefore, the pauses following it do not result from grammatical needs. Sentence-initially, there is no physiological need for pauses for breathing. The pauses following it are thus out of the need for expression. Whether such a pause occurs or not depends on whether the speaker needs to win time to think or not. The pauses of different duration reflect the different thinking time spent by the speaker in organizing the subsequent speech. If the speaker does not encounter expression obstacles, such as hesitation, thinking, etc., he can fluently say what he wants to express, and there will be no pause in the speech flow. These prominent prosodic features of sentence-initial *ni zhidao* not only attract the listener's attention to the follow-up sentence but also hint to the listener the importance of the subsequent sentence, encoding and conveying the speaker's communicative intent and thus meta-pragmatic awareness that "I want to call your attention to the topic to be initiated in the following sentence."

When used as a floor-holding means, within-clause *ni zhidao* is a relatively independent prosodic word acoustically, and it is easily separated from the preceding and following

sentence components. **Figure 13** reveals that F_0 and intensity are the most important indicators of the floor-holding *ni zhidao*. In this usage, *ni zhidao* features a continuous flat F_0 contour, usually with a reset after it, but occasionally displays a flat contour with a reset within it. It is produced with the second highest mean F_0 and intensity among *ni zhidao* in the four sentence positions. Within the embedding clause, it sometimes carries a lower mean F_0 and a lower intensity, a lower mean F_0 but a similar intensity, or a mean F_0 higher than the preceding components and lower than the succeeding components but a higher mean intensity. This prosodic performance of within-clause *ni zhidao* can be deemed as a signal of mental hesitation, most possibly indicative of the speaker's struggle in the production of intended speech. In comparison with other components in the same turn, the mean tempo of within-clause *ni zhidao* is sometimes faster and sometimes slower, and it is faster than that of sentence-initial *ni zhidao* but slower than that of between-clause and sentence-final *ni zhidao*. The tempo of within-clause *ni zhidao* depends on the length of thinking time used by the speaker: the longer the thinking time is, the longer its duration is and the slower its tempo is. In natural speech, people often do not first think about the content to be expressed and then utter it fluently. Instead, they think and speak while correcting, explaining, or supplementing what has been said. Therefore, the speaker often pauses in the middle of the sentence or between the syntactic components (Grosjean et al., 1979). To avoid too long a pause and thus an embarrassing temporary communication break-off, and even a loss of turn, speakers often use fillers to indicate their mental or thinking state while maintaining the current turn. Being "behavior-driven" (Xue and Liu, 2008), within-clause *ni zhidao* suggests that the speaker has something to say, fulfilling a floor-holding function. If the time won through uttering *ni zhidao* and through the possible pause preceding it is not long enough for the speaker to pinpoint what is to be produced, there is likely to be a pause following it. Of the 108 tokens of within-clause *ni zhidao*, 12 (11.1%) are preceded by a pause, 10 (9.3%) are followed by a pause, 20 (18.5%) are both preceded and followed by a pause, and 66 (61.1%) are neither preceded nor followed by a pause. This result shows that because "where there is a pause, there is a danger of losing the turn" (Ward, 2004), the speaker endeavors not to pause within the clause for fear of losing the floor or causing embarrassment. These prosodic performances of within-clause *ni zhidao* are closely related to one another (as is shown in **Figure 6**), and they jointly decipher the speaker's intended pragmatic meaning that "I want to hold the floor here, so please allow me time to search for the appropriate content or linguistic items."

As with the between-clause *ni zhidao*, post-pause is the most important indicator of its coherence-marking function. Of the 170 tokens of between-clause *ni zhidao*, 92 (54.1%) are followed by a pause. This post-pause is most likely to result from the purpose of expression, in that there is no need of pause for breathing after such a short prosodic word, and there is no need of pause for marking the boundary of

the prosodically independent *ni zhidao*. This *ni zhidao* serves as a link, which indexes both the preceding and succeeding clauses and thus binds them into a coherent proposition. The speaker employs it, coupled with the pause following it, provides the listener with sufficient time to work out the logic between the clause preceding it and the clause to be uttered. According to statistics, 106 (63.4%) tokens of between-clause *ni zhidao* are preceded by a pre-pause, which may be caused by a grammatical need of marking the clause boundary, by a breathing need following a clause, or by an expressive need for time to prepare the succeeding clause and prepare the listener for it. Thus, this pre-pause is most elusive. The between-clause *ni zhidao* is characteristic of a continuous flat contour. Its mean F_0 and intensity are relatively lower than sentence-initial and within-clause *ni zhidao* but comparatively higher than sentence-final *ni zhidao*. Its mean tempo is faster than that of sentence-initial and within-clause *ni zhidao* but slower than that of sentence-final *ni zhidao*. Compared with other components in the same sentence, it is sometimes faster and sometimes slower, which is decided by the length of time used by the speaker to prepare the listener for the following clause. In a word, the characteristic prosody of between-clause *ni zhidao* is intended to communicate the speaker's pragmatic purpose that "I want to make ostensive the coherent semantic relations between the preceding and succeeding clauses."

The prosody of within-clause and between-clause *ni zhidao* does not show any apparent regularity, and the reasons behind this deserve exclusive studies in the future. However, this research found that like the prosody of sentence-initial *ni zhidao*, the prosody of sentence-final *ni zhidao* also exhibits apparent regularity. As is indicated in **Figure 13**, F_0 and intensity are once again the most essential variables facilitating sentence-final *ni zhidao* performing the emotion-projecting function. According to statistics, it has the lowest mean F_0 and intensity and the fastest mean tempo among the four categories of *ni zhidao*. Compared with other components in the same sentence, its mean F_0 and intensity are lower, its mean tempo is faster, and its mean duration is shorter. Its F_0 contour is generally flat, with a moderate rise and, or fall within it. These prosodic attributes have a lot to do with the sentence-final position. The phrase at the end of the topic has a narrower tonal range, a lower pitch, and a faster tempo (Hirschberg, 2002). In general, the sentence-final prosodic word carries the lowest F_0 in a complete sentence (Wang, 2011). This is the FINAL LOWERING, compression of the pitch range during the last half-second or so of an utterance (Caspers, 1998). The compression of pitch range within about half a second before the end of the speech can indicate that the speaker has finished the current turn (Hirschberg, 2002). 73 (45.1%) of the 162 sentence-final tokens are preceded by a pause, which may be triggered by the speaker's breathing need and, or grammatical need. These prosodic hallmarks of sentence-final *ni zhidao* convey the speaker's meta-pragmatic awareness that "I want you to identify with me in terms of the strong attitude and feeling that I have projected into the preceding sentence."

Prosody is a prominent phonetic feature of natural speech, which is extremely important but often overlooked in the research of spontaneous speech. This characteristic of speech reflects the actual usage of language in the improvised context. It intuitively displays the rhythm of the speaker's speech, as well as the speaker's attitude toward and emotion at people and things. It thus provides objective evidence for judging the pragmatic functions of discourse. Praat speech software and algorithms in R can represent the prosodic features of *ni zhidao* and the potential interaction between its prosodic features and pragmatic functions statistically, graphically, and thus visually, therefore achieving relatively simple, effective, and reliable semi-automated processing of spontaneous speech. Accordingly, the "invisible" meta-pragmatic awareness underlying discourse is made "visible" to a large extent. Statistical analysis and modeling can put the study of discourse markers on a more objective and scientific footing.

CONCLUSION

The intrinsic mechanism of spoken discourse is maintained by three integral components, phonological (the phonetic and prosodic feature), morphological (the morphological and syntactic configuration), and propositional (the semantic and pragmatic meaning). However, academic circles have mostly been inferring and summarizing the pragmatic functions of discourse markers subjectively in specific contexts, based on a few examples or a small-sized corpus. Although some researchers (e.g., Hirschberg, 2002; Matzen, 2004; Braga and Marques, 2004; Wichmann et al., 2010; Beňuš, 2012; Abuczki, 2014; Cabarrão et al., 2015; Gonen et al., 2015; Volín et al., 2016) have investigated how discourse markers' prosody relates to their pragmatics, they have neither investigated their prosody-pragmatics interaction statistically nor built a model to predict their pragmatic functions automatically.

Based on a relatively large-scaled corpus of media interviews, this study examined the prosody-pragmatics interaction of *ni zhidao*. It was found that *ni zhidao* exhibited different prosodic features when occurring in four sentence positions, that it fulfilled four broad pragmatic functions of initiating a topic, holding the floor, marking coherence, and projecting emotions, and that the prosody-pragmatics correlation of *ni zhidao* can statistically be investigated and modeled, and the constructed classification model can be used to predict the pragmatics of *ni zhidao* highly accurately. These findings seem to confirm that the prosody of *ni zhidao* plays a role in deciphering its different pragmatic functions.

Speech analyses and computational statistics based on the natural spoken language are well established in computational linguistics and speech engineering. Although not used in the studies of discourse markers, these methods are fully applicable to discourse marker research, proved in this study. Within the framework of this paper, we can not only explain abstract pragmatic phenomena in discourse analysis but also clearly and objectively grasp the intrinsic mechanisms of prosody-pragmatics interaction. A combination of formal and functional

approaches and corpus data and intellectual inquiry is not only feasible and effective but also inevitable and potent in the future research of language in general and discourse markers in particular.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, and further inquiries can be directed to the corresponding author/s.

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“Desire Is Like a Dreadful Monster”: Analysis of Extended Metaphors in L2 Argumentative Essays by Chinese Learners of English

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This article explores the use, function, and understanding of extended metaphors in L2 argumentative essays by Chinese learners of English. The analysis starts with the identification of linguistic metaphors and extended metaphors in 72 argumentative texts produced by 37 intermediate Chinese English majors. The function of extended metaphors is then analyzed by adopting the bottom-up approach of establishing systematic metaphors from those identified extended metaphors, to draw learners’ communicative intentions in producing extended metaphors. To understand learners’ thinking processes behind using extended metaphors while writing, four of nine writers were interviewed about the process of writing extended metaphors in their texts in the stimulated recall interviews. It is found that extended metaphors, expressed through similes or direct metaphors at strategic stages in L2 argumentative essays, are often the result of learners’ conscious manipulation of L1 in producing L2 for various communicative purposes, such as the desire for vividness, coherence, comprehensibility, when there is a knowledge gap between L1 and L2, and for evaluative and persuasive power. These communicative functions are consistent with the ideational, interpersonal, and textual functions of language, which also coincide and interact with the rhetorical goals of moves and stages in L2 argumentative essays. Metaphoric thinking, L1 influence, and struggling to express meaning and persuade, cited in learners’ thought reports, are major factors triggering extended metaphors. The findings of this article can contribute to the knowledge of learners’ metaphoric competence in L2, which can, in turn, enrich teachers’ metaphor knowledge and draw teachers’ attention to learners’ creative ways of using metaphors and then raise metaphor awareness in L2 writing, teaching, and learning.

Keywords: extended metaphors, systematic metaphors, L2 argumentative essays, metaphoric competence in L2, stimulated recall comments, communicative functions

INTRODUCTION

Metaphor is understood as a tool of describing or viewing something abstract, i.e., topic domain, in terms of something more concrete, i.e., vehicle domain, in the applied linguistic tradition (Cameron, 2003; Low et al., 2008; Deignan, 2017). Metaphor has been demonstrated to be pervasive in language generally, as well as in academic writing specifically (Lakoff and Johnson, 1980; Power and Carmichael, 2007; Herrmann, 2013; Littlemore et al., 2014; Hoang, 2015; Hoang and Boers, 2018; Nacey, 2020). Researchers find that metaphor can be described as opportunities of achieving more expressive or pervasive power in argumentative writing for L2 learners with different language backgrounds at different language levels, e.g., Spanish (MacArthur, 2010), Norwegian (Nacey, 2013), German and Greek (Littlemore et al., 2014), and Thai (Hoang, 2015; Hoang and Boers, 2018). For instance, MacArthur writes, “there are no ‘correct’ or ‘incorrect’ metaphors for among all the forces that drive semantic extension, the most powerful is metaphor. . .” (MacArthur, 2010, p. 159). Littlemore et al. (2014, p. 120) suggest that “one might expect development in the production of metaphor clusters in learners’ writing at the different levels.” An example of metaphor clustering in Littlemore et al.’s (2014) research is produced by an advanced German speaker of English (hereafter, linguistic metaphors are underlined):

[. . .] your heath [health] will suffer when you reath [reach] a higher age. An old car doesn’t run as smooth as a new one. This will sooner or later reduce your quality of life.

Littlemore et al. (2014, p. 136) argue that “the learner is able to use a creative direct metaphor for humorous effect, which makes their writing even more persuasive, by comparing an old person with an old car.” With the ethical approval granted by the ESSL, Environment and LUBS Faculty Research Ethics Committee, University of Leeds (AREA 16-160), creative metaphor uses were observed which were produced by an intermediate Chinese learner of English in their writing assignment:

It’s our duty to purify our standard language and maintain our culture purity. We should not use Internet buzzwords without limit and make our language lose its own original appearance (Chen, a second-year Chinese university student studying in English language).

In this example, an extended analogy between the Chinese language and human beings is summarized in a personification metaphor: *LANGUAGE IS A PERSON*. The learner draws multiple parallels between language and human beings, such as the metaphorically used words of “purity” and “appearance.” Creative direct metaphors or personification metaphors like these show learners’ ability to “express themselves and to create meaning in a second language by means of metaphor” (Postma, 2015, p. 49), or learners’ metaphorical competence in L2 (Birdsell, 2018).

The tendency for metaphors to extend or cluster at certain points in texts or discourse has been noted by some metaphor researchers (Corts and Pollio, 1999; Corts and Meyers, 2002; Cameron, 2003; Koller, 2003; Cameron and Stelma, 2004;

Corts, 2006; Semino, 2008; Kathpalia and Carmel, 2011; Krennmayr, 2011; Littlemore et al., 2014; Dorst, 2017; Sun and Chen, 2018). The widespread and intriguing phenomenon where speakers or writers suddenly produce multiple metaphors in close proximity in texts or discourses has been defined as the pattern of metaphor clustering or metaphor clusters (Cameron and Stelma, 2004; Semino, 2008). Investigations on functions of metaphor clusters in spoken and written contexts, such as lectures (Corts and Pollio, 1999), sermons (Corts and Meyers, 2002), political speeches (Semino, 2008), news articles (Krennmayr, 2011), and business magazines (Koller, 2003), find that metaphor clusters occur at particularly significant points in texts or discourses and relate to a range of communicative functions. “Metaphor clusters are often used in strategic positions for rhetorical purposes” (Semino, 2008, p. 24). Kimmel summarizes three functions of metaphor clusters by reviewing prior studies on metaphor clusters in written texts: “(1) metaphor clusters are attention-grabbing and thus a relevance-producing device; (2) clusters seem to occur ‘where the action is;’ and (3) metaphor clusters connect and dynamize discourse” (Kimmel, 2010, p. 98).

This article focuses on one type of metaphor cluster—extended metaphors, from which systematic relationships among related vehicle terms of linguistic metaphors can be identified out (Semino, 2008; Maslen, 2017). The extension of linguistic metaphors often involves “a single metaphoric idea over a long stretch of language” (Denroche, 2018, p. 7), or systematic metaphors by establishing related vehicle terms (Cameron et al., 2010), such as the metaphoric idea *LANGUAGE IS A PERSON*¹, established from the clustering of connected linguistic metaphors produced by Chen above. Discussions on the role of extended metaphors in texts and discourses have involved some metaphor scholars (e.g., Darian, 2000; Semino, 2008; Carter and Pitcher, 2010; Goatly, 2011; Naciscione, 2016; Thibodeau, 2017; Denroche, 2018). Semino (2008), Goatly (2011), and Thibodeau (2017) put the emphasis on the “text structuring” or organizing role of extended metaphors in texts and discuss the pervasive power of extended metaphors. Naciscione regards extended metaphors as a structure/pattern of figurative thought, which “helps to form new creative instantiations in use” (Naciscione, 2016, p. 243). Denroche (2018) also suggests that extended metaphors are likely to involve novel or creative metaphorical ideas. The link between metaphoric thinking, creativity, and extended metaphors has been discussed in these studies. In the context of language teaching and learning, Darian (2000) argues that the use of extended figurative language is a way of metaphoric thinking, which is productive for students to discuss ideas in writing; and the use of direct metaphors is helpful to students in understanding complex ideas in science, such as those easy-to-understand direct analogies, simile forms, personifications, and animations in science texts. For instance, students could “think of electricity as analogous to the flow of water”

¹In this article, “systematic metaphors are written in *SMALL ITALIC CAPITALS* (e.g., *LANGUAGE IS A PERSON*) to distinguish them from conceptual metaphors (e.g., *LOVE IS A JOURNEY*), which are written in *SMALL CAPITALS*” (Cameron et al., 2010, p. 117).

(Darian, 2000, p. 183). Carter and Pitcher (2010), inspired by the role of extended metaphors in the scaffolding learning in electronic subjects, explore how to use metaphors as a pedagogical aid in helping students in thesis writing, by finding similarities and differences between the vehicle domain and the target domain.

As noted above, prior researchers tend to choose topic-based (argumentative) writing texts to investigate metaphor production in L2 (Chapetón, 2010; MacArthur, 2010; Nacey, 2013, 2017; Littlemore et al., 2014; Hoang, 2015; Gao, 2016), and to compare metaphor uses in native and non-native writing (Chapetón-Castro and Verdaguer-Clavera, 2012). Possible reasons are: first, argumentative writing topics are often abstract and reflective, which can “involve a substantial amount of metaphor” (Littlemore et al., 2014, p. 121), and “some topics may also trigger more metaphor than others” (Nacey, 2020, p. 296); second, “metaphors have been important argumentative and rhetorical devices such as creating vivid images and function as examples or organizing ideas behind a series of examples” (Klebanov and Flor, 2013, p. 11). Research on metaphor and L2 topic-based writing has shown that learners have the need to use figurative language to express complex and abstract ideas and will do so to fulfill communicative needs in L2 argumentative writing, such as the persuasive argument constructed by the German English learner’s comparison between “an old person” and “an old car” (Littlemore et al., 2014), and the Chinese English learner’s metaphorical comparison between “a short-sighted person” and “a frog in the well” when arguing about the importance of being knowledgeable and broad-minded (Xu and Tian, 2012). Following the literature, it seems safe to conclude that as in many English as a Second Language (ESL) contexts, argumentative writing is crucial for Chinese university students to succeed in high-stakes examinations (Liu and Stapleton, 2014; Abdollahzadeh et al., 2017) and extended metaphors are productive in driving semantic extension and organizing ideas when students are under communication pressure (Darian, 2000; MacArthur, 2010).

This article explored the use of extended metaphors in L2 argumentative essays by Chinese university students and students’ thought reports behind some of their extended metaphor uses, given the fact that relatively little is known about the use and function of extended metaphors in non-native English learners’ argumentative writing; and about “whether or not a writer has deliberately used metaphor in this way or whether they have done so subconsciously” (Littlemore et al., 2014, p. 137). The term “extended metaphor” was used “when at least two metaphorically used words belonging to different phrases describe the same topic domain in terms of the same vehicle domain” (Semino, 2008, p. 25). Here, terms of “topic” and “vehicle” are used for basic descriptive reporting (Low et al., 2008; Maslen, 2017). Hyland’s (1990) model of describing the rhetorical structure of an ESL argumentative essay was adopted which divides an ESL argumentative essay into three stages, with both obligatory and optional moves. Querol and Madrunio (2020, p. 65) write, “in most of the argumentative essays, the three stages with the obligatory moves were followed although some new moves were also identified.”

The three stages and moves at each stage are (Hyland, 1990, p. 69):

- (1) **Thesis stage:** introduces the proposition to be argued Moves: (Gambit), (Information), Proposition, (Evaluation), (Marker)
- (2) **Argument stage:** discusses grounds for thesis Moves: (Marker), (Restatement), Claim, Support
- (3) **Conclusion stage:** synthesizes discussion and affirms the validity of the thesis Moves: (Marker), Consolidation, (Affirmation), (Close)

The moves in brackets show that these moves are optional instead of being obligatory to be found in an L2 argumentative essay. The rationale is that Hyland (1990)’s model offers detailed explanations of the structural units and corresponding functions (e.g., introduces the proposition to be argued) in an L2 argumentative essay, which can function as a backup in locating the identified extended metaphors in an L2 argumentative essay and then analyzing the intended rhetorical functions of extended metaphors. In line with the research on communicative functions of metaphors in academic texts or discourses (e.g., Goatly, 2011; Herrmann, 2013), the investigation on what rhetorical functions that extended metaphors can serve in different stages of an L2 argumentative essay, as well as in relation to each other, is also summarized by using Halliday and Matthiessen’s (2004) framework of three metafunctions of language: ideational, interpersonal and textual. The focus of this current investigation is on identifying extended metaphors in Chinese English learners’ argumentative texts, analyzing the communicative functions, and exploring learners’ thinking processes behind their production of extended metaphors during the writing processes. This article may hopefully contribute to the growing body of knowledge about learners’ metaphoric competence in L2 by recognizing L2 learners’ awareness and ability to create new and figurative meanings via extended metaphors, and to generate pedagogical implications in helping “students create their own, as opposed to text- or teacher-made, metaphors” (Darian, 2000, p. 184). While some researchers have used both text data and learner interviews to explore the influence of L1 and metaphoric thinking in L2 learners’ metaphor production processes (e.g., Xu and Tian, 2012; Hoang, 2015; Wang and Wang, 2019), none has shifted the focus for the use of extended metaphors in L2 writing and has had access to the writers talking about their thinking processes, or intentions, behind extended metaphor uses, so no possibility of eliciting their understandings and awareness of using extended metaphors during the writing processes. This gap was attempted to be filled.

Three research questions are addressed in this article:

- (1) In what ways do Chinese learners of English use extended metaphors in their L2 argumentative essays?
- (2) What are the communicative functions of extended metaphors when intertwined with the strategic moves and stages of an L2 argumentative essay?

- (3) How do Chinese learners of English report their thinking processes behind extended metaphor uses during their writing processes?

MATERIALS AND METHODS

Identifying Extended Metaphors and Establishing Systematic Metaphors

To answer the first two research questions, 72 argumentative writing samples were collected which were produced by 37 intermediate Chinese English majors in March and April 2018, on the abstract writing themes of *Spend and Save* and *Campus Love*. The second semester of each academic year in Chinese universities usually starts in March. In this semester, the learning objective of the writing module studied by the participants was argumentative writing. The participants also needed to practice argumentative writing as part of the preparation for their TEM-4 test (a national English language proficiency test for second-year English majors on the third Saturday of April every year in mainland China). This enabled a collection of authentic writing samples in a natural and principled way, without imposing additional work on both teachers and students. The linguistic metaphors were identified out by following the MIP (“metaphor identification procedure”) (Pragglejaz Group., 2007). The core principle of MIP is to compare the more abstract contextual meaning of a lexical unit with a more “basic” or concrete meaning in other contexts and look for a relation of comparison. Online versions of Macmillan Dictionary (Macmillan Education, London) and Oxford English Dictionary (Oxford English Press, University of Oxford) were consulted to establish the basic meaning and contextual meaning of each lexical unit and to minimize subjectivity in doing so. Following MIP, metaphor, metonymy, and simile were included as metaphorical when there were metaphor-related meanings. Then, the focus was turned to the identification of extended metaphors. As noted above, the extension of linguistic metaphors involves “at least two metaphorically used words belonging to different phrases describe the same target (topic) domain in terms of the same source (vehicle) domain (Semino, 2008, p. 25).

An example of extended metaphor is given in **Extract 1**, which is taken from one of the participants’ writing samples on the topic “The Reasons for College Students to Learn to Budget Their Money”:

Extract 1 *Once we want to waste money, the beasts of desire in our chests are awakened, they yell and stamp their feet, trying to control our mind.*

(Deng, writing assignment submitted on 21/03/2018)

The linguistic metaphors were underlined which were identified by following the MIP (Pragglejaz Group., 2007). The participant (Deng) used the clustering of connected linguistic metaphors and directly compared the desire to waste money as a horrible beast that can be awakened and cause a physical fight, violently threatening life. To avoid overgeneralization about writers’ conceptualization and intention

in argumentative writing, Cameron and Maslen’s (2010) applied linguistic approach was followed to identify groupings that they term “systematic metaphors” by establishing “vehicle groupings” from collected linguistic metaphors in the discourse activity. The bottom-up approach of establishing systematic metaphors from extended metaphors is not the same as the generalization of conceptual metaphors in the Conceptual Metaphor Theory (CMT). The latter has been problematic for metaphor research focusing on naturally occurring data in context because of its use of invented linguistic evidence and its top-down approach of apparently preselecting conceptual metaphors then tracking for evidence of their realizations at the linguistic level (Cameron, 2010; Deignan, 2010). From finding systematic metaphors from semantically connected metaphor vehicles, researchers aim to “draw inferences about their [participants’] thoughts and feelings, their [participants’] conceptualizations and communicative intentions, from the language they [participants] used then” (Maslen, 2017, p. 89). The “systematic metaphors” termed by Cameron et al. (2010) resemble the conceptual metaphors suggested by the CMT, “but they should not be seen as equivalent” (Deignan et al., 2013, p. 9). In this article, systematic metaphors were then established by following Cameron et al. (2010) practice of grouping metaphor vehicles by using the Excel software (Microsoft, United States). The semantics of the basic meaning of the metaphor vehicles were used as the starting point to generalize grouping labels (see **Figure 1**).

In **Figure 1**, “linguistic metaphors were gathered together in a list and then were grouped and organized according to the basic meanings of the vehicle terms” (Cameron, 2010, p. 12). The grouping labeled *BODILY ACTION* included the linguistic metaphors “awakened,” “yell” and “stamp” in **Extract 1**. The grouping labeled *BEAST* was first generalized from the explicit metaphorical expression “the beasts of desire” and then was further grouped into *DANGEROUS ANIMAL* in terms of the basic meaning of “beast”: “an animal, especially a dangerous or strange one,” according to online Macmillan Dictionary. So, at the very beginning, the “labels for groupings were often taken from the actual words that appear in the written data” (Cameron et al., 2010, p. 119) and the words that appear in the basic meanings of metaphor vehicles. This process “contracts with Conceptual Metaphor Theory which aims to generalize labels as much as possible in order to posit universals in human conceptualizing” (Cameron et al., 2010, p. 119). The second possible grouping labeled *VIOLENT ACTION* was one of the two subdivisions of the *PHYSICAL ACTION* grouping. The *PHYSICAL ACTION* metaphor vehicles can be further divided into *PHYSICAL ACTION* and *VIOLENT ACTION* in terms of “those actions which are neutral and those which express an element of violence” (Cameron et al., 2010, p. 123). Based on the immediate text context in **Extract 1**, and the basic meanings of collected metaphor vehicles — “beasts,” “yell” and “stamp,” the grouping labeled *CONTROL* was further generalized as *VIOLENT ACTION*. The grouping *PARTS OF THE BODY* was quickly built by referring to both the basic meaning of “feet” and the grouping *PARTS OF THE BODY* in Cameron and Maslen’s (2010) work. “A systematic metaphor is a set of linguistic metaphors in which connected vehicle words are used

Vehicle group 1	Vehicle group 2	Metaphor	Line	Participant	Text	Basic meaning	Writing theme
BEAST	DANGEROUS ANIMAL*	beasts	24	Deng	Once we want to waste money, the <u>beasts</u> of desire	an animal, especially a dangerous or strange one	Spend and Save
BODILY ACTION	BODILY ACTION	awakened	25	Deng	in our chests are <u>awakened</u>	to wake up, or to wake someone up	Spend and Save
BODILY ACTION	BODILY ACTION	yell	25	Deng	they <u>yell</u>	to say something in a loud voice, or to make a loud noise because you are angry, afraid, excited, or in pain	Spend and Save
BODILY ACTION	BODILY ACTION	stamp	25	Deng	and <u>stamp</u>	to put your foot down hard and noisily on someone or something	Spend and Save
PARTS OF THE BODY	PARTS OF THE BODY	feet	25	Deng	their <u>feet</u>	the part of your body at the end of your leg, on which you stand	Spend and Save
CONTROL	VIOLENT ACTION*	control	25	Deng	trying to <u>control</u> our mind.	the power to make something such as a vehicle, machine, or animal do what you want	Spend and Save

*Second possible coding

FIGURE 1 | Possible groupings of metaphor vehicles in **Extract 1**.

metaphorically about a particular topic” (Cameron et al., 2010, p. 127). It was easy to find the topics based on the immediate writing contexts and the writing themes in collected text data. For example, in the *DANGEROUS ANIMAL* grouping in **Figure 1**, a subset of metaphor vehicles that were used to talk about the desire of wasting money were connected and grouped together as the systematic metaphor: *DESIRE OF WASTING MONEY IS A DANGEROUS ANIMAL WITH VIOLENT BODILY ACTION*.

The bottom-up procedure of finding systematic metaphors from vehicle groupings generalized in extended stretches of written texts focuses on what the communicative intentions or goals are when the participants used extended metaphors at some strategic moves and stages in L2 argumentative texts (Deignan et al., 2013; Deignan, 2017). Systematic metaphors established from the extended metaphors identified in writing samples serve both as evidence for ideas, attitudes, and values which may not be directly expressed in the texts, and as a starting point for the further exploration of functions of metaphor clusters (Cameron et al., 2010, p. 116). As mentioned above, Hyland’s (1990) model of describing the rhetorical structure of an ESL argumentative essay and Halliday and Matthiessen’s (2004) framework of three metafunctions of language: ideational, interpersonal, and textual, are the theoretical guide. In the example analysis of **Extract 1**, the textual function of extended metaphors, such as “creating internal coherence” (Koller, 2003, p. 120), can be realized by the connected metaphor vehicles that can be summarized by the metaphorical idea—“beasts of desire” at the argument stage of the writing sample (Cameron and Low, 2004). The new representations of the desire of wasting money in terms of a dangerous animal are evidence of the ideational functions of extended metaphors (Corts and Pollio, 1999; Goatly, 2011; Kathpalia and Carmel, 2011) in the move of making a claim. The systematic metaphor *DESIRE OF WASTING MONEY IS A DANGEROUS ANIMAL WITH VIOLENT BODILY ACTION* not only contributes to building a coherent argument (textual function) but also a persuasive one (interpersonal function) at the argument stage of Deng’s writing sample. The *BEAST* metaphor is used to describe crime in Thibodeau and Boroditsky’s (2011) research, and the participant creatively extends the *BEAST* metaphor when arguing about the reasons and importance of saving money. In **Extract 1**, the systematic metaphor highlights the negative elements and deemphasize the positive ones contained in the topic domain

DESIRE OF WASTING MONEY (Thibodeau, 2017), to affect readers’ concerns and beliefs and to persuade them to take specific actions (interpersonal function) (Hyland, 1990; Cameron and Maslen, 2010; Paquot, 2010; Goatly, 2011; Littlemore et al., 2014; Yang et al., 2014; Thibodeau, 2017).

Stimulated Recall Interviews

“Stimulated recall methodology can be viewed as a subset of introspective research methods which help the researchers to access, examine and understand participant’s reflections on mental processes” (Gazdag et al., 2016, p. 119; Fox-Turnbull, 2011, p. 205). Prior research has demonstrated that “stimulated recall methodology can be used to prompt participants to recall thoughts they had while performing a task or participating in an event” (Gass and Mackey, 2000, p. 13; Mackey and Gass, 2005; Henderson et al., 2010; Fox-Turnbull, 2011; Ryan and Gass, 2012; Gazdag et al., 2016; Gass and Mackey, 2017). The application of stimulated recall methodology to L2 research has been extended from investigating classroom practices and interactions like videotaped lectures or discussions to exploring participants’ mental processes in events like reading and writing (Gass and Mackey, 2017). Hoang (2015) used keystroke data generated by the Input-Log program together with the stimulated recall interviews to explore how Vietnam learners of English explained their metaphors used in their in-class compositions based on an elicitation writing task prepared by the researcher. Hoang (2015) used the stimulated recall interviews, with well-prepared interview protocol and instructions for both researcher and the students, to reveal the underlying factors that may directly link to the development of metaphorical units in students’ topic-based writing, by transcribing and categorizing the participants’ comments. The three outstanding categories in her participants’ comments on metaphor uses were “the use of images, background knowledge, and novel metaphors” (Hoang, 2015, pp. 97–98). As Wang and Cheng (2016) suggest, “probing factors behind learners’ metaphoric creativity can thus enrich teachers’ knowledge of how to develop learners’ ability to use L2 metaphorically, preparing them to participate in actual social communication” (Wang and Cheng, 2016, p. 205). Extended metaphors in texts or discourses are often linked with novel or creative metaphorical ideas and intended communicative purposes (Denroche, 2018). By now, the investigation of extended metaphors and metaphoric creativity in Chinese English learners’

L2 argumentative writing, and the examination of possible factors underlying L2 learners' metaphor use in writing still seems to be an under-researched area. To answer the third research question and to contribute knowledge of learners' understanding of their writing process in terms of extended metaphor use, stimulated recall interviews were conducted. Each individual interview (around 30 min) was conducted within 2 days of the submission of the related writing sample to maximize the recall accuracy. The stimulated recall methodology was piloted with five of targeted participants at the very beginning of the data collection procedure. The aim of this was to decrease the amount of unnecessary information in the interviews and help the participants to focus on the recalling process. The audio-recorded interview data was manually transcribed and then translated from Chinese into English following strict conventions (Richards, 2003, pp. 80–81; Watanabe and Swain, 2007, p. 140; Bailey, 2008, p. 131). Supporting evidence of possible intended functions of learners' extended metaphor uses is also hoping to be found in the stimulated recall interview data. Participants were asked two key interview questions: (1) When writing words or phrases like this, what were you thinking about or how did you perceive it? (2) Why did you use this/these particular word/words or phrases, what were you thinking about then?

An interview extract from the interview with Deng, the author of **Extract 1**, is given below:

Researcher: Yeah, you used “Once we want to waste money,” you wrote, “the beasts of desire in our chest are awakened,” so why you expressed like this at that particular time?

Deng: I wanted to be more vivid. I just wanted to stress again that our desire, the importance of controlling that kind of desire. Because what I wanted to say was that desire was like a dreadful monster. If it were awakened, you would be out of control.

From Deng's self-reports, her conscious reflection on her desire to make the writing more vivid and her metaphoric thinking of “desire” as “a dreadful monster” at the time of writing have been clearly and confidently verbalized. By emphasizing the negative effect of not controlling desire well, Deng's metaphorical extension of the *BEAST* metaphor could support her viewpoint and argument and reinforce the persuasive nature of the argumentative essay. The stimulated recall method has been able to generate interesting insights when efforts have been made to ensure that the accurate recall has been taken place, which may support the function analysis of the systematic metaphors established from the extended metaphors involving single metaphorical ideas, e.g., the pervasive power of *DESIRE OF WASTING MONEY IS A DANGEROUS ANIMAL WITH VIOLENT ACTION* metaphor established from Deng's writing sample. The study hoped to draw teachers' attention to learners' conscious uses of extended metaphors in argumentative texts and to enrich teachers' knowledge of metaphors in developing learners' metaphoric competence in L2.

FINDINGS

Extended Metaphors and Communicative Functions

In total, I identified 11 single extended stretches from the written texts produced by 9 writers, including **Extract 1** illustrated above for demonstration purposes, from which 11 systematic metaphors were established (see **Table 1**). The underlined metaphor vehicles are linguistic metaphors extended in single metaphorical ideas.

During the process of establishing systematic metaphors, there were situations where one metaphor vehicle could be grouped into different vehicle groupings. Collaborative decisions were made to group one metaphor vehicle into one most appropriate vehicle grouping for the ease of categorization (Cameron et al., 2010). The metaphor vehicles “petrol” and “battery” in **Extract 2**, on the topic “More Than Love,” for example:

Extract 2 Basically, love is the invisible power. It has the driving force which can encourage people to achieve some goals. [...] love is like the petrol to a car, the battery to a player.

(Li Y., writing assignment submitted on 28/03/2018)

first were grouped as *ENERGY* because of the words like “fuel” and “electricity” in the basic meanings of metaphor vehicles, based on the online Macmillan Dictionary. After regular discussion with co-rater who has a professional background in metaphor research, the group was then recorded and broadened to *VEHICLE* by including metaphorically used words—“car” and “player” representing vehicles and machines in the physical world. As noted above, the metaphor vehicle “control” in **Extract 1** was grouped as *VIOLENT ACTION* by following Cameron and Maslen's (2010) two subdivisions of the *PHYSICAL ACTION* grouping. The rationale is that the context of the *BEAST* metaphor may convey a sense of violence. Borderline cases about the metaphor vehicle “control,” which can be grouped into *VIOLENT ACTION* or *PHYSICAL ACTION* depending on writing contexts were agreed upon after discussion. The bilingual background of the co-rater and the author, and their familiarity with Chinese intermediate English learners' argumentative writing were helpful in capturing accurate generalizations of the metaphor vehicles and the corresponding topics to which participants had written. The trustworthiness of vehicle groupings can be maximized by “keeping with the ‘principled flexibility’ that has informed the process throughout” (Cameron et al., 2010, p. 126). By regular discussions with co-rater throughout the metaphor identification and metaphor analysis processes, the systematic metaphor proposed from the extended metaphorical stretch in **Extract 2** is: *LOVE IS PHYSICAL FORCE DRIVING VEHICLES/MACHINES*.

Like the functional analysis of the *BEAST* metaphor noted above, the systematic metaphor *LOVE IS PHYSICAL FORCE DRIVING VEHICLES AND MACHINES* could contribute to building a coherent argument (textual function) but also a persuasive one (interpersonal function) at the argument stage of the writing text. The student creatively used novel metaphors to increase comprehensibility and to highlight the

TABLE 1 | Examples of extended metaphors and systematic metaphors.

Systematic metaphors	Extended stretches	Participants	Topics
<i>DESIRE OF WASTING MONEY IS A DANGEROUS ANIMAL WITH VIOLENT ACTION</i>	Once we want to waste money, the <u>beasts</u> of <u>desire</u> in our chests are <u>awakened</u> , they <u>yell</u> and <u>stamp</u> their <u>feet</u> , trying to <u>control</u> our mind.	Deng	Spend and save
<i>MONEY WITHOUT CONTROL IS A WILD ANIMAL</i>	Without any goals, your money will <u>run wild</u> and <u>go</u> all over the place. You will even find that you buy nothing useful which causes a lot of money. Take <u>control</u> of your money and stick to your goals.	Shi	Spend and save
<i>MONEY IS A PERSON</i>	"Money is good <u>servant</u> but a bad <u>master</u> ." We cannot be <u>controlled</u> by money so that we will not be a pathetic <u>slave</u> of money.	Li N.	Spend and save
<i>SPENDING IS A VEHICLE</i>	There is a common view in China saying that the three <u>carriages</u> of the economy are consumption, export, and investment. [...] we should pay a lot attention to consumption and rationally spend more so that our economy can have a sustainable and <u>powerful driving force</u> .	Wang	Spend and save
<i>SAVING MONEY IS RESERVING WEAPON</i>	If life is compared to a <u>war</u> , saving money is like to <u>storage</u> [store] <u>bullets</u> .	Zhang	Spend and save
<i>LOVE IS PHYSICAL FORCE DRIVING VEHICLES/MACHINES</i>	Basically, love is the <u>invisible power</u> . It has the <u>driving force</u> which can encourage people to achieve some goals. [...] love is like the <u>petrol</u> to a <u>car</u> , the <u>battery</u> to a <u>player</u> .	Li Y.	Campus love
<i>NEGATIVE EMOTION CAUSED BY BREAKUP IS A BOMB</i>	Campus love will increase the psychological burden. When they experience a breakup, they will feel desperate and depressed for a long time. Their feelings will be a <u>ticking time bomb</u> which will lead to terrible consequences when it <u>blows up</u> .	Liu	Campus love
<i>LOVE IS ILLNESS</i>	Love can be a good <u>medicine</u> or a <u>poison</u> . [...] we all know that romance can go <u>sour</u> , and a <u>failed</u> love experience can be <u>stressful</u> and <u>painful</u> .	Lou	Campus love
<i>LOVE IS FIRE</i>	Love is like a <u>fire</u> , <u>warm</u> and <u>bright</u> but easy to <u>burn</u> .	Lou	Campus love
<i>LOVE IS FOOD BEARING PLEASANT FEELINGS</i>	<u>Pursuing</u> romantic love is the instinct of human, just like <u>hungry</u> people <u>find</u> [finding] <u>food</u> . [...] the romantic love, just like <u>desert</u> [dessert] can make the hearts <u>warm</u> and happy.	Guo	Campus love
<i>HUMAN BEINGS ARE PLANTS AND ANIMALS</i>	Only when <u>flowers bloom</u> will the <u>bees</u> come to <u>gather honey</u> .	Deng	Campus love

positive role of campus love as *PHYSICAL FORCE/STRENGTH* (ideational function), which were possible attempts made to persuade the readership to accept the writer's viewpoint (interpersonal function). More examples of functional analysis of the identified extended metaphors listed in **Table 1** are given (see **Figures 2–5**).

In **Figure 2**, spending (topic domain) is described as a vehicle (vehicle domain) *via* four metaphorically used words in the gambit move of the thesis stage and the closing move of the conclusion stage in Wang's writing text. This extension coincides with the gambit move in an argumentative essay where the writer's purpose is to "capture the readers' attention, rather than inform" (Hyland, 1990, p. 70) by way of dramatic illustration at the very beginning of the writing text. These linguistic metaphors are related to a vehicle that can move forward. A systematic metaphor *SPENDING IS A VEHICLE* can be formulated, offering the topic of spending a new representation and the text's internal coherence. *SPENDING IS A VEHICLE* used when introducing viewpoints on the positive side of spending can convey a writer's positive attitude toward spending and then construct the evaluative function of metaphor (Goatly, 2011). Attempts contained in this systematic metaphor, such as dramatic illustration, coherence construction, and evaluation, can be related to the three dimensions of functions of language: ideational, interpersonal, and textual.

In **Figure 3**, linguistic metaphors "war," "storage [store]," and "bullets" are used creatively to talk about the topic of money (topic domain) in terms of weapon (vehicle domain), at the conclusion stage of Zhang's writing text. The words in

square brackets are some grammatical mistakes corrected by the researcher with participants' agreement. Bullets can be supplied or reserved and used for war. A creative systematic metaphor, therefore, is formulated: *SAVING MONEY IS RESERVING WEAPONS*. The ideational, interpersonal, and textual function of this systematic metaphor is intertwined with the rhetorical goal of the conclusion stage, which is to summarize the argument section persuasively, to provide a prospective focus for discussion, and to achieve vivid consolidation (Hyland, 1990; Querol and Madrunio, 2020). It seems that the conventional metaphoric idea *LIFE IS WAR* is compatible with the creative systematic metaphor *SAVING MONEY IS RESERVING WEAPONS* concerning the connection between war and weapons.

In **Figure 4**, the conventional systematic metaphor *LOVE IS FIRE* built from the metaphorical extension at the conclusion stage in Lou's writing text also can help to realize the persuasive power in the writing text in a coherent and dramatic way.

In **Figure 5**, love (topic domain) is described as food (vehicle domain) *via* three different linguistic metaphors ("hungry," "food," "dessert") within the same text. The connection among these linguistic metaphors could be reflected in the metaphor flag "just like." Here, this subset of metaphor vehicles, consisting of extended metaphor, is used to talk about love, and can be expressed through the systematic metaphor: *LOVE IS FOOD BEARING PLEASANT FEELINGS*. The conventional concepts *LOVE IS FOOD* or *LOVE IS SWEET FOOD* are lexicalized by the creative and possibly deliberate comparisons between "pursuing love" and "finding food," and between "love" and "dessert." The linguistic metaphors

Vehicle grouping	Metaphor	Line	Participant	Text	Basic meaning	Writing theme
VEHICLE	carriages	1	Wang	There is a common view in China saying that the three <u>carriages</u> of the economy [...] we should pay a lot attention to consumption and rationally spend more so that our economy can have a sustainable and powerful driving force	a vehicle with wheels that is pulled by horses, especially one used in the past before cars	Spend and Save
PHYSICAL FORCE/STRENGTH	powerful	32	Wang	powerful <u>driving</u> force	with a lot of physical force	Spend and Save
PHYSICAL ACTION	driving	32	Wang	powerful <u>driving</u> force	the activity of controlling a vehicle so that it moves somewhere	Spend and Save
PHYSICAL FORCE/STRENGTH	force	32	Wang	powerful driving <u>force</u> .	physical strength, or violence	Spend and Save

FIGURE 2 | Extended metaphor contributing to the *VEHICLE* systematic metaphor.

Vehicle grouping	Metaphor	Line	Participant	Text	Basic meaning	Writing theme
WAR	war	29	Zhang	If life is compared to a <u>war</u> ,	a particular period of fighting between countries or groups of people	Spend and Save
SUPPLY/RESERVATION	storage/store	30	Zhang	saving money is like to <u>storage</u> [store]	To keep in store for future use; to collect and keep in reserve; to form a store, stock or supply of; to accumulate, hoard.	Spend and Save
WEAPON	weapon	30	Zhang	<u>bullets</u> .	a small piece of metal that is shot from a gun and causes serious damage to the person or thing it hits	Spend and Save

FIGURE 3 | Extended metaphor contributing to the *SAVING MONEY IS RESERVING WEAPONS* systematic metaphor.

Vehicle grouping	Metaphor	Line	Participant	Text	Basic meaning	Writing theme
FIRE	fire	24	Lou	Love is like a <u>fire</u>	flames and heat from something that is burning in an uncontrolled way	Campus Love
PLEASANT FEELINGS	warm	24	Lou	<u>warm</u>	warm clothes and buildings keep heat in and prevent you from feeling cold	Campus Love
LIGHT	bright	24	Lou	and <u>bright</u>	full of strong shining light	Campus Love
FIRE	burn	24	Lou	but easy to <u>burn</u> .	if something is burning, it is being destroyed or damaged by fire	Campus Love

FIGURE 4 | Extended metaphor contributing to the *FIRE* systematic metaphor.

Vehicle grouping	Metaphor	Line	Participant	Text	Basic meaning	Writing theme
FOOD	hungry	2	Guo	Pursuing romantic love is the instinct of human, just like <u>hungry</u> people	without the food you need to stay strong and healthy	Campus Love
MOVEMENT	find	2	Guo	<u>find</u> [finding]	to come across, meet with, light upon, discover	Campus Love
FOOD	food	2	Guo	<u>food</u>	the things that people or animals eat a particular type of food	Campus Love
FOOD	dessert	20	Guo	romantic love, just like <u>desert</u> [dessert]	sweet food that you eat after the main part of a meal	Campus Love
PLEASANT FEELINGS	warm	21	Guo	can make the hearts <u>warm</u> and happy.	warm clothes and buildings keep heat in and prevent you from feeling cold	Campus Love

FIGURE 5 | Extended metaphor contributing to the *FOOD* systematic metaphor.

“hungry” and “food” at the thesis stage give a focus to Guo’s proposition, and “dessert,” “warm,” and “happy” at the argument stage reinforce his claim (Hyland, 1990). So, clusters that include extended metaphors at different moves and stages could give internal coherence to an argumentative text, which is the textual function of extended metaphors. Guo’s creative use of these similes highlights the positive side of love, which conveys evaluative and persuasive power, i.e., interpersonal function.

The bottom-up analysis of systematic metaphors shows extended metaphors are often found to build coherent and persuasive arguments in learners’ written texts. Among the 11 instances of systematic metaphors, seven occurred at the argument stage, one at both thesis stage and argument stage, one at both thesis stage and conclusion stage, and two at the conclusion stage. The *SPENDING IS A VEHICLE* metaphor is found at both the thesis and conclusion stage in Wang’s writing sample, contributing to the textual structuring

function and ideational function simultaneously. The two systematic metaphors built at the conclusion stage of the writing samples can be sensed as deliberate and creative because of similes. The systematic metaphor *LOVE IS FIRE* in the close move in Lou's text reinforces the evaluative and persuasive power. The systematic metaphor *SAVING MONEY IS RESERVING WEAPON* at the conclusion stage in Zhang's text conveys the writer's strong emotions toward the importance of saving money, which might encourage a change of perspective. The *DESIRE OF WASTING MONEY IS A DANGEROUS ANIMAL WITH VIOLENT ACTION* metaphor and *LOVE IS PHYSICAL FORCE DRIVING VEHICLES/MACHINES* metaphor established from the argument stages also contribute to the construction of coherent and persuasive arguments. The function analysis focusing on extension and systematicity generates insights on how Chinese learners of English use extended metaphors at strategic points in their argumentative essays, and for what communicative purposes. More supporting evidence on learners' intentions and communicative purposes are obtained from the follow-up stimulated recall interviews.

Learners' Thought Reports in Stimulated Recall Comments

Not all extended metaphors identified are able to be asked in the stimulated recall interviews because of the time limitation and ethical considerations. Due to the difficulty of finding a time to interview students within 2 days of the writing tasks, four extended stretches listed in **Table 1** (including **Extract 1** explained above for demonstration purpose), written by four different participants, were able to be asked in the stimulated recall interviews. The four participants were interviewed individually in a face-to-face manner during their free time. Two interviews were on *Spend and Save* and two on *Campus Love*. All interviews were voluntary and did not cause extra workload to both teachers and students involved in this present investigation. **Table 2** presents participants' thought reports cited in their recall comments.

At this stage, the focus was on what the participants said about their choice of metaphorical expressions that were identified as extended metaphors. The participants were not told whether a stretch of written texts had been classified as a metaphorical extension before or during the interview processes. Each student was interviewed no more than once. The opening coding approach, on a line-by-line basis (Richards, 2003), enabled to constantly comparing the similarities and differences among learners' comments on their metaphor use at the time of writing when coding recall data. Here, "a code ascribes meaning to the coded text" (Jamieson, 2016, p. 8). So, the explanations and thought reports that are similar at the conceptual level could be grouped into themes or categories by breaking down the interview data for the analytical purpose (Corbin and Strauss, 1990; Chapman et al., 2015). As demonstrated above, it was observed that learners were willing to discuss their language uses with me. Learners also reported on their conscious or deliberate metaphor uses at the time of writing. **Table 3** illustrates

the four categories of reasons that were identified for learners' extended metaphor uses.

Based on the interview data, the four reasons explaining when and why learners' produce extended metaphors are: (1) learners' metaphoric thinking; (2) communicative functions of metaphor in academic writing (ideational, interpersonal, and textual); (3) L1 influence; (4) learners' limited L2 knowledge and desire for a better writing performance in L2. It seemed that more than one reason was cited concerning each of the extended metaphor use identified and asked in this present investigation, which shows participants' ability, or efforts made, to think, write, and persuade metaphorically and creatively in English, i.e., learners' metaphoric competence in L2. In the following section, the findings obtained from learners' writing samples and stimulated recall interviews were discussed.

DISCUSSION OF FINDINGS

Findings obtained from the written texts data indicate that extended metaphors can be found at different strategic points in Chinese English learners' argumentative essays. Functions of extended metaphors are analyzed by taking the strategic moves and stages of an L2 argumentative essay (Hyland, 1990) into consideration. Like what Koller (2003) has found by analyzing metaphor clusters in magazine texts on marketing, it has been found that extended metaphors in the mid-texts, i.e., the argument stages, often serve the interpersonal function, such as developing persuasive arguments. The extended metaphors at the thesis stages, and at the concluding stages of participants' argumentative texts, often occur on smaller scales compared to those in the middle parts. The bottom-up analysis of systematic metaphors built from extended metaphors indicates that communicative functions of extended metaphors at the beginning of written texts often coincide with the rhetorical aims of the thesis stage, such as achieving a dramatic illustration and attracting the readership's attention, which are the ideational and interpersonal function. Extended metaphors at the end of texts can help learners to reinforce the proposition by "providing a prospective focus and widening the context" (Hyland, 1990, p. 74). Learners can "drive the point home to the readership" (Koller, 2003, p. 120) and achieve persuasive power.

Some examples of extended metaphors which appear to be deliberate were also observed. More than one systematic and metaphoric idea can be found within the same text. For instance, in Lou's writing sample, the systematic metaphor *LOVE IS ILLNESS* can be established from the extended metaphors used at the argument stage for presenting and supporting standpoints. The systematic metaphor *LOVE IS FIRE* can be built from the conclusion stage to reinforce the central viewpoint and widen the context for evaluation and persuasion. This indicates that Lou could deploy and develop different vehicle terms and metaphoric ideas to talk about the topic domain at different stages of the text, with stronger emotions and persuasive power. The *LOVE IS FOOD* metaphor across the thesis and argument stages of Guo's writing

TABLE 2 | Extended stretches and corresponding recall comments.

Extended stretches	Thought reports cited in recall comments
Once we want to waste money, the <u>beasts</u> of <u>desire</u> in our chests are <u>awakened</u> , they <u>yell</u> and <u>stamp</u> their <u>feet</u> , trying to <u>control</u> our mind.	Deng: "I wanted to be more vivid. I just wanted to stress again that our desire, the importance of controlling that kind of desire. Because what I wanted to say was that desire was like a dreadful monster. If it were awakened, you would be out of control".
There is a common view in China saying that the three <u>carriages</u> of the economy are consumption, export, and investment. [...] we should pay a lot attention to consumption and rationally spend more so that our economy can have a sustainable and <u>powerful driving force</u> .	Wang: "What I was thinking at that moment is that, first, the topic is economy and spending, and then I came up with the same Chinese expression that I learned in senior high school so I translate the '马车' into 'carriages.' The three carriages are equal to the driving power of economic development. [...] I wanted to echo the earlier expression "three carriages," so I wrote 'powerful driving force,' which means the drive that can lead to economic development".
Basically, love is the <u>invisible power</u> . It has the <u>driving force</u> which can encourage people to achieve some goals. [...] love is like the <u>petrol</u> to a <u>car</u> , the <u>battery</u> to a <u>player</u> .	Li Y: "It was, when I was using English to express myself, I worried that the readership might not understand my intended meaning. Maybe there was some of my own subjective understanding in it. I just wanted to mean that love is a strength that can move things forward, just like the function of petrol to a car and the batteries in a player. The strength was dominating because it could make you alive and give you energy, and make you operate and work. This is what I was thinking".
Pursuing romantic love is the instinct of human, just like <u>hungry</u> people <u>find food</u> . [...] the romantic love, just like <u>desert</u> [dessert], can make the hearts <u>warm</u> and happy.	Guo: "Here I just want to make it clear that love is positive. It is normal and common, with no negative side. [...] Love is sweet. When thinking about sweetie, it is easy for me to link with desserts".

TABLE 3 | Grouping codes into themes.

Coded recall comments	Codes (C#)	Themes (T#)
I wanted to be more vivid. I just wanted to stress again that our desire, the importance of controlling that kind of desire. Because what I wanted to say was that desire was like a dreadful monster.	C1: Compare one abstract concept to a more concrete one to achieve vividness C2: Compare one abstract concept to a more concrete one by looking for similarities C3: Desire to persuade through metaphorical constructions	T1: Metaphoric thinking (Littlemore and Low, 2006a) T2: Communicative functions of metaphor in academic writing (Goatly, 2011; Herrmann, 2013)
What I was thinking at that moment is that, first, the topic is economy and spending, and then I came up with the same Chinese expression that I learned in senior high school so I translate the '马车' into 'carriages.' The three carriages are equal to the driving power of economic development [...] I wanted to echo the earlier expression "three carriages," so I wrote "powerful driving force," which means the drive that can lead to economic development.	C4: Use the first language as a base for understanding or producing the second language (O'Malley and Chamot, 1990, p. 120) C5: Desire to make the writing coherent	T3: L1 Influence (Ellis, 1999; Nacey, 2013) T2: Communicative functions of metaphor in academic writing (Goatly, 2011; Herrmann, 2013)
It was, when I was using English to express myself, I worried that the readership might not understand my intended meaning. Maybe there was some of my own subjective understanding in it.	C6: Struggling to express meaning	T4: Limited L2 knowledge and desire for a better writing performance in L2 (Hinkel, 2002; MacArthur, 2010)
I just wanted to mean that love is a strength that can move things forward, just like the function of petrol to a car and the batteries in a player. The strength was dominating because it could make you alive and give you energy, and make you operate and work.	C2: Compare one abstract concept to a more concrete one by looking for similarities C3: Desire to persuade through metaphorical constructions	T1: Metaphoric thinking (Littlemore and Low, 2006a) T2: Communicative functions of metaphor in academic writing (Goatly, 2011; Herrmann, 2013)
Here I just want to make it clear that love is positive. It is normal and common, with no negative side. [...] Love is sweet. When thinking about sweetie, it is easy for me to link with desserts.	C2: Compare one abstract concept to a more concrete one by looking for similarities C3: Desire to persuade through metaphorical constructions	T1: Metaphoric thinking (Littlemore and Low, 2006a) T2: Communicative functions of metaphor in academic writing (Goatly, 2011; Herrmann, 2013)

sample could also show a degree of learners' conceptual fluency and metaphoric competence in L2 English (Danesi, 1992). Different systematic metaphors built from different extended texts show learners' ability to facilitate change in perspectives on part of the readership, by directing the readership's attention and understanding to a different area of experience (Deignan et al., 2013). The function analysis of extended metaphors, by establishing systematic metaphors, provides more evidence about learners' metaphoric competence in L2, at both conceptual and linguistic levels of metaphor (Littlemore, 2010; Nacey, 2013).

The stimulated recall interviews enabled to talk to learners and know more about their intentions and purposes in terms

of their choice of some metaphorical extensions. Learners' thought reports cited in their recall comments suggest that they are confident about their word choices during their writing processes, no matter whether the words and expressions are deliberately used to be metaphorical or not. Learners are able to report clearly about the efforts they have made to express their meanings during the writing, such as directly applying the metaphorical comparison from L1 to L2 and consciously thinking metaphorically in L1. Learners also report their desire for vividness, better comprehensibility, and persuasive power, concerning some extended metaphor uses, which supports the function analysis of extended metaphors and learners' metaphoric competence in L2. The stimulated

recall methodology has its limitations, but it is believed to be enough for this present investigation to ask learners in a face-to-face manner to know more about their thinking processes behind their use of extended metaphors in L2 argumentative texts. Useful pedagogical implications can be obtained. For instance, there are situations where learners may consciously decide to use extended metaphors to persuade through metaphorical constructions. Now that evidence has shown that both conventional and creative extended metaphors are inevitable for learners to meet various communicative needs in writing, it is necessary for teachers to realize this, recognize this as not an arbitrary phenomenon but a way of thinking and communication, and offer corresponding feedback in developing learners' metaphoric and communicative competence in L2. The interesting insights obtained from the analysis of stimulated recall interview data can offset the limitations of the stimulated recall methodology.

Learners' thought reports cited in some recall comments may also provide supporting evidence to the possible presence of certain metaphorical ideas in L1 or L2, such as "desire was like a dreadful monster" (Deng) and "love is a strength that can move things forward" (Li Y.), in the writers' minds when they wrote extended metaphors. This may contribute to, as Littlemore (2009) suggests, the implications of CMT in second language teaching and learning. L1 influence on L2 metaphor production is not "simply lexical interference from the L1, or as the result of a knowledge gap in the use of L2 idiomatic language" (Danesi, 2016), but also may be the result of conceptual transfers from L1 to L2 (Nacey, 2013).

CONCLUSION

This present investigation is a relatively small-scale study. The collected text data and interview data may not represent all Chinese university students' use, function, and understanding of extended metaphors in L2 argumentative writing. However, limitations like these are less important compared to the findings and insights gained from the textual analysis and interview analysis. The findings from this present investigation show that Chinese learners of English have been able to refer to some metaphorical concepts in their L1 to produce conventional and creative extended metaphors in L2 argumentative texts for achieving various communicative purposes, such as the desire for vividness, for more comprehensible meaning, coherence, and for supporting viewpoints and persuading. Findings from the interview data also show that learners may develop metaphorical extensions deliberately, by consciously thinking metaphor in L1 and writing creative direct metaphors under certain communication pressure. But participants' ability to write metaphorically in their targeted language, and sometimes to report metaphorically about their writing processes, are still not recognized as a crucial ability to

be developed in their L2 classrooms. Littlemore and Low write, "control over metaphor is one of the essential tools for empowering learners to cope successfully with native speakers" (Littlemore and Low, 2006b, p. 22). It is reasonable to constantly draw both teachers', learners', and policy makers' attention to the exposure of metaphor knowledge in L2 classrooms at the tertiary level (Shirazi and Talebinezhad, 2013), and pay more attention to learners' metaphor production in L2 (Hoang, 2015). The reinforcement of metaphor awareness, metaphoric/creative thinking, and cross-cultural awareness is essential in developing Chinese English learners' metaphoric competence and overall communicative competence in L2.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the ESSL, Environment and LUBS Faculty Research Ethics Committee, University of Leeds (AREA 16-160). The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

QL contributed to the conception and design of the study, conducted data collection, performed the analysis and interpretation of both text and interview data, wrote the first draft, and made the revisions and approved the publication of this article.

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How EFL Teachers Engage Students: A Multimodal Analysis of Pedagogic Discourse During Classroom Lead-Ins

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Classroom lead-in is the initial stage for motivating students to become engaged in-class interaction. However, little research, to our knowledge, has analyzed the role of teachers' multimodal competence reflected through their multimodal pedagogic discourse in the realization of the ultimate goals of classroom lead-ins. Based on the data collected from a teaching contest in China, this paper explores how two-winner teachers utilize their multimodal ensembles of communicative modes to engage students during classroom lead-ins. The analysis shows that different communicative modes construct the higher-level action of lead-in, and they are orchestrated into multimodal ensembles for the specific function of each lead-in move. The findings indicate that EFL teachers' high multimodal competence plays a decisive role in performing classroom lead-ins, and different lead-ins strategies influence the different orchestration of communicative modes. In constructing multimodal pedagogic discourse, teachers build up their professional image and display their personal charm as well. Future research for multimodal discourse analysis and pedagogic research is suggested in the paper.

Keywords: engagement, EFL teachers, pedagogical discourse, multimodal, classroom lead-in

INTRODUCTION

Multimodality has become a hot topic in language education research (Kress, 2010; Rowsell and Collier, 2017; Canagarajah, 2018; Peng, 2019). As in all educational contexts, teaching English as a foreign language (EFL) in Chinese universities is a multimodal experience that happens through the orchestration of spoken language and an array of other communicative modes, such as gesture, gaze, and facial expression (Peng, 2019). However, EFL classrooms are different from others in that EFL teachers are advanced EFL learners themselves, and students mostly learn and use English in class. Therefore, in order to maximize learning, teachers often make great efforts to motivate students to participate in class interaction (Peng et al., 2017; Peng, 2019). EFL teachers' multimodal competence – the ability to select and combine different communicative modes besides spoken language to complement or support their use of English as the medium of instruction for various teaching purposes – appears to be particularly important as it contributes to effective learning (Morell, 2018). In the context of the EFL classrooms, effective pedagogy often starts with a good lead-in, a technique utilized

by teachers to prepare students to learn and involve them in-class participation (Turney, 1975; Arendas, 1998; Gardner and Miller, 1998; Slavin, 2004).

Engagement is one of the hottest research topics in the field of educational psychology. Research shows that a plethora of benefits occur when students are engaged in their learning (Sinatra et al., 2015, p. 1). However, to the best of our knowledge, the study of the relations between teachers' multimodal competence and engagement is scanty. Seizing the gap, this study intends to explore how teachers' multimodal competence contributes to the realization of the ultimate goal of classroom lead-in: to engage students. The ultimate aim of this study is twofold.

On the one hand, we intend to expand the knowledge of multimodal research by analyzing classroom discourse during the lead-in from a multimodal perspective while considering that all semiotic resources play a role in meaning-making. In this sense, we are interested in exploring what semiotic modes are used and how they are combined to achieve communicative purposes. On the other hand, we aim to reveal the significance of teachers' multimodal competence in engaging students, intending to arouse teachers' awareness of multimodal competence and learn to make appropriate use of it when they design classroom lead-ins.

LITERATURE REVIEW

Classroom Lead-Ins

Classroom lead-in is the first pedagogic procedure used to "awaken" students in the first 3–5 min and motivate them to learn. Arendas (1998: 240) delimits lead-in as "a technique by teachers at the beginning of a new lesson or when presenting new knowledge to prepare students to learn and establish a communicative link between the learners and the information about to be presented." Turney (1975) believes that it is essential to attract students' attention and cultivate their desire for learning at the beginning of teaching. Since a good beginning is half done, a good classroom lead-in is decisive for successful classroom teaching (Liu and He, 2020). Many researchers have reached agreements on the significant role of classroom lead-in in effective teaching that the lead-in is a crucial link of classroom teaching (e.g., Gardner and Miller, 1998; Liu, 2004; Slavin, 2004; Fu, 2005). Turney (1975) categorizes the multiple functions of classroom lead-in into five types: gaining attention, arousing motivation, setting up a teaching target, structuring, and making links. These functions would enable students to get psychological preparation for the new class. Cooper (1992) maintains that the ultimate goal of the lead-in is to motivate students to participate in class activities or engage students.

Concerned with its significance to effective teaching, many researchers have proposed guidelines and strategies to make a good lead-in. For example, Gower and Walters (1983) suggest that lead-in should be socializing and the lead-in topic should be related to students' daily lives; Slavin (2004) requires that teachers attract students' attention and provoke their curiosity. Liu and He (2020) summarize the previous research and state

that a good lead-in should be interesting, relevant, student-centered, brief and authentic, and close to students' life. They also suggest a range of lead-in strategies that a teacher can choose depending on their preference: situational lead-in, multimedia lead-in, dialogue lead-in, revision lead-in, question lead-in, hot topic lead-in, and storytelling lead-in. These guidelines and strategies are conducive for teachers to design a lead-in during the lesson-planning stage.

In the sense of genre analysis, classroom lead-in is a specific genre as it is a communicative event shared by the teacher and students in a classroom setting (a "discourse community") and with a common goal or the communicative purpose (Swales, 1990, p. 58). Thus, it can be analyzed in terms of its structure and communicative purposes. The discourse structure is described as a sequence of "moves," where each move represents a stretch of discourse serving a particular communicative function. Therefore, following a top-down approach by identifying functions or communicative purposes that classroom discourse can serve during the lead-in, we can segment the lead-in into different moves and note the type of each move. Chinese Scholar Zhang (2015, p. 169–172) puts forward a comprehensive lecture structure consisting of 16 moves, based on a sample of six classroom teaching videos of national excellent EFL courses for undergraduates. Following Zhang's (2015) classification of EFL classroom structure and making necessary modifications, we propose that an EFL classroom lead-in includes four moves (see Table 1) in line with some of Turney's (1975) identification of lead-in functions: it begins with a move that the teacher greets with students, followed by a move that clarifies the teaching plan, introduces the upcoming topic, and declares the shift to the next section.

Multimodal Pedagogical Discourse

Multimodal research first appeared as early as in the latter half of the 1990s in the studies of meaning-making, conveying, and receiving (Jewitt et al., 2016). As a new paradigm for discourse analysis, multimodal discourse analysis extends the study of language itself to the study of language combined with other semiotic resources (such as images, gestures, actions, and music) in the meaning-making process (O'Halloran, 2004).

TABLE 1 | Moves of EFL class lead-in.

S. no.	Moves	Functions
1.	Greeting	Getting attention: declaring the start of lesson and establishing/maintaining an interpersonal relationship with students
2.	Introducing teaching plan	Setting up teaching target and structuring: Getting students to know the teaching/learning goals and how to achieve them
3.	Lead-in activities	Arousing motivation: Familiarizing students with the topic and get them prepared according to different teaching contents for features
4.	Closing the lead-in	Making links: making links between lead-in and the following section and directing students to the next teaching procedure

The sequence of move 2 and move 3 is interchangeable.

The multimodal pedagogic analysis primarily draws on a social semiotic perspective (Kress, 2010) or on systematic functional multimodal analysis (SF-MDA) to explore the multimodal meaning-making of pedagogic discourse in different educational contexts and disciplines (Morell, 2018).

In the literature of multimodal analysis of pedagogic discourse, studies involve educational contexts of different levels, including primary and secondary schools (e.g., Kress et al., 2005; Jewitt, 2008), high schools (e.g., Young and Nguyen, 2002), and higher education seen in the special issue of *System* in 2018 (e.g., Coccetta, 2018; Franceschi, 2018; Morell, 2018), and even in 3-D virtual worlds for language teaching and learning (Tan et al., 2016). They have explored multimodal discourse of various disciplines, like science (Kress et al., 2001; Young and Nguyen, 2002; Tang, 2013), mathematics (O'Halloran, 2004, 2005, 2010), and English (Jewitt, 2002; Kress et al., 2005; Jewitt, 2008). Some studies have focused on specific semiotic modes for meaning-making in classrooms – for example, gestures (Bezemer, 2014; Cao and Chen, 2017; Lim, 2017), classroom space (Lim et al., 2012), gestures and facial expressions (Sueyoshi and Hardison, 2005), or language and images (Lotherington et al., 2019). Some have explored the effects of multimodal pedagogic discourse on classroom teaching efficiency (Sueyoshi and Hardison, 2005; Moreno and Mayer, 2007; Guichon and McLornan, 2008; Morell, 2018).

These studies challenge the traditional view that teaching and learning are primarily accomplished through pedagogic language. The multimodal approach to classroom discourse reveals that the pedagogic language is not the only mode to construct or display knowledge. It is the process where several semiotic resources work together during social interaction within the classroom (Lim, 2021). Lim (2021) also observes that the teachers' use of gestures, the classroom spaces they occupy, and the movements they make and the tools they use work together with language as a multimodal ensemble of meanings. This is especially crucial for language learning and teaching because it is a process mediated in interaction with language teachers and students, where the medium of learning is often also the content (i.e., language; Lantolf, 2000; Lamy and Hampel, 2007). Hence, "it is now impossible to make sense of texts, even of their linguistic parts alone, without having a clear idea of what these other features might be contributing to the meaning of a text" (Kress, 2000, p. 337).

However, the research into multimodal EFL pedagogic discourse and their role in engaging students in class in higher education is less than adequate. A few studies have shown that a teacher's facial expressions, gestures, and spatial positions are fundamental communicative modes that contribute to EFL learners' willingness to communicate in English language classrooms (Peng et al., 2017; Peng, 2019). Morell (2018) has illustrated that coordinated use of complementary mode ensembles together with language enables teachers to organize and interpersonally involve students in class activities textually. Morell et al. (2020) uncover that trained English-medium instruction (EMI) lecturers combine semiotic resources (e.g., gaze, gesture, and written language) with their use of verbal discourse to engage students, and the orchestration of

communicative modes serve to foster engagement in the classroom. These studies suggest that multimodal classroom pedagogies can promote EFL learners' willingness to communicate, which results in effective interactive lecturing. However, these are all macro-investigations that examine the teaching process as a whole devoid of delving into one specific teaching procedure, for example, classroom lead-in.

In the context of the EFL classrooms, effective pedagogy often starts with a good lead-in, and a good lead-in involves EFL teachers' multimodal competence. The lead-in is the initial stage for motivating students to become engaged in-class interaction. Previous research into lead-in highlights its functions and proposes guidelines and approaches on making a good lead-in (e.g., Slavin, 2004; Velandia, 2008). However, previous research seldom analyzes the multimodal process of how teachers implement lead-in to engage students in English classrooms. Up to our knowledge, only a couple of researchers have examined EFL classroom lead-ins, but their studies are mainly from the pragmatic perspective. For example, Qin (2015) explores the EFL teacher's multimodal pedagogic discourse during the lead-in from the adaption theory; Li and Zhou (2012) investigates the EFL teachers' multimodal actions in the lens of politeness theory, and they find that inappropriate multimodal behaviors might distract students' engagement in-class participation. Therefore, to enrich the research into lead-in, the present study intends to reveal how teachers' multimodal competence contributes to students' classroom engagement by analyzing lead-ins of two demo classes as an example.

Multimodal Interaction Analysis

Multimodal interaction analysis (MIA) is a theoretical and methodological framework proposed by Sigrid Norris to analyze a multiplicity of interactions that social actors are simultaneously engaged in. It is a more interactional approach toward multimodality where the focus is on the actions carried out by the social actor (Norris, 2004, 2011). It is initiated by applying the theoretical notion of mediated discourse proposed by Scollon (1998, 2001) and employing visual research methods to discourse analysis (Kress and van Leeuwen, 2001). The theoretical framework of mediated discourse analysis focuses on human action and encourages the integration of nonverbal communicative modes into discourse study. Meanwhile, visual methods promote the analysis of many communicative modes and help researchers investigate the intricate interplay between various modes in communicative events (Norris, 2011, p. 3).

MIA places a considerable emphasis on the notion of context and situated interaction (Jewitt, 2014). Moreover, thus, the social actor becomes central in MIA studies as the actions carried out by the social actor with or through multimodal mediational means are the focus for analysis (Norris, 2004). Therefore, this approach aims to figure out the intricacies of interactions and how social actors behave in specific instances (Norris, 2004). Norris (2004, p. 4) explains, "Multimodal Interaction Analysts set out to understand and describe what is going on in a given interaction."

MIA shifts attention from representation and communication, the focus of approaches taken by Kress, van Leeuwen, and

O'Halloran, to interaction (Jewitt, 2014). In Norris's (2004, p. 149) view, communication is interaction if "one person conveys a message and another perceives it." Here, the focus of interaction is expanded, moving away from linguistic interaction to explore how people employ gesture, gaze, posture, movement, space, and objects to mediated interaction in a given context. As a corollary of the focus shifting to interaction, the modal system is no longer a primary concern.

In multimodal interactional analysis, the *mediated action* is the unit of analysis, and it can be further categorized into three layers of actions: *lower-level actions*, *higher-level actions*, and *frozen actions* (Norris, 2004, p. 13; Scollon and Scollon, 2004). Lower-level actions are fluidly performed in interaction and are mediated by an array of communicative modes, including body parts, hands, arms or figures, etc. Moreover, the sum of fluidly performed chains of lower-level actions develops into higher-level actions. Social actors orchestrate a range of multiple modes of communication in interactions to accomplish various higher-level actions simultaneously (Norris, 2011). Frozen actions are higher-level actions frozen in a material object. For example, the objects present in a classroom construct the mode of layout, which gives off messages about the social actor and structure the interaction somehow. According to Norris (2004, 2019, 2020), the higher-level actions are also fluid and develop in real-time, and each higher-level action is bracketed by social openings and closings that are at least in part ritualized.

Jewitt (2014, p. 36) holds that multimodal interaction focuses on the mediate interaction in a given context, that is, how a variety of modes are brought into and constitutive of social interaction. Therefore, the first step to a multimodal interaction analysis is a basic understanding of a multiplicity of communicative modes (Norris, 2004, p. 11), which are essentially systems of representation with rules and regularities attached to them (Kress and Van Leeuwen, 2001). And, since the modes are interdependent upon one another in many different ways and the structure has to be determined through specific analysis with the consideration of occurring environment and context (Norris, 2004), the analyst will then try to investigate how these communicative modes play together to make sense in interaction. Norris (2004) used modal intensity to refer to the intensity, or weight one communicative mode carries in interactions. If a mode takes on primacy in a specific interaction, it takes on high intensity. This can happen to any mode or several jointly interconnected modes. When several modes communicate together in synchrony without one communicative mode taking on particular interactions, the intricate interplay among modes is called *modal complexity*. Modal complexity and modal intensity can also combine. That is, a hierarchically structuring mode is an intense mode that constructs other modes in interaction. It can work with other complexly interconnected modes. The notion of *mode density* indicates the level of attention/awareness that a social actor plays on a particular mode, which is achieved through modal intensity or modal complexity or both when constructing a higher-level action. White (2010) has utilized the concept of modal density to analyze the New Zealand Army interactive posters and shows how communications in the age of information overload

are more likely to be successful if they find new ways of getting and keeping attention.

Although MIA is "still in its infancy" (Norris, 2014, p. 98), it has recently been applied in various studies. Norris (2004) utilizes the framework of multimodal interaction analysis to illustrate how a teacher utilized an interactive means in a language instruction classroom discourse to shift students' attention to a new higher-level action. Norris (2011, 2017) has illustrated the efficacy of the framework for constructing a social actor's social world in everyday interactions, like identity production, complexity, and cultural differences in different nations. Lotherington et al. (2019) analyzed how language and images interact as meaning-making resources in constructing a plurilingual talking book from the multimodal interaction perspective. Pirini is one of the supporters of this approach. In a series of studies, Pirini (2014) explores shared attention/awareness in high school tutoring sessions and develops the notions of *agency* in intersubjectivity in tutoring sessions, among others (Pirini, 2013). Within the field of education, Fernández-Pacheco (2016, 2018) has recently adopted the concept of *higher-level action* to structure a series of vodcasts with the aim to analyzing which multimodal ensembles are more beneficial for students' comprehension; Bernad-Mechó (2017) uses MIA to examine how topics are introduced through the use of *introducing topic* metadiscourse in a history lecture, and he then explores the complex process of lecture structuring by analyzing actions carried out by the lecturers (Bernad-Mechó and Fortanet-Gómez, 2019).

To sum up, previous research has shown that MIA allows for an in-depth exploration of human interaction with a particular emphasis on the social actor, in which the mediated action becomes the basic unit for analysis. It is believed that the exploration of various interactions based on this perspective undoubtedly will bring new developments to the field of multimodality (Norris, 2014). In the present research, MIA is adopted as a theoretical and methodological framework to scrutinize the mediated actions performed by EFL teachers. This allows for a closer, more interpretative way to reveal how EFL teachers engage students during the lead-ins. These three research questions guide this study.

1. What multimodal communicative modes are selected and utilized by EFL teachers when they construct the higher-level actions of the lead-in?
2. How are communicative modes assembled to realize the communicative purpose of each move of classroom lead-ins?
3. What role does EFL teachers' multimodal competence play in engaging students during classroom lead-ins?

METHODOLOGY

Research Settings

This study reports on two case studies of two highly-qualified EFL teachers, the top two winners of a national teaching contest held for college English teachers in 2015. The teaching contest is an annually held event to provide a platform for college English teachers to demonstrate their teaching strategies and

skills. The annual competition has attracted EFL teachers from nearly one thousand colleges and universities across the country, and only those who stand out from their provincial contests will have the opportunity to attend the semi-finals, and only the top 10 semi-finals winners will advance to the national final. Thus, in this paper, we take those winner teachers of national finals as highly-qualified English teachers for their profound language skills, excellent teaching performance, and elaborate curriculum design.

Contestant teachers are required to present a 20-min lecture with a complete teaching procedure as a regular classroom does, including the lead-in, presentation, practice, and homework assignments. The demo course, called *Intensive Reading*, is a comprehensive reading course designed for English majors in China, aiming at improving students' basic skills of reading, listening, speaking, and writing. The topics for demo class are determined by drawing lots 2 weeks ahead of the competition. The contests are held in the same lecture room seated with participant students and expert judges. Furthermore, constant teachers do not know the students in advance, and the students know nothing about what topic will be introduced, either. Hence, it is quite a challenging task for contestant teachers to engage students during the lead-in section. The complete teaching procedure of each contestant is recorded and published nationwide together with winner teachers' personal reflection on the contest, their PPT, and expert judges' comments on each contestant's performance. These resources are also available online for use in pedagogic purposes.

Participants

Two top winners of the national finals are selected as participants for this study. They are EFL teachers from two different universities located in different provinces in China. For the convenience of reference, one teacher is referred to here as T1 and the other as T2. The demographic information of the two teachers is shown in **Table 2**. These two teachers are chosen as participants for the following considerations. Firstly, they are the top two winners of the national finals who also happened to be of the opposite sex. Secondly, they taught the same group of students (demographic information is shown in **Table 3**) with different topics, fully presenting different lead-in strategies during their demo class. T1's topic is "Life as a Housefather," and he uses storytelling lead-in to provoke students' interest in the story of a housefather; and T2's topic is "The Quest for Convenience" and she adopts question-answer style to motivate students' participation in the topic discussion. Thirdly, they adopt different lead-in strategies with different time allocation, but both teachers successfully engage students and establish a positive classroom atmosphere for the smooth transition to the reading and appreciation of the given text. Their different ways to introduce the topic of the text are well received by the students (judged from the reaction of students in the video) and highly praised by expert judges as "simple and effective, which aroused students' interest in the topic, and prepared them for the study of the text" [National Advisory Committee on Teaching English to Majors in Higher Education (NACTEMHE), 2016, p. 30].

TABLE 2 | Demographic information of the two teachers.

Background information	T1	T2
Gender	Male	Female
Age	35	36
Years of EFL Teaching	14	15
Education	MA	MA
Major	Translation	Literature
Language proficiency	Fluent English speaker	Fluent English speaker
Award rank	1st-prize	2nd-prize
Demo class topic	Life as a House Father	The Quest for convenience
Lead-in strategy	Storytelling	Question-answering
Lead-in time allocation	2'36	3'48
Total time duration of demo class	20'	20'

TABLE 3 | Demographic information of the students.

Participant students		
Gender	Male	3
	Female	9
Age	Maximum	19
	Minimum	17
Years of English Learning	Maximum	12
	Minimum	10
Major	English	
Grade	Freshmen	
Familiarity with demo-lecturers	Total strangers	Total strangers

Data Collection

Data collected for this study include recorded videos of demo class, expert judge's comments, contestant teachers' self-reflection on their teaching, and their PPT (available online: <https://we.sflep.com/Teaching/PastCompetition.aspx?id=6>). For the video clip, this study uses the ELAN multimodal analysis software (EUDICO Linguistic Annotator) to annotate communicative modes (Version 5.8 of this software can be downloaded from the official ELAN website, <https://tla.mpi.nl/tools/tla-tools/elan/download/>). To annotate the data, the researchers first clipped out the lead-in segments and then watched and observed the two sample-videos for numerous times to note the features of different modes. Based on previous research into multimodal teaching and Norris' (2004) list of communicative modes for everyday multimodal interactions, we annotate the following modes: spoken language, print, distance, posture, gesture, gaze, head movement, and facial expression. The eight communicative modes were further annotated with ELAN (see **Figure 1**) based on a coding schema (see **Table 4**). After the annotation, the ELAN can provide the annotation statistics, including numbers of annotation, average duration, total annotation duration, annotation duration percentage, etc. seen in **Figures 1, 2**.

Analytical Procedures

The researchers follow the procedures suggested by Norris (2004, 2019, 2020) to analyze two EFL teachers' multimodal pedagogic discourse during classroom lead-ins. According to Norris

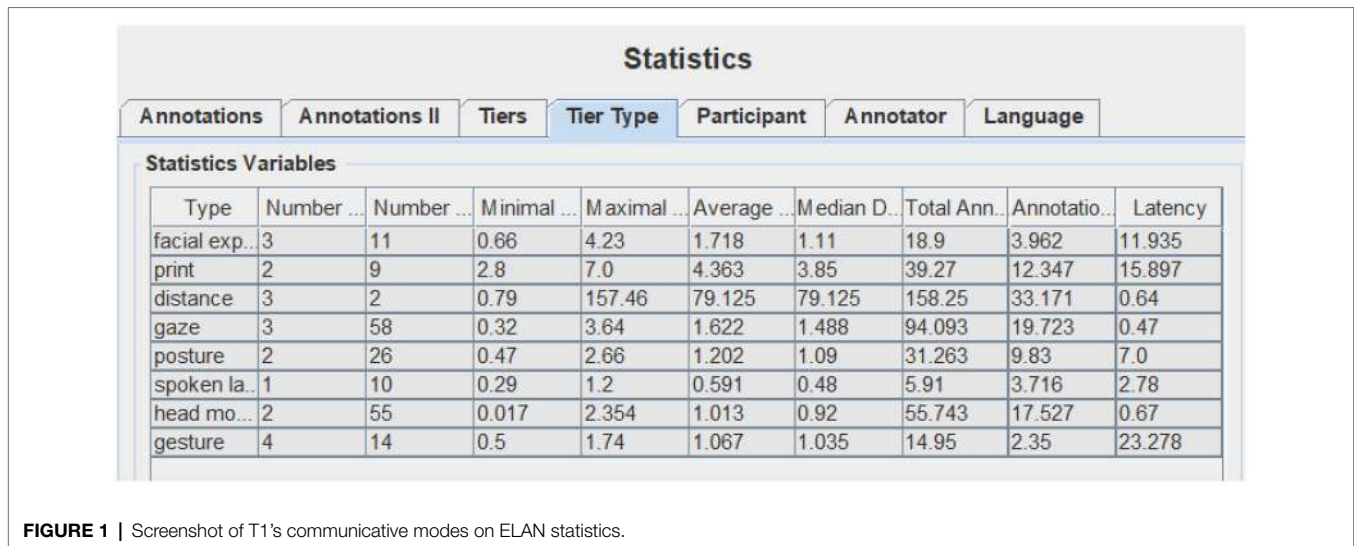


FIGURE 1 | Screenshot of T1's communicative modes on ELAN statistics.

TABLE 4 | Coding schema of communicative modes.

Communicative modes	Tier and Coding	
Language	Spoken language (SL)	Prosody (SLP)
	Print(P)	Writing on the white board (PWWB), PPT slide (PPS)
Distance (D)	Formal distance (DFD), Social distance (DSD), Personal distance (DPD)	
Posture (P)	Closed posture (PCP), Open posture (POP)	
Gesture (G)	Iconic gesture (GIG), Deictic gesture (GDG), Metaphoric gesture (GMG), Beat gesture (GBG)	
Gaze (G)	Gaze at all the students (GGAS), Gaze at one student (GGOS), Gaze at the PPT presentation (GGPP)	
Head movement (HM)	Directional shift (HMDS), head beats (HMHB),	
Facial expression (FE)	Positive (FEP), Negative (FEN)	

(2004, 2019, 2020), the first step to a multimodal interaction analysis is to understand an array of communicative *modes*. The ELAN annotation of communicative modes helps us achieve the first step already. After that, we will investigate how modes play together in interaction. Here, the classroom lead-in is seen as a higher-level action, and the four moves are four lower-level actions. We will analyze the interplay of communicative modes at each move level and assemble them into patterns according to their modal intensity. Last of all, based on the findings of the first two steps, we will discuss the role of teachers' multimodal competence in engaging students during classroom lead-ins.

RESULTS AND ANALYSIS

This study first presents the descriptive data of communicative modes used by two teachers and then illustrates how communicative modes work together to realize the communicative purpose of lead-in.

Communicative Modes in Pedagogical Discourse

The annotation statistics provided by ELAN (see Table 5) show that both teachers made full use of eight communicative modes to construct a multimodal pedagogic discourse during the classroom lead-ins. There is no significant difference between them in terms of multimodal behaviors in general ($F=0.80311486$, value of $p=0.399931623$, $F_{crit}=5.591447851$). However, the statistics indicate that two teachers differ significantly in their performance of each specific communicative mode ($F=8.596998143$, value of $p=0.005510677$, $F_{crit}=3.78704354$). The variance value of each communicative mode indicates the similarity or difference in teachers' multimodal behaviors. The bigger the variance value, the larger is the difference between them. From the values, we can find that among the modes utilized by both teachers, those that help to build interpersonal relationships are preferred, like facial expressions, gaze, and distance, while the other modes that are associated with lead-in strategies take on different application frequencies, like gesture, head movement, and posture. Table 6 presents the detailed information of each communicative mode utilized by two teachers. The following is the use of communicative modes between two participants during classroom lead-ins.

Language

In an English as a foreign language classroom, a target language is a tool for teachers to organize classroom teaching and an important source of language input. This study represents language mode by spoken language, print mode of PPT slides, and blackboard writing. Spoken language is the primary mode with the most vigorous intensity among all the communicative modes in the language classroom setting. Spoken language is analyzed in terms of prosodic features where stress and pause are annotated. The statistics of ELAN annotation show that both teachers have the same number of prosodic features but differ in annotation duration. There is no significant difference, in any case. As for pause,

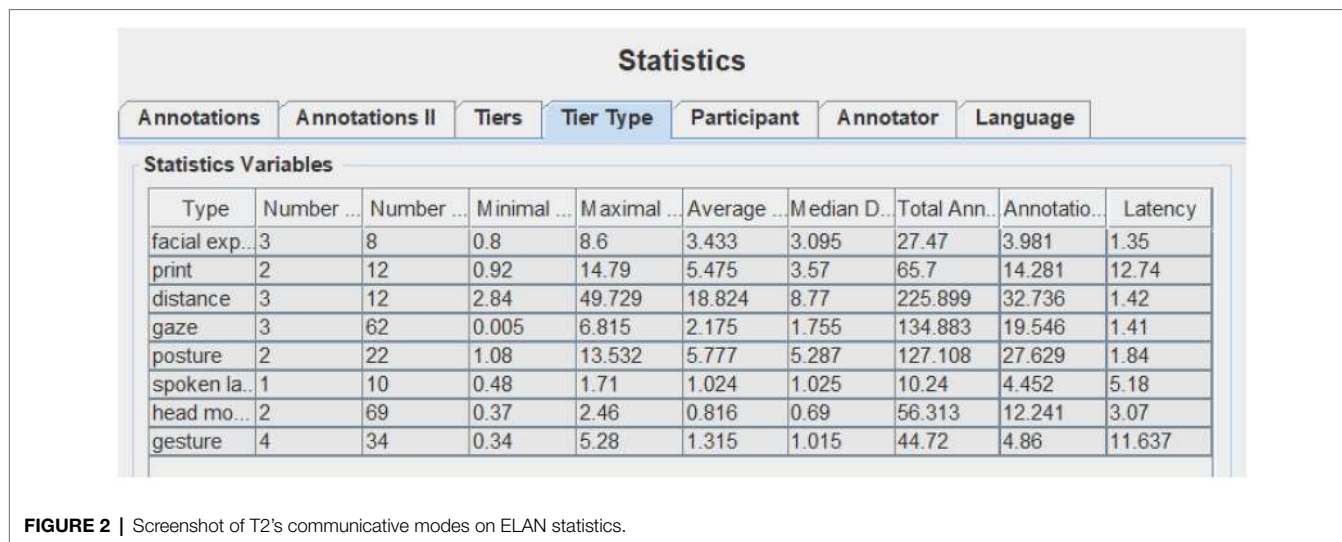


FIGURE 2 | Screenshot of T2’s communicative modes on ELAN statistics.

TABLE 5 | Communicative modes in the classroom lead-ins of two demo-lectures.

Mode	T1				T2				Variance
	NoA	AD	TAD	ADP	NoA	AD	TAD	ADP	
Spoken language	10	0.591	5.91	3.716	10	1.024	10.24	4.452	0.270848
print	9	4.363	39.27	12.347	12	5.475	65.7	14.281	1.870178
Distance	2	79.125	158.25	33.171	12	18.824	225.999	32.736	0.0946125
Gaze	58	1.622	94.093	19.723	62	2.175	134.883	19.546	0.0156645
Posture	26	1.202	31.263	9.83	22	5.777	127.108	27.629	158.4022005
Head movement	55	1.013	55.743	17.527	69	0.816	56.313	12.241	13.970898
Gesture	14	1.067	14.95	2.35	34	1.315	44.72	4.86	3.15005
Facial expression	11	1.718	18.9	5.942	8	3.433	27.47	5.971	0.0004205

NoA=Number of Annotations, AD=Annotation Duration, TAD=Total Annotation Duration, ADP=Annotation Duration Percentage.

T1 seemed to use it as a technique for storytelling lead-in. For instance, after his comment with a tag question, “That sounds perfect, right?” T1 paused to check students’ reactions. This is also the case of T2. After she raised a question, she paused to observe the students’ responses. Since T2’s question-answer lead-in needs more students’ participation, she also used more prosodic features, like high pitch or stress, when asking or responding to students’ answers. Besides spoken language, both teachers depend more on a computer-mediated PPT screen to present information, but T2 also uses the whiteboard to present information, which makes up for the shortage of PPT slides. One expert judge spoke highly of T2’s use of the whiteboard, saying that it is a “smart and effective way to catch students’ attention on the keywords which presuppose the theme of the text’ [National Advisory Committee on Teaching English to Majors in Higher Education (NACTEMHE), 2016, p. 12].

Distance

The distance that a teacher takes up for students allows us to gain insight into social relationships. Based on Hall’s (1966) work on proxemics, we examined three types of distance as the close distance is rare in the formal classroom: formal distance, social distance, and emotional distance, which

corresponds to the three types of space in the classroom proposed by Lim et al. (2012): authoritative space, interactional space, and personal space. In the study, the three distances are redefined depending on the specific layout of the furniture in the classroom. Formal distance refers to the position where the teacher stands around the laptop table or near the whiteboard. The social distance is where the teacher stands in or near the passageways between students’ desks, and the personal distance refers to the position where the teacher intentionally stands beside one student. The result in Table 6 shows that both teachers prefer to keep a social distance with students as it both highlights the teachers’ authoritative position in the class and facilitates interaction with the entire student. To be specific, T1 maintained a “stable” social distance to students (see Figure 3). T1 starts his lecture by moving his position from the laptop table to the right front of the passageway between students’ desks, and he keeps this kind of social distance to the end of the lead-in. In contrast, T2 (see Figure 4) constantly adjusts her distance with students due to the need to interact. Nevertheless, both teachers’ preference of standing.

Posture

Body posture is a modal form that goes hand in hand with gaze and head movement. The form and direction of posture

TABLE 6 | Annotation statistics of each type of communicative mode.

Mode	Types	T1			T2		
		NoA	TAD	ADP	NoA	TAD	ADP
Facial expression	FEP	5	10.86	6.829	7	26.0	11.303
	FEN	6	8.04	5.056	1	1.47	0.639
Gaze	GGAS	51	85.653	53.862	34	74.508	32.391
	GGOS	0	0	0	11	23.275	10.119
Distance	DFD	1	0.79	0.497	3	91.28	39.683
	DSD	1	157.46	99.018	5	121.469	52.807
	DPED	0	0	0	4	13.15	5.717
Spoken language	SLP	10	5.91	3.716	10	10.24	4.452
Print	PPS	9	39.27	24.684	4	40.32	17.529
	PWWB	0	0	0	8	25.38	11.034
Gesture	GIG	0	0	0	1	6.3	2.739
	GDG	11	12.5	7.86	13	11.71	5.091
	GMG	0	0	0	11	12.19	5.299
	GBG	3	2.45	1.541	9	15.54	6.756
Head movement	HMDS	34	38.991	24.519	60	50.393	21.908
	HMHB	21	16.752	10.534	9	5.92	2.574
Posture	PCP	22	28.493	17.917	13	51.119	22.223
	POP	4	2.77	1.742	10	76.266	33.156

NoA = Number of Annotations, TAD = Total Annotation Duration, ADP = Annotation Duration Percentage.

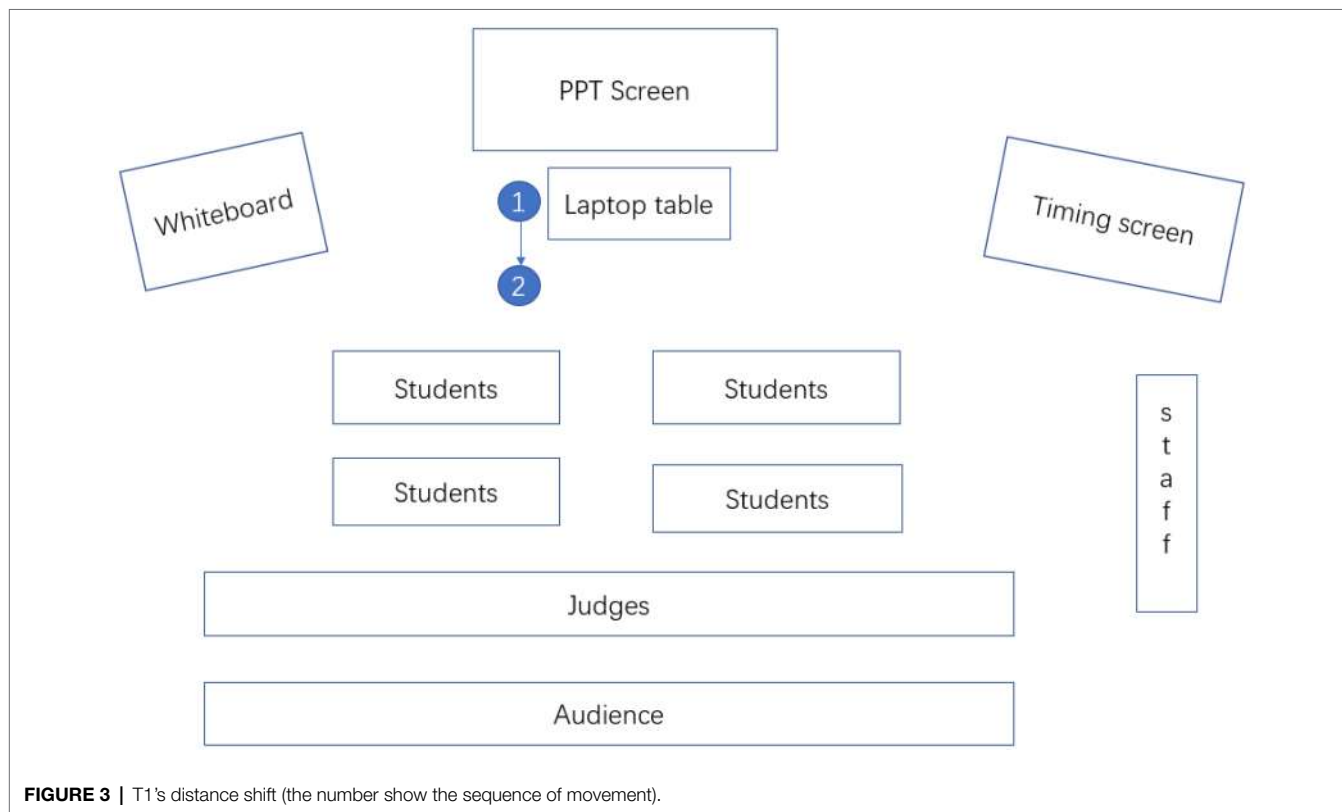


FIGURE 3 | T1's distance shift (the number show the sequence of movement).

play an essential role in representing and constructing interactive meaning (Norris, 2004). Since the direction of body position coincides with deictic head movement in this study, only the form of body posture is analyzed in terms of the openness of arms. When two arms are hanging in front of the abdomen with hands crossed to form a circular gesture, it is considered a closed or otherwise open posture. T1 and T2 differ significantly

in the shift of body posture. T1 presents a closed body posture most of the time. T2, however, switches her form of body posture constantly between open and closed posture, but her open posture takes longer than her closed posture. Different forms of body posture seem to help to build up different teacher images. T1's closed posture may make students feel solemn, conscientious, and perhaps a little reserved, but he is

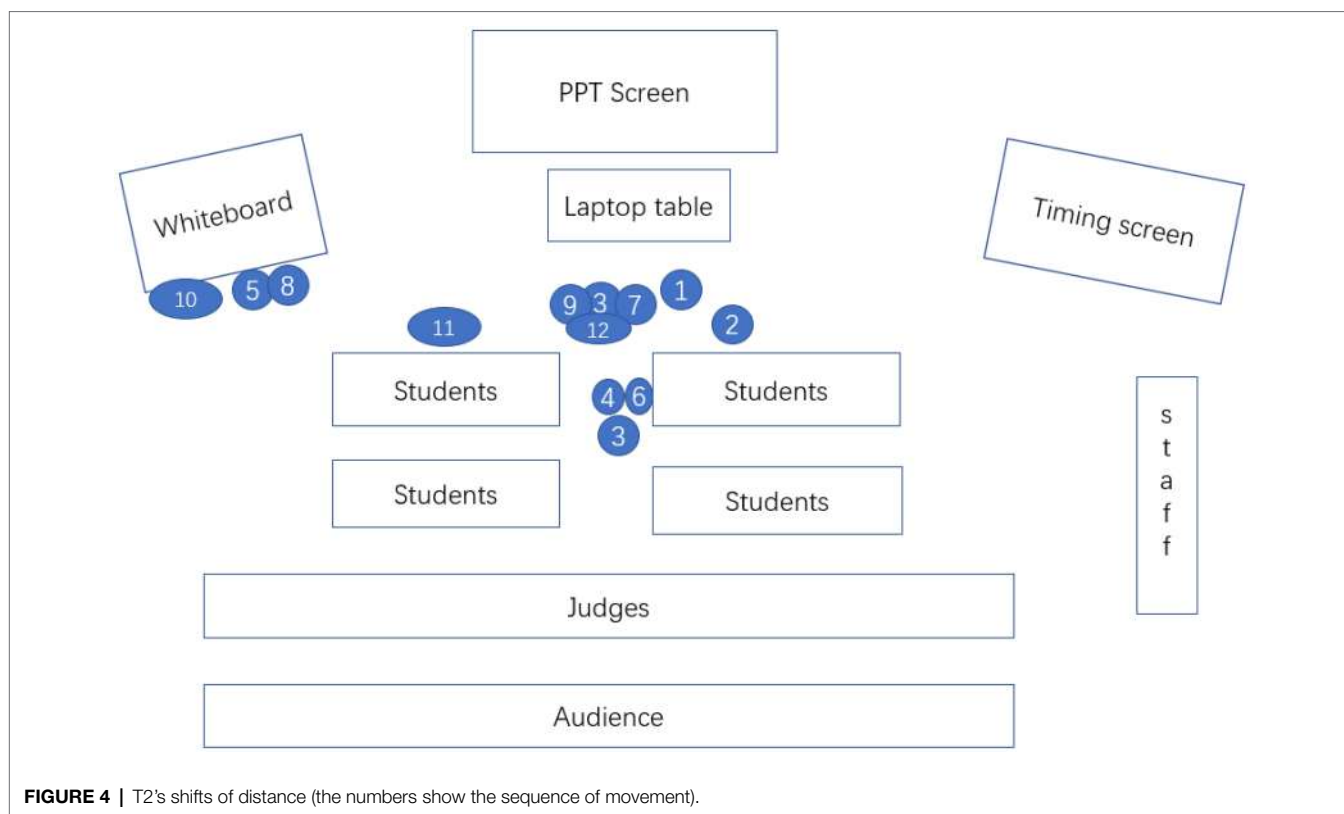


FIGURE 4 | T2's shifts of distance (the numbers show the sequence of movement).

very humorous during his storytelling. One judge comments that “this contrast makes his storytelling very infectious” [National Advisory Committee on Teaching English to Majors in Higher Education (NACTEMHE), 2016, p. 30]. T2's shifts between two posture forms indicate that she is a passionate and enthusiastic teacher, but at the same time, she is aware of her teacher identity, as T2 reflects that “I have to posture as what a teacher is expected to be, elegant and scholarly” [National Advisory Committee on Teaching English to Majors in Higher Education (NACTEMHE), 2016, p. 6].

Gesture

In this study, any deliberately expressive hand/arm movement that often accompanies spoken language is considered a gesture. When understanding the meaning of gestures, according to McNeill (1992), it is vital to consider them in connection with the accompanying speech. The interconnected relationship between gestures and speech categorizes gestures into four types: iconic gestures, metaphoric gestures, deictic, and beat gestures. **Table 6** shows that T1 makes fewer gestural movements than does T2 both in number and duration. As for specific gestural behaviors, T1's gestures are limited to deictic gestures and beat gestures. His deictic gestures occurred when he raised his hand to switch PPT slides, and beat gestures accompanied spoken language to emphasize a smooth flow of speech. T2, in contrast, makes more frequent use of the four types of gestures, among which deictic gestures are used most frequently, metaphoric gestures the second, ironic gestures the least used, and beat gestures have the most prolonged duration. T2's

frequent use of gestures has much to do with her lead-in strategy, which is explained in the discussion section.

Gaze

Eye contact or gaze is a communicative mode subordinate to the mode of spoken language (Norris, 2004, p. 37). The annotation statistics of gaze (see **Table 6**) show that two teachers resort to eye contact as one of the essential teaching aids to build social contact with students. There are two primary forms of eye contact with students, one with all the students and one with one single student. The former one of the “one-to-many” eye contact shows that the teacher attaches importance to all the students and is treated equally in the teacher's eyes. T1 utilizes the “one-to-many” type of eye contact all the time during his lead-in, giving students the feeling of “equal treatment.” T2 has direct eye contact with single students during her one-to-one question style of lead-in section, which shows her concern and respect for individual students. However, her “one-to-many” type of eye contact still takes the higher percentage in both numbers and duration. This suggests that the teacher's one-to-many gaze builds a sense of inclusion conducive to smooth interaction between the teacher and students.

Head Movement

In the case of head movement annotated in the study, deictic head movement and head beats are of significance (Norris, 2004, p. 33). Deictic head movement is a modal representation closely related to the shifts of gaze. Head beat is the rapid

up and down, or back and forth head movement accompanying spoken language. The annotation result shows (see **Table 6**) that deictic head movement is the primary representation of head movement, and both teachers shifted their head direction by the shifts of body position or shift of eye contact accompanying spoken language. The head direction shifts are almost in parallel with the frequency of gaze shifts to indicate the direction. This is more often seen in T1's multimodal pedagogic discourse during his storytelling lead-in.

Facial Expression

Teachers' facial expression is a direct indicator showing their attitudes toward students, which is often categorized into two types: cheerful face and negative face. Teachers often prefer a positive facial expression to evoke warm feelings in students and reflect the teachers' self-confidence. The annotation result in **Table 6** shows that both teachers adopted positive facial expressions more often than negative ones. T1, however, utilized more negative facial expressions (like frowning or a wry smile) in his pedagogic discourse, catering to need when telling the story. That is, T1 utilized more diversified facial expressions to assist in information transmission and thus produce the students' appealing effect. For example, he frowned when speaking of the protagonist's work pressure; he gave a wry smile when explaining the stomach ulcer caused by the pressure. An expert judge comments that "the teacher is emphatic with the protagonist, displaying the human side" [National Advisory Committee on Teaching English to Majors in Higher Education (NACTEMHE), 2016, p. 12].

Multimodal Ensembles of Communicative Modes

The communicative modes are interdependent upon one another in many different ways (Norris, 2004). It is, therefore, of great necessity to find out how the communicative modes are structured to realize the communicative purpose in context. We have found that both teachers' classroom lead-ins include the same four moves with distinct functions, but they are realized by different specific multimodal ensembles except for the introducing the teaching plan move (see **Tables 7** and **8**). In the other three moves, T2's multimodal ensembles are more complex and in scope than T1's due to their different lead-in

strategies. The following is an analysis of how the communicative purpose of each move is realized through the application and coordination of communicative modes.

The Interplay of Communicative Modes in Greeting

The greeting is an inseparable part of classroom lead-in, which functions to arouse students' attention and establish and maintain an interpersonal relationship with students. In the present case of demo class, the contestant teacher meets the students and the judges for the first time, and thus, greeting plays an essential role in affecting the audience's first impression. To perform this action well, both teachers draw on positive facial expressions, eye contact, social distance, and closed posture with the primary mode of spoken language to establish a friendly and agreeable teacher-students relationship and construct their teacher identity.

However, there are some differences in the salience of specific communicative modes between the two teachers due to their different lead-in strategies. In the case of T1 (seen in **Figure 3**), there is a noticeable shift of distance to indicate the beginning of class. He steps forward to the students from the laptop desk (as number ① shows) as he is uttering the formulaic expression, "Good afternoon, ladies and gentlemen" with a smiling face and a gaze at all the students. He then chooses to stand in the middle-left front of the students (as number ② shows). He makes his identity clear with the expression "I'm going to be your new teacher" while simultaneously leaning forward and nodding his head with the expression of "for the next 20 min," highlighting the temporary teacher-student relationship (see the numbers above). During the process, the teacher kept a closed posture, making him look serene and scholarly.

To sum up, in T1's case, he calls students' attention to the beginning of the class with shift position and his words, which are most conspicuous in modal intensity. In addition, T1's gaze, facial expression, and head movement also play a role. Thus, the communicative modes to achieve the purpose of greeting can be structured into the ensemble pattern, as is shown in **Table 7**.

T2's modal combination pattern in her greeting action (see **Table 8**) differs slightly from T1's. T2 also utilizes the same type of communicative modes but different modal intensities, making her greeting more interactive and constructing an amiable teacher image. **Figure 4** shows T2 stands in the middle

TABLE 7 | T1's model pattern during lead-in.

S. no.	Moves	Communicative modes pattern
1.	Greeting	Distance + spoken language + gaze + head movement + posture + facial expression
2.	Lead-in activities	Spoken language + facial expression + print (PPT slides) + gaze + head movement + gesture + posture
3.	Introducing the teaching plan	Spoken language + print (PPT slides) + gaze + head movement + gesture + posture + distance + facial expression
4.	Closing the lead-in	Spoken language + posture + print (PPT slides) + gaze + head movement + gesture + facial expression

TABLE 8 | T2's model pattern during lead-in.

S. no.	Moves	Communicative modes pattern
1.	Greeting	Spoken language (prosodic feature) + gaze + facial expression + posture + head movement + distance
2.	Introducing the teaching plan	Spoken language + print (PPT slides) + gaze + head movement + gesture + posture + distance + facial expression
3.	Lead-in activities	Spoken language (prosodic feature) + distance + gesture + gaze + head movement + facial expression + print (PPT + whiteboard) + posture
4.	Closing the lead-in	Spoken language (prosodic feature) + posture + print (PPT slides) + gaze + facial expression + gesture + head movement

right front of the students and smiles all the time during the greeting secession. She is aware of the presence of judges and the audience, so she addresses them at the very beginning (see the numbers above). She addresses them “dear students” with an obvious emphasis on “Dear” in her voice when it comes to students.

Meanwhile, she leans forward, looking at the students before her and then sweeping the whole class. This series of nonverbal modal representations have strengthened the referential meaning of “dear students.” The clever wording and the teacher’s nonverbal modes will narrow the distance between the teacher and students. After uttering “How are you today?” the teacher pauses for students’ response with a simultaneous postural shift of leaning forward, encouraging smile and head movement. These chained lower-level actions accompanying T2’s spoken language help convey the communicative meaning of greeting and serve to construct T2’s image as friendly.

The Interplay of Communicative Modes in Introducing the Teaching Plan

The primary purpose of introducing the teaching plan is to give students a clear idea about the learning objectives and the procedures to achieve these objectives. T1 and T2 are different in the order of presenting this move. In T1’s demo class, he introduces the teaching plan after the lead-in activity, while T2 follows the regular order of presenting the teaching plan after the greeting move. The two structures have their advantages: T1 states that he “intentionally” puts the teaching plan after the lead-in activity because he “intends to provoke students’ curiosity through the storytelling and then create a kind of suspense to students’ [National Advisory Committee on Teaching English to Majors in Higher Education (NACTEMHE), 2016, p. 12]. T2’s order can get students to have a clear idea of what is going to learn and how to learn it from the very beginning to prepare themselves for the following part.

Though different in ordering the move, both teachers assemble communicative modes into the same pattern (See **Tables 7** and **8**). As is seen in the videos (<https://we.sflep.com/Teaching/PastCompetition.aspx?id=6>), both teachers mainly rely on spoken language and PPT slides (i.e., print mode) to achieve this purpose. The two modes appear overlapping in that what appears on the PPT screen is precisely the content that the teacher speaks. In addition, both teachers employ deictic movements comprised of postural shifts, head movements, gestures, and gazes to indicate a shift of attention to the PPT screen. For example, T1 and T2 shifted their posture and gaze to turn the students’ attention to the PPT slide. These deictic movements coordinate with and assist spoken language to convey information, promote a sense of transition and add cohesion to the representation of interactional meaning.

The Interplay of Communicative Modes in Organizing Lead-In Activity

The move of presenting a lead-in activity is the critical part of lead-in, whose purpose is to acquaint students with the background information of the topic and prepare them for the following class procedure. In these two cases, both teachers

succeed in attracting students’ attention and arousing their enthusiasm and initiative in learning, which can be shown from the students’ responses in class. Spoken language still takes up high modal density, and the interactional meaning is realized by spoken language and complexity of other communicative modes, like print, proxemics, gaze, posture, gesture, layout, head movement, etc.

However, there are differences in modal selection and combination because the two teachers adopted different lead-in methods. T1 adopts the storytelling way to tell students how Rick decides to quit his job and become a housefather. It seems dull that T1 himself speaks all the time without involving students’ participation. However, he is a good storyteller by appealing to students with clear and interactive language and multiple other communicative modes, especially facial expressions, gaze, and head movement. In T1’s storytelling style of lead-in, he sets up suspense and questions to attract students’ attention to better follow him to know the background information of the topic. For example, he starts with “Today is not about me. Today is about a guy whose name is Rick,” and then he pops up the question “Who is Rick?” on the PPT screen, which arouses students’ curiosity to find out more information about Rick. He also uses the expressions like “let me tell you this is a stressful job” “sounds perfect, right?” to make his narration dialogue directly appealing to students.

His narration is more appealing because he utilizes various communicative modes, such as facial expressions, PPT images, posture, head movements, gaze, layout, and gesture, to coordinate with spoken language. The complexity of communicative modes supplements and strengthens the information conveyed through spoken language and made the narration vivid and appealing. For example, when talking about Rick suffering from a gastric ulcer due to tremendous work pressure, the teacher’s head is tilted, frowning, and his face is solemn, showing a sad expression. He smiles broadly when he tells the students that it was only a joke about Rick’s death obituary. The teacher’s multimodal combination made his introduction so appealing that students’ enthusiasm is aroused for the upcoming discussion. Just as one expert judge commented on his lead-in, “The teacher’s natural description produces a great affinity, which makes the interaction in the following section between teachers and students is natural” [National Advisory Committee on Teaching English to Majors in Higher Education (NACTEMHE), 2016, p. 24].

However, T2’s modal combination pattern is quite different from T1’s due to the question-and-answer approach adopted to familiarize students with the topic. T2’s procedures of presenting lead-in activity are pretty straightforward. She first brings up technology with the PPT screen displaying the technology products in the contemporary world. She then interviews students for reasons of using a cell phone. After that, she asks all the students to brainstorm what they have lost if using cellphone too much and writes critical points on the whiteboard. She points out that students have expressed their point of view on technology, but the class focuses on exploring the author’s view. Therefore, students will be intrigued to delve into the author’s view.

During the whole process, T2 utilizes a multiplicity of communicative modes to construct this communicative purpose

(see **Table 8**). Due to the high interactive feature, T2's ensemble of communicative modes is different from T1. First of all, her spoken language takes on apparent prosodic features, such as pause and high pitch. For example, the teacher pauses after asking a question and observes the student's reaction. She raises her voice in surprise when one student provides an unexpected answer to her question. While listening to students answering questions, she encourages them to speak more through eye contact, smiling facial expressions, and nodding head movement. Secondly, in the process of interaction, the teacher constantly adjusts the distance from students. She will approach the students and shorten the distance when asking questions or walking away to write on a whiteboard when listening to students answering questions. Thirdly, the teacher utilized a more diversified form of the mode of print. Besides PPT images, the teacher also writes on the whiteboard to directly presents students' views on a cellphone, which makes up for the shortcomings of PPT images.

In terms of model density and complexity of communication modes, the modal representation forms adopted by T2 are more apparent and more distinguishable, such as walking in the classroom and writing on the whiteboard, and the modal forms of spoken language, body posture, and head movements are more prominent as well. All in all, the modal form adopted by T2 has something to do with the lead-in method she adopted.

The Interplay of Communicative Modes in Ending the Lead-In

The move of ending the lead-in is the manner to direct students to the following procedure of the class. Both teachers utilize spoken language accompanied by deictic movements to indicate the end of lead-in and shift students' focus to another new higher-level action. Moreover, the PPT slide also plays a significant role in informing the students of the following teaching procedure. That is, they take on modal intensity in the meaning-making process. However, there is a slight difference between the two teachers in applying and combining communicative modes.

As is shown in videos (<https://we.sfllep.com/Teaching/PastCompetition.aspx?id=6>), when T1 announces, "Let us proceed to the first part" – a sign of ending the lead-in – he utilizes deictic movements, such as body posture, gesture, head movement, and gaze to direct students' attention to the next part of the class. At the same time, the PPT slide shows the information of the following teaching procedure, complementary with T1's verbal information. T2 still adopts a more interactive way to inform the students of the end of lead-in, and she employed a more complicated combination of communicative modes. She uses complex modal forms, such as proxemics, body posture, gestures, head movements, facial expressions, and gaze to assist spoken language in meaning delivery. For example, she tags with "all right" after she tells the students that they will read something to explore the author's view. At the same time, she leans forward with a gentle smile and an expectant gazing at the students, calling for their response. When they respond positively, the teacher thanks the students and turns around to change the PPT slide, indicating they are moving on to the following teaching procedure.

DISCUSSION

The central issue of this study was how EFL teachers engaged students during classroom lead-in employing multimodal pedagogic discourse, which is a reflection of teachers' multimodal competence. We probed into this question from two aspects: the teachers' choice of communicative modes and the way they constructed multimodal ensembles to realize the functions of classroom lead-in. Our findings corroborate the previous point of view that classroom teaching is a multimodal experience that happens through orchestration of spoken language and an array of other communicative modes, such as gesture, gaze, and facial expression (Kress et al., 2005; Jewitt, 2008; Peng, 2019; Lim, 2021). Our findings also reveal that the two highly-qualified EFL teachers possess the multimodal competence to construct multimodal pedagogic discourse during the classroom lead-in. And their multimodal competence enables them to choose and assemble communicative modes to realize the functions of classroom lead-in: gaining attention, stimulating motivation, setting up teaching objectives, building and establishing communicative links.

The teacher is recognized as "a designer of the learning experience of students" (Mercer and Dörnyei, 2020, p. vi). Teacher's multimodal competence "plays a crucial role in integrative lecturing, especially when the language of communication is other than one's own" (Morell's, 2018, p. 70). Our study supports Morell et al. (2020) in that multimodal ensembles indeed foster classroom engagement. In addition, it verifies Lim's (2017, p. 26) claim that teachers' orchestration of multimodal recourses encourages a "more congruent and effective" learning experience for students. During the classroom lead-ins, both teachers' orchestration of communicative modes was utilized to realize the pedagogic functions in the four moves. This is a demonstration of their high awareness of multimodal competence. Our findings show that EFL teachers' multimodal competence in performing a multimodal pedagogic discourse during lead-in allows stranger students to follow them and establish a communicative link step by step. Education is relational, and a close, caring teacher-student relationship plays a vital role in students' classroom engagement, learning, and performance (Furrer et al., 2014; Mercer and Dörnyei, 2020). In this way, students are aware of the teaching plan, acquainted with the topic theme, and motivated for the following procedures of class activities. van Lier (1996, p. 112) points out that language teaching is most effective when the teacher "stimulates intrinsic motivation, to take advantage of natural interests, curiosity, and emergent rewards."

Student classroom engagement is often considered a good predictor of student learning and development (Pike et al., 2012). Among the different dimensions for the realization of engagements, Mercer and Dörnyei (2020, p. 3) perceive "engagement to always be associated with an action." Behavioral participation is the most attractive predictor for students' participation in the classroom (Fuller and Marler, 2009). Lim (2021, p. 2) observes that "[w]hether the students feel safe to participate or are inhibited from speaking up are often a result of the meanings they perceive from their teachers' embodied semiosis." Therefore, in order to engage students to participate in the classroom,

two highly-qualified EFL teachers preferred to choose embodied modes like positive facial expressions, “one-to-all gaze and interpersonal distance” to build an intimate personal relationship with “stranger” students and make them feel a sense of belonging to the class not just as “onlookers” of the class. Cemalcilar (2010) notices that students who are more likely to feel a sense of belonging will be more engaged in school work.

It is worth noting that the two EFL teachers possess high-level multimodal competence, which enables them to choose and assemble a multiplicity of communicative modes under the different lead-in strategies they adopted. T1’s storytelling lead-in appears to involve fewer students’ behavioral participation as there was no question-answer section during the storytelling. However, it impacted students’ emotional/affective engagement – it is an internal dimension of engagement, referring to learners’ interests and sense of belonging/attachment (Fredricks et al., 2004). Judged from T1’s multimodal ensembles, it is noted that T1’s facial expression, gaze, PPT slides accompanied his clever choice of spoken language weighted high in modal density. T1 orchestrated these semiotic resources to design a learning experience for students by arousing students’ interest in the topic. Jewitt (2008, p. 262) observes that “the way teachers use multimodal semiotic resources like gaze, body posture, and space in the classroom affects literacy.”

In contrast, T2’s question-answer lead-in involves more students’ behavioral engagement in that students are expected to participate in activities designed by the teacher. Behavioral engagement draws on the idea of participation (Fredricks et al., 2004, p. 60). The classroom setting refers to the students’ active and participatory involvement in academic activities (Mercer and Dörnyei, 2020). That is to say, students’ behavioral engagement can be observed from the actions or performance in terms of active participation in interactive classroom activities (Fredricks et al., 2004). Seen from T2’s multimodal ensembles, it is found that her pattern is mainly different from T1’s. Communicative modes like the teacher’s positioning, gesture, movement, and gaze take on more shifts and higher modal density because these modes have much to do with provoking students’ behavioral engagement. Among all the dimensions of engagement, behavioral participation in the classroom is considered the “core construct, most prototypical of engagement” (Skinner, Furrer, Marchand, and Kindermann, 2008, p. 778; Mercer and Dörnyei, 2020, p. 3). Therefore, it is crucial for teachers’ to use their multimodal competence to engage students to participate actively to achieve positive academic outcomes.

It is also noted that teachers’ multimodal competence has much to do with the different engagement they intend to provoke in students. T2’s question-and-answer lead-in involves students’ behavioral participation. In order to engage students, T2 used an interactive tone of voice, constant gaze shifts, frequent shifts of positioning distance with students, and diversified gestural forms. Peng (2019) observes that teachers’ gestures and spatial positions predict students’ willingness to participate in the classroom. This is also the case in T2’s multimodal ensembles. T2’s complex multimodal ensembles during the classroom lead-in show that T2 provides necessary support to students, and she is also very passionate about what she is to do. If understood

in terms of the principles suggested by Mercer and Dörnyei (2020), T2’s multimodal competence displayed during the lead-in helps to facilitate a more behavioral engagement.

Compared with T2’s complex multimodal ensembles, T1 seems to be more “simplistic” in telling students a story with his words accompanied with embodied actions like eye contact, facial expressions, and information on the PPT slides. However, T1 also fully engaged students and laid a solid foundation for the formal presentation of the topic in the following section. We think the reasons might be found in another principle that Mercer and Dörnyei (2020) suggested facilitates the more compelling aspects of engagement. First of all, T1 is physically approachable when he chooses a position to tell students the story. More importantly, T1’s approachability is reflected through his humor. Mercer and Dörnyei (2020, p. 54) hold that humor can be another way to “lower the affective filter and generate positive affect,” revealing to learners the “human” side of the teacher. Wanzer et al. (2010) explain that humor might lead to deeper cognitive processing, better relationships, and more effective learning when the form of humor is appropriate. Secondly, the teacher is emphatic. Empathy means being able to step into somebody else’s shoes and see the world from their perspective (Mercer and Dörnyei (2020, p. 55). This can be seen from T1’s shift of facial expressions accompanying storytelling and his clever choice of linguistic symbols where he used Chinese symbols to explain abstract English words, facilitating students’ understanding.

Finally, the teacher’s multimodal competence also helps to shape a teacher’s image and teaching style. Norris (2004, p. 137) argues, “Every higher-level action that a social actor engages in constructs the person’s social world.” Our findings also suggest that both teachers construct their professional image through the appropriate application of multimodal communicative modes reflected in their words and actions. T1 impresses the students and judges with his calm and steady image, which is constructed by his application of closed posture, stable distance with students, and infrequent shifts of gestures. Meanwhile, he also is regarded as humorous as his skillful and humorous style of telling the story fully engaged the students during the lead-in. T2, on the other hand, builds up her personal charisma as a passionate and approachable teacher to students through her frequent application of nonverbal communicative modes to complement and reinforce her spoken language.

CONCLUSION

This study has explored the multimodal pedagogical discourse of classroom lead-ins delivered by two highly-qualified EFL teachers during a national teaching competition. The findings reveal that language teachers’ high-level multimodal competence play a positive role in engaging students during the classroom lead-in. The multimodal competence enables them to choose and assemble a multiplicity of communicative modes along with the primary mode of spoken language depending on the communicative purpose in context. In addition, the multimodal

pedagogic discourse they produced is largely in accordance with the different lead-in strategies they adopted.

However, this multimodal interaction analysis only focuses on a very small corpus of two EFL teachers' classroom lead-ins, and thus, we can only reach some tentative findings. More future research with larger datasets is expected to verify our findings. In addition, some research-based and pedagogical implications might be drawn from the present research. In the case of multimodal pedagogic discourse study, as Kress et al. (2005) have suggested that multimodal analysis of pedagogic discourse contributes to a more complete understanding of the teaching and learning that occur in the classroom, future studies are suggested to take into account the overall language teaching process, so that we will better understand the degree of teachers' multimodal competence contributes to effective EFL teaching. Particularly, more empirical research is expected to investigate the relations between the teacher's multimodal competence and students' classroom engagement as well as the effects on students' academic performance.

In terms of pedagogic implication, EFL teachers need to be aware of the significance of multimodal competence and learn to put it into practice to engage students in the classroom setting. For the first thing, language teachers should take care of teacher talk. Mercer and Dörnyei (2020) suggest that teacher talk in the language classroom has the power to affect not only language learning but also the teacher-student relationship. During the teaching plan period, language teachers are advised to prepare in advance what to say and how to say it to positively engage students. Secondly, language teachers need to be aware of the significance of nonverbal communicative modes accompanied by language, as they can also "talk" in the meaning-making process and learn to combine them according to modal density into multimodal ensembles. Thirdly, when teachers make modal combinations, they need to consider the complexity of the lead-in strategies, as different lead-in strategies involve different multimodal pedagogic discourse. Therefore, this study suggests that more future research could be conducted on this topic to suggest the relations between multimodal competence and students' classroom engagement.

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DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the institutional review board of Foreign Language School, Jiangsu University of Science & Technology. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

YQ and PW shared equal contributions: They conceived of the presented idea, collected, and analyzed data. YQ wrote the manuscript. PW revised the manuscript. All authors contributed to the article and approved the submitted version.

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Multimodal Irregular Self-Selection in Chinese Postgraduate English as a Foreign Language Learners' Conversation: When, How, and Why

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Irregular self-selection is a demonstration of active involvement in interaction. English as a foreign language (EFL) learners' talk-in-interaction is one of such cases. Yet, little research has explored when, how, and why learners implement this action. The aim of this article is to address these issues in Chinese postgraduate EFL learners' conversations from the perspective of multimodal interaction. To this end, we provide descriptive statistics and use multimodal conversation analysis to investigate the detailed process of irregular self-selection. The results show the interactional sensitivity of learners, and all the successful irregular self-selection can be divided into the following three types: turn interruption (TI), turn competition (TC), and turn holding abortion (THA). Learners implement this action by using multimodal resources, including lexis, syntax, pitch reset, intensity enhancement, gaze, and so forth. However, their body movements lack diversity, causing behaviors to be constrained and inactive. The main purpose of irregular self-selection is to provide knowledge that contributes to topical development. This study reveals that Chinese postgraduate EFL learners are interactionally competent members. They are able to achieve communicative goals but in a low diversity of body movements. The findings help to understand the detailed process of speakership claiming in EFL learners' conversations.

Keywords: irregular self-selection, Chinese postgraduate EFL learners, descriptive statistics, multimodal conversation analysis, detailed process

INTRODUCTION

Interaction is one of the core matrixes for human social life. A mechanism for coordinating interaction is a turn-taking system that regulates who is to speak and when (Sacks et al., 1974). Until now, a substantial amount of research has been conducted concerning how the system works either in ordinary or institutional conversation (e.g., Mondada, 2007, 2013; Stivers and Rossano, 2010; Weiß, 2018; Yang, 2019; Auer, 2021). In studies of turn-taking practices, conversation analysis (CA), which adopts a participant-relevant emic perspective, offers a valid tool for observing and analyzing the dynamic details of turn and sequence organization in talk-in-interaction. Recently, how multimodal resources work together in the construction and organization of turns has received much attention (Mondada, 2007, 2013; Streeck, 2009; Yang, 2011; Dressel, 2020). In line with this

research, multimodal CA has largely remained a framework used by and shared with scholars in the social sciences.

However, mainstream multimodal CA research predominantly investigates first language interactions, and thus research on foreign language conversation is still marginalized in the literature (Pietikainen, 2018). In a few studies of non-native discourse, attention often turns to language classrooms since this is one of the main locations where foreign language learners have the opportunity and need to use the language they are learning (Waring, 2011). Yet, as noted by Kasper and Wagner (2011), language classrooms offer a limited range of interaction. Obviously, turn-taking in the classroom is under the guidance of the teacher, who has a high knowledge status and dominates the class interaction. Because of the low knowledge status and unequal relationship between teachers and students, self-selection is quite challenging and unusual in the teacher-student interaction context (Takahashi, 2018).

In contrast to it, peer interaction involves students who have equal identity status and similar knowledge status. In such a context, there is a tendency of English as a foreign language (EFL) learners to implement self-selection in an irregular turn-taking way, that is, irregular self-selection (Almoaily, 2020). However, by referring to the previous literature, relatively little is known about this action in EFL learners' conversation from the perspective of multimodal interaction. To fill this gap, the present article aims to examine irregular self-selection in Chinese postgraduate EFL learners' conversations by mainly using a multimodal conversation analytic approach. It tries to reveal the nature and essence of this action from when, how, and why to some extent. This article is expected to gain a deeper and more detailed understanding of Chinese postgraduate EFL learners' irregular self-selection and add to the research on multimodal turn-taking practices of EFL learners. In all, we seek to address the following research questions:

- (1) When does irregular self-selection occur (i.e., type)?
- (2) How does the hearer mobilize multimodal resources (in verbal, vocal, and non-verbal aspects) to achieve irregular self-selection?
- (3) Why do they implement irregular self-selection (i.e., purpose)?

LITERATURE REVIEW

Turn-Taking System and Irregular Self-Selection

A major feature of conversation is that people overwhelmingly talk in turns. The conversation analytic account of how turn-taking is managed has been noted by Sacks et al. (1974). They claim that the speech-exchange system consists of turn-constructive components and turn-taking rules. The characteristics of the turn-taking system can be summarized in three points as follows:

- (1) Turn is made up of turn-constructive units (TCUs). These units can be lexical, phrasal, clausal, or sentential,

used to complete a communicative act. The possible completion point (PCP) at the end of each TCU may become a place for speaker transition, called a transition relevance place (TRP), which is the appropriate position for turn-taking.

- (2) An essential feature of TCU is its projectability, which allows participants to project where a turn will reach possible completion. A range of resources is used to project the possible completion of a TCU, including syntax, intonation, and pragmatics (Ford and Thompson, 1996). That is, a TCU has "syntactic, intonational, semantic, and/or pragmatic status as potentially complete" (Lazaraton, 2002, p. 32). To be specific, an utterance is grammatically complete if it could be interpreted as a complete clause in its discourse context. This utterance can be a word, a phrase, or a sentence. Intonation completion refers to a point at which a rising or falling intonation can be clearly heard as a final intonation. An utterance is pragmatically complete when it can be heard as a complete conversational action within its discourse context. When grammatical, intonational, and pragmatic completions of a TCU converge, a complex transition relevance place (CTRP) occurs (Ford and Thompson, 1996). CTRP is also where actual turn transitions are most likely to occur. Moreover, a substantial body of scholars notes that non-verbal conducts also figure in projecting TCU completion, such as eye gaze, open hand palm up (OHPU), pointing gesture, and so on (Kendon, 1967; Goodwin, 1980; Mondada, 2007; Streeck, 2009; Li, 2014).
- (3) The organization of turn-taking obeys three rules. Rule 1: Current speaker selects the next; Rule 2: Other participants self-select for the next speaker; Rule 3: If no hearer takes the turn, the current speaker should continue the turn until the next speaker takes it. These "gross observations" are critical in understanding how turn-taking is managed and "when a turn is complete from the participants' perspective" (Greer and Potter, 2008, p. 299). By adhering to turn-taking rules, the ideal condition of turn-taking is featured as only one party speaking at a time, avoidance of overlapping talk, and the minimization of gaps and silences between turns.

Self-selection is one of the efficient ways to participate in a conversation and gain the speakership actively. The basic principle for the next speaker's self-selection is to "start as early as possible at the earliest transition relevance place" (Sacks et al., 1974, p. 719). However, because of the dynamic and unpredictable features of interaction, participants do not always adhere to the turn-taking system to participate in a conversation. Thus, the ideal condition of turn-taking cannot be guaranteed, "turn-taking irregularities" (Almoaily, 2020, p. 188) are of frequent occurrence. Violating the turn-taking system, irregular self-selection is mainly characterized as a form of interruption or overlap, which occurs in the following two circumstances: C1. The hearer may self-select at non-TRPs to achieve a certain communicative goal, especially when the speaker is still speaking or has no intention to give up the speaking turn (i.e., not project the turn completion). This kind of behavior results in an

interruption in a conversation. C2. The hearer may self-select at a possible TRP (rule 2), which simultaneously occurs with the current speaker's application of rule 3 (i.e., the current speaker's continuation) (Konakahara, 2020). This kind of behavior results in overlap in a conversation. All of them reflect the dynamic and unpredictable nature of interactions and are vital to the understanding and study of irregular self-selection.

Multimodality of Self-Selection

In earlier CA research, embodied actions are considered to have a subsidiary role in interaction as "a hand-maiden to speech" (Streeck, 2009, p. 26), but more recent work has started to consider bodily actions to be as important as talk (Streeck et al., 2011). A substantial body of scholars have confirmed that a large range of interactional resources is relevant to the organization of turn-taking, encompassing linguistic resources such as lexis, grammar, prosody (Ford and Thompson, 1996), as well as embodied multimodal resources such as eye gaze (e.g., Kendon, 1967; Goodwin, 1980; Goodwin and Goodwin, 1986; Rossano, 2012), gesture (Mondada, 2007; Streeck, 2009; Yang, 2010; Li, 2014), head movement (Markaki and Mondada, 2012; Li, 2019), and body posture (Mondada, 2013; Li, 2014).

With regard to self-selection, "a possible next speaker may start gearing up for his or her turn before the current speaker's turn completion" (Lee, 2017, p. 672), and the participants use multimodal resources to implement this action in various contexts. For example, in a multi-party conversation, the linguistic resources "*I'm sorry (to interrupt)*" are used as self-selection devices to obtain the speakership (Park and Duey, 2020). The pointing gesture of the hearer also severs the action-projecting function to "self-selection for would be next speakers" (Mondada, 2007, p. 207). In a teacher-fronted classroom (Sahlström, 2002; Lauzon and Berger, 2015; Takahashi, 2018), Sahlström (2002) reported that students used hand raising to self-select as the next speaker. In ordinary conversation (Streeck and Hartge, 1992; Iwasaki, 2009), Streeck and Hartge (1992) observed that facial configurations display the speakers' intent. For example, facial expression (a) was used as a self-selection device among Ilokano speakers in their interactions.

Although most of the studies focus on self-selection actions in first language conversations, the remaining non-native speakers' interactions are somewhat marginalized. It must be emphasized that EFL learners, "despite their limited proficiency in the target language, are interactionally competent members who manage to participate in discussions" (Lee, 2017, p. 673). For instance, Carroll (2004) observed that Japanese novice speakers of English used recycled turn beginnings (words) in ways similar to those of native speakers of English as a self-selection device. Moreover, non-verbal resources such as gestures, gaze orientation, and posture are also used by learners to show participating interests in conversation (Olsher, 2004; Konakahara, 2015, 2020; Taleghani-Nikazm, 2015; Lee, 2017; Majlesi and Markee, 2018). For instance, Lee (2017) found that learners used to gaze and gesture to prepare for self-selection.

In line with the multimodality of self-selection, irregular self-selection has the same nature. Moreover, this action has been reported as a demonstration of active involvement in

interactions, with EFL learners' talk-in-interaction being one of such cases (Cogo and Dewey, 2012; Konakahara, 2015). Explorations of irregular self-selection could enrich multimodal CA-based turn-taking studies. However, relevant research is still scarce in this field, especially in EFL learners' conversations. Thus, more investigations are needed.

Irregular Self-Selection: When, How, and Why

To begin with, scholars have conducted a few studies on when, how, and why learners implement self-selection. They are referential to the study of irregular self-selection. Orletti (1981) reported that self-selection occurs during a pause or after another speaker has completed the previous turn. Referring to how, Richard and Nunan (1990) demonstrated that self-selection could be achieved linguistically, non-verbally, pragmatically, and tactically. As for why, Waring (2011) reported three types of self-selections: to initiate a sequence, to volunteer response, and to proceed with the agenda. Furthermore, Garton (2012) found that confirmation checks, clarification requests, and information requests were the three most common uses of self-selection. The existing findings are beneficial to understanding the nature of participants' self-selection.

Recently, scholars have been interested in how learners engage embodied resources in self-selection. For instance, Lee (2017) investigated the multimodal resources used by EFL learners to gain primary speakership within their peer group discussions. This study showed that the hearer actively moved into the primary speaker position by utilizing an ensemble of talk, gaze, gesture, and bodily orientation. For instance, learners used to gaze and gesture to claim for the speakership and to prepare for self-selection and used touch to interrupt the ongoing talk to join the conversation. It must be emphasized that both regular and irregular self-selection are a crucial part of the learning process because they both allow learners to claim speakership for the exchange of views, analyses, and opinions. However, the analysis of irregular self-selection is scarce, and only a few studies have explored it in learners' conversations (e.g., Guillot, 2009, 2012; Konakahara, 2015, 2020; Lee, 2017). For example, Konakahara (2015) examined the interactional environment in which overlapping questions occur (i.e., when) and the interactional functions they serve (i.e., why). He found that this kind of irregular self-selection results from the simultaneous application of a next speaker's self-selects, and the current speaker continues turn-taking. Moreover, without clinging to the overlap, participants cooperatively moved the talk forward. Konakahara (2020) further reported two kinds of irregular self-selections (i.e., floor-taking overlap and floor-attempting overlap) from when and how, but this study did not consider why. Lee (2017) investigated how learners used touch to interrupt the ongoing talk to join the multi-party interaction. However, when and why has not been concluded in the study.

Previous literature reveals that irregular self-selection research is still insufficient. Thus, the aim of the present study is to enrich the research of this action. We focus on relatively naturally occurring peer conversations among Chinese postgraduate EFL

learners, to illustrate their irregular self-selection. This study provides overall descriptive statistics of the number, type, and purpose of this action, and then uses single-case analysis and a multimodal conversation analytic approach. It exemplifies the process of irregular self-selection from when, how, and why in detail by analyzing their turn construction and sequence organization. The study contributes to the growing body of knowledge of the multimodal nature of EFL learners' interaction. It also helps to understand what they actually do to achieve successful outcomes in different interactional contexts.

MATERIALS AND METHODS

Participants

This study involved 40 Chinese postgraduate EFL learners (4 men and 36 women), who were in the first year of their master's program in September 2020. Their average age was 23 years ($SD = 1.48$; range 21–27). They generally shared the same first language background (Chinese) and had studied English for about 13.6 years on average ($SD = 2.23$; range 10–18). Their overall English language proficiency can be characterized as high, because they had passed the Test for English Major-8 (TEM-8) with 70.5 points out of 100 on average ($SD = 4.92$; range 65–80), and those who can reach 60 points are identified as advanced EFL learners in China. Before recording, informed consent was obtained from the participants at the time of the recruitment, and they volunteered to participate with great zeal.

Data Collection

Before collecting data, participants were not informed of the general study purpose. We only informed them of the video recording and required them to carry on an ordinary, casual, and natural conversation as much as possible. The data are at best characterized as “non-pedagogic casual talk” (Carroll, 2004, p. 203), because it was collected after class and was chatted among friends who are familiar with each other. In dyadic dialogue, the participants finally formed 20 peer-to-peer conversation groups by adopting a free combination at their own will. Each group chose one of the 10 topics to discuss, such as “friends,” “travel,” and “traditional Chinese festival,” which had been delivered to them in advance for preparation. The topics were slightly general to give the participants enough “chat space” to show their interactional ability.

The data was collected in a quiet room which is commonly used by these participants. They were requested to sit comfortably close to each other, with the video camera placed about 1 m away on a tripod in front of them, and a voice recorder placed behind them. The conversational interactions among participants were recorded by the current first researcher utilizing “non-participant observations” (Davies, 2007, p. 174). That is, the researcher does not participate in the discussion, but instead sits in a corner hidden from the participants' view, to observe their behaviors without interference. In the study of multimodal interaction, facial expressions, gestures, head movements, and body movements of the participants are all important information. Therefore, their upper bodies were

mainly captured by the closed-set-up video camera. Furthermore, the sound was also recorded by the high-quality voice recorder used to conduct prosody analysis. For each recording, the researcher started the video recording, checked the audio, and then sat. The participants could freely begin and end their conversations without a time limit. In all, the duration time of each conversation varied from 8 to 23 min, and the total communication time was 295 min, with 31,759 words.

Single-Case Analysis and Multimodal Conversation Analysis

A single-case analysis means “the techniques of seeing significant interactional detail in the ongoing production of singular sequences of talk-in-interaction” (Hutchby and Wooffitt, 2008, p. 113). Its goal is to explain a single complex phenomenon of interest. This approach can be enhanced further by combining with multimodal CA (Mondada, 2018). As Mondada (2018, p. 86) puts it, multimodal CA pays “careful and precise attention [...] to temporally and sequentially organized details of actions that account for how co-participants orient to each other's conduct and assemble it in meaningful ways, moment by moment.” Multimodal CA allows analysts to detailly identify a range of interactional resources that interactants utilize and organize to achieve communicative goals in the extended sequences of talk, from participant-relevant emic and multimodal perspectives. Overall, the combined approach can help us to enrich our understanding of the learners' irregular self-selection deeply and detailly to some extent, especially the interplay of verbal and non-verbal resources in specific interactional contexts.

Data Analysis

To address the research questions, four analytical procedures were followed:

- (1) The simplified Jeffersonian convention (Jefferson, 2004) was used to transcribe verbal behavior in the data by the first author with help of Transcriber software (Boudahmane et al., 2022) (see **Appendix**). To improve the accuracy and reliability of the transcribed data, the two researchers worked together to check it over. Then, we conducted a line-by-line analysis, in a larger sequence closely examining what and when the participants said. We narrowed the focus down to sequences in which the participants implemented irregular self-selection to speak next and gathered a collection of all such turns (i.e., number).
- (2) With reference to the two aforementioned circumstances of irregular self-selection, we carefully analyzed and coded each case within the collection. This round of analysis yielded findings of the types. We counted the frequency of each type and recorded it in an Excel sheet. Adhering to the purposes of self-selection classified by Waring (2011) and Garton (2012), we conducted another round of analysis and coding of the successful irregular self-selection, guided by the question: “Why that now?” (Schegloff and Sacks, 1973, p. 299). Through classification, comparison, and modification, this round of analysis

yielded findings of the purposes. We counted the frequency of each purpose and recorded it in the Excel sheet. During the process of analysis, the inter-rater agreement of the two researchers was over 80%.

- (3) To further explore the issues of when, how, and why, the single-case analysis combined with multimodal CA was used to carefully examine three excerpts of irregular self-selection representing the types, respectively. A slightly modified version of Mondada's (2016) annotation was used to describe the embodied actions within interactions (see **Appendix**). Details about participants' body movements were noted on a separate line above the verbal line in the transcript. Screenshots were also used to show the participants' body movements capturing the moment of when and how, and their specific occurrences were noted with a “#” in the transcript.
- (4) To analyze the prosodic features of irregular self-selection, particularly focused on pitch and intensity, we used *Praat* software, a combination of auditory and acoustic analysis (Boersma and Weenink, 2021). The form of spectrogram, waveforms, pitch traces, and intensity traces were all analyzed by this software. They are the compelling evidence that self-selector claims for turn space (Schegloff, 2000).

RESULTS

In this part, we first presented the overall descriptive statistics of number, type, and purpose of irregular self-selection. Then, three representative excerpts were analyzed in detail using multimodal CA to further address the issues of when, how, and why.

Descriptive Statistics Number

Through repeated line-by-line observation and analysis of the transcribed data, this study yielded 152 cases of irregular self-selection. As **Table 1** showed, in a total of 20 groups, seventeen groups contained irregular self-selection, ranging from 1 to 38 cases in each conversation. According to the number of cases, the participation model of seventeen groups could be characterized as conventional, active, and highly active. Among them, five groups contained irregular self-selection in less than 5 cases, indicating that turn-taking devices in these groups were more conventional because they tended to obey turn-taking rules and used less irregular self-selection devices to take turns. The groups containing cases in 5–9 were the most, including eight groups. These groups were active because

TABLE 1 | Number of irregular self-selection in each group.

Group (G)	G1	G2	G3	G4	G5	G6	G7	G8	G9
Number	9	18	38	1	6	2	12	1	7
Group (G)	G10	G11	G12	G13	G14	G15	G16	G17	
Number	5	9	8	3	5	6	4	18	

more interruptions or overlaps occurred in their conversations, indicating that the participants more actively joined in the discussion. Finally, four groups had cases over 10, and the most were 38 cases, indicating the highly active participation of the learners in the interaction. This means that hearers in these groups were more eager to obtain the speakership. The uneven distribution of irregular self-selection among different groups reflected the group or individual discrepancy of participation in interaction. In summary, seeing from the overall data, the Chinese postgraduate EFL learners were relatively active in participating in peer conversations.

Type

According to the two aforementioned circumstances of irregular self-selection in the literature review, we divided 152 cases into four types (see **Table 2**). The frequency of each type was reported in **Table 3**.

As shown in **Table 2**, successful irregular self-selections mainly occurred in three interactional contexts: (1) when the speaker's turn was at a non-TRP, the hearer interrupted to obtain the speakership; (2) the two participants competed for the speakership; and (3) when the speaker was holding the current turn, the hearer chose to speak to abort this turn holding process, and then gain the speakership. The detailed multimodal

TABLE 2 | Types of irregular self-selection.

Type	Meaning	Example
Turn interruption (TI)	The current speaker's turn is at a non-TRP, signified by a uncomplete TCU, the hearer interrupts to obtain the speakership. (C1).	A: "Where are you come from, that's" B: "Or what's your name"
Turn competition (TC)	The current speaker's turn reaches the TRP. Then, the two participants speak simultaneously to compete for speakership. It is the hearer who wins the competition for the turn space here. This kind of situation is a result of application of rule 2 and rule 3 as described in C2.	A: "So have you some uh did you have some maybe some hum example teacher [in your]" B: "[uh]You know yes here is one."
Turn holding abortion (THA)	The current speaker's turn reaches TRP. However, the speaker has no intention of giving up the speakership by using non-lexical words, such as hum/uh/mm. At this time, the hearer chooses to speak to abort this turn holding process to obtain speakership. (C1).	A: "I can hold parties many times hum" B: "There must be a garden in your house"
Self-selection failed (TF)	The hearer fails to gain the speakership when he/she self-selects. (C1 or C2).	A: "I hope all of us can" B: "Can" A: "Find a Mr. Right."

All the examples in **Tables 2, 4** are real cases that occurred in the participants' conversations.

TABLE 3 | Frequency of types.

Type	TI	TC	THA	TF	Total
Number	96	37	10	9	152
Percentage	63.4%	24.2%	6.5%	5.9%	100%

process of those irregular self-selections will be analyzed in the subsequent section.

Table 3 revealed various types of irregular self-selection. The most frequent type was TI, consisting of 96 cases (63.4%) of all the irregular self-selection. TC came next, with 37 cases (24.2%). THA came third, with only 10 cases (6.5%). Because of the small percentage of the last type, TF, where hearer failed to gain the speakership, we excluded them from the analysis.

Purpose

With reference to the classifications of Waring (2011) and Garton (2012), and combining them with the actual cases that occurred in the present data, we divided the purposes of irregular self-selection into six types, as shown in **Table 4**. The frequency of each type was reported in **Table 5**.

In accordance with **Table 4**, we calculated the frequency of each type in participants' conversations, and the result was reported in **Table 5**.

As can be seen in **Table 5**, the most important purpose of irregular self-selection was to display knowledge, which had 76 cases (53.1%). It indicated that irregular self-selection was used by the hearer to show understanding of and interest in what had been said, and then displayed their own thoughts and views or provided comments and new information. All of them can contribute to topical development. The purposes of aiding and cooperative completion had 18 cases (12.6%) and 11 cases (7.7%), respectively. They both indicated high participation of the hearer in the conversation to help or cooperate with the speaker to

complete their current turn. The information request purpose had 16 cases (11.2%). By asking a question, the hearer attempted to show interest in what has been said and tried to elicit further information relating to the ongoing topic from the speaker. The agreement purpose had 15 cases (10.5%), which showed the hearer's attentive listening and understanding of what had been said. The last one, clarification purpose, only had seven cases (4.9%), indicating the negotiation of information between participants to achieve mutual understanding.

Having shown the overall number, type, and purpose of irregular self-selection, the next section will analyze three representative excerpts of successful irregular self-selection in detail to further illustrate when, how, and why the self-selectors implement them.

Case Analysis of Irregular Self-Selection Using Multimodal Conversation Analysis Method

The focal episodes of the analysis centered on the following three types: turn interruption (TI), turn competition (TC), and turn holding abortion (THA). In what follows, by focusing on three representative episodes in as much detailed as possible, we showcased when, how, and why self-selectors accomplished self-selection in the peer-to-peer conversation by using the multimodal CA method.

Turn Interruption

This subsection shows the analysis of the first type of irregular self-selection, that is, TI, one of the practices frequently used by self-selectors. TI means that the hearer implements self-selection when the speaker's turn is at non-TRP. More specifically, when the speaker is still in the state of event narrating or storytelling, the obvious sign is that the TCU is incomplete. However, at this time, the hearer self-selects to speak, resulting in a TCU being interrupted before it has reached a point of possible completion, as shown in excerpt 1.

Excerpt 1. Rubbish Sorting

```
01 W U:m I have heard that like Beijing and Shanghai
02 um they have put forward the (.) project
HandL -. . . . .
TorsoL F----
03 like #hum
Gaze mutual gaze
HandL ****
TorsoL H--
04 L #Ah
05 W [rubbish classification]
06 L [rubbish classification]
07 W yeah
08 L yeah
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a. When

In lines 01–02, W describes the garbage management scheme proposed by the environmental institutions in Beijing and Shanghai. She makes a concrete elaboration of the program in line 03. Grammatically, W uses preposition “like,” but due to the

TABLE 4 | Purposes of irregular self-selection.

Purpose	Meaning	Example
Aiding	To help the current speaker when he/she faces some expression difficulties (e.g., disfluency or pause)	A: “Hum, I think the challenges means more. (2.3)” B: “Means more chances”
Cooperative completion	To cooperatively complete the following turn content with the current speaker based on contextual information	A: “The character acted by the by [Zhou Dong Yu]” B: “[Zhou Dong Yu]”
Displaying knowledge	To display own thoughts and views or providing comments and new information contributing to the topical development	A: “You can also listen some informal materials such as the Allen Show or Friends [this]” B: “[Yeah] they are popular.”
Agreement	To express agreement and support of the current speaker's speech	A: “He usually she usually do some small punishment to us uh then” B: “Yes I agree with you”
Clarification	To request the current speaker to clarify some vague information in the previous turn in order to reach a mutual understanding, usually by using some lexical bundles like <i>you mean X</i>	A: “So he (0.5) [pro-]” B: “[You mean] leave her family a big fortune?”
Information request	To elicit further information that relates to the ongoing topic based on the previous utterance/sequence, usually by using interrogative sentence	A: “We waited a very long time, very very very long, so [in that]” B: “[Is in] midnight?”

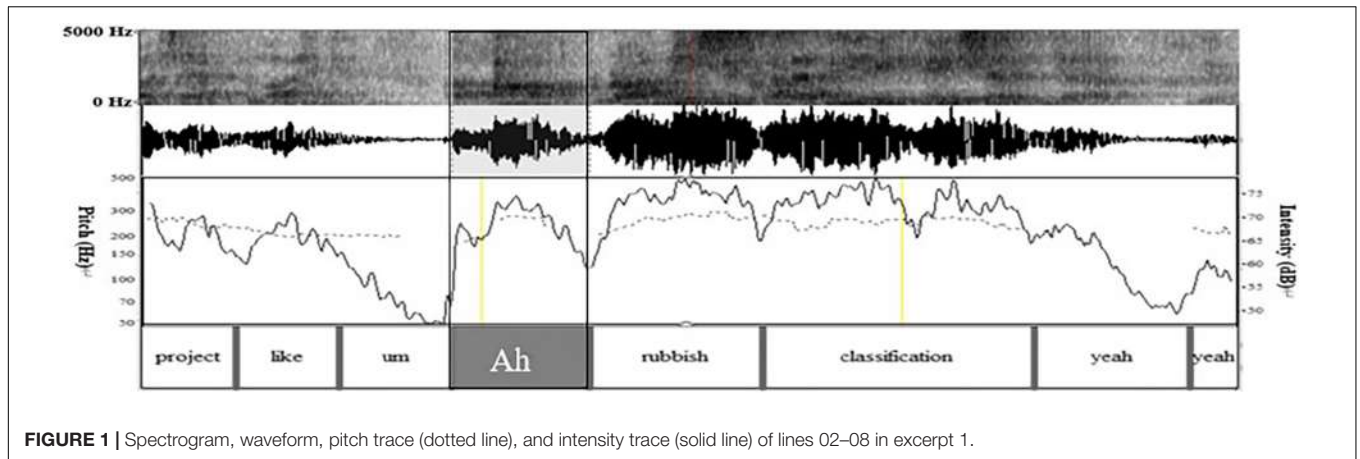


FIGURE 1 | Spectrogram, waveform, pitch trace (dotted line), and intensity trace (solid line) of lines 02–08 in excerpt 1.



FIGURE 2 | Bodily movement of W in line 03.

a. When

In lines 01–04, J states that the Chinese government must promulgate laws and policies to protect teenagers from school bullying, including college students. Grammatically, it is an adverbial clause directed by “so that,” with complete syntactic structure; Prosodically, the sentence can be judged to be in falling intonation by combining with listening and discrimination. In addition, a pause of 0.3 s following “well” suggests that turn-taking may occur (Ford and Thompson, 1996); Pragmatically, J’s declarative statement is complete and expresses his point of view; Non-verbally, J looks at Y at the end of the turn (the word “well”), forming a mutual gaze with Yang at the same time (Figure 4), which projects possible end of the turn (Kendon, 1967). In all, the

above four multimodal resources indicate that J’s turn may end and arrive at TRP at this moment and turn-taking may occur.

However, J’s gesture does not return to the home position but still keeps the “open hand palm up (OHPU)” (Li, 2014, p. 219; Figure 4), implying turn holding. It can be seen that the gesture resource of J is in conflict with the aforementioned four kinds of multimodal resources. All the other resources indicate turn completion and occurrence of turn-taking, while gesture indicates turn holding; that is, J still wants to talk and has no intention of giving up the speaking turn. A noteworthy observation is that J’s OHPU gesture in the current turn lasts about 15 s in the video, almost throughout his whole turn. It means from the perspective of J’s gesture using habit, he prefers it. Previous studies have shown that the OHPU gesture usually



FIGURE 3 | Bodily movement of L in self-selection in line 04.

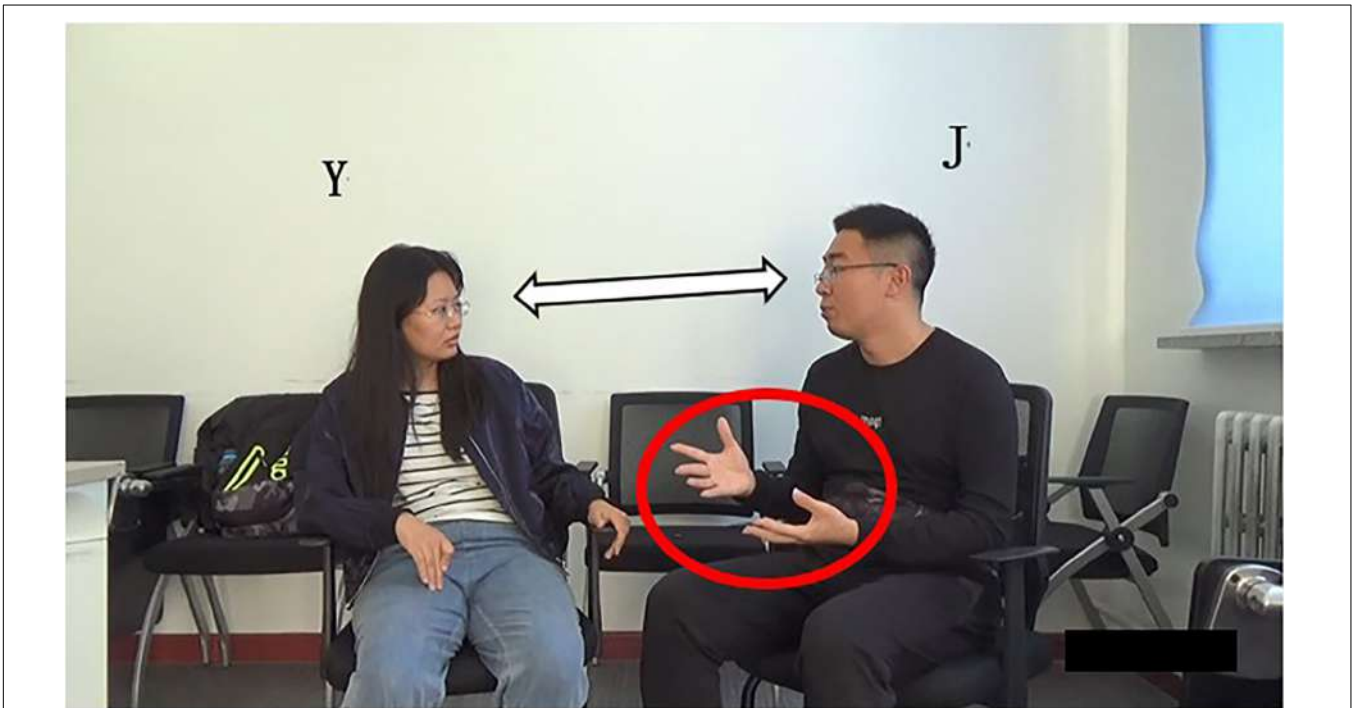


FIGURE 4 | Bodily movements of Y and J in lines 04–05.

appears at the possible end of a turn, indicating the yielding of that turn (Streeck, 2009). However, in this case, the OHPU gesture is J's habitual practice; hence, it does not indicate the end

of the turn but implies the holding of this turn. The intention can also be seen in J's following actions. In lines 05–06, J's turn overlaps with Y's. They compete for the speakership, but Y wins



FIGURE 5 | Gesture of J after vertical bar in lines 05–06.

the competition for the turning space here. In addition, J returns his gesture to the home position at the word “so” and “personal” in lines 05 and 06 (Figure 5) and completes the turn of himself after overlapping resolution (line 06). Thus, it shows that J wants to continue his turn, and only the return of gesture indicates the possible end of the turn (Li, 2014). This excerpt reflects whether noticing the individual discrepancy is an essential factor in deciding self-selection time. It is more unpredictable and needs the hearer to monitor the turn momentarily. Just as in this case, Y ignores the diverging of gesture and thus implements self-selection to show her understanding of and interests in what has been said by J.

b. How

(1) Grammatically, Y uses the acknowledgment token “yes” to express her approval of J’s statement, followed by the sentence “I think so.” (2) Prosodically (Figure 6), the software Praat shows that Y makes a pitch reset but hardly makes an intensity enhancement. First, pitch trace shows that the pitch at the end of J’s turn is about 124 Hz, while the pitch at yes is 176 Hz (300 min 124 Hz), which is 52 Hz higher than that at the end of J’s turn. Second, as can be seen in the intensity trace, the intensity at yes is about 27 dB (72 min 45 dB), which is lower than 45 dB at the end of J’s turn. Last, the color of the spectrogram at yes becomes darker, and the amplitude of the sound wave in the acoustic map becomes larger. They indicate that the energy value at yes becomes larger, which supports the occurrence of the overlapped speech of Y and J here. (3) Non-verbally, Y implements self-selection while at a mutual gaze state with J (Figure 4). In all, Y uses lexis, syntax, pitch reset, and gaze to achieve self-selection.

c. Why

The conversation sequence (lines 03–04) shows that the purpose of Y’s self-selection is to express her agreement with J’s statement by using the word “yes” and the sentence “I think so.” It shows her active participation in the current topic.

Turn Holding Abortion

The usage frequency of the third type of irregular self-selection is less than the aforementioned two ones, but it is still a way for the hearer to gain the speakership. This type is THA, wherein when a speaker uses some multimodal resources to indicate the continuity of speakership, the hearer implements self-selection to obtain the speakership. The continuation of talk is represented by the use of the non-lexical word “hum,” gaze shift, and the holding of “thinking face” (Goodwin and Goodwin, 1986, p. 57). As illustrated in excerpt 3.

Excerpt 3. House

01 M I will buy hum a very very big house
02 and I can hold (.) many parties.

Gaze_M away

03 #hum

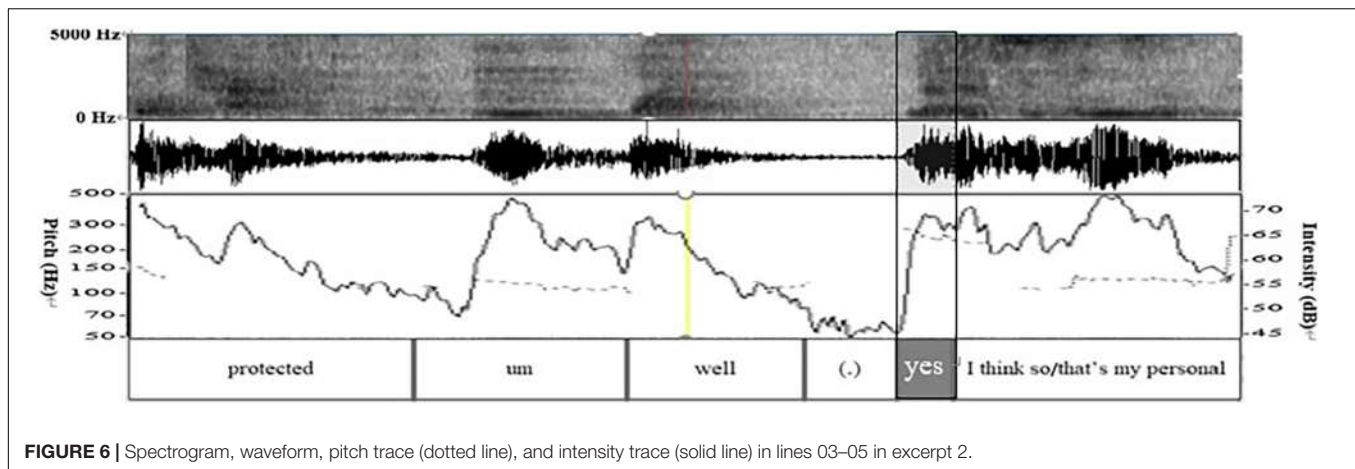
Gaze mutual gaze

04 N #there must be a garden in your (.) home(.

05 M yes

a. When

In lines 01–02, M states that she wants to buy a big house in the future so that many parties can be held in it. Grammatically, this sentence is a compound sentence combined by a connective



and, with complete syntactic structure. Prosodically, the point number shows that the second part of the sentence is in falling intonation, indicating the possible end of the sentence (Ford and Thompson, 1996). Pragmatically, M's declarative statement is complete, and she finishes her opinion of the house. At this time, her turn is complete in grammar, prosodic, and pragmatic behavior. The above multimodal resources indicate a high possibility of turn completion and turn-taking. However, instead of ending the turn here, M uses several turn holding strategies to indicate the continuity of the current turn, including non-lexical word "hum," gaze shift, and holding of a thinking face (Figure 7). To facilitate the back-and-forth flow of a natural conversation, N participates in the conversation actively to self-select and to gain the speakership, which shows her turn controlling awareness (line 04). Moreover, since the decision-making of self-selection lies with the hearer, the timing of it is related to participation state, knowledge, or emotional status (Heritage, 2013).

b. How

(1) Grammatically, N uses the existential sentence guided by "there be." (2) Prosodically, in Figure 8, the pitch trace shows that N does not reset the pitch but maintains the same pitch range just as M has (about 250 Hz), so the pitch changes slightly. However, N enhances the intensity of the words "there must" to draw the attention of speaker M. In Figure 8, the peak value of the intensity at "there must" is 71 dB, higher than that in hum at the end of the M's turn (60 dB). In addition, the color of the spectrum at "there must" becomes deeper and the amplitude of the sound wave in the acoustic map becomes larger. They indicate the increment of the energy value, which are proofs of the above findings; (3) Non-verbally, N and M form mutual gaze when she implements self-selection (Figure 9). In all, N uses syntax, intensity reset, and mutual gaze to achieve self-selection.

c. Why

Conversation sequence (lines 01–04) reveals that the self-selection sentence "There must be a garden in your house" is

used for displaying knowledge and functions as a supplement of new information to M's speaking content. It can promote topical development (line 04). M then acknowledges this with acknowledgment token *yes* (line 05).

DISCUSSION

As an important turn-taking method and conversation monitoring strategy, the implementation of irregular self-selection reflects certain interactional features of Chinese postgraduate EFL learners. We explore it by providing overall descriptive statistics of this action and then conducting a detailed analysis (i.e., multimodal CA) of three representative examples of irregular self-selection from when, how, and why. The results are of great significance to enrich the existing research on turn-taking practices of EFL learners from the perspective of multimodal interaction.

First of all, regarding when to self-selection, as shown in the number of irregular self-selections of each group, in a total of twenty groups, seventeen groups contain irregular self-selections, varying from 1 to 38 cases in each conversation. The participation mode of seventeen groups can be characterized as conventional (five groups), active (eight groups), and highly active (four groups). To summarize, 85% of groups contain irregular self-selections, and 60% of groups are active in implementing such actions to participate in the conversation. The results are in line with the evidence that EFL learners are interactionally competent members to participate in a conversation (see Carroll, 2004; Firth and Wagner, 2007; Lee, 2017; Konakahara, 2020). For example, Lee (2017) found that learners actively interrupted the ongoing talk to move into the primary speaker position. They are able to achieve certain communicative goals despite their limited proficiency in the target language. Just as Carroll (2004) observed that Japanese novice speakers of English used similar ways to self-select as those of native speakers of English.

Based on an analysis of the 152 cases, we find three types of successful irregular self-selection in learners' interactions: TI, TC, and THA. The TI occupies the most of them (63.4%), reflecting that Chinese postgraduate EFL learners are used to interrupt to



FIGURE 7 | Gaze of M in line 03.

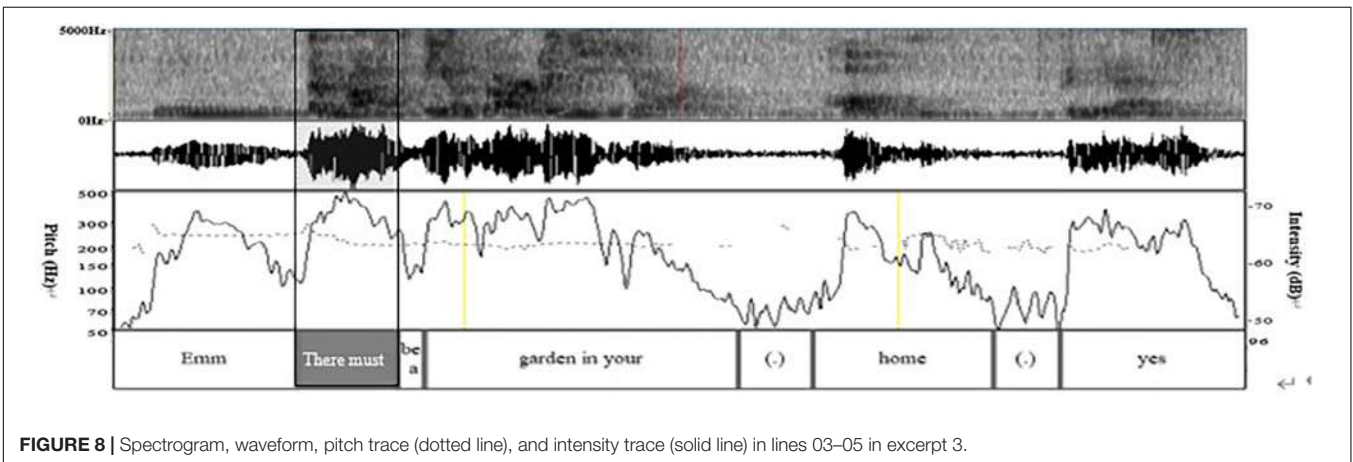


FIGURE 8 | Spectrogram, waveform, pitch trace (dotted line), and intensity trace (solid line) in lines 03–05 in excerpt 3.

obtain the speakership in conversations. Park and Duey (2020) also found that in multi-party workplace meetings, the self-selector interrupted to gain the speakership. This indicates that interruption is an important device for both native and non-native speakers to participate in conversations. The TC occupies 24.2%, which is the second most frequent way of irregular self-selection mentioned as “floor-taking overlap” and studied by Konakahara (2015, 2020) in casual ELF conversations. The result reveals that turn competition is also a way of active involvement in non-native speakers’ conversation. The third one is THA, which only occupies 6.5%, but it also implies that learners are eager to participate in interaction by aborting the holding of

speakers’ turn. They aim to claim the speakership and boost conversational development.

Referring to the underlying reasons for the initiation of irregular self-selection, we think it may be because learners in peer interaction are naturally in an equal position; thus, they will initiate and participate in a conversation more actively. Moreover, when hearers have relevant conversational knowledge, they will initiate irregular self-selection in different interactional contexts to show their “knowledge status” (Heritage, 2013, p. 376) and willingness to express opinions concerning a certain domain of knowledge. The findings of this study show that after a long period of English learning, about 10 years, Chinese postgraduate

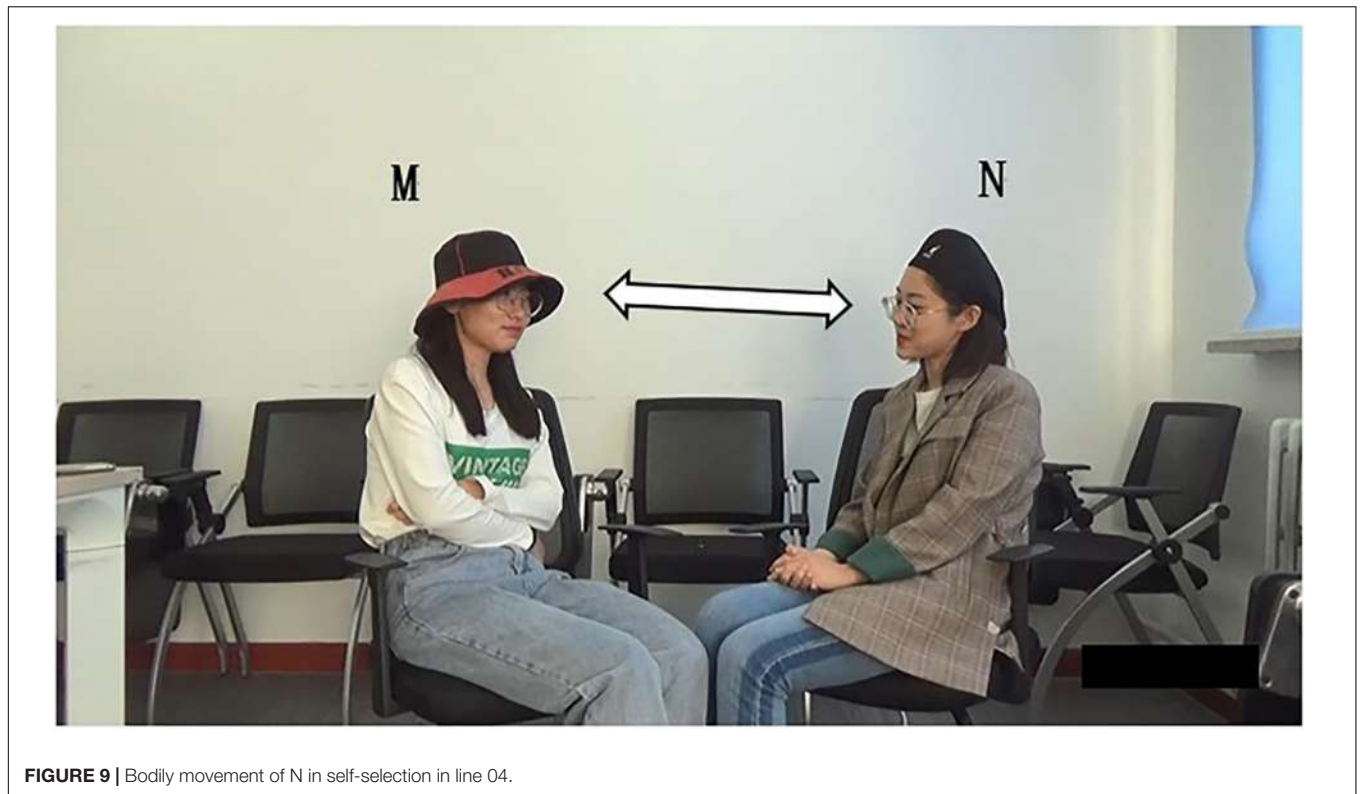


FIGURE 9 | Bodily movement of N in self-selection in line 04.

EFL learners have got certain self-selection capabilities and turn controlling awareness to obtain speakership, as shown in the aforementioned three cases. However, the initiation of irregular self-selection is also based on the flow of conversation, being context-dependent and unpredictable. On the one hand, the initiation of it is context-dependent (Lerner, 2003), which requires both participants to construct the context together. They work to promote the flow of conversation and to provide a self-selection context at the same time. For example, in excerpt 1, L can implement irregular self-selection because of the existence of a “rubbish sorting” context. On the other hand, the initiation of this kind of action is unpredictable, and the decision-making is in the hands of the hearer. For example, hearers' participation state, knowledge state, emotional state, and individual differences will all affect their implementation of self-selection actions. Thus, only when learners have a certain awareness of turn monitoring can they initiate this action in a conversation.

Second, regarding how to self-select, by detailed analysis of the three cases, we find that (1) in lexical and syntactic dimension (i.e., verbal aspect), learners can provide appropriate language resources to participate in conversation according to the flow of conversation. (2) in prosodic dimension (i.e., vocal aspect), pitch reset and intensity enhancement are used by learners to different degrees. Some of them use both ways to increase the volume of their self-selection words, for example in excerpt 1, while others only use pitch reset or intensity enhancement to achieve self-selection, as shown in excerpts 2 and 3. (3) in non-verbal dimension or aspect, except in excerpt 1, L uses four kinds of non-verbal resources in her irregular self-selection, including

gaze, gesture, head movement, and body posture. The other two hearers only use gaze to predict and achieve self-selection. From the use of multimodal resources, it can be seen that the learners in these cases use at least three kinds of resources to implement irregular self-selection, which shows their ability to use multimodal resources to some extent.

However, through the overall investigation of irregular self-selection that occurred in our data, we find that about 80% of the self-selectors only use one or two kinds of body movements to project or implement irregular self-selection, such as gaze, gesture, or head movement. However, other body movement resources rarely occur, such as facial expression and body posture. Lee (2017) found that learners utilized an ensemble of talk, gaze, gesture, and bodily orientation to gain the speakership. Konakahara (2020) also found that in overlap sequences, interactants collaboratively exploited multiple non-verbal resources, such as gaze, posture, and gesture, for organizing turn-taking and conveying meaning. Compared with these two findings, the overall modal complexity and diversity of Chinese postgraduate EFL learners are low, causing their behaviors to be restrained and inactive. This phenomenon may be related to the Chinese culture emphasizing introversion and restraint of conversation participation. It reflects that culture has a profound influence on one's behavior, even when they use other languages to communicate and participate in the interaction. However, some studies show that in Mandarin Chinese talk-in-interaction, participants will use plenty of multimodal resources to take turns or manage their affiliation (Yang, 2007, 2011). For example, Yang (2007) found that Chinese speakers used

non-verbal resources to manage turns, such as hand drop, gaze, non-gaze, touch, thinking face, and finger count. The result was not the same as found in the present study. Maybe another possible reason for the low diversity of body movements in this study is that learners are aware that they and their conversations are being recorded. Thus, they cannot behave naturally when using the English language to talk and tend to control and restrain their behaviors to some extent.

Last, regarding why to self-selection, irregular self-selection can be divided into six types: displaying knowledge (53.1%), aiding (12.6%), information request (11.2%), agreement (10.5%), cooperative completion (7.7%), and clarification (4.9%). It can be seen that the main purpose of irregular self-selection is to display knowledge, also mentioned as one of the self-selection purposes by Waring (2011). The result indicates that the hearer contributes to topical development by displaying his/her own thoughts and views or providing comments and new information (for example, in excerpt 3). Then, the purposes of aiding, agreement, and cooperative completion occupy 29.4%, used to support the current speaker in the meaning-making process. They also help to maintain the rhythm or pace of the conversation by showing listenership, understanding, active participation, and agreement (see Murata, 1994; Lerner, 2002) (for example in excerpts 1 and 2). Finally, the purposes of information request and clarification occupy 16.1%, used to interact with the speaker of vague information and to elicit further information. They also serve to show high interactional sensitivity and active participation (Konakahara, 2020).

Although the purposes of irregular self-selection are various, showing different communication intentions of the learner, the common characteristic of them is that they reveal the learners' active involvement in interaction (Cogo and Dewey, 2012), topical development, and interactive sensitivity of conversation. Moreover, with irregular self-selection, the participants cooperatively move the talk forward, reflecting their cooperative communication intention. Konakahara (2015) obtained the same finding in casual ELF conversations of the overlapping questions. Consequently, non-native speakers are successful in "achieving mutual understanding and developing interpersonal relationships" (Konakahara, 2015, p. 37).

CONCLUSION

This study investigated when, how, and why Chinese postgraduate EFL learners implement irregular self-selection from the multimodal interaction perspective. By providing descriptive statistics and using a multimodal conversation analytic approach to examine three excerpts in detail, the results show that learners are interactionally competent members to participate in the conversation. They are able to achieve communicative goals, but their body movements lack diversity as compared with other non-native English speakers, causing behaviors to be constrained and inactive.

Based on the findings, this study provides some implications for EFL learners, especially other East Asian EFL learners who are commonly characterized as silent, reserved, and inactive during discussions, particularly in the classroom. This study

shows that EFL learners with high language proficiency will benefit from peer interaction to develop their interactional competence, as evidenced by the initiation of irregular self-selection and active involvement in participation. Thus, in oral English learning and teaching, more high-level peer interaction without teacher involvement should be carried out. Although irregular self-selection violates the turn-taking system, it is harmless to the topical development. Therefore, learners should be encouraged to use this kind of turn-taking way to participate in the conversation, making their interaction more natural and vivid. However, when participating in interactions, EFL learners need to pay much attention to the use of multimodal resources, especially a variety of body movements, such as facial expression, gesture, head movement, and body posture. The use of these resources can improve the diversity of body movements and enhance interactional ability with native or other non-native English speakers.

This study adds to the scarce research on EFL learners' irregular turn-taking practices and the growing literature on the use of multimodal resources in their interactions. At the same time, it verifies the applicability of the multimodal CA approach to the studies of learners' conversation again. It is of significance in the detailed investigation of the learners' turn management and their embodied participation in the conversation. It helps to understand the visible processes through which learners positively claim the speakership to participate in the conversation and build a cooperative relationship. It has also provided new empirical evidence to confirm the fact that EFL learners are interactionally competent members to successfully participate in the interaction, although with limited proficiency in the target language.

Despite its significance, the potential limitation of a single-case analysis is that it can only be representative of the analyzed phenomenon. To gain a richer and more comprehensive understanding of the phenomenon of interest, more investigations are needed. Our study also suggests directions for future research. Although topic discussion is one of the most efficient and natural ways to collect participants' interactional data, it would be beneficial for future research to investigate irregular self-selection in varied tasks, for instance, role-play games, jigsaw puzzles, quiz games, and so on. Moreover, as the conversations of the present study were collected between friends, it is worth exploring whether the observation also applies to conversations between participants who are not familiar with each other or participants of unequal power relations.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Professor Committee of School

of Foreign Languages, Northeast Normal University. The patients/participants provided their written informed consent to participate in this study. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

MMJ contributed to the conception and design of the study, data collection, data analysis and interpretation, writing, and developing the manuscript. HPZ was responsible for data analysis and interpretation, manuscript development, writing, and editing. Both authors contributed to the article and approved the submitted version.

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APPENDIX

Transcription Conventions

(.) micro pause (0.3) pauses of 0.3 s [] overlap
: prolongation or stretching of the sound = latching
° ° the word is markedly quiet or soft . falling intonation
away gaze away at gaze at
* stroke of gesticulation -. recovery of gesticulation
F forward movement H home position
----- close dashes indicate the holding of the body movements



Problematizing Argumentative Writing in an Iranian EFL Undergraduate Context

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Argumentative writing is the most important genre that undergraduate students need to learn to meet their academic requirements. Hence, many studies in different ESL/EFL academic contexts have explored different aspects of argumentative essay at micro text level and also wider educational, contextual and cultural levels. However, majority of these studies have focused on separate aspects of argumentative writing. Therefore, in the absence of studies which examine different variables involved in undergraduate EFL students' argumentative writing, the present study was conducted by drawing on multiple data sources: students' perceptions of the argumentative texts, writing teachers' views on argumentative writing of the students and finally analysis of the structure of the argumentative texts written by the students. For this aim, a total of 66 argumentative essays written by the undergraduate students was analyzed. In addition, a group of 66 undergraduate students majoring in English literature and 20 university writing instructors were interviewed. The findings revealed that the concept of argumentation was poorly conceived and tackled with by the learners. Teachers also counted various grounds that students faced difficulties. Moreover, the structural analysis of the students' texts showed that they had problems with developing secondary elements of argumentation. In sum, the study discusses that the failure to develop an argumentative essay by the Iranian undergraduate English majors entails several academic, contextual and pedagogical grounds. Implications for improving argumentative writing in the EAP context would be provided.

Keywords: argumentative writing, academic writing, EFL writing, toulmin argument structure, EAP (English for academic purposes)

INTRODUCTION

Academic writing has a recognized significance for both the admission of the students to universities and their academic achievements (Hyland, 2013). Despite the variations in academic writing across the disciplines, argumentative essay is the most important genre in the academic context (Wu, 2006). At the heart of this particular genre lies the ability to develop sound arguments which is an essential skill in the academic context (Toulmin, 1958, 2003; Lea and Street, 1998; Németh and Kormos, 2001; Wolfe, 2011; Wingate, 2012; Rapanta et al., 2013). As Nesi and Gardner (2006) put it, the ability to display critical thinking and develop an argument is commonly pursued across academic texts of different disciplines. However, despite the importance

of argumentative essay writing in the academic context, there are many studies in both L1/L2 writing contexts which demonstrate the difficulties the students have with argumentative writing (Qin and Karabacak, 2010; Abdollahzadeh et al., 2017; Altınmakas and Bayyurt, 2019; Saprina et al., 2020; Divsar and Amirsoleimani, 2021; Sundari and Febriyanti, 2021). One of the major struggles the students have is with the concept of argumentation. Many students do not know that they are expected to develop arguments in their essays or they have difficulty with developing an argument in their essays (Davies, 2008; Bacha, 2010; Wingate, 2012). Aside from the particular structure of argumentation which entails a considerable cognitive ability, many studies consider the poor pedagogic activities as an important factor involved in the students' inability to develop argumentative texts (Wingate, 2012; Abdollahzadeh et al., 2017; Altınmakas and Bayyurt, 2019; Taheri and Nazmi, 2021). Andrews (1995), for example, states that students acquire quite different concepts of argumentation in secondary school. At university, the students are given general guidelines on argumentative writing and they are left to apply them in their argumentative essays. The way argument development is treated in academic context shows the teachers' uncertainty over the requirements of the argument and at the broader level their tacit knowledge of how to develop an essay in the academic context (Atkinson and Ramanathan, 1995; Lea and Street, 1998; Mitchell and Riddle, 2000; Mutch, 2003; Casanave, 2004; Jacobs, 2005; Wingate, 2012).

The fact is that higher education requires new ways of learning which is qualitatively different from general literacy. This new learning culture which also entails the writing practices of the students demands a kind of writing which is no more a simple language skill for meaning making rather specific academic disciplines require the students to produce text types to meet the requirements of the disciplinary writing. In fact, the ability to argue which is a novel cognitive demand for the majority of the undergraduate students poses difficulties for them since they are still in the process of developing their L2 language proficiency. In addition, EFL/ESL students as people with particular sociocultural and socioeconomic grounds, past schooling histories, established identities, individual learning strategies, etc. need to acculturate to the new academic writing which prominently emphasizes the argumentation and critical thinking (Altınmakas and Bayyurt, 2019; Divsar and Amirsoleimani, 2021). It is clear that the requirements of the new educational context pose a double burden on the undergraduate students as language learners who should also operate with the conventions of the academic discourse.

Much has been written on the linguistic and rhetorical structure of the arguments (Al-Abed-Al-Haq and Ahmed, 1994; Hemmati, 2001; Khiabani and Pourghassemian, 2009; Rashidi and Alimorad Dastkhezr, 2009; Dastjerdi and Samian, 2011; Nimehchisalem et al., 2015). In addition, some other studies (Wingate, 2012; Abdollahzadeh et al., 2017; Altınmakas and Bayyurt, 2019; Saprina et al., 2020; Sundari and Febriyanti, 2021) specifically focused on the students' problems with developing sound arguments in the higher education contexts. The common thread of all these attempts is the fact that developing argumentative writing as the milestone of academic

writing includes a body of linguistic, cultural, pedagogical and contextual factors. However, as passed above, the existing studies in the literature have focused on individual aspects of argumentative writing. This fragmented body of knowledge fails to delineate different linguistic and non-linguistic aspects of argumentative writing. In other words, considering the dynamic and multi-faceted nature of the academic writing, relying on limited data sources would not yield a complete understanding of the argumentative writing of the students. Therefore, the research reported here adopted a wider perspective for studying the argumentative writing of the students by including three main data sources of texts, students and the writing teachers. Putting together the concerns of major stakeholders in academic essay writing, the present study aimed to improve the argumentative writing practices of the students through enacting realistic pedagogical measures. In addition, argumentative essay writing would receive its due attention in the context. The present study was conducted to fulfill these objectives in the context.

LITERATURE REVIEW

The skill of argumentation has long been considered as one of the basic goals of education (Terenzini et al., 1995; Mitchell and Riddle, 2000). For this, within the past two decades argumentative reading and writing have received growing attention in tertiary education contexts (Feak and Dobson, 1996; Varghese and Abraham, 1998; Helms-Park and Stapleton, 2003; Newell et al., 2011). In fact, as an essential academic skill the students are required to both identify and evaluate the structure of argument and also compose sound arguments. As an evidence, argumentative writing abilities of the students are constantly tested through the recognized International language proficiency tests such as TOEFL, IELTS, GRE (Coffin and Hewings, 2004).

At the heart of argumentative writing lies the concept of argument which has been used differently in the academic discourse. Wingate (2012) states that the concept of argument has been used in three main ways in the scholarly literature. The first view which is based on philosophical syllogism considers argument as individual claims. Here, the argument requires the ability to make inferences out of premises and conclusions (Toulmin, 1958). The second approach defines the development of an argument as developing a position and presentation of it through the logical arrangement of the propositions. Andrews (1995, p. 3) describes this view of argumentation as "a connected series of statements intended to establish a position and implying response to another (or more than one) position." The last view defines argument as the selecting and evaluating of the content knowledge from the relevant sources to develop the argument (Wu, 2006).

Studies have shown that learners and teachers have vague and partial understanding of the concept of argument. Mitchell et al. (2008), for example, showed that students defined argumentation as a series of "for-and-against" structure put between the introduction and the conclusion sections. Wingate (2012) also found that the students had only partial or incorrect concepts of argument. They were also mostly unaware of the requirements

of the argumentative essay, particularly the need to develop their own position in an academic debate. Teachers were also uncertain about the concept of argument as they equated it with the critical analysis and the expression of opinion. In the study by Lea and Street (1998), academic instructors despite acknowledging the argument as the central element of an essay could not explain the nature of a well-developed argument. In addition, it was found that the instructors had conceptual uncertainties with regard to the nature of argument as they could not differentiate between the argument as individual claims and development of a position. The research has also shown the learners' difficulties with different components of developing an argument as stated above. The studies have shown that the students could not analyze and evaluate conflicting points of views in the literature (Andrews, 1995); they could not establish a position by making balance between the source and the voice (Groom, 2000) and finally, the learners failed to present their position in a coherent manner, rather they followed a simple formulaic structure to develop their position (Andrews, 1995).

Many studies have also adopted a textual perspective and investigated the learners' difficulties with the argumentative writing from a textual perspective by analyzing the students' texts. These studies have shown that English argumentative writing poses rhetorical difficulties for the learners (Al-Abed-Al-Haq and Ahmed, 1994; Hemmati, 2001; Khiabani and Pourghassemian, 2009; Dastjerdi and Samian, 2011; Nimehchisalem et al., 2015; Abdollahzadeh et al., 2017; Saprina et al., 2020). In addition, text-based research that has compared argumentative writing by native and non-native English speakers reveals rhetorical and textual differences, although some similarities have also been found (Choi, 1986, 1988a,b; Lux, 1991; Ferris, 1994; Bouchard, 1996; Kim, 1996; Hinkel, 1999). In addition to the textual perspective, many studies have investigated the processes and strategies that L2 writers use to develop an argumentative essay. Many studies conducted in late 1980s and early 1990s studied the writing processes involved in argumentative writing (Raimes, 1987; Cumming, 1989; Hall, 1990; Whalen and Menard, 1995). Other studies following the same line of inquiry investigated the writing strategies (Leki, 1995; Riaz, 1997; Khaldieh, 2000) the learners used when developing an argumentative essay.

As it can be inferred from the above studies, the students' problems with argumentative studies have been mostly studied from a textual perspective which focuses on the written products of the students. There are few studies in the literature which have studied the writing difficulties from the writers' points of view (Zhu, 2009; Wingate, 2012). As an example, Zhu (2009) studied the Mexican graduate students' argumentative writing difficulties in English and found that the students perceived the most difficult aspect of English argumentative writing to be its rhetorical aspects.

In the last few decades, a number of studies have analyzed the structure of argumentative writing by using Toulmin's theoretical framework (Toulmin, 1958, 2003; Lea and Street, 1998; Németh and Kormos, 2001; Qin and Karabacak, 2010; Wolfe, 2011; Rapanta et al., 2013; Abdollahzadeh et al., 2017; Sundari and Febriyanti, 2021). The model proposed by British Philosopher Toulmin (1958) has been used to analyze the

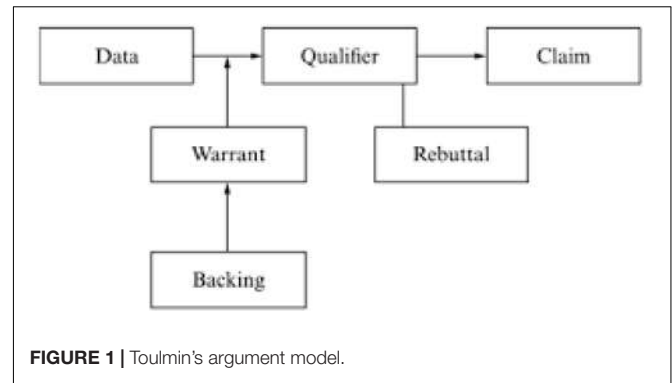


FIGURE 1 | Toulmin's argument model.

argumentative writing (Figure 1). According to Toulmin (1958, 2003) every argument is composed of basic components and modifying components. Basic components include claims, data and warrants. Claim considers the conclusion of an argument that should be justified. Data refers to the information used as evidence and warrants which function as a link between claim and data aim to justify the claim using the data. At another level, modifying components include backing, qualifier and rebuttal. The function of backing as the name says is to further support the warrant. The modal terms show the strength of the warrant and rebuttal or counter-claims that the warrant fails to justify the claim based on the data.

The use of Toulmin's argument components across levels of expertise (Crammond, 1998), the relation of the argument elements and the overall quality of argumentative essays (Qin and Karabacak, 2010; Abdollahzadeh et al., 2017), and the role of goal specification in the frequency of use of argument elements (Page-Voth and Graham, 1999; Ferretti et al., 2000; Nussbaum and Kardash, 2005) have been among the research conducted. As an example, Abdollahzadeh et al. (2017) studying the argumentative behavior of a group of Iranian EFL graduate learners found that the essays were mostly deductively organized. Also, the students used data and claim more frequently compared with the secondary elements of counterarguments and rebuttals. The study further showed that the good surface structure of the arguments does not indicate their soundness. Similarly, Qin and Karabacak (2010) who studied Toulmin's elements in Chinese EFL argumentative texts, found that data and claim were used significantly more than counterargument and rebuttal.

Along with the above, the literature also shows that argumentative writing in general and argumentation in particular has received little academic support. In fact, despite the importance of argumentation as an important academic achievement for the students in different disciplines (Davies, 2008), the university usually has only relied on few focus courses (if any) and the general feedback of the instructors which do not directly address the concept of argument (Groom, 2000; Altunmakas and Bayyurt, 2019; Divsar and Amirsoleimani, 2021; Taheri and Nazmi, 2021).

Overall, it seems that the research on argumentative writing suffers from the lack of coordinated efforts which consider text, students and teachers in the wider academic contexts.

Therefore, adopting a general research perspective would provide pedagogical benefits by making a harmony among teachers' decisions, students' needs and the ultimate argumentative text produced. In addition, the findings of this study would prioritize the significance of argumentation as one of the main competencies in the higher education contexts. In fact, the accumulation of evidence on argumentative writing gathered from the major stake holders in the context would help develop sound instructional programs to improve the argumentative ability of the students in the context.

Hence the research reported here aims to extend the current knowledge on EFL argumentative writing by answering the following three research questions:

1. How do Iranian EFL undergraduate students perceive an argumentative essay?
2. What are the common difficulties of Iranian EFL undergraduate students' argumentative writing identified by writing teachers?
3. What is the structure of argumentative texts written by Iranian EFL undergraduate students?

METHODOLOGY

Participants

A body of 66 undergraduate students who majored in English language and literature at Persian Gulf University (PGU) in Bushehr, Iran participated in this study. They were selected using the convenience sampling procedure. There were both male and female students in the study ($M = 15$, $F = 51$) and they aged between 20 and 25. At the time of the study, the students had already passed two writing courses of advanced writing and essay writing. All of the participants were native speakers of Persian and had learned English for almost 8 years. The students who come from two intact classes in the context were next given open-ended questionnaire to answer. They were also asked to write argumentative texts for a later structural analysis of the essays.

In addition, a group of 20 experienced university writing instructors participated in this study. The teachers worked as either full-time English professors or visiting instructors at PGU English department. The teachers varied in terms of age, gender and EFL teaching background. There were 13 male and 7 female instructors and they aged between 39 and 56 ($M = 49$) in this study. All the instructors were quite experienced in teaching/assessing writing with a minimum 5 years of teaching and assessing writing experience (Table 1).

The Study Context

The present study was conducted in the English language and literature department of Persian Gulf University in Bushehr, Iran. Following the English language and literature undergraduate curriculum announced by the Iranian ministry of science, research and technology (MSRT), undergraduate academic writing in this context includes two courses of advanced writing (i.e., paragraph writing) and essay writing. The focus of advanced writing course is to enable the students to learn the essentials

TABLE 1 | Demographics of the participants in the study.

		Categories	N	(%)
Students	Gender	Male	15	23
		Female	51	77
	Age	20–22	58	88
		23–25	8	12
	Context of study	PGU	66	100
	Gender	Male	13	65
Female		7	35	
Teachers	Age	39–45	11	55
		46–56	9	45
	Context of teaching	PGU	20	100
	Teaching experience	5–15	8	40
		15–27	12	60
Context of study	PGU	20	100	

of composing simple paragraphs in English. This course is a requirement for the more advanced essay writing course which aims to prepare learners to develop essays in English in different genres including argumentative one (**Supplementary Appendix I**). English is the medium of instruction and the students are required to handle their assignments in English. In fact, a variety of academic writing types (papers, reviews, summaries, reaction reports, etc.) are needed.

Instruments

Open-Ended Questionnaire

Drawing on the related literature (Lea and Street, 1998; Nesi and Gardner, 2006; Qin and Karabacak, 2010; Wingate, 2012; Nimehchisalem et al., 2015; Abdollahzadeh et al., 2017; Altınmakas and Bayyurt, 2019) and the researcher's personal experiences with teaching undergraduate writing courses, the researcher developed an open-ended questionnaire in order to elicit the perceptions of the students with regard to argumentative essays (**Supplementary Appendix III**). The questionnaire included close-response items about the students' background including demographic information and English essay writing experiences. The next part involved open-ended question items which sought in-depth information on different aspects of argumentative writing. As an example, the students were asked to define argumentative writing and its different parts. After developing the questionnaire, the researcher asked a group of expert colleagues to examine the items for any content or language ambiguities. The researcher applied the experts' views to modify some of the items. The questionnaire developed in this way were used to collect the students' views on argumentative writing.

Semi-Structured Interviews

A semi-structured interview was developed by the researcher to know how the writing instructors identified the difficulties the learners faced when writing argumentative essays. To develop the interview items, the researcher used the previous studies (Groom, 2000; Zhu, 2009; Wingate, 2012; Altınmakas and Bayyurt, 2019) and also unstructured interviews with some

writing instructors in the context. The interview items were prepared in Persian (i.e., native language of the participants) to prevent any probable language hindrances. A panel of experts further examined the questions. After applying the experts' suggested modifications, a group of 8 questions were selected to be used as interview prompts in this study. The interviews conducted and audio-recorded by the researcher were next transcribed for further analysis.

Argumentative Writing Tasks

In order to collect argumentative essays, under an exam-like condition argumentative texts were collected from the students. An argumentative topic was assigned for the students to write. The topic chosen was, "Why did you choose English as your academic major?" To select the topic, a pilot study was done and a group of 30 students were asked to choose among three argumentative topics provided to them. About 70% of the students chose this topic (Why did you choose English as your academic major?). The results of the pilot study showed that many undergraduate students could produce the least required number of paragraphs for an essay (i.e., three). It was assumed that the topic was interesting enough to personally involve the students in developing and reflecting on the topic. Task instruction asked the students to take a position on the topic provided. Overall, a collection of 66 argumentative essays was obtained from the students in the two essay writing groups.

Qin and Karabacak's Rubric

Qin and Karabacak's (2010) Rubric which was originally based on an adapted Toulmin (2003) model and Nussbaum and Kardash (2005) was employed to identify the argument elements in the students' essays in this study. In this model, counterargument and rebuttal were divided into two levels of claim and data to provide a more detailed analysis of the argument structure of the arguments. Semantic structure and linguistic elements are used in the rubric to identify different argument elements

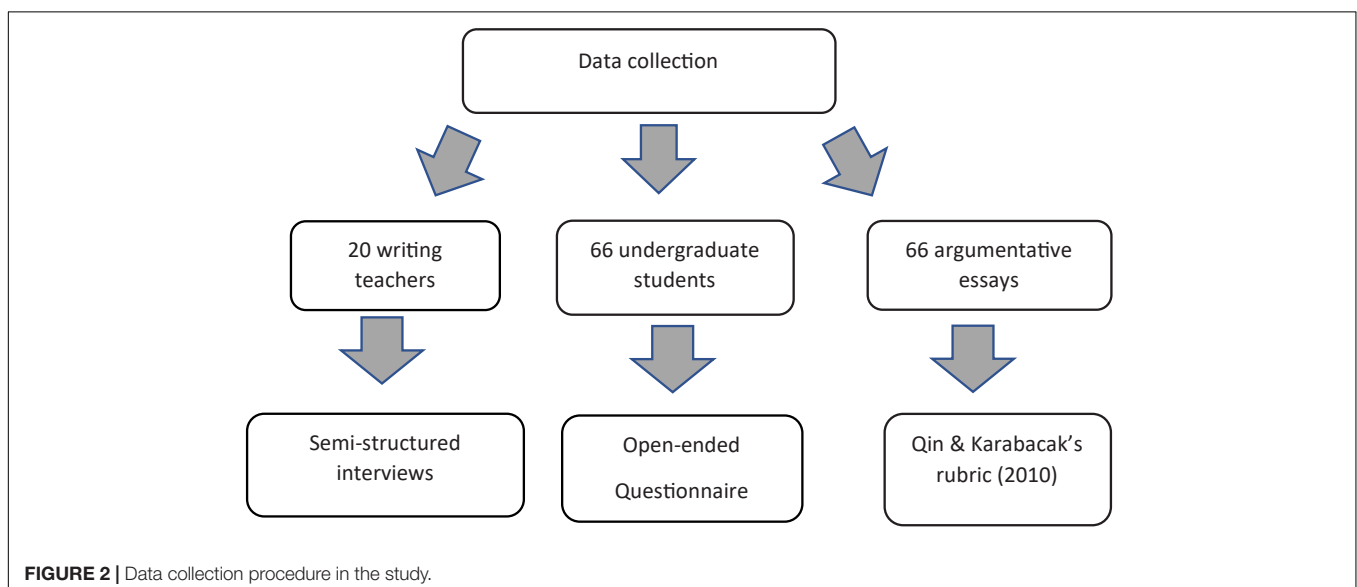
(**Supplementary Appendix II**). The rubric has been claimed to reliably identify the argument elements. In this study the inter-rater reliability was 0.89. Also, at the time of disagreement between the raters, data were negotiated until a consensual agreement was obtained.

Data Collection

The data for this study was collected during the 2020–2021 academic year. The researcher worked with the students in the two essay writing groups. At the end of the course, the students in both groups were asked to write an argumentative essay as the final exam assignment. Overall, 66 essays were collected. The texts obtained in this way were next analyzed for the argumentative elements based on the Qin and Karabacak's (2010) rubric. Later, the students were given an open-ended questionnaire which aimed to reveal the students' perceptions of different aspects of an argumentative essay. The students could answer the items and also provide any further information that they deemed necessary. Finally, a group of 20 writing instructors were asked to participate in a semi-structured interview. Each interview lasted for 60–80 min to give the participants sufficient time to express their views on the difficulties the students encountered with developing an argumentative essay (**Figure 2**). The interviews obtained in this way were recorded and subscribed for further analysis.

Data Analysis

Due to multiple data collection procedures used in this study, the researcher used different data analytic measures. The students' essays were analyzed using Qin and Karabacak's (2010) rubric. In order to establish the inter-rater reliability, an experienced colleague who was also an experienced writing instructor rated the essays. The measure of inter-rater reliability (0.89) showed high agreement between the two ratings. To analyze the results of the questionnaire and the interviews, the researcher used the qualitative analysis procedure of content analysis. In particular,



the conceptual content analysis as the particular content analysis method was used. In conceptual analysis, a concept is chosen for examination and the analysis involves quantifying and counting its presence. Following Dornyei (2007), the data were transcribed verbatim and before coding the researchers carefully read the transcripts several times. Then after several rounds of coding and recoding, the researcher could develop higher-order codes from the data. The major themes obtained in this way were considered as the way the students perceived argumentative writing. In addition, the themes emerged from the analysis of the interviews were considered as the problems the teachers counted the students had with developing argumentative essays. Moreover, the coding of data and forming major themes were next checked with two experts who were familiar with the qualitative content analysis procedure.

RESULTS

The first research question investigated how the students conceived of an argumentative essay in English. The analysis of results of the open-ended questionnaire provided six major themes. These categories can be seen in **Table 2** below based on the frequency of mentions. In fact, a large number of the students did not mention the main characteristics of an argumentative text. As shown below, majority of the students did not know the particular structure of the argumentative essay. They considered the general introduction-body-conclusion as the organization pattern for developing the arguments. The students mentioned that the body of the argument should be developed similar to other essay genres. As an evidence, one of the students described the typical organization of an argument as so,

“After stating your view in the introduction paragraph, you should explain it in the body paragraph to justify your views.”

It seems evident that the learners did not know the particular structure of the argumentative essay in English which confirms that they have just generalized their previous writing experience into the argumentative genre.

Moreover, many of the students considered an argumentative text as a kind of writing to express personal opinions. For example, one of the students defined an argumentative essay as so,

“Argumentative writing means that you should express your views on a controversial topic and also show why you think so.”

A good of number of the students mentioned that argumentative writing should persuade the readers in the first place. However, their responses did not show that they have the argumentative structure in mind. As evidence, only a few of the students considered argument to include multiple views, rather their responses showed that by argumentative text, they aimed a persuasive explanatory essay in which they should provide sufficient grounds to convince the readers of their claims posed early in the text. This structure, in the respondents' views, was expressed in a first-person writer-only text.

In addition, some of the students stated that there are always two parties involved in argumentative writing. However, as mentioned before, they were unable to explain how such a dialog was represented in the argumentative text. In fact, the inclusion of two sides in an argument shows that the students fail to consider multiple resources in developing an argument. It can be inferred that they did not know that evaluating and analyzing the resources is indispensable in developing a robust argument in English. Further, the second party which was an imaginary figure developed by the writer was restrained to pose particular views which were part of the writer's imagination.

It was in this imaginary dialog that the students believed that they should persuade the readers to accept their personal views. In fact, the students adopted an empty notion of the persuasion. The following excerpt by one of the students clearly shows the way the students conceived the persuasion in argumentative writing:

“In the body I should state ideas that would fortify my claim posed earlier. I believe this would have two functions. The first is that I have supported my claim and the second is to justify those who disagree.”

Relying on their L1 background, some students considered a different structure for the argumentative text in which the thesis statement appeared in the conclusion section of the essay. This assumption was interesting since the students know the structure of English essays in which the thesis statement appeared in the introduction paragraph but when it came to argumentative writing, they believed that the claim as the product of argumentation should appear after enough supports have been posed. All in all, the way the students perceived the argumentative essay revealed that the students had a partial and narrow concept of the argumentative writing.

As mentioned, teachers also participated in semi-structured interviews which aimed to identify the kind of difficulties the students faced in argumentative writing. The teachers' comments were grouped into six categories as shown in **Table 3** below. The most frequently mentioned problem by the teachers was lack of structure. The teachers believed that the students failed to organize their ideas into a logical structure. The teachers stated that in many cases the texts were jumpy and could not present the students' ideas in a coherent way. The teachers' comments further showed that the problem with structure related to the students' inability to state their position (i.e., claim) in a sound argumentative structure. The next most frequent problem mentioned by the teachers was the lack of evidence in the students' argumentative texts. The teachers claimed that the

TABLE 2 | Students' perception of the argumentative writing.

Category	Frequency
Argumentative writing is similar to other essay genres.	52
Argumentative writing is for expressing personal opinions.	49
Argumentative writing should persuade the readers.	38
Argumentative writing includes two sides	27
Argumentative writing includes the thesis in the conclusion	25

TABLE 3 | Teachers' views on students' problems with argumentative writing.**Lack of structure**

Lack of evidence (unable to use/evaluate the related sources)
Lack of critical analysis
Problems with basic writing skills (sentence construction skills, paragraph development skills, etc.)
Poor L1 & L2 pre-university writing experience
Marginal role of argumentative writing experience/practice in the context

students failed to use sources to support their claims. They used their own personal opinions or popular, wise sayings instead. Similarly, the students could not evaluate the information to write the relevant information in their text. In fact, the teachers stated that the students mislead their line of argumentation by providing lots of information which usually do not fit their text. In other words, students who aim to improve their arguments by displaying the range of their knowledge usually provide lots of irrelevant information which does not help the argument.

The next problem which was not unrelated to the previous problem was the students' inability to critically analyze the information. Critical analysis of data which is at the core of argumentation ability concern the students' ability to provide opposing views (i.e., counterarguments) and be able to refute them (i.e., rebuttal). In the words of teachers when the students could not provide relevant evidence, then they could not critically evaluate the information and hence develop integrative and coherent arguments. One of the teachers who viewed these two problems as related stated as so,

"The most challenging and troublesome flaw with learners' argumentative essays stems from their lack of critical thinking abilities. My 14-year experience in academic writing convinces me to uphold that what hampers the process of argumentative writing is the students' inability to gather data, think independently, and establish a stance through logical development of ideas."

Moreover, a good number of the teachers claimed that the students suffered from basic literacy skills. In particular, they referred to poor sentence construction skills in English. They believed that this basic deficiency negatively affected the students' ability to develop any written pieces including argumentative essays in English. The teachers emphasized that English program in the Iranian EFL context should further focus on improving the basic language skills such as sentence construction skills, paragraph development skills which would affect subsequent writing courses in the program. Two of the teachers described part of this problem as so,

"Most of the students have not yet mastered sentence construction skills. They have problems making grammatical sentences. Moreover, they are unable to develop a topic while maintaining unity and coherence."

"Some of these problems concern the students' lack of ability to write good sentences, choose proper vocabulary, use suitable cohesive devices, not to mention the mechanics of writing such as punctuation, capitalization, and spelling. These can adversely affect any kind of writing, especially argumentative essays."

The other difficulty concerned L1 and L2 pre-university writing experience. In teachers' ideas, the students had only a blurred picture of Persian (L1) idea development in writing in which the conclusion received the most importance. The students did not know how to develop a well-formed argument which caused them to develop explanatory essays instead of argumentative one most of the time. One of the teachers who particularly emphasized the poor argumentative writing tradition in the students' L1 referred to the problem as so,

"This mostly has its roots in the students' not being trained in their pre-university years to question the phenomena, think critically, welcome opposition, analyze, and think independently regardless of sources, disagreeing voices, and conventional norms and values."

In teachers' ideas, Iranian EFL students experienced their first serious writing practices in English at university. It is evident that argumentative writing which relies on solid development principles would be particularly unfamiliar and challenging for the students. The teachers also mentioned that Iranian pre-university English language instruction followed a traditional grammar-based methodology in which reading comprehension skills received the most emphasis. Despite the national change into foreign language curriculum which emphasized a communicative approach to language teaching, the reality of practice underestimated the writing courses.

The last problem identified by the teachers was that argumentative writing despite its importance in the academic context did not receive its due priority both in the national curriculum and by the writing teachers. Argumentative writing was treated simply as a genre similar to other essay types. Consequently, it was not the focus of explicit instruction. Therefore, the students developed a partial and fuzzy concept of argumentative writing. As evidence, some teachers referred to poor pedagogical practices of the instructors in the composition courses which could add to the problem. One of the teachers described the problem as so,

"We, as teachers, might not have taken the writing courses seriously. It may be due to the fact that we have our own problems outside the classroom, in our private lives. Enhancing writing skill requires a long process. On the one hand the student must strive and practice to learn. This is something which does not happen with our students. On the other hand, we, teachers, must put more time to correct and comment on the students' writing. Of course, one reason, or justification can be the crowded writing classes. It would be a burdensome task for the teacher to put a lot of time on the students' writing."

Some other teachers even referred to teachers' incorrect concepts of argumentation. In their ideas, many EFL teachers have vague ideas of argumentation which shows a broader unawareness of the requirements of argumentative essay in English among them. For example, one of the teachers referred to her personal experience to show that many EFL writing instructors themselves have a tacit knowledge of the rhetorical requirements of the argumentative essays:

"I have problems with argumentation in my writing let alone the students. Personally, I think one of the reasons that my articles as

a member of the Iranian EFL writers are rejected is that we are not aware of the rhetoric of the English language. For example, we have problems in presenting our arguments in a coherent way. We either take many points for granted in writing or provide too much information which includes lots of irrelevant data.”

Last, in order to analyze the structure of the students' argumentative essays, two types of analyses were conducted. First, rhetorical organization of the essays were examined. This was done to find out if the students developed any position (i.e., claim) in their essays and if so, what were the rhetorical patterns preferred by them. Next, elements of the students' arguments including claim, data, counterclaim, counterclaim data, rebuttal and rebuttal data were examined based on Qin and Karabacak's (2010) rubric. In this rubric semantic structure and linguistic elements are used to identify the argumentative elements. For example, phrases such as in my opinion, I think, I believe refers to claim. Also, counterarguments and rebuttals are identified through phrases such as, however, while. . .although; in spite of the fact that. . .

The analysis of the texts showed that almost half of the students (56%, $n = 37$) stated their position clearly at the beginning of their essays. However, 43% ($n = 29$) of the students had not adopted an explicit stance on the topic. In sum, the overall rhetorical organization of the essays was as deductive (56%) and off (43%) (Figure 3).

In the next stage of analysis following Qin and Karabacak's (2010) (Supplementary Appendix I), different elements of the arguments such as claim, data counterargument claim, counterargument data, rebuttal claim and rebuttal data were identified and their associated frequencies were calculated. The analysis of the texts showed that although more than half of the students (56%) could take a stance in their essays, still a good number of them failed to develop an explicit position in their essays. According to Toulmin (1958), a claim should be supported by its relevant data in order to be considered as a claim; otherwise it is just a piece of personal opinion. The analysis of the students' texts showed that nearly half of the students' essays included elements of data. As Table 4 below shows although there

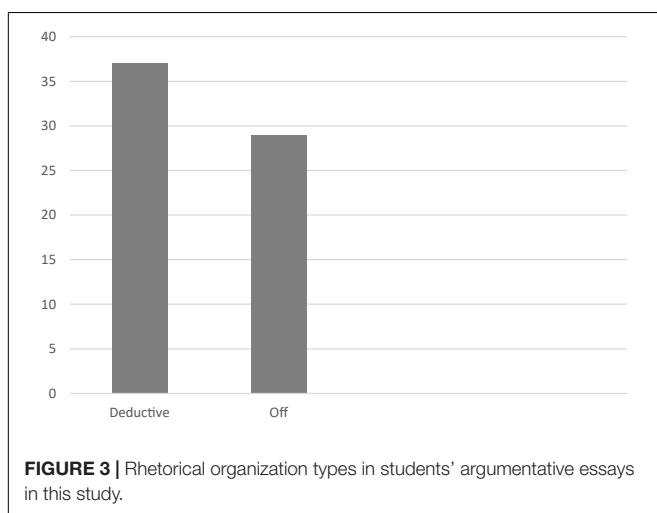


TABLE 4 | Frequency of argument elements in the students' argumentative essays.

Components	N	(%)
Claim	37	56
Data	27	41
Counterargument claim	13	20
Counterargument data	11	17
Rebuttal claim	4	6
Rebuttal data	1	1.5

was a salient difference in the frequency of use of claim and data as the basic argument elements and the counterarguments and rebuttals as the secondary argument elements, the undergraduate students had difficulties for developing sound claims and their supporting data. The greater number of claims compared with the data confirmed the students' inability to develop sound claims further supported by the relevant data.

DISCUSSION

The present study investigated argumentative writing in the Iranian undergraduate EFL context. Adopting a holistic perspective, the study examined the issue through exploring three data sources: students, writing instructors and argumentative texts. The findings obtained from the students' perceptions of the argumentative writing, the teachers' views on the students' problems in the argumentative writing and finally the structural analysis of the students' argumentative texts revealed that the Iranian EFL students suffer from considerable problems in different areas of argumentative writing. The analysis of the data gathered through three different sources showed considerable convergence which implies that EFL academic writing faces similar challenges. A closer look at the findings revealed that the students have difficulty with argumentation in the first place. They conceive of arguments as individual claims. However, they did not know how to put their ideas into a coherent, logical structure. The analysis of the students' argumentative essays and also what the instructors counted as main difficulties showed that the students failed to meet the basic requirements of developing an argumentative text such as gathering enough evidence from different opposing sources, evaluate and critically analyze them and next present them through a sound organization.

This observation can be explained on several grounds. First and the most important one is that Iranian EFL students live in a literacy culture in which written mode has a marginal role. A deeper look at the pre-university L1 and L2 writing instruction reveals that the Iranian education system provides vague and limited writing instruction which does not offer any contribution for the students' educational outcomes. In a context where writing does not bear any role in the educational fulfillment of the students, the students would develop their particular writing styles to meet the least writing they are expected to do. Argumentative writing requires a robust reasoning tradition in place before practicing with this genre. It goes without saying that the Iranian EFL students with vague conceptions

of argumentative writing and poor reasoning abilities would encounter several difficulties when developing the argumentative texts. Several studies (Kobayashi and Rinnert, 2002; Altınmakas and Bayyurt, 2019; Taheri and Nazmi, 2021) reported similar L1 writing situation. For example, Altınmakas and Bayyurt (2019) claimed that the Turkish pre-university education system does not provide the students with the needed writing knowledge and skills which the students can later use in the academic context. Similarly, Kobayashi and Rinnert (2002) showed that despite the importance attached to L1 writing instruction in Japanese education system, the actual classroom practice put less emphasis on the writing skill compared with the reading skill mainly due to the impact of university entrance exam. Taheri and Nazmi (2021) also showed how providing scaffolding strategies while writing instruction would affect the argumentative writing ability of the participants in terms of the total organization and linguistic accuracy. Therefore, the marginal role of L1 writing among other skills would exert its negative impact on the academic writing at university.

On a similar ground, it is said that the students should take responsibility for their learning in the tertiary level education. This is a difficult task for the students who have experienced teacher-fronted, exam-oriented education system before entering the university. The past learning habits of the students only emphasized rote learning in a passive way and little intellectual engagement was required. It is clear that the students encounter serious problems when they should both critically reflect on the content and manage the form of the language when developing argumentative essays.

The students' perception of the argumentative writing in this study showed that the students had a partial understanding of the argumentative genre. Since Iranian EFL students receive their first academic writing instruction in the university, it can be claimed that writing teachers are also involved. The analysis of the students' argumentative texts partly reflects the way they have been instructed. From these observations it can be inferred that the L2 writing teachers mainly focus on the students' immediate L2 writing needs such as grammatical knowledge and mechanics of writing which reflects the teachers' lack of competence in developing argumentative essays. Poor qualifications of EAP practitioners has been a recurrent theme in many studies (Belcher, 2013; Basturkmen, 2019). Despite the global increase of EAP courses, there is a paucity of research on EAP practitioners' knowledge base (Kaivanpanah et al., 2021). In a context where the teachers receive no explicit training, they are left alone with the complex task of teaching EAP. Particularly when it comes to teaching writing, the same confusion persists. Needless to say, academic writing as a multi-layered difficult task is simply treated on impressionistic and subjective grounds (Wingate, 2012). In the absence of professional development programs, teachers proceed by drawing on their partial knowledge of the EAP writing.

According to Hyland (2011) learning to write involves five kinds of knowledge: content knowledge, system knowledge, process knowledge, genre knowledge and context knowledge. It goes without saying that EFL student writers with a poor L1 writing history cannot achieve this set of knowledge to develop conceptual, interpretive skills. According to Currie (1993), the

writing process is a socialization process in which the writers develop different writing skills and conventions throughout the time. The undergraduate students in this study who have recently received the academic writing instruction seem to have a long way to learn the critical skills needed in developing sound arguments. Therefore, EAP writing teachers should develop a more tolerant attitude to the students' difficulties with an argumentative text. The teachers should remember that academic discourse culminates in the social, cognitive and epistemological context of particular disciplinary contexts (Hyland, 2009). Making judgments about the students' argumentative writing as the most important academic text genre in a context where the students face the first rule-governed and serious writing practices does not provide a comprehensive picture of their academic writing practices. Therefore, teachers in similar contexts to the present study should consider academic writing as part of a complex system which progresses in time.

The next ground which is not unrelated to above is the poor general language ability of the EFL undergraduate learners in this study. In fact, the students who still have problems with the basics of sentence construction in English would be unable to synthesize larger chunks of the language into a coherent, logical whole. In other words, English academic writing program should put more weight on improving the basic writing skills of the students such as sentence development and paragraph development along with emphasizing more advanced academic writing conventions.

CONCLUSION

This study aimed to provide a general picture of EFL argumentative writing as the most important kind of academic writing. The data elicited from three different sources revealed that argumentative writing is poorly treated in the context. Findings of the present study can have several implications. At the most basic level, the study calls for a change in the educational value attached to the academic writing in general and argumentative writing in particular. At the wider level, curriculum developers should put more emphasis on pre-university L1 and L2 writing instruction programs. This change should make the writing meaningful for the students. Teachers who implement the curricular goals also should involve students in writing tasks in a way that they can think, and critically evaluate the originality and relevance of the ideas for further development of sound arguments. This systematic integration of L1 and L2 writing from the early years of writing instruction can considerably improve the writing practices of the students in the following tertiary level education as well.

Moreover, findings of the study would clarify the way argumentation in English is perceived by the students. This will aid the writing instructors to provide more focused instructional programs for the students. As the findings showed, the sound organization of the essay which was mainly concerned with the development of the arguments was the recurring problem mentioned by different parties who took part in this study. To fix this fundamental problem is beyond the mechanical and the surface linguistic aspects, rather the students should learn how

to think, critically evaluate the sources and organize different parts of an argument. Such abstract conceptual activities require a writing program that confirms the primacy of the written discourse in the academic context first and then design writing activities to improve the argumentative writing of the students in the long run. Teacher professional development programs have a critical role in preparing the pre-service teachers to fulfill the above task. Prospective EAP writing teachers should also know that academic writing is not a separate activity that can be worked on individually, rather, it is a dynamic and evolving skill that should be taught by drawing on several grounds.

Present study also suffers from a number of limitations. The study was conducted in a single university in Iran which narrows the scope of the study. Further studies should be designed to include more universities in the context. Similarly, the study was conducted with a limited sample of students, teachers and texts which restrict the generalizability of the findings.

Findings of the present study also provide new directions for future research projects. For example, comparing the results of the present study with ESL and ENL contexts would reveal to what extent the context may affect the academic writing. In sum, the study would also call for more studies on the EFL academic writing in general and argumentative writing in particular. It is expected that this focus would improve the academic achievement of the students in the academic settings where the written mode prevails.

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DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors upon the request.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the Local Legislation and Institutional Requirements. The patients/participants provided their written informed consent to participate in this study.

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Both authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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"Be rational!" Epistemic aims and socio-cognitive tension in argumentation about dietary choices

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Argumentation is a social practice that can lead to epistemic outcomes, that is, to the construction of knowledge. Recent research in collaborative learning has pointed out the significance of affective and motivational aspects, as well as the influence of socio-relational concerns, which have been found to frequently take priority over epistemic ones. Our research objective is to investigate how the epistemic and socio-relational dimensions of students' argumentative interactions are intertwined. We apply discourse analysis to examine the interactions in a small group of four 11th-graders evaluating the nutritional acceptability of omnivorous and vegetarian diets. The epistemic dimension is analyzed in terms of the aims pursued by the participants and the epistemic outcomes achieved. The socio-relational dimension is analyzed in terms of fluctuations of interpersonal tensions and their relaxations. The results show a convergence of participants' epistemic aims and the epistemic statuses of the options. Most of the epistemic outcomes are produced in sequences in which socio-cognitive tension arises and then relaxes. Enduring high socio-cognitive tension and overcoming conflict seem to have encouraged the adoption of epistemic aims. Moreover, our findings suggest that driven by epistemic aims in high socio-cognitive tensed contexts, students can refine the conditions by which they engage in argumentation. These results call for further investigating on what constitutes an appropriate or productive level of interpersonal tension for learning. Educational implications are related to the design of argumentative learning environments promoting epistemic aims and outcomes through the encouragement of suitable socio-cognitive climates leading to them.

KEYWORDS

epistemic cognition, argumentation, classroom discourse, socio-cognitive conflict, collaborative learning

Introduction

Research on epistemic cognition (EC), that is, on knowledge about how knowledge is constructed and justified, has developed in recent years (Chinn et al., 2014; Greene et al., 2016a), showing that it is situation-specific and pointing out the need for further examination of patterns across specific practices and contexts. There has been a shift from conceptualizing EC as essentially individual toward a consideration of its social nature (Goldman, 1999; Ludvigsen, 2009; Chinn and Rinehart, 2016). However, its social aspects, such as how individual practices aggregate at the level of groups, are still understudied (Asterhan, 2013; Chinn et al., 2014; Clément, 2016).

Argumentation has a range of meanings, and several types of argumentative dialogue have been described in the literature (Walton, 1990). In relation to EC, argumentation can be defined as an epistemic and social practice in which interlocutors attempt to modify the intersubjectively agreed degree of acceptability, or, more generally, the *epistemic status* of proposals (claims, views, ideas, or solutions) through joint engagement in reasoning (Asterhan, 2013). Being an inherently social practice taking place in the interplay between people, argumentation is a suitable context for studying the social aspects of EC. Given the appropriate conditions, argumentation can lead to *epistemic ends, outcomes, or achievements*, that is, to the construction of new knowledge. This newly acquired understanding may be achieved through the modification of the epistemic statuses of the ideas in discussion (that is, the intelligibility, plausibility, or acceptability of those ideas, from the point of view of each participant) when interlocutors publicly present their ideas and resolve discrepancies. Indeed, research has shown that argumentation can be an effective way of learning and refining understanding (Nussbaum and Sinatra, 2003; Clark and Sampson, 2008; Felton et al., 2009; Yeh and She, 2010). However, there is a need for further research on how argumentation produces specific changes in the consideration of ideas in their epistemic statuses. Research shows that it can do so, although not always (Asterhan and Schwarz, 2007; Goldman et al., 2016), and clear changes in position (e.g., from being in favor to being against a proposal) are, in fact, a rare finding, especially in socio-scientific debates involving systems of values (Simonneaux, 2001; Yu and Yore, 2013). Another kind of knowledge, besides the one specifically related to the epistemic status of the ideas in discussion, may be constructed as a result of argumentation: knowledge about the knowledge-building processes themselves. While it has been shown that engagement in argumentation supports the development of epistemic understanding (Kuhn et al., 2013; Iordanou and Constantinou, 2015), that is, meta-level understanding of the construction of knowledge, further research is required to address the complexity of the interconnections between the emergence of this kind of epistemic achievements and the engagement in argumentation (Iordanou et al., 2016).

Two areas of research are relevant for understanding why argumentative interactions do or do not consistently produce epistemic achievements. Both involve the acknowledgment of the “hot” nature of learning and cognition (Bendixen and Rule, 2004; Sinatra, 2005) encompassing affective and motivational components (Chen and Barger, 2016; Brocos and Jiménez-Aleixandre, 2021). The first area concerns the goals and motivation behind EC, exploring the question of why individuals would want to engage in thinking about knowledge and knowing. In this regard, the interest in the AIR model of EC developed by Chinn et al. (2011, 2014) has been emphasized (Chen and Barger, 2016). This model, described below, incorporates as one of its essential components *epistemic aims*, which are goals that individuals may adopt in relation to knowledge. Thus, this model incorporates motivational constructs into EC (Chen and Barger, 2016). As the relevance of epistemic aims in knowledge construction has been recognized, they are likely to play an important role in determining the extent to which epistemic outcomes are achieved in argumentative exchanges. Since collaborative engagement is not the mere sum of the individual’s motivation levels, being influenced by group dynamics (Mullins et al., 2013), epistemic aims are arguably subjected to the particularities of how the social interaction unfolds, and as such, they should be examined.

The second research area of interest to our research purposes concerns the social aspects of argumentation. While much attention has been paid to the cognitive and epistemic dimensions of argumentation, the socio-relational dynamics on which these dimensions are dependent have been largely understudied (Andriessen et al., 2011; Asterhan, 2013). While engaged in argumentation, participants are not only concerned with epistemic matters related to the issue under discussion, but also with aspects related to social belongingness, interpersonal relations, and social perceptions (Hijzen et al., 2007; Asterhan, 2013). It has been pointed out that these socio-relational aspects often take priority over epistemic ones (Andriessen et al., 2011; Asterhan, 2013; Isohätälä et al., 2018), demonstrating that emotional tension frames the construction of arguments (Brocos and Jiménez-Aleixandre, 2021). Research has yet to further clarify how engaging in productive argumentation while regulating socio-emotional processes occurs and intertwines in students’ interactions (Baker et al., 2007). In this regard, examining the patterns of *socio-cognitive tension* and its relaxation in argumentative interactions has been proposed as a potentially insightful approach to better understanding whether and how learning occurs in argumentative exchanges (Andriessen et al., 2011). Thus, we incorporate the analysis of socio-cognitive tensions in our study.

In sum, our research objective is to investigate how the epistemic and socio-relational dimensions of students’ argumentative interactions are intertwined. In particular:

To examine in which ways enduring socio-cognitive tension and overcoming conflict in group argumentation encourages or

inhibits the adoption of epistemic aims and the achievement of epistemic outcomes.

The epistemic dimension is analyzed in terms of the epistemic or non-epistemic aims pursued by the participants, and in terms of the epistemic outcomes achieved. The socio-relational dimension is analyzed in terms of fluctuations of interpersonal tensions and their relaxations.

We pursue this objective through a case study, examining the social interactions of a group of four 11th-grade students participating in a socio-scientific argumentation task involving the evaluation of dietary options. This group was selected since an analysis of their argumentative exchanges suggested that they achieved sophisticated epistemic outcomes, both in terms of deepening the knowledge about the matter at stake, as well as in terms of meta-level understanding, as they engaged in explicit regulation of the argumentative and decision-making processes. We examined the evolution of the epistemic status of their proposals relating to dietary choices (vegetarian, omnivorous) throughout the debate, in relation to the epistemic aims of the participants, the patterns of socio-cognitive tension, and the regulation of epistemic processes. We outlined the possible interactions among these dimensions, delving into the specific ways in which these may be interconnected. We did so by analyzing excerpts of the participants' discourse, which marked the progression of the discussion toward the outcome of the task. In so doing, we intended to shed some light on how the interrelation of participants' epistemic aims and the particularities of the socio-cognitive climate may interrelate and influence the epistemic outcomes achieved in argumentative exchanges.

Theoretical framework

The framework is drawn from the literature on epistemic cognition and research on socio-relational aspects of argumentation and collaborative learning.

Argumentation as a social epistemic practice

EC is an interdisciplinary research area that addresses how people acquire, understand, justify, change, and use knowledge, having its roots in psychology, sociology of science, and philosophy (Greene et al., 2016b). EC has also been presented as a theory of personal epistemology (Hofer and Pintrich, 2002), epistemological resources (Hammer and Elby, 2002), or of the nature of science (Osborne et al., 2003). Perspectives on how knowledge is produced are shifting from an individual focus toward a social one (Ludvigsen, 2009; Chinn and Rinehart, 2016; Clément, 2016). Simultaneously, the field has expanded from personally held beliefs about

knowledge to a broad spectrum of cognitive processes (Chen and Barger, 2016). In recent years, new models for EC have been developed, aiming at a better understanding of how beliefs change. These models are potentially helpful for researching and explaining the role of social, affective, and motivational aspects of EC that have been traditionally neglected (Asterhan, 2013). Chen and Barger (2016) model of epistemic change comprises three components: epistemic doubt (being skeptical of one's beliefs), epistemic volition (related to motivational aspects), and resolution strategies such as reflection, social support, and social interaction. The latter two components deconstruct the roles of motivational and social aspects of EC, where, as these authors emphasized in earlier studies, the role of peers and emotions in epistemic change needs to be further elucidated.

More recently, Chinn et al. (2014) developed the AIR model of EC, which includes three components: *Aims*, epistemic goals or objectives that individuals set to pursue epistemic ends; *Ideals*, standards used to evaluate whether epistemic ends have been achieved; and *Reliable epistemic processes*, procedures, and strategies to achieve epistemic ends. The notion of epistemic ends, also termed epistemic products, outcomes, or achievements, refers to the new knowledge or understanding that is being constructed in each situation. According to this model, when processing information, individuals may adopt epistemic aims; for instance, they may set goals for developing a representation of how the world is (Chinn and Rinehart, 2016). Conversely, and perhaps simultaneously, they might adopt non-epistemic aims that are not specifically related to knowledge and may be diverse in nature, for instance, concerning personal pleasure or self-image. Chen and Barger (2016) illustrated the differences between both kinds of aims with the following example: students can be oriented to understand the biases of the author of a text to better understand the complexity of the issue (an epistemic aim) or to be esteemed by their peers for finding an interesting insight (a non-epistemic aim). We can map the other two elements of the AIR model onto the same example: students could use certain epistemic ideals as criteria for deciding what constitutes a bias, and enact specific epistemic processes, such as systematically consulting a range of sources to acquire information about the author and hence gain a better understanding of the author's biases.

Epistemic and non-epistemic aims interact, and it has been argued that people are often driven by a mix of the two (Kawasaki et al., 2014), given that, in group work, they must simultaneously manage problem-solving and social interaction. The notion of epistemic aims involves both motivational and social aspects of EC. Thus, the AIR model incorporates goal-orientation constructs traditionally studied in the motivation literature (Maehr and Zusho, 2009) into EC, further expanding them by including not only features related to what motivates people, but also what people value when dealing with epistemic matters (Chen and Barger, 2016). The AIR model highlights that EC is social and contextualized and that it is centered on

practices rather than formal beliefs (Chinn and Rinehart, 2016). In this study, we aim to contribute to research on EC by studying the epistemic practice of argumentation in a socio-scientific context, exploring how the epistemic and non-epistemic aims of participants might be related to socio-relational aspects and the epistemic outcomes are potentially achieved because of argumentative exchanges.

Argumentation in science education is conceptualized as an epistemic practice that involves the evaluation of knowledge. It has the potential to broaden, deepen, and refine understanding, as it may foster justification, negotiation of meaning, and opinion (epistemic status) change (Baker, 2009). We should clarify that we use the term *epistemic status* as it is understood within EC, referring to the status of ideas from a participant's point of view, and it should not be mistaken with the use of the same term in the conversation analysis discipline, in which it is generally utilized to characterize the relative position of speakers in a gradient of knowledge about the domain in discussion (Heritage, 2012; Lindwall et al., 2016). In argumentative situations, proposals will have different epistemic statuses from the participants' points of view. The aim of the argumentative interaction is to try to make epistemic statuses evolve so that agreement is reached on what should be mutually accepted (Baker, 2002), so the epistemic status of the ideas in discussion from each participant's point of view is better aligned. We argue that the term *epistemic status* has a range of meanings in diverse argumentative contexts. In developing explanations, it refers to the plausibility and explanatory power of alternative models, and, in decision-making, to the degree of *acceptability* of options. It is worth mentioning that, as Kolstø (2005) argues, decision-making is not solely based on knowledge, but a result of the interaction between knowledge and values, the latter being necessary for assessing the desirability of the different potential consequences of alternative decisions. In these contexts, argumentative interactions have the potential to modify the epistemic statuses associated with the alternative options (that is, their acceptability for each participant), in terms of their consistency with other conceptions and values (individually or socially accepted), their consistency with evidence, or their potential to successfully address several dimensions of the dilemma and achieve something that is considered of value. We further explore the differences between the shifting of epistemic statuses in the context of scientific explanations and socio-scientific decision-making in another study (Jiménez-Aleixandre and Brocos, 2018).

Thus, epistemic statuses may be modified as an outcome of argumentation, so the argumentative interactions can be characterized as discursive moves aimed at triggering acceptability changes, or as attempts to decide on alternative solutions by transforming attitudes toward them (Baker, 2009). When students express information and reasoning relating to a problem, they potentially change the degrees of acceptability of the options being discussed and they presumably construct

new knowledge (Baker, 2009). Viewed thus, not only is the interactive epistemic process (argumentation) social in nature, but the epistemic ends achieved by argumentative means (understanding) are social as well.

Argumentation may be a reliable process for achieving epistemic ends. However, as Chinn et al. (2014) point out, its reliability depends on certain conditions. We argue that these conditions are closely related to what Baker (2009) has termed the argumentative rules of the dialogue game. Some of these rules are *logical*, such as the requirement for coherence (e.g., invalidating an argumentative position if it has incurred a contradiction), while others relate to the *collaborative* nature of argumentation (e.g., dismissing a party who argues in circles, allowing no evolution of the debate, or the obligation of defending one's position when it is criticized). In the pragma-dialectical perspective, the "ten commandments" for a critical discussion (van Eemeren and Grootendorst, 1992) can be considered as a set of rules for engaging in argumentation in a reliable way. Chinn et al. (2011) point out that people may have ideas about the conditions, generally tacit (Baker, 2009), that must be met in small-group procedures to reliably produce epistemic outcomes. By engaging in practices such as argumentation, individuals may develop these ideas, and hence a better understanding of the procedures themselves. So, by practicing argumentation, individuals may achieve not only epistemic ends about what is being argued but also about the argumentation process itself. Indeed, it has been shown that engagement in argumentation supports the development of meta-level knowledge (Kuhn et al., 2013; Iordanou and Constantinou, 2015), and research on students' metatalk (talk about the discourse, distinguished from talk about the topic) sheds some light on the rules that govern argumentative exchanges, showing that, over sustained periods, students' discourses become more explicit regarding norms (Kuhn et al., 2008, 2013). Further research is required to address the complexity of the interconnections between the development of meta-level knowledge and engagement in argumentation (Iordanou et al., 2016). In our study, we address how the development of this kind of knowledge might relate to socio-relational dynamics.

The socio-relational dimension of argumentation

It should be noted that co-construction of knowledge in argumentation does not necessarily emerge from an initial disagreement, and all that is required is a diversity of proposals and epistemic statuses ascribed to them. However, research shows that conceptual gains are primarily predicted by the presence of critical aspects of argumentative discourse, such as contradiction or rebuttals, and less so by purely consensual

reasoning moves (Asterhan and Schwarz, 2007, 2009a; Howe, 2009). Asterhan (2013) argues that for argumentation to be conducive to learning, it should be both critical and constructive, coining the notion of co-constructive critical argumentation (Asterhan and Schwarz, 2009b), related to “deliberative argumentation” (Asterhan and Schwarz, 2016), “exploratory talk” (Mercer, 1996), or “collaborative argumentation” (Nussbaum, 2008). Asterhan (2013) points out that co-constructive critical argumentation includes features such as (a) willingness to listen and critically examine the different ideas and alternatives proposed; (b) willingness to make concessions; (c) competition between ideas, rather than individuals; and (d) a collaborative and respectful atmosphere. These features, we argue, are largely dependent on the balance between epistemic and non-epistemic aims of interlocutors, their motivations, goals, and willingness. Indeed, Asterhan (2013), discussing why this kind of productive argumentation might be so difficult to elicit in educational contexts, points to the relevance of conflicts between different goals, indicating that concerns about interpersonal relations and social perceptions may cause students to primarily focus on the social dimension on the conflict, rather than on the epistemic one. We must consider, then, the inherent socio-relational aspects of argumentative interactions.

Labov and Fanshel (1977) argue that the kind of conversational actions with the greatest social impact is those in connection with the status of participants and their changing social relationships. When argumentation arises from disagreement, it is potentially a face-threatening activity (Grimshaw, 1990) where criticism of a person’s views can carry with it an element of indirect criticism of the person proposing them. However, according to Muntigl and Turnbull (1998), arguing does not necessarily damage social relations, as it can also strengthen group bonds. They propose that, as facework concerns potentially both positive and negative social relations, it may play an important role in how argumentative exchanges are conducted.

Productive interaction in argumentation requires a balance between engaging in high-level cognitive processes, which are potentially critical and confrontational while sustaining favorable socio-emotional processes (Isohätälä et al., 2018), as students require a workable relationship with their partners (Andriessen et al., 2011). The greater the difference in interlocutors’ knowledge and intentions, the greater the socio-cognitive tension in the working relationship, but also the more potential mutual gain (Andriessen et al., 2011). Avoiding confrontation and tension altogether does not provide grounds for high-level critical discussion which may imply missing learning opportunities (Isohätälä et al., 2018). Thus, socio-relational concerns may divert students’ attention away from the epistemic dimensions, resulting in argumentative discourse that can be too critical on an interpersonal level, and uncooperative, or else too consensual, and hence devoid of the criticism

needed for co-construction of knowledge (Asterhan, 2013). If arguers can deal with the interpersonal aspect, they may develop their ideas whereby tuning at the epistemic level may be related to tuning at the socio-cognitive level (Andriessen et al., 2011). It has been found in certain cases that socio-relational aspects are prioritized over epistemic concerns (Andriessen et al., 2011; Asterhan, 2013), but further research is needed to understand how students deal with socio-cognitive tension, and for uncovering how and under what conditions this tension may allow or facilitate the construction of knowledge.

Methods

Research design

This study adopts a qualitative methods approach, seeking to analyze educational cases through expressions and actions in their local contexts (Denzin and Lincoln, 2013). We present a case study examining interactions in a group of four 11th-graders. Data collection included written products and video recordings, through immersion of the first author in the classroom during 22 sessions of the project. For our study, the data corpus comprises one small group’s written evaluation and video recordings of two sessions. This micro-analytic approach is appropriate given the need for fine-grained analysis for exploring EC in the context of social interaction *in situ* (Bendixen and Rule, 2004; Chen and Barger, 2016; Iordanou et al., 2016), in which measures need to be context, task, and even case-specific (Bendixen and Rule, 2004; Chen and Barger, 2016; Isohätälä et al., 2018).

Participants

Participants were drawn from an interdisciplinary project on food choices, carried out with the complete cohort of 11th-grade students in a high school, aged 16–18 years, during a school year. They were 35 students (22 girls and 13 boys), from sciences and humanities, divided into eight small groups. The case study examined interactions in one group of four 11th-graders (two girls and two boys), participating in a task as part of the final phase of the project. The participants, identified by pseudonyms, were already familiar with each other. This particular small group was selected for micro-analysis based on the following criteria: (a) diversity and changes in the group members’ epistemic and non-epistemic aims; (b) fluctuating socio-cognitive environment in terms of tension-relaxation; and (c) abundance of epistemic outcomes achieved. These outcomes included explicit modifications of the scoring of the options at stake (different dietary choices), argumentative broadening and deepening of the notions discussed, as well as regulation of the epistemic processes of argumentation and

decision-making. It should be noted that this group was not meant to be representative, particularly due to the higher density and diversity of the epistemic outcomes achieved in their interactions, which was mainly noticeable in the sequence of 161 turns selected for our in-depth analysis. We were primarily interested in unraveling what specifically happened in this group that led to sophisticated epistemic outcomes, and in doing so, we hoped to refine our understanding of the conditions under which these outcomes were achieved in argumentative interactions. Following the aforementioned criteria for group selection, we believed that the analysis of the selected group held the potential for answering our research questions and allowing us to explore whether and how epistemic outcomes that were achieved in argumentative exchanges might relate to the interlocutors' epistemic aims and the socio-cognitive climate.

Context: Project on healthy and sustainable food choices

The project on healthy and sustainable food choices was carried out in a high school in a small town where the main activity is agriculture and livestock breeding, including a milk factory. Its aim was two-fold: (a) to promote students' development of the practice of argumentation, and (b) to encourage critical and informed decision-making on dietary options (vegetarian, omnivorous) based on five criteria including nutritional, environmental, economic, ethnic, and cultural/personal. The project design aimed at promoting the understanding of the environmental impact of different diets, which has been recently researched and emphasized in the sustainability literature (Stehfest et al., 2009; Tilman and Clark, 2014). The results of the participants' consideration of the environmental impact of diets and their use of environmental data are addressed in another paper (Brocos and Jiménez-Aleixandre, 2020a). The project consisted of three phases: (1) practicing argumentation and identifying criteria for an optimal diet, (2) searching for information and discussing the criteria, and (3) undertaking the argumentation task on diets carried out in three 50-minute sessions, which is the focus of this paper. This teaching sequence is further detailed in Brocos and Jiménez-Aleixandre (2020b).

The task was designed according to the optimization strategy (Papadouris, 2012), which provides a framework for the evaluation of options. The students were asked to use the information gathered during the second phase of the project pertaining to the five criteria to discuss within the group and jointly evaluate omnivorous and vegetarian diets. They had to score (0–10) on each criterion and provide a written justification for each score. This paper is focused on the discussion around the nutrition criteria. The group was engaged in this task in the first session for 50 mins and an additional 20 mins in the

second session. The turns cited from the second session are preceded by "S2-".

Data analysis

We employed the microgenetic approach, which involves a close examination of the participants' discursive interchanges during practice, focusing on moment-to-moment interaction. Researchers have recommended this method to obtain a comprehensive understanding of epistemic development (Iordanou and Constantinou, 2015; Iordanou et al., 2016) as it can provide insight into the processes of change (Sandoval, 2014). Analysis of the categories was constructed iteratively, analyzing the data in several cycles and in interaction with the literature.

First, the sessions were transcribed. The coding was conducted using the transcripts in the two languages in which the discourse was originally produced, Spanish and Galician, and it was mainly carried out by the first two authors, who are bilingual and hence fully proficient in both languages. The third author worked with English translations. The unit of analysis was the speech turn. Turns were grouped into episodes, defined as one or several turns of speech related to the same topic or action (Gee, 2014). Transcriptions and written productions were analyzed through prolonged immersion in the data. Initial repertoires of categories were elaborated, drawing from the literature, and independently assigning a tentative code to each unit. The codes were compared and the differences were resolved. Then the categories were refined. Using these revised categories, data were subjected to several cycles of analysis. Selected fragments translated to English are reproduced to illustrate the analysis.

In this manner, the first session was divided into 12 episodes. We focused on the analysis of episodes one to five from turns 1–161 as they corresponded to the sequences in which we found a higher density of epistemic outcomes, both in terms of changes in epistemic statuses, refinement of the conceptual notions discussed, and regulation of epistemic processes; these were obtained within a fluctuating socio-cognitive environment.

Analysis of epistemic outcomes

We analyzed three kinds of epistemic outcomes. Firstly, outcomes related to the *modification of the epistemic statuses* of the options at stake. As discussed, argumentation can be interpreted as a practice in which the participants attempt to modify the epistemic status of ideas in the discussion. In decision-making contexts, the ideas at stake are the specific options or decisions being considered. The epistemic statuses of those options correspond to their acceptability, that is, the

degree to which they are considered adequate, viable, and desirable in the context of the specific issue being debated. The task demanded that participants score each criterion according to its adequacy, so the scores publicly manifested by each participant during the debate can be considered as an indicator of the acceptability of that option for that participant, i.e., the epistemic status of that option at that time for that participant. Thus, we examined the evolution of the epistemic statuses by tracking the scores publicly proposed and accepted throughout the discussion, as they indicated the *degrees of acceptability* of each option for the participants who proposed or accepted such scores at a given time in the debate.

Secondly, epistemic outcomes related to the constructed arguments and what has been termed *broadening and deepening of the space of debate* (Baker et al., 2007). These outcomes are constructed by producing an argument, or a counter-argument, or by discussing argumentative links, or the meaning of key notions that a given argument is built on discursive operations such as reformulation, conceptual dissociation, association, or elaboration. In our analysis, we represent the constructed arguments and the argumentative operations in a diagrammatic form.

Thirdly, we analyzed the epistemic outcomes related to the *regulation of the conditions* under which the argumentation and

decision-making practices were carried out. In particular, we focused on how the *rules of debate* were established during the discussion and how the legitimacy of argumentative moves was regulated. We identified these rules when students pointed out that from their point of view a peer had violated the rule. The rules included those related to the requirement of logical consistency, the cooperative nature of argumentation, and the delimitation of the scope of the debate (i.e. what is or is not relevant to the debate).

Analysis of epistemic and non-epistemic aims

To access the epistemic aims adopted by the participants, which require inferring underlying intentions from their discursive moves, the data were examined by fine-grained discourse analysis in an interpretive process that requires elucidation within the sequence context, rather than consideration of separate, individual turns. From the theoretical grounds established in the AIR model developed by Chinn et al. (2011), and in interaction with the data analyzed, we built a non-comprehensive coding scheme (Table 1) for characterizing the participants' aims expressed through their interactions in the debate. We coded as epistemic the utterances signaling aims directed at cognitive representational

TABLE 1 Coding categories for epistemic and non-epistemic aims and students' performances indicative of them.

Aims	Description	Examples of performances indicative of epistemic/non-epistemic aims	Instances from the students' discourse
Epistemic aims	Considering relevant evidence	Manifesting disposition to consider additional evidence	47 Elena: <i>But no, look, for example, it says... where we can find it [zinc in food]</i>
	Achieving a properly justified claim	Providing justifications for the score proposed	75 Elisa: <i>I would give it a 7 [...] It supplies everything, but [...] it can lead to cardiovascular diseases</i>
	Interpreting the information accurately	Detecting errors in the data handout	S2-158 Santiago: <i>Here there is an incongruity!</i>
	Achieving collective understandings	Asking questions to understand a peer's reasoning or to clarify the meaning of a concept	49 Elena: <i>You mean like mixing lentils with rice and all that...?</i>
	Engaging in reliable epistemic processes	Encouraging a peer to follow the proper rules to reliably engage in epistemic processes	114 Alfonso: <i>Come on, man, speak right, I'm speaking right, dude</i>
Non-epistemic aims	Finishing the task as soon as possible	Restricting the amount or quality of the evidence considered	35 Alfonso: <i>What difference does it make... let's move on, let's not stop at that</i>
	Preserving a positive self-image	Preventing the modification of the epistemic status of preconceived ideas with personal implications	58 Santiago: <i>But no, look, each one of us gives a score, and then we do the average</i>
	Prioritizing lack of effort over the quality of the result	Making decisions or proposals based on how easy they are to be justified	316 Santiago: <i>Let's see, meh... explaining a 10 is easier. Put a 10</i>
	Achieving high scores in the subject	Expressing concerns about the relevance of the task for the subject scores	196 Alfonso: <i>This is taken into account for our scores. It is important</i>
	Enjoying oneself	Engaging in activities unrelated to the task such as making jokes or playing games	S3-239 Elisa: <i>You have white hair on the ear!</i>
Uncodifiable		Utterances that are not indicative of either epistemic or non-epistemic aims	38 Elisa: <i>Mine is here</i>

goals. The non-epistemic aims category encapsulated aims of diverse nature unrelated to the construction of knowledge, including utterances that suggest pragmatic goals such as finishing the task as soon as possible or preserving a positive self-image. As we cannot directly access the participants' aims, we identify them by analyzing participants' engagement in certain epistemic performances revealed in their discourse. [Table 1](#) summarizes the coding scheme for the analysis of the epistemic and non-epistemic aims, including a non-exhaustive list of performances indicative of them. It must be noted that the analyses of epistemic outcomes, epistemic aims, and socio-cognitive tension are not mutually exclusive. For instance, a specific utterance in which a participant regulates the rules of debate implies the achievement of epistemic outcomes related to the regulation of the argumentation practice, but it is also considered an epistemic performance, and hence, interpreted as indicative of epistemic aims. Alternatively, certain utterances signaling non-epistemic aims might as well be considered discursive moves increasing socio-cognitive tension. The analysis of the participants' aims was independently conducted by the first two authors, showing an agreement of 93% and a Cohen's kappa value of 0.88.

Analysis of socio-cognitive tension

Drawing from [Andriessen et al. \(2011, 2013\)](#), we examined socio-cognitive tension as arising from argumentation and disagreement-in-discourse. We analyzed the potential of a broad inventory of discursive moves to negotiate face and increase or decrease socio-cognitive tension, which is summarized in [Table 2](#). This repertoire builds on the work of [Andriessen et al. \(2011\)](#), adapted to the particularities of our data, and ranged from metatalk utterances ([Kuhn et al., 2013](#)), such as meta-directive statements, to more traditional argumentative moves, like counterarguments or concessions, as well as discursive moves involving affection, such as the use of displayed emotions ([Plantin, 2011](#)), humor, or irony. These are used to estimate the evolution of the tension-relaxation pattern throughout the argumentative exchanges, which, at a given point in the debate, is quantified as the number of tensed utterances minus the number of relaxed responses. This quantification is a simplification and represents the general direction of tension increase or decrease. It should be noted that: (a) the socio-cognitive potential of certain utterances is highly context-dependent, for instance, humor can be used in either a playful manner, reducing tension, or in a hurtful manner, increasing it (b) certain utterances might include elements that may simultaneously increase and relax the tension and in our data, these were coded as both, and hence their net effect in the overall tension pattern was quantified as zero (c) the overall contribution of each utterance was analyzed against the general emotional "climate," but some interventions may increase the tension for some members while

decreasing it for others; for instance, agreeing with one partner who disagrees with another, and (d) different kinds of utterances might have a different power to influence tension and relaxation; for instance, personal attacks might hold greater potential to increase tension than counterclaims but in our analysis, they are quantified in the same way. These methodological considerations notwithstanding, we argue that this analysis provides a way of creating a simple visualization of the overall direction of the socio-cognitive tension-relaxation patterns that might emerge in argumentative exchanges, which is useful for our research purposes. The analysis, independently conducted by the first two authors, showed an agreement of 95% and a Cohen's kappa value of 0.9.

Results

To explore how the epistemic outcomes achieved in argumentative exchanges relate to interlocutors' epistemic aims and the socio-cognitive climate sustained, first, we examined how the epistemic status of both options changed throughout the debate. Then, we addressed the characterization of the epistemic and non-epistemic aims of the participants, and their evolution. Finally, we examined the emerging socio-cognitive tension-relaxation patterns and their relationship with the epistemic outcomes achieved.

Evolution of the epistemic status of the options and participants' epistemic aims

We analyzed the modification of the epistemic statuses (i.e., their *acceptability*) of both diets (omnivorous vs. vegetarian) throughout the debate regarding the nutritional criterion by tracking the scores for each diet proposed by each participant, as displayed in [Figure 1](#). The horizontal axis includes only the turns in which a new score was proposed or changed by any participant, and their representation is not linear to improve readability. The group average scores (in blue) are only represented after all group members had already proposed or agreed to a specific score.

From [Figure 1](#), it is apparent that the student whose opinions/scorings changed the most was Santiago, as discussed below. The final group score was the same for both diets, seven. However, the process for arriving at it differs. The acceptability of the omnivorous diet was higher at the beginning of the debate for two students, Santiago and Alfonso. It did not change for Elisa and was initially lower for Elena. So the group average decreased through the debate. The opposite happened for the vegetarian diet where its acceptability was initially lower for Elena and particularly for Santiago and it did not change for

Alfonso and Elisa; the group average increases slightly. This trend was particularly noticeable in Santiago's scores for both diets, which were initially outliers, but converged toward the group average as the debate moved forward.

We studied the students' aims to better understand the scores proposed and their modifications in the debate. The results of the analysis of the performances indicating epistemic or non-epistemic aims for each participant are summarized in Table 3.

Elena, Elisa, and Alfonso showed a clear predominance of epistemic over non-epistemic aims. However, Santiago's performances were indicative of non-epistemic aims and were more frequent than those indicative of epistemic ones. To better understand the characterization of the epistemic aims for each student, Figure 2 illustrates how the ratio between epistemic and non-epistemic aims changed throughout the debate. Specifically, it showed the percentage of performances indicative of epistemic aims relative to the sum of performances indicative of both aims identified for each student up to each represented turn. To exclude initial sharp fluctuations, the starting point for each student's ratio corresponded with the turn in which seven of their performances had been coded as either indicative of epistemic or non-epistemic aims.

As seen in Figure 2, most of Elena and Elisa's utterances were consistently indicative of epistemic aims, since for most of the debate they signaled a commitment to attain a better

understanding of the issue and achieving scores that are properly justified. This engagement is illustrated with this fragment:

	Performances
	(E: epistemic; NE: non-epistemic; U: uncodifiable)
30 Elena: [Reading from the handout] "It is considered balanced the following nutritional distribution regarding the caloric content of a diet"... this is wrong. [...]	E: Detecting potential errors in the handout
33 Elisa: No, it's right. Lipids... lipids 60, proteins 10... and fat 30...	E: Challenging a peer's understanding
34 Elena: It is not 50, it's 60... that's what I studied.	E: Challenging a peer's understanding
35 Alfonso: What difference does it make... let's move on, let's not stop at that.	NE: Restricting the amount or quality of the evidence considered
36 Elena: [keeps reading the handout aloud] [...]	U
45 Alfonso: Nothing, that... read in which foods is present, to know the diets and...	NE: Restricting the amount or quality of the evidence considered

TABLE 2 Coding categories for the analysis of the socio-cognitive tension/relaxation patterns (adapted from Andriessen et al., 2011).

Tension–Relaxation	Sub-categories	Instances from the students' discourse
Tension (increase)	Counterclaims	65 Elena: But almost no one consumes a balanced omnivorous diet
	Taking stance, persisting	75 Elena: I would give it a 7
	Requests for justification or clarification	146 Santiago: Is it for the score?
	Personal attacks, accusations	82 Elisa: Shut your mouth, boy
	Sarcasm, exasperation	114 Alfonso: I give less to the vegetarian, but... but a 10 for compensating, right? No way, no way
	Interrupting	133 Santiago: [simultaneously] I give it a 5, I know, I know what we are talking about!
	Showing opposition, ignoring, irrelevancy	142 Alfonso: No, it's not like that
Relaxation (decrease of tension)	Giving directives	147 Elena: Be rational
	Building	78 Elena: [nods] And other diseases
	Compromise, concession	89 Elena: We have to do an average if we can't agree
	Humor	84 Alfonso: It is so tasty
	Focusing, change of focus	109 Elena: And what about the vegetarian one?
	Clarification	14 Elena: No, for instance, the omnivorous diet... maybe you don't cut so many trees and it's less... it leads to... is better for the environment
	Showing agreement or approval, encouragement, confirmation	55 Elisa: Exactly. Especially with meat
Following up, Giving a turn	96 Santiago: So ten, plus four, divided into 2... equals 7	

- 46 *Elisa: Meh, it's all the same, but...* NE: Restricting the amount or quality of the evidence considered
- 47 *Elena: But no, look, for example, mine about zinc, it says... where we can find it and... ok, but, look, why is that important? [...] So that is the problem with the vegetarian people, because... in the animals [minerals] are better bioavailable. [...] That's the problem.* E: Providing relevant evidence
- 48 *Elisa: I believe that... there are some [nutrients] that are in food from animals, where if you have to mix them to obtain them, then you have to be very careful, and...* E: Sharing individual understandings with the group
- 49 *Elena: You mean like mixing lentils with rice and all that...?* E: Asking questions to understand a peer's reasoning or to clarify the meaning of a concept

Alfonso's utterances suggest the predominance of the non-epistemic aim of finishing the task as soon as possible (35, 45), as he actively tries to stop Elena and Elisa from discussing and evaluating the available information. However, soon afterward, he also engages in an epistemic talk (analyzed below) discussing the problem definition with Elena and Elisa, agreeing with them about the assignment of a justified nutritional score of seven to the omnivorous diet. From this point on, Alfonso's interventions are consistently indicative of epistemic aims, as illustrated by the

steady upwards trend in Figure 2. He adopts a central role in the debate, particularly in his interactions with Santiago, discussed below (see turns 90–97 and 116–156).

In contrast, most of Santiago's utterances can be interpreted as indicative of non-epistemic aims, particularly at the beginning of the debate, as represented in Figure 2. He interrupts the teacher's explanation, assigning an unjustified ten score to the omnivorous diet as early as turn two. He does not participate in evidence evaluation (30–50) and in turn 58 he suggests a *voting and averaging strategy*, which, as discussed later, potentially discourages epistemic talk. Later, he continues to engage in non-epistemic performances when he disregards others' arguments and does not provide justifications for his scores (120: *But I give it a 2*), or even when he provides them on his peer's insistence they are based on *non-evidence* or *pseudo evidence* (Kuhn, 1991) such as in turn 99 (*But I give it a 9. Because that... I still count it... as a 9*) or turn 129 (*Because it seems... wrong to me*). However, Santiago's epistemic performances undergo an increase in frequency, from 14% in turn 85 to 41% in turn 159, which suggests a shift toward the adoption of epistemic aims. His later interventions in the following session when discussing other criteria support this interpretation as he then engages in epistemic performances such as asking questions to clarify the meaning of a concept (234: *Teacher, what is the gross added value?*), providing relevant evidence (s2-33: *People working in the primary sector only cover 4% of the total population*), or detecting errors on the informational handout (s2-158 *Santiago: Here there is an incongruity!*).

We may summarize the evolution of the epistemic status of both options as a convergent process. The participants who showed a predominance of epistemic aims proposed similar, consistent scores. This convergence of scores was concurrent with a convergent progression in the balance between epistemic and non-epistemic aims, noticeable in the increase of epistemic aims for the participants that did not show a predominance of

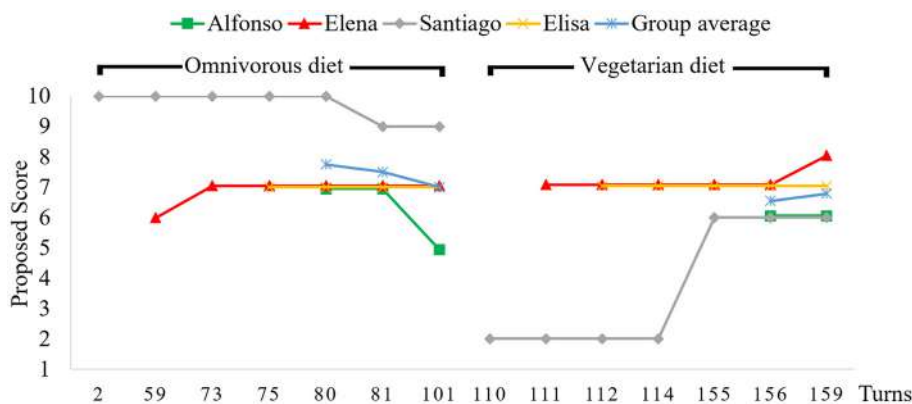


FIGURE 1 Evolution of the proposed scores for the nutritional acceptability of omnivorous and vegetarian diets throughout the debate.

epistemic aims from the beginning. For instance, Alfonso, and particularly Santiago, whose proposed scores experienced the most dramatic changes throughout the debate.

Socio-cognitive tension-relaxation patterns and epistemic outcomes

Next, we examined the patterns of socio-cognitive tension-relaxation that emerged during the debate, exploring their relationship with the epistemic outcomes achieved and with the shifts in participants' epistemic aims.

Figure 3 displays the changes in the tension-relaxation pattern throughout the debate, quantified as the number of

tensed statements minus the number of relaxed statements identified in each turn.

The first significant instance of tension increase arises in turns 58–70 during an argumentative conflict led by Elena and Alfonso:

- 58 *Santiago: But no, look, each one of us gives a score, and then we do the average.* NE T
- 59 *Elena: So I would give it a 6, a "C", because... lots of people that eat meat are having a lot of cardiovascular issues.* E T
- 60 *Alfonso: But we are talking about, I mean, about a balanced diet.* E T
- 61 *Elena: Sure, ok, but... uh... almost no one eats like that... almost no one consumes a balanced omnivorous diet* E R/T
- 62 *Alfonso: If you follow a balanced omnivorous diet...* E
- 63 *Elisa: It's alright* E R
- 64 *Alfonso: It's great.* E R
- 65 *Elena: But almost no one consumes a balanced omnivorous diet.* E T
- 66 *Alfonso: I know, but we have to include that case, right?* E T

TABLE 3 Participants' performances indicative of epistemic (E) aims and non-epistemic (NE) aims.

Participant	Performances indicative of E aims	Performances indicative of NE aims	Uncodifiable
Alfonso	29	4	12
Elena	21	2	8
Elisa	13	2	12
Santiago	12	17	8
Total	75	25	40

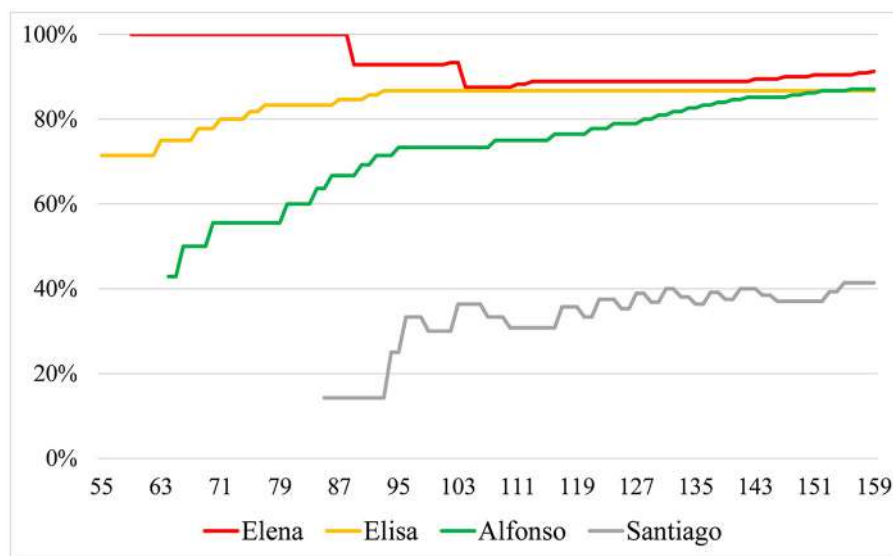


FIGURE 2 Evolution of performances indicative of epistemic aims through the debate for each participant.

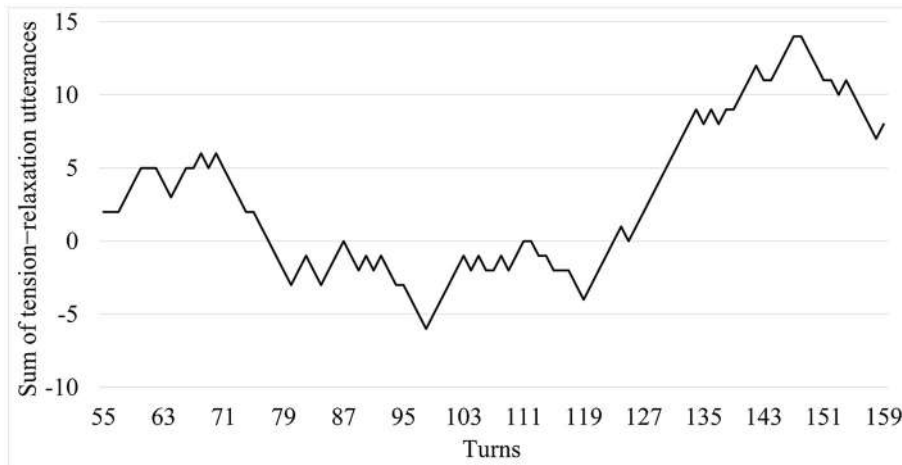


FIGURE 3
The pattern of socio-cognitive tension-relaxation during the debate.

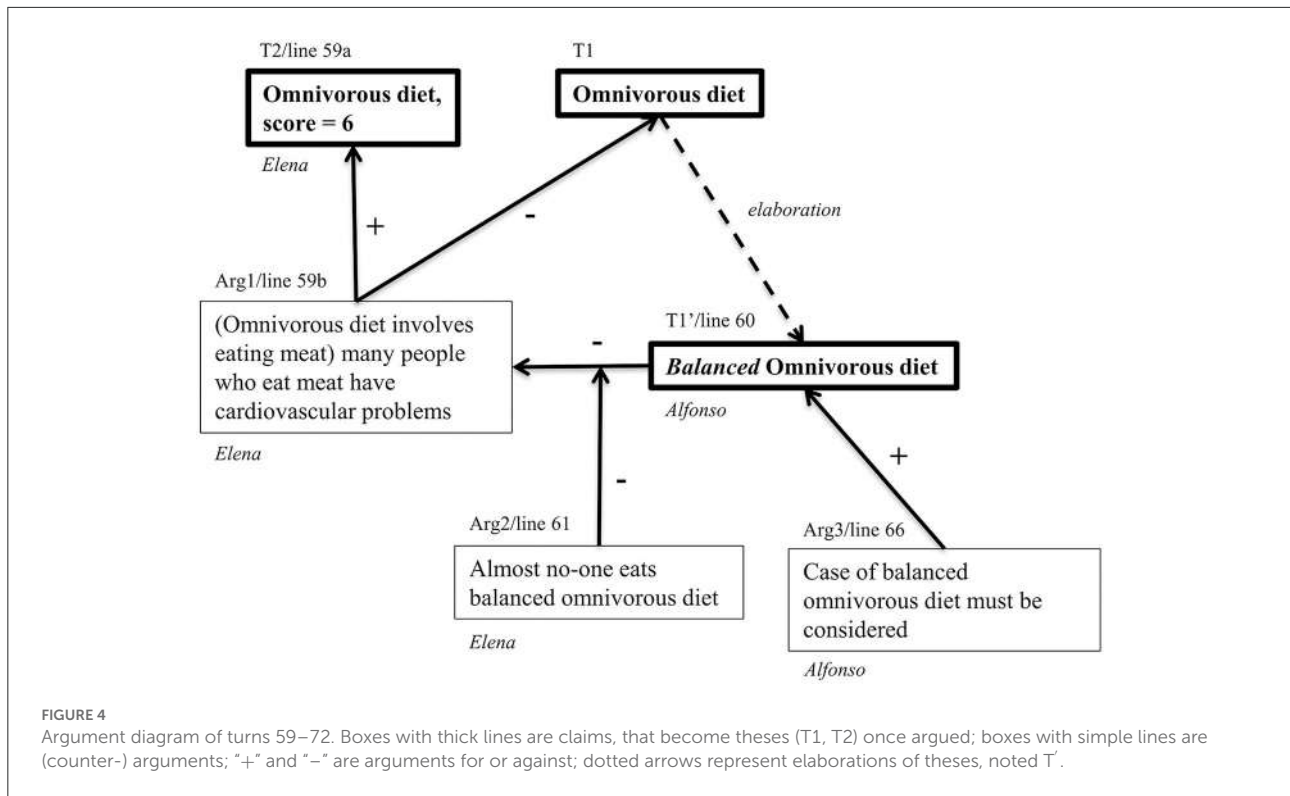
67 Santiago: Well, we need to think that...	U	T/R
68 Elisa: No, you have to include every case...	E	T
69 Elena: Every one.	E	R
70 Alfonso: In general?	E	T
71 Elisa: Of course.	E	R
72 Alfonso: Ok [nods]	U	R

The argumentative structure of this episode, in which there is a predominance of epistemic performances, is represented in diagrammatic form in Figure 4. The diagram represents a reconstruction (van Eemeren et al., 1993; van Rees, 2001) of the structure of the main arguments and theses expressed. As van Rees (2001) points out, reconstructing argumentation involves identifying the implicit and indirect meaning of the discourse according to the elements of a particular model of argumentation. In this case, the model combines elements of Toulmin (1958) structures and speech acts in argumentative discussions (van Eemeren and Grootendorst, 1984). In addition to argument structures, the diagram shows operations of elaboration of theses, for example, when the “omnivorous diet” option is made more precise or restricted (Naess, 1966) as a “balanced omnivorous diet”.

In diagrams of the kind shown in Figure 4 (see also Figure 5), the line of the transcript that is reconstructed argumentatively is shown above the thesis boxes. For example, T1’, “balanced omnivorous diet” corresponds to line 60, “But we are talking about, I mean, about a balanced diet.” In other cases, a reconstructed argument may span several turns. Argumentative relations are rarely explicitly made by arguers and thus need to be understood in context.

The main thesis discussed (T1) is the omnivorous (O) diet. Elena claims that it should have a score of 6, not higher, providing the supporting argument (+) that it involves eating meat, and many meat-eaters have cardiovascular problems. Alfonso engages in the negotiation of the meaning: T1, O, should be understood as a balanced O (T1’). This constitutes his argument against Arg1: an O diet does not necessarily cause cardiovascular problems if it is balanced. Elena (61) criticizes the argumentative relation rather than T1’ argument itself: O diet is not generally balanced. Alfonso (Arg3, 66) replies that the balanced O diet must nevertheless be taken into consideration. Elisa and Elena accept contemplating this case, but not exclusively: it must be considered in the context of how the O diet is generally carried out, which is not in a balanced way, to which Alfonso finally agrees. Conflict is solved and the students align their epistemic statuses: Elena has succeeded in defending her claim of the score of six for the O diet and in countering Alfonso’s counterarguments, but there is some co-construction as well because they agree in considering the balanced O diet or, in Elisa’s words, that they have to “include every case”.

In this exchange we observe several epistemic outcomes: arguments and counterarguments constructed, links established and questioned, elaboration of theses, and dissociation of O diets into balanced and not balanced. Simultaneously they are regulating their engagement in argumentation: they discuss which form of the options should be evaluated, whether an ideal balanced O diet or one that would be representative of how this diet is currently being followed by the general population. This negotiation of the problem definition has implications for how they should tackle the task, scope, and strategy for their evaluation, which is further operationalized later (92–96 and 148–150). This episode in which conflict is solved and



epistemic outcomes are co-constructed seems to be a turning point for Alfonso, who up to this point showed a predominance of non-epistemic aims, which are not identified thereafter (see Figure 2).

Tension decreases shortly after an agreement is reached among Alfonso, Elena, and Elisa. They concur in scoring the O diet with a seven, collectively co-constructing a justification for it (73–80, omitted). However, Santiago does not participate nor criticize it, proposing instead an independent score (81), enacting the *voting and averaging* strategy that he had previously proposed (58). In this context, we interpret the proposal for this strategy as a way of preemptively avoiding engagement in epistemic talk, preventing the modification of the epistemic status of the options. After Santiago's lack of participation in evidence evaluation (30–50) and in the co-constructed justifications for a seven score, his unjustified nine score for the O diet is heavily rejected, especially by Elisa: tension rises until turn 87.

- 81 Santiago: I'm giving it a 9. NE T
- 82 Elisa: Shut your mouth, boy. U T
- 83 Santiago: For me... I think the omnivorous diet... it is ideal. [...] NE R
- 88 Teacher: Well, if you cannot agree on a mark, so use an average. U R
- 89 Elena: We have to do an average if we can't agree. NE R

- 90 Alfonso: Ok, look, I'm explaining to you, the omnivorous diet is very good, I already said so, if it's balanced, if it's balanced is a 10, you get everything, you eat everything, it's awesome. E T
- 91 Elisa: It is perfect. E R
- 92 Alfonso: But it's not always balanced, so you have to include every case, what it deserves. And in every case, if we eat a lot of meat, you are getting... E T
- 93 Elisa: Obesity. E R
- 94 Santiago: But then it's not a 7, it's a 5 or a 4. E R
- 95 Alfonso: So that's what I'm saying, that we have to put ourselves... in the average. E R/T
- 96 Santiago: So 10, plus 4, divided by 2... equals 7. E R
- 97 Alfonso: Alright! Seven! There you go. U R
- 98 Elisa: [Applauds]. U R

Possibly induced by the perception of excessive socio-cognitive tension at this point, and perhaps also in the interest of time, the teacher accepts the validity of the averaging strategy, suggesting its implementation in turn 88, which could relax the tension, but also restrict potential epistemic outcomes developed

in a further attempt to reach consensus. Santiago’s proposal for this strategy had remained unaddressed, but after the teacher’s recommendation, Elena accepts its adoption (89). However, Alfonso and Elisa do not follow up by casting their votes as they still apparently aim to solve the disagreement and reach a consensus. Through dialogue (90–93) they reconstruct their argument, explicitly considering what they had agreed upon, which was that they should consider balanced and “unbalanced” O diets. This agreement is seemingly appropriated by Santiago (94–96), in interaction with Alfonso. Specifically, they operationalized the problem by separately considering both extreme cases (idealized-balanced and realistic-unbalanced diets) and estimating an average score. Santiago follows Alfonso’s argument, reaching the same conclusion as they did with a score of seven for the O diet. Alfonso and Elisa (97–98) give him encouraging feedback. The socio-cognitive climate has relaxed from turn 88 to 98. Agreement (and thus, alignment of epistemic statuses) is reached, without resorting to the voting strategy.

Immediately thereafter, Santiago retracts his score, advocating a nine with no valid justification, resulting in tensions flaring up again.

99 Santiago: <i>But I give it a 9. Because that... I still count it... as a 9.</i>	NE	T
100 Elisa: <i>Fuck, Santiago.</i>	U	T
101 Alfonso: <i>Ok, I give it a 5, and there we go [laughs].</i>	U	T
102 Elena: <i>Only because it’s tasty?</i>	E	T
103 Santiago: <i>What are you saying, dude? No... a 9 because... it’s true. It gives you everything.</i>	E	T
104 Elena: <i>We have to do the average among us, seven... three sevens and one nine...</i>	NE	R
105 Alfonso: <i>No, no. You and she gave it a 7, he, a 9, and me, a 5. It equals 7. There we go.</i>	U	T
106 Elena: <i>Ok [laughs]. So that’s it.</i>	U	R
107 Santiago: <i>Put a 7!</i>	NE	T/R
108 Alfonso: <i>It is indeed a 7.</i>	E	T

Santiago’s discursive move is strongly rejected by Elisa. Alfonso seemingly desists from addressing Santiago’s unjustified position and *artificially* changes his score to render Santiago’s without effect by way of dismissing him and raising the tension. Our interpretation is that Santiago is implicitly being accused of violating the rules of debate in two senses: lacking argumentative coherence, and hindering progress, repeating an argumentative move with no further justification. Elena (102), arguably driven by epistemic aims, persists in her effort to uncover the reasoning behind Santiago’s position, pointing to gastronomic preferences. Her discursive move may be interpreted as yet another accusation of violating

a rule, namely overstepping the scope of the debate, which should be restricted to the nutritional criterion. Santiago rejects her accusation and Elena desists, moving the debate forward by implementing the averaging strategy. She then reiterates all the proposed scores, not taking Alfonso’s (101) tweaked score seriously. Alfonso, however, stands by it, which is then accepted by Elena. Santiago, perhaps due to excessive pressure, exasperatedly concedes (107), but it is a forced, disinterested concession, with no real agreement: they change the focus, moving forward. The tension is sustained and the disagreement is not solved nor carried further until its ultimate consequences. At this point, the participants have tried but failed to align their epistemic status and agree on the regulation of the rules of debate.

A similar event takes place immediately thereafter when they evaluate the vegetarian (V) diet, and Santiago proposes a low score with no justification:

109 Elena: <i>And what about the vegetarian one?</i>	U	R
110 Santiago: <i>A 2 [the other group members laugh, Santiago shrugs]</i>	NE	T
114 Alfonso: <i>[laughing] I give it less to the vegetarian one, but... a 10 to compensate, right? No way, no way. I give it... come on, man, speak right, I’m speaking right, dude.</i>	U	T/R
115 Santiago: <i>Ok, ok.</i>	U	R
116 Alfonso: <i>[...] don’t you give it a 2... an organized vegetarian diet can cover...</i>	E	T/R
117 Santiago: <i>Also the omnivorous one.</i>	E	T/R
118 Alfonso: <i>That’s it!</i>	U	R
119 Elena and Elisa: <i>Ah! [They pound the table]</i>	U	R

The group rejects Santiago’s unjustified score, by displaying emotions (sarcastic laughter), thereby increasing the tension. Alfonso then acknowledges that he does not consider the V diet as nutritionally adequate as the O one, and yet, he shows a disposition to fake his vote again to balance what might be considered an unreasonably low score. In other words, he uses humor about “tweaking” the score for increasing the pressure on Santiago, which continues from their previous exchange. Alfonso also exhorts Santiago to “speak right” as he is doing, interpreted as an encouragement to follow the rules of debate, which is, this time, seemingly accepted by Santiago (115), de-escalating the tension. Then, Alfonso points out that a V diet could cover all nutritional needs, which is implicitly accepted by Santiago (117). The rest of the group reacts by displaying enthusiastic emotions, relaxing the tension, as they presumably consider that, once Santiago acknowledged Alfonso’s statement, he would accordingly modify his score to avoid a lack of coherence. However, Santiago insists on his unjustified score:

120 Santiago: <i>But I give it a 2.</i>	NE	T
121 Alfonso: <i>Why?</i>	E	T
122 Santiago: <i>Because, because it doesn't seem... balanced to me.</i>	E	T
123 Elisa: <i>Really, hu?</i>	U	T
124 Alfonso: <i>But it can be balanced sometimes, dude!</i>	E	T
[...]		
127 Santiago: <i>If the thing is balanced... I give it a 5.</i>	E	T
128 Alfonso: <i>Because you don't like it.</i>	E	T
129 Santiago: <i>Because it seems... wrong to me.</i>	NE	T
130 Alfonso: <i>But we are not talking about the food, we are talking... [about nutrients]</i>	E	T
133 Santiago: <i>I give it a 5, I know, I know what we are talking about!</i>	NE	T

Tension progressively increases during turns 120–134, as disagreement is not solved. Alfonso demands a justification for Santiago's score, and upon getting an unsatisfactory answer, prompts additional exclamations from Elisa. This can be interpreted as an implicit denouncing of Santiago's failure to comply with the rules for coherence and for a valid defense of a standpoint when challenged. Alfonso suggests, as Elena did in turn 102, that Santiago might be influenced by preferences beyond the space of debate on nutrition, which is again denied by Santiago.

134 Alfonso: <i>But what you are saying doesn't make sense.</i>	E	T
135 Santiago: <i>Ok... so put a 7.</i>	NE	R
136 Alfonso: <i>But listen, you are saying that the omnivorous diet is a 9, because it has all the nutrients, but a vegetable diet that has all the nutrients is a 5 because it's vegetable.</i>	E	T
137 Santiago: <i>It's a 5 because it's vegetable, for sure.</i>	E	R
138 Alfonso: <i>But that doesn't make sense! [Elisa and Elena laugh]</i>	E	T
139 Santiago: <i>Ok, so then give it a 7!</i>	NE	T/R
140 Alfonso: <i>No. We have to engage in argumentation, it's not that way...</i>	E	T
145 Alfonso: <i>But no... God! Come on, listen.</i>	U	T
146 Santiago: <i>Is it for the score?</i>	NE	T
147 Elena: <i>Be rational.</i>	E	T

Alfonso (134, 138) keeps pointing out Santiago's lack of coherence in his evaluation of balanced O and V diets, reconstructing (136) his implicit argument to point out a contradiction: if the criterion for nutritional adequacy is

the capacity to supply all necessary nutrients, and if they are comparing "balanced" versions of both O and V diets, which provide all nutrients, it is not legitimate to give them different scores. This critique is supported by Elisa and Elena's laughter and answered by Santiago's *disinterested concession* (139) for the sake of finishing the discussion as a mean to reduce tension.

In this sequence (120–147) we observe a sustained increase of tension, which arguably reaches its highest peak, followed by Santiago's attempt to relax it by means of a disinterested concession, as he did earlier when discussing the O diet. Interestingly, this time, Alfonso explicitly rejects it, stating that "we have to engage in argumentation," and alongside Elena, keeps exerting pressure and encouraging Santiago to "be rational," to follow the rules of the debate, and thus to adopt a sounder epistemic stance. This might also be interpreted as a manifestation of the belief that a decision achieved through disinterested concessions would not be reliable. At this point we identify Alfonso's clearest declaration of epistemic aims: they have to argue properly even if that implies a high level of socio-cognitive tension; in other words, the epistemic dimension must take precedence. Santiago even inquires on the motives for sustaining such tension: "is it for the score?" (146), implicitly suggesting that, if what is really at stake is a task-oriented goal (i.e., the score), he is ready to concede to prioritize the socio-relational dimension. However, Alfonso's refusal to accept such disinterested concession and his disposition to keep the tension (140, 145) suggests that he is not driven by task-oriented goals, but by knowledge-oriented, epistemic ones: they must reach a collective agreement, for the right reasons, and according to the proper rules of debate.

This episode is summarized in an argument diagram (Figure 5) that highlights the argumentative and conceptual operations involved (i.e., the epistemic outcomes).

Figure 5 illustrates two main characteristics of the argumentative sequence on the acceptability of the vegetarian diet. Firstly, the sequence turns on a classical move in argumentation, that of "dissociation" (Perelman and Olbrechts-Tyteca, 1958; Baker, 2002); in this case, the concept of "vegetarian diet" is dissociated into two possible sub-concepts, "balanced" and "unbalanced." This distinction is introduced by Santiago to support his low score of two, for the purportedly unbalanced V diet. The other students maintain the existence of the opposite, a balanced version of the diet. The second characteristic is the diversity of ways in which Santiago's claims are shown as invalid: (i) his 'argument' against any form of V diet in terms of his simple dislike for it is claimed by Alfonso to be an unacceptable argument, and irrelevant given that the issue here is nutritional value; (ii) Alfonso shows that Santiago's views are internally contradictory since for "balanced" diets, O or V, he gives very different scores (9 and 5, respectively); (iii)

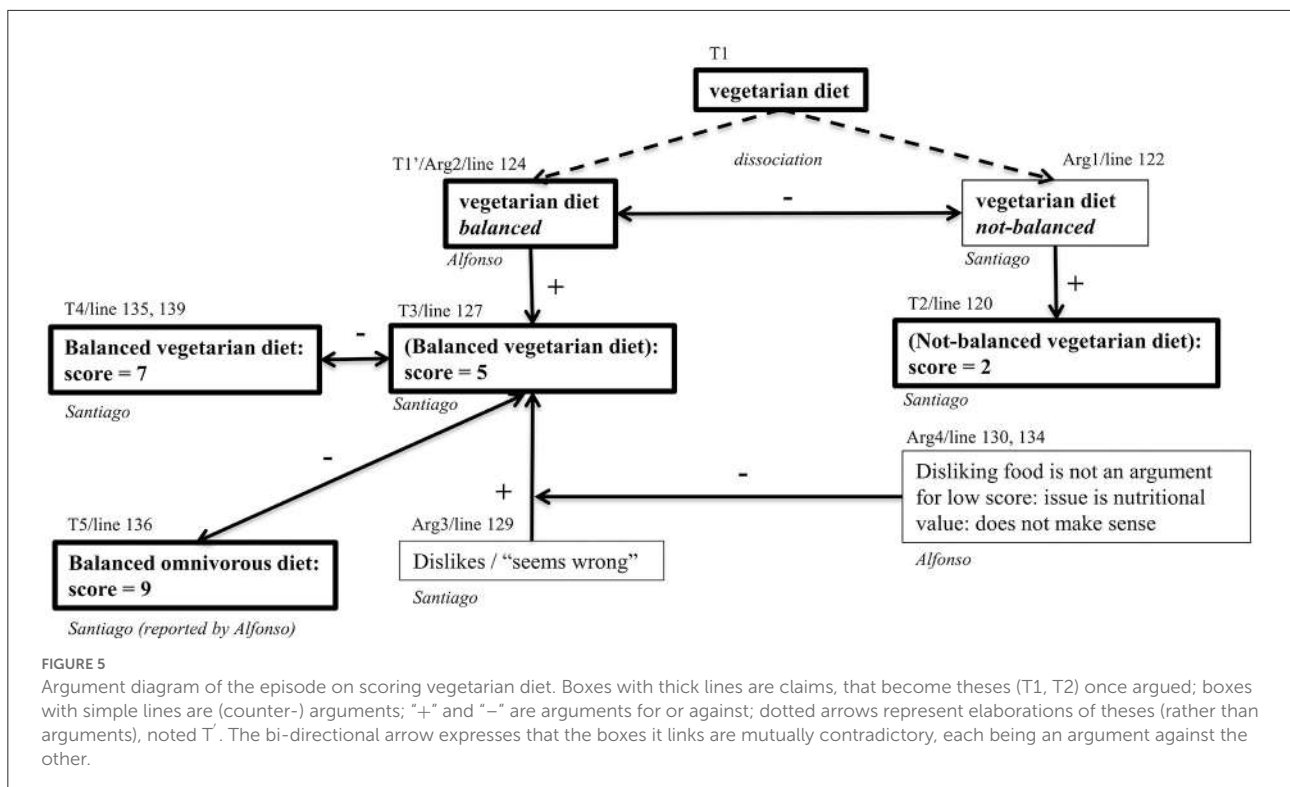


FIGURE 5 Argument diagram of the episode on scoring vegetarian diet. Boxes with thick lines are claims, that become theses (T1, T2) once argued; boxes with simple lines are (counter-) arguments; "+" and "-" are arguments for or against; dotted arrows represent elaborations of theses (rather than arguments), noted T'. The bi-directional arrow expresses that the boxes it links are mutually contradictory, each being an argument against the other.

Santiago’s quick change of score for the balanced vegetarian diet from 5 to 7 when faced with criticism of his view is not motivated in epistemic terms and contradicts himself but (as the diagram shows) his new score has no argument in its favor.

At the end of this episode, Alfonso, in discussion with Elena, reconstructs their argument once again, the validity of which is finally accepted by Santiago (153):

- 148 Alfonso: Listen, look. We are assessing... the capacity of the diet for getting all the necessary nutrients, so, for the omnivorous diet, it is easy to reach the nutrients, but it is also easy to go too far, so then you need to do the average. E T/R
- 149 Santiago: An average that is 7, yes. U R
- 150 Alfonso: Ok, so in the vegetarian diet you have to do the same, assessing... it's difficult to end up having all the necessary nutrients with a vegetarian diet, you have to balance it very well. E R
- 151 Elena: But it's not impossible. E R
- 152 Alfonso: But you can do it. You have to take that into account. E R/T
- 153 Santiago: Ok. So here I gave it... E R
- 154 Alfonso: It's not a 2, dude. U T

- 155 Santiago: Then I give a 6 for the vegetarian... E R
- 156 Alfonso: Ok, that makes sense. Ok, I give it a 6 also. E R

Santiago accepts it this time, changes his score accordingly, and proposes a 6, which converges toward the group average. This move is acknowledged by Alfonso, who legitimizes Santiago’s shift, providing positive feedback (156). Thus, after a prolonged sequence of high tension, the socio-cognitive climate has finally relaxed, even before the turn in which Santiago finally concurs with the rest of the group. He revises his position and consequently rectifies his scores. Epistemic statuses are seemingly aligned, and agreement is finally reached.

Conclusions

This paper analyzes the interplay between epistemic and socio-cognitive dimensions in argumentation in a case study. While not generalizable, we believe that our findings can shed some light on certain critical aspects of the interconnections among epistemic aims, the patterns of socio-relational climate sustained, and the epistemic outcomes achieved in argumentative interactions.

The results indicate that epistemic aims predominate for three of the four students, which suggests that, overall, the

task design and implementation were successful in enabling their epistemic aims and performances. The scores proposed by them were similar and largely consistent with the literature about the nutritional adequacy of V and O diets (Leitzmann, 2014; Sabaté and Soret, 2014), which differs from public consideration of O diets being nutritionally better than V ones (de Bakker and Dagevos, 2012; Pohjolainen et al., 2015). The contributions of the fourth member, however, are mainly indicative of non-epistemic aims for the greater part of the debate, corresponding with the proposal of scores that are outliers in comparison to those of other members. Thus, there seems to be a correspondence between the epistemic status of the options and the epistemic aims adopted by the participants. The balance between epistemic and non-epistemic aims is dynamic, involving changes throughout the debate. In our data, we observed a convergence of both participants' epistemic aims and of the epistemic statuses of the options; a gradual adoption of epistemic aims coincides with scores converging toward the group average.

The analysis of the socio-cognitive patterns of tension-relaxation might help us understand how these convergent processes and epistemic outcomes were developed. Most of the epistemic outcomes identified were produced in sequences with the following socio-cognitive pattern: tension arises, and relaxation follows. This suggests that the group was successful in combining critical and co-constructive discursive moves (Asterhan, 2013) in a fluctuating socio-cognitive climate, and supports the idea that tuning at the cognitive level is related to tuning at the socio-cognitive level (Andriessen et al., 2011).

Our findings suggest that these tuning processes are yet related to another one: the tuning of participants' aims. The changes in epistemic aims are noticeable for two participants: Alfonso and Santiago, but there are differences in how they change and their relation to the socio-cognitive climate. Alfonso showed some instances of non-epistemic aims at the beginning of the debate, but after the first socio-cognitive conflict, which was successfully resolved (and the climate, thus, relaxed), his performances were consistently indicative of epistemic aims: the change is drastic. This suggests that, rather than being necessarily in conflict with epistemic matters, the socio-relational dimension, when it is successfully dealt with, could be related to the promotion of epistemic aims. It must be noted that in the case of Alfonso, part of his initial position is integrated into the group's agreement, which might have facilitated his transition toward epistemic aims.

The case of Santiago is different: his discrepancies with the rest of the group are much more pervasive, becoming a source of conflict and tension throughout the debate. His position is not integrated into the group agreement as the others do not accept the validity of his arguments. Despite prolonged increases in socio-cognitive tension, in the end, the group manages to reach an agreement. Santiago concurs with his partners and shows a gradual increase of epistemic aims

throughout the debate. Our interpretation is that these changes in epistemic status and epistemic aims might have happened not despite the high tension sustained, but rather because of it. Had the students prioritized a favorable socio-emotional climate, particularly after a reasonable exploration of their irreconcilable differences, the final agreement would have not presumably been reached, implicit premises might have remained misaligned, and Santiago's position would have not shifted. That is what seems to have happened at the end of the discussion about the omnivorous diet as they give up their efforts to explore a mutual understanding and choose to dismiss Santiago's position. At that point they are not fully prioritizing epistemic aims: they choose to decrease the tension by moving forward, even if the conflict remains unresolved. But later, when a similar situation unfolds discussing the vegetarian diet, they instead keep their epistemic aims until their ultimate consequences, deeply pushing the levels of tension. They then prioritize the epistemic dimension over the socio-relational one, and, in doing so, they reach a mutual agreement.

The rejection of the validity of Santiago's arguments, and thereby the refusal to integrate them into the group consensus, might be explained by the consideration that, in the eyes of the other members, his discursive moves violate the norms for reliably engaging in argumentation and decision-making. The others explicitly point out these norms and criteria, commending him to properly follow them. Thus, there seems to be yet another process involved where the tuning of the enacted epistemic processes and the ideals and conditions should be met to reliably produce epistemic outcomes. Our findings suggest that, when driven by epistemic aims, participants engaging in argumentation can refine the conditions by which they carry out this practice. They also suggest a development in the participants' epistemic understanding of the norms and rules governing the argumentative discourse, in alignment with Kuhn et al. (2013) findings. In the literature, the beliefs about the conditions to be met to reliably perform processes such as argumentation are considered generally tacit (Baker, 2009; Chinn et al., 2011), but in our study, we identified several instances of negotiation of these conditions in contexts of increasing socio-cognitive tension, such as requirements for argumentative coherence, beliefs about the reliability of voting vs. consensus-seeking, or the invalidity of disinterested concessions.

Overall, our findings highlight some of the complex relationships that may stem from the interplay among the participants' aims, the socio-cognitive climate, and the epistemic outcomes achieved. In light of our results, we argue that particular epistemic and non-epistemic aims (and the balance between them) that were adopted by each participant are likely to evolve because of the socio-cognitive climate and the influence of the group epistemic outcomes achieved, particularly the arguments built and their persuasiveness. This, in turn, potentially affects the epistemic processes enacted by each

participant, which influence how the rest of the debate is carried out, in an iterative, back-and-forth manner, in which participants can engage in the regulation of the norms and criteria to enact epistemic processes and further adopt epistemic aims. In the group analyzed, this dynamic results in an increasingly convergent trend of shared epistemic aims and processes, which appears to be related to the convergence of the proposed scores (i.e., epistemic statuses). Overcoming conflict seems to encourage the adoption of epistemic aims, as illustrated in the case of Alfonso.

The value of this case study, we believe, emanates not only from the illustration of this complex interplay but from the fact that, in this particular case, the students attained sophisticated epistemic outcomes, including self-regulation, while sustaining a high degree of socio-cognitive tension. When faced with the challenge of balancing the epistemic and socio-relational dimensions, they *prioritize the epistemic dimension*. Our findings potentially challenge the consideration of socio-relational concerns as rather an obstacle to knowledge construction. In this regard, authors such as [Thiebach et al. \(2016\)](#) have pointed out that socio-cognitive conflict often needs to be further stimulated. [Stewart and D'Mello \(2018\)](#) have found negative correlations between positive perceptions of groups' agreeableness and their learning outcomes, suggesting that, prioritizing agreeability, and minimizing conflict, participants might promote favorable subjective outcomes at the expense of learning. Our findings align with theirs.

Thus, the results of this study call for further investigation on what constitutes an appropriate or productive level of interpersonal tension for promoting epistemic aims and outcomes, and upon which factors it may depend. Is it context-specific? To what degree does it depend on the personal traits of the participants, such as their character or their cultural and personal identities? How does the regulation of socio-cognitive tension relate to the perceived right to speak and participate in a conversation ([Clarke, 2015](#))? What role do social relationships within the group, their closeness, and their friendship, play? Is this process dependent on their individual or group interest in the topic, or their previous knowledge about it? Can the capacity to tolerate socio-cognitive tension be enhanced? By which instructional approaches? Is it related to metacognitive or metamotivational experiences ([Efklides, 2011](#); [Miele and Scholer, 2018](#))? These are questions that we believe may be worth exploring in future research.

Another interesting research direction is deepening our knowledge about beliefs and regulations on how to reliably engage in epistemic processes such as argumentation and decision-making. [Duncan and Chinn \(2016\)](#) argue that instructional interventions should consider the role of norms and epistemic criteria in argumentation, advocating for further elucidation about how such norms are engendered and for determining their impact on argumentation competency.

Our findings suggest that socio-cognitive tension might play an important role in the regulation of such norms and rules. Considering these results, we propose the development of further research and educational initiatives directed at enhancing students' ability to establish, defend, negotiate, and refine the conditions under which argumentation and other group procedures should be enacted. In this sense, it might be worth exploring how different types of dialogue, involving different criteria of retractability or agreement between distinct positions, are likely to be governed by certain rules of the dialogue which affect the application of socio-cognitive tension, development of epistemic criteria, and reaching more specific or unspecific agreements.

Our study presents some limitations, many of which originate from the study design. There are some analytical limitations, addressed in the Methods section, such as the lack of consideration of the relative potential of some utterances to increase or decrease socio-cognitive tension, the high level of interpretation necessary for the analysis of epistemic aims, and the non-exhaustivity of the coding scheme, which could be further developed through the incorporation of additional categories stemming from the analysis of additional data in a wider range of argumentative contexts. As a case study, our findings are not generalizable. Following the methodological approaches advocated in the literature for exploring EC in social settings ([Chinn and Rinehart, 2016](#); [Clément, 2016](#); [Greene et al., 2016a](#)), we have developed a fine-grained analysis at the micro-level, studying cognition-in-practice (rather than declarative knowledge) in a specific context. Therefore, our approach necessarily limits the applicability of our findings. Our intent is not to portray what generally happens in classrooms but to study a case in which sophisticated epistemic outcomes are produced and epistemic aims are adopted and try to understand which conditions allowed for them and how they could be encouraged. We conducted this study and selected this particular group and discussion not because we believe it is representative, but because it meets certain criteria, which potentially allows for a better understanding of the complexities of the interplay between the epistemic and socio-cognitive dimensions, which might be of research and instructional relevance. Future studies are likely to be enriched by a better account of the social relationships among the participants and their personal backgrounds. The analysis of the argumentative interactions could be further explored through the incorporation of non-verbal and multimodal approaches ([Heller, 2021](#)). The educational implications of this study are related to the admission or even encouragement of a certain degree of productive socio-cognitive tension and conflict through instructional strategies and prompts, and to the design of argumentative learning environments, which, through the incorporation of further research, could promote a broader disposition to adopt epistemic aims and refine

epistemic processes, including the encouragement of socio-cognitive climates and peer-to-peer interactions leading to them.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was provided by the participants' or their legal guardian/next of kin.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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It is time for health institutions to invest in persuasive communication to combat low quality information: A lesson learned from the COVID-19 infodemic

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Introduction

“We’re not just fighting an epidemic; we’re fighting an infodemic,” said Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization, at a gathering of foreign policy and security experts in Munich, Germany, in mid-February 2020. The term infodemic refers to an excessive amount of information about a problem that is viewed as being a detriment to its solution (WHO, 2020). Infodemics include information of high-vs.-low quality. Low quality information refers mainly to disinformation, misinformation and fake news. Specifically, disinformation is false or misleading information being created and shared with the intention to cause some harm; misinformation differs from disinformation as it lacks this intention, and it is shared inadvertently. Fake news is false or misleading manufactured information that mimics news on the mass-media. It is a term that, however, is rather vague and nowadays there is refrain from using it (Wang et al., 2019).

In this paper, we show why institutional communication during an infodemic is particularly challenging and call on health institutions to engage in persuasive communication. While some laypeople associate the term persuasion with manipulation, there is a clear difference. Persuasion refers to communication that aims to convince an audience of a certain message’s appropriateness. It is not *per se* negative communication; indeed it is important to present ideas in a convincing way. On the contrary, manipulation occurs when the speaker dishonestly tries to convince an audience (Rubinelli, 2013). We claim that it is time for health institutions to consider communication not as a basic act of information or even education. It is fundamental to engage in communication that involves people’s knowledge, beliefs, and attitudes and can guides their understanding of evidence-based recommendations. Persuasive communication should aim at showing why institutional recommendations are worth being considered, as a way to provide important information that people can consider to engage in properly informed decision-making.

Here we do not claim that people should blindly follow health institutions' recommendation. But they should understand why certain recommendations are as they are and, on the basis of appropriate information from health institutions, best decide what to do. Indeed, it is not a successful decision-making when people harm themselves because they have followed fake or generally suboptimal health information. To prevent this, however, it is fundamental that health institutions do not communicate to people "top-down", but present their views using sound argumentation and showing exactly the ground of their claims.

Institutional communication challenges in a public health emergency

When public health emergencies occur, risk communication from authorities to individuals living in the community is essential to inform people about what is happening, seek to engage them in protective behavior, address concerns, and create an overall feeling of support and collaboration toward limiting the spread of a disease. Poor risk communication can have detrimental consequences at the individual, social, and economic levels (Bennett et al., 2010). However, the success of institutional risk communication in infodemic contexts is severely challenged by several aspects.

First, risk communication during a new epidemic takes place under uncertainty, with major implications for how it can be received by people. When a new disease is spreading, epidemiologic data collection is ongoing. In the initial phases of an epidemic's spread, and for months afterwards, comprehensive scientific evidence is lacking (Jansen et al., 2018). People must be informed that a new virus may cause serious health threats, but at the same time the scientific appraisal of the problem varies from day to day. Health institutions engage in public risk communication, but the communication content can change daily based on newly acquired knowledge. This uncertainty can lower people's trust in institutions and science (Longman et al., 2012).

Second, laypeople may struggle to appraise scientific evidence and epidemiological data. Information about the nature of a virus, including its origin, development, and spread, is often technical, and it is likely to be outside the average health literacy of laypeople. Lay epidemiology refers to the processes by which laypeople understand and interpret health risks. In these processes, they may develop personal views that undermine institutional messages and may even obstruct the transmission and uptake of institutional communication (Allmark and Tod, 2006).

Third, institutional risk communication is challenged by dis/misinformation that, as mentioned above, is false or inaccurate, or that expresses the opinion of a single person and

cannot be generalized, or that results from conspiracy theories (Wang et al., 2019). These types of low-quality information often involve questioning, doubting, and contradicting institutional communication and can lead to a lack of trust in institutions and stigma of population groups that have become scapegoats. Mis/disinformation was and still is a major communication problem in the context of COVID-19. It will also remain a problem for future public health issues. People are constantly exposed to information that comes from non-experts giving their points of view on scientific and technical topics. This is particularly evident on social media: among the so-called influencers speaking about COVID-19, only a few are qualified to explain and support institutional communication (Cuan-Baltazar et al., 2020). And information on social media can easily become viral. For example, there is evidence of a relationship between anti-vaccination efforts on social media and public doubts of vaccine safety, as well as between related disinformation campaigns and declining vaccination coverage (Wilson and Wiysonge, 2020; Gisondi et al., 2022).

In this context, it is concerning that much mis/disinformation can be persuasive, providing explanations when institutions are not yet in the position of giving them (e.g., about the origin of COVID-19). These explanations are easy to understand, as they have engaging narratives. Lots of low-quality information, especially resulting from conspiracy theories, do not require scientific knowledge to be understood, although they might falsely report scientific evidence and proof in support. They build on people's insecurity about institutions, maximizing the perceptions and ideologies of those who, in general, do not trust science and institutions (Scardigno and Mininni, 2020).

As the behavioral sciences show, information influences knowledge, beliefs, and perceptions that together are the main determinants of behavior (Rubinelli et al., 2020). As the Health Belief Model posits, people's engagement in health promotion and disease prevention behavior derives mainly from their beliefs about the severity and perceived risks of a health problem, their beliefs about the perceived benefits of and the barriers toward acting in a certain way, and their level of self-efficacy (Rosenstock, 1974). The prevention and management of the COVID-19 pandemic, as a case-study, has a main behavioral component. People have to engage in relatively easy behaviors, such as handwashing and avoiding shaking hands, and in more restrictive behavior, such as protecting the elderly by keeping a safe distance, and finally by observing drastic measures like staying at home and avoiding social gatherings. If people form incorrect beliefs and perceptions from low-quality information, they may fail to engage in appropriate behavioral responses, minimize the risks, and not consider behavior change as important. Conversely, they may develop excessive risk perception and suffer from psychological stress and other mental disorders as a consequence. All this happens in a context of risk appraisal that, as Kahneman and Tversky

have raised, can also be influenced by heuristics. People often use shortcuts that simplify thinking and reduce the cognitive burden of deep reflection. In this sense, heuristics may simplify thinking and lead to finding easy solutions to deal with information that is technical or difficult to understand (Tversky and Kahneman, 1974).

Discussion: Call for persuasive communication

For the above-mentioned reasons, risk communication during a public health emergency is challenging. Existing work gives basic guidelines, but they do not specifically address how to act in contexts characterized by mis/disinformation and considering the entire set of factors highlighted above (World Health Organization, 2017). Moreover, institutions face two additional barriers. First, although health systems are more aware of the importance of communication (see, for instance, the introduction of communication skills courses in medical and health professional curricula), the resources allocated to communication are often insufficient. Following the Eisenhower Decision Matrix, communication is often still seen as important but not urgent. Second, the modalities and strategies of persuasive communication by (social media) influencers are often not applied in official communication (Olaru, 2014). Nowadays, the lay audience is accustomed to quick and rapid communication, often in the form of claims from messengers favored for their physical and emotional appearance, sociability, and assertiveness. Mis/disinformation is frequently packaged in formats that are very easily received, understood, and evaluated by lay audiences. From this type of communication health institutions can learn how to best speak to their public, which does not mean to follow strategically manipulative instances, but to talk at a level that really “speak” to people.

To think about communication as persuasion means reflecting on the characteristics of communication that will likely make it successful to target an audience. Investing in persuasive communication requires a focus on the following aspects, all highlighted in the traditional Jacobson model of communication (Lidov, 2007):

- 1) The sender: how to build trust in people and be perceived as relevant and important. This often means publicly addressing mis/disinformation that accuse institutions of making mistakes or acting in the wrong way.
- 2) The message: how to best frame messages in order to answer people’s uncertainties, fears, and lack of understanding, considering that most people are not experts in science, scientific language, or scientific reasoning.
- 3) The receiver: how to influence people’s knowledge, beliefs, attitudes, and behavior, while avoiding the growth of perceptions that minimize or maximize risk perception. This

also requires systems to be able to interact with people and to collect and address their concerns and questions.

- 4) The channels: how to best use communication channels according to users’ characteristics and preferred methods of communication.
- 5) The context: how to provide counterarguments to fake news and false generalizations of the opinions of single experts or influencers that go against scientific evidence and recommendations or present information that is inconsistent with what health institutions communicate.

Knowledge on how to make risk communication persuasive can be found in theories and tools presented in the literature on health campaigns and social marketing, argumentation theory, persuasion research, and advertising theory (O’Keefe, 1982; Rodgers and Thorson, 2012; Rubinelli and Henkemans, 2014; Lee and Kotler, 2019). For this to take effect, however, significant resources have to be allocated. Here it is fundamental to reflect on the linguistic aspects of the institutional discourse, relying on years of strong theories and models of argumentation and persuasion available since the time of classical rhetoric. Investment in persuasive health communication is needed to strengthen health institutions’ role as public health advisers and guides for the community, as they are entitled to be and should be.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Linguistic expressions of negative stances: A conversation analysis of turn-medial particle *dai* in Jishou dialect (Hunan Province, China)

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The study focuses on the syntactic functions and prosodic features of the turn-media particle *dai* in Jishou dialect, Hunan Province, China, as well as its distributions and interactional functions across eight different contexts. The research utilizing a corpus of 70 h consisting of 300,000 characters of the Jishou dialect, employed the conversation analysis (CA) method to analyze the interactional behaviors of *dai*. The results show that *dai* serves as an overt marker of speakers' negative stances, including complaining and criticizing. It is treated as an emerging product continuously shaped by diverse factors, such as context, sequential positioning, prosodic manifestation in talk-in-interaction, and its influence on the subsequent development of the conversation.

KEYWORDS

Jishou dialect, turn-medial particle *dai*, marker of negative affective stance, conversation analysis, interactional (socio) linguistics

1. Introduction: Particles and language

Particles are ubiquitous in languages across the world. They have been cross-linguistically discussed in terms of their function of marking speakers' stance, e.g., *oh* in English (Schiffrin, 1987; Heritage, 1998); *yo*, *ne*, *sa*, *zo*, and *no* in Japanese (Cook, 1990, 1992; Maynard, 1993, 2002; Tanaka, 1999), and *kwun*, *ney*, *tela*, and *ta* in Korean (Lee, 1993; Strauss, 2005; Strauss and Ahn, 2007). These particles exist within a wide variety of interactional contexts and serve to express surprise, empathy, and degrees of certainty. Examples of these include "*a*, *ou*, *ya*, *ba*, *ne*" in Mandarin (Li and Thompson, 1981; Li et al., 1982; Wu, 1997, 2004), "*la*, *lo*, *wo*" in Cantonese (Luke, 1990; Matthews and Yip, 2013), "*nā*, *nia*" in Thai (Horie and Iwasaki, 1996), and "*nii(n)*, *joo*, *kato*" in Finnish (Hakulinen and Seppänen, 1992; Sorjonen, 1997, 2001).

Given the pervasiveness of particles within and across languages and their discourse-pragmatic functions, their research can provide keen insights into the socio-contextual elements that underlie various aspects of speakers' stances in relation to the participants, the theme of the talk, the information presented, and so on.

In the article, conversation analysis (CA) is employed to investigate the interactional functions of one such turn-medial particle,¹*dai*, in the Jishou dialect of Western Hunan Province, China. We chose '*dai*' as the focal point of our study for two reasons: first, it plays a crucial role in indicating the speaker's emotional stance, and second, it is unique to the Jishou dialect and is not present in other dialects spoken in the Hunan Province, as confirmed by both literature and field research. We identified and tracked its usage within a corpus of audio-taped interactions in which native speakers of Jishou interact face-to-face

1 It should be noted, however, that the term "particle" is occasionally used as a term of convenience as a substitute for the term "turn-medial particle" in this study.

with numerous interlocutors in various contexts. The study illustrates that *dai* serves as a clear indicator of the speaker's negative stance, and it is utilized by speakers to express complaints and criticisms within negative interactional contexts,² as is presented in excerpt 1 below:

(1) (Households)

(In this scenario, person M³ believed that person R had already reached his destination, Jishou City. M then expressed her complaint to R over the phone, stating that the train was late. However, it was later revealed that R had only just arrived in Huaihua City, which is a two-hour journey away from Jishou City).

1M: *aiyo, cai dao huaihua a.*
(exclamation), just arriving in (city) PRT
Uh-oh, (you are) just arriving in Huaihua.

2M: → *wo dai: hai yiwei ni zao dao le.*
I PRT still thought you early arrive PRV
I DAI thought that you had arrived early.
(in Jishou)

3M: *aiyo, na ni xiaci bie zai zuo huoche le.*
(exclamation), then you next time N again take train CRS
Ah, then you (had better) not take the train next time.

Excerpt 1 illustrates when the *dai* turn-at-talk is used to address speaker M's complaints (line 2). Her negative stance can also be seen in her suggestion that R had better not take the train next time (line 3). Prosodically and lexically, the prolonged particle *dai* and two prefaced exclamations *aiyo* mainly contribute to achieving a negative affective stance. In the article, we will demonstrate that turn-medial particle *dai* is an overt marker of an emergent negative stance in talk, showing participants' orientation to complaints and criticisms.

2. Previous research on *dai*

The Jishou dialect is spoken in an area at the border between the *Xiang* dialect, which is spoken in Hunan Province, China, and Southwestern Mandarin. It displays characteristics of both dialects, combining features of the *Xiang* dialect and Southwestern Mandarin in its phonetic system. For instance, when ancient-voiced initials are pronounced as plosives or affricatives, their tones are transformed into *Ping-sheng* (level ones) in the same unaspirated way as the *Xiang* dialect does. However, there is no *Ru-sheng* (entry tone) in the Jishou dialect. Under this condition, ancient *Ru-sheng* characters are pronounced in a rising tone whose tone pitch is similar to the usual tone pitch of Southwestern Mandarin. Morpho-syntactically, abundant retroflexed er-suffixed (-/L) words, reduplicative constructions, and shared syntax ingredients with

2 "Negative interactional contexts" refer to situations in which speakers express their negative attitudes, potentially challenging the listener's social image, such as through complaints, objections, refusals, warnings, and so on. For example, Wu's (2004) study of final particles in Mandarin Chinese using Conversation Analysis has demonstrated that the particle *ou* at the end of a turn serves as a warning to the listener of negatively-valenced interactions such as complaints, disagreements, warnings, jokes, declines of requests, rejections of expectations, or denials of presuppositions.

3 The main participants' coding is found in Appendix I.

Southwestern Mandarin in the Jishou dialect demonstrate that the Jishou dialect is far closer to Southwestern Mandarin than the *Xiang* dialect (Xiang, 2011). In addition, the fact that ethnic minorities account for 70% of the total population in Jishou city contributes to long-term contact among the *Han*, *Tujia*, and *Miao* populations, with distinctive features of the Jishou dialect induced by regional language contact (Li, 2002; Xiang, 2009).

Typical for the Jishou dialect, the particle *dai* is common in ordinary conversations. Previous studies on *dai* (e.g., Li, 2002; Xu, 2006; Yang, 2008) argued morphologically that it serves as an infix in the verb reduplication "V *dai* V" and adjective reduplication "A *dai* A." However, in the former sense, it is placed at the sentence's predicate, as is presented in excerpts 2 and 3. In the latter sense, it acts as the predicate or complement, as is presented in excerpts 4 and 5. Besides, they also point out that the embeddedness of the particle *dai* adds speakers' subjective stances to their utterances. Thus, "V *dai* V" and "A *dai* A," compared with those without *dai*, present speakers' stronger deontic modality (Excerpts 2–5 are quoted from Li, 2002: p. 250–258).

(2) *wo naoke yun dai yun.*
my head faint PRT faint
I am feeling strongly faint.

(3) *hu li de shui kai dai kai.*
kettle inside PRT water boil PRT boil
The water inside the kettle keeps boiling violently.

(4) *na tiao po gao dai gao, pa si ge ren.*
that C slope high PRT high, climb exhaust C people
That slope is so high and exhausting to climb up.

(5) *ta zuo shi guoxi dai guoxi.*
3SG do things careful PRT careful
He is quite conscientious about his work.

Unlike previous research, this study identified 54 instances where *dai* functions as an infix in verb and adjective reduplication, accounting for only 2% of total occurrences of *dai*. The remaining 98% function as turn-medial particles, demonstrating that *dai* plays an important role in interactions among speakers of Jishou, as is presented in excerpt 1.

Given the claims that the turn-medial particle *dai* is highly emotionally charged and frequently used in interactions, this study, which is based on a corpus of 70 h comprising approximately 300,000 characters of the Jishou dialect, employs CA to explore its interactional functions. This study also seeks to gain a deeper understanding of the functional motivations behind its use, not just through the analysis of specific linguistic features but also by examining the actions and attitudes that it accomplishes in the course of the interaction, as evidenced by the participants' conduct.

The remainder of this article is organized as follows. "Section 3" introduces the analytical and methodological framework and provides an overview of the data analyzed, the transcription procedures, and the contextual distribution of *dai*. "Sections 4 and 5" demonstrate *dai*'s syntactic functions, prosodic features, and sequential functions. "Section 6" presents findings regarding the interactional functions of *dai* in the initiative and responsive positions. The final section summarizes the findings presented in the main sections and discusses the implications of this study.

3. Methodology and data

3.1. The function of particles in social interaction

CA is a field of research where a conversation is viewed as a primordial site for and a basic form of social interaction, which is this study's major theoretical and methodological framework. Social interaction is structurally organized by participants and is "a describable domain of interactional activity exhibiting stable, orderly properties that are the specific and analyzable achievements of speakers and hearers" (Zimmerman, 1988: 407). The main objective of CA is to examine and describe the structural elements of everyday conversations and other forms of talk-in-interaction that enable people to establish a shared understanding of the interaction.

From a CA perspective, one key aspect that underlies the organization of social interaction is "recipient design," i.e., "the multitude of respects in which the talk by a party in a conversation is constructed or designed in ways that display an orientation and sensitivity to the particular other(s) who are the co-participants" (Sacks et al., 1974: p. 727). In the organization of their action, participants ordinarily consider the contingencies as they demonstrate in their next moves what sense they make of a prior speaker's action. Accordingly, to understand the participants' "then-relevant" sense of these contingencies, the immediately subsequent moves by participants commonly become analytic loci for CA. In short, this study mainly uses subsequent talk as a "proof procedure" in the analysis.

From the perspective of CA, the interactional functions of the turn-medial particle *dai* can be accomplished interactionally through the use of linguistic resources or other practices. Thus, the interactional functions of *dai* are treated as an emerging product that is shaped by and shapes the subsequent development of interaction. In this process, linguistic resources or other practices play a constitutive role in contributing to the functions accomplished by the particle *dai*. The interactional functions of particle *dai* are mutually dependent, thereby "maintaining or altering the sense of the activities and unfolding circumstances in which they occur" (Heritage, 1984: p. 140). Our study outlines three major areas for studying the particle's functions: (a) context; (b) sequential positioning; and (c) prosodic manifestation. Our study sheds light on how linguistic resources play a role in achieving social action and mutual understanding, and it can be seen as a contribution to the expanding field of research on Chinese dialects within interactional linguistics.

3.2. The data⁴ and transcription conventions

Our study's corpus consists of telephone and face-to-face conversations among family members, friends, or acquaintances. The authors collected these conversations mainly in eight contexts, including supermarkets, households, tea houses, hair salons, shopping malls, food markets, photographic studios, and others in Jishou from December 2012 to July 2021. The corpus comprises approximately 70 h of interaction by 97 participants, including 61 women and 36 men, all of whom are native speakers of

⁴ We have obtained informed consent from the participants in the recordings done in public places.

TABLE 1 The number and relative frequency of *dai* in eight different contexts.

Contexts	Numbers	Relative frequency
Supermarkets	1,080	55924 ¹ : 1080 ≈ 52: 1
Households	771	44328: 771 ≈ 57: 1
Food markets	160	36554: 160 ≈ 228: 1
Shopping malls	90	36023: 90 ≈ 400: 1
Photographic studios	23	42066: 23 ≈ 1829: 1
Tea houses	18	42460: 18 ≈ 2359: 1
Hair salons	12	39088: 12 ≈ 3257: 1
Others	13	2241: 13 ≈ 172: 1
Total	2,167	298684: 2167 ≈ 137: 1

¹This refers to the total number of Chinese characters in each context.

the Jishou dialect. Their ages range from the mid-20s to the late 80s. Various contexts and combinations of participants are chosen to guarantee that the research findings are not context- and participant-specific.

The 70 h of interactions were transcribed using the *Pinyin* romanization system without tone marks, in accordance with the conventions of CA (Atkinson and Heritage, 1984), with slight modifications⁵.

Each transcribed Jishou dialectal turn is accompanied by two lines of an English translation. The first line provides a literal translation of each Jishou dialectal element, while the second line offers an idiomatic English equivalent, as is shown in excerpts 1–5.

3.3. The contextual distribution of the turn-medial particle *dai*

3.3.1. The number and relative frequency in eight different contexts

As shown in Table 1, there is a noticeable discrepancy in *dai*'s distribution in eight different contexts. More specifically, out of a total of 2,167 instances in the present corpus, 1,851 instances occur overwhelmingly in supermarkets (1,080) and households (771) contexts, respectively. Other contexts with a dramatically lower frequency of *dai* are food markets (160), shopping malls (90), photographic studios (23), tea houses (18), hair salons (12), and others (13). A simple calculation reveals that the number of *dai* in supermarket and family contexts is about six times that of the total number of the other contexts. The data presented in the supermarkets are conversations among four sisters (M, A1, A2, and A3). In contrast, those in the households consist of family members (M, F, and R), demonstrating that the turn-medial particle *dai* is more likely to be used among participants with more intimate social relationships.

However, as shown in Table 1, although its frequency is lower, the occurrence of *dai* in seven other contexts involving participants with relatively more distant social relationships is not an isolated linguistic phenomenon. As will be shown later in this article, the

⁵ The transcription and glossing conventions employed in the excerpts are provided in Appendices II and III.

TABLE 2 The relative frequency in different sequential positions.

Sequential position	Number and relative frequency
Initiating turn	1,347
Responsive turn ¹	820
Total	2,167

¹We have included 172 *dai* turns-at-talk in the third position in the responsive turns.

speakers' negative stance for complaining and criticizing is displayed and partly achieved by the *dai* turn-at-talk. In addition, pursuing interpersonal harmony in interaction has been suggested to be the essence of human beings' rationality (Ran, 2012: p. 1); thus, in this study, there are fewer instances of face-threatening *dai* turns-at-talks in the seven other settings with participants in more distant social relationships, which is understandable.

3.3.2. The relative frequency of *dai* in sequential positions

Sequential position refers to the relative position of adjacent turns within an adjacency pair consisting of two or more turns with conditional relevance in turn-taking (Schegloff, 1996). Previous studies (Schegloff, 1982; Couper-Kuhlen, 1996; Goodwin, 2000; Wu, 2004; Couper-Kuhlen and Selting, 2018) have found an "interaction" between particles' sequential positioning and their syntactic features, meanings, and functions. As Table 2 demonstrates, the turn-medial particle *dai* in an initiating turn, compared with that in a responsive turn, has a higher relative frequency. The fact that the sequential positioning influences the relative frequency of *dai* shows an interactive relationship between syntactic features, meanings, and functions of the turn-medial particle *dai* and its sequential placement in the interaction.

In this section, we have discussed the "interaction" between *dai* and its distribution in different contexts and sequential positions. Then, the interactional functions of the turn-medial particle *dai* from the perspective of CA will be described empirically.

4. Syntactic functions and prosodic features of the turn-medial particle *dai*

To date, there have been very few studies of *dai* in the Jishou dialect. This section will be dedicated to its syntactic functions and prosodic features.

4.1. Syntactic positions

Syntactically speaking, there are three main positions for the turn-medial particle *dai*: (1) being between the nominal subject and predicate, as is presented in the excerpts (6a, b); (2) following a sentence-initial adverbial, as is shown in excerpts (6c, d); (3) following a prepositioned object, as is presented in the excerpts (6e, f). Overall, the turn-medial particle *dai* is referred to as a marker dividing the sentential "theme-rheme."

- (6) a. *wo dai yi yang mei de.*
I PRT one C N gain
I DAI have gained nothing.

- b. *ta sun dou hao da le,*
3sg grandson already very old PRV,
ni dai hai mei you.
you PRT still N have
His grandson has already grown up to be an older child (but) you DAI do not have (your own) yet.
- c. *zhe ge shihou dai loufang hai jicongjicong.*
this C time PRT buildings still everywhere
In recent times DAI, buildings exist everywhere.
- d. *na tian lai dai:*
that day come PRT
wo hai yao tamen tuoxie a.
I then ask them take off shoes Q
(Did it mean that) I should ask them to take off (their) shoes on the day they came DAI (to my house)?
- e. *rou dai wo de ji ke chi.*
meat PRT I get a few C eat
I (only) got a few dices of meat DAI to eat.
- f. *anhao_anhao dai mei*
cipher_cipher PRT N see ASP
(I) have not seen the cipher DAI (at all).

4.2. Sentential functions

The turn-medial particle *dai* in declarative sentences is shown in excerpts (7a, b).

- (7) a. *ta dai gang, zhe shui hui leng.*
3sg PRT say, this water will cold
It was him, DAI, who said the water would get colder.
- b. *dianshi dai ta dou mei kan.*
television PRT 3sg already N watch
He hardly ever watches TV DAI.

In addition, the turn-medial particle *dai* can also be used in exclamatory sentences to express the speaker's assessment directly. As presented in excerpt 7c, *dai* is mainly used in responsive turns to evaluate a prior turn's statement.

- (7)c (Supermarkets)
(A1 and M are making a comparison of transactions between two suppliers))

- A1: *na ta shengyi mo bu hao a?*
then 3sg business Q N good Q
then isn't his business in good condition?
- M: → *yo:: renjia haoduo dou shi zhijie gei*
oh:: others many already be direct give
chaoshi songhuo, ta dai::
supermarket deliver goods, 3sg PRT
Oh::, many other suppliers directly deliver goods to supermarkets (this is good business), but he (his business) DAI (is not good)

The turn-medial particle *dai* is completely incompatible with interrogative and imperative sentences based on the present corpus.

4.3. Prosodic manifestation

There are two types of prosodically different *dais* in the present corpus; one of them, the unmarked *dai*, is produced with a flat, low pitch and demonstrates prosodic features closer to what has been described for particles in the literature, while the other, the marked *dai* (marking as *dai^m*), does not. These marked tokens are produced either with a markedly high pitch or with some dynamic pitch movements, such as a rising or a falling-rising pitch contour. The unmarked *dai* is considered the main prosodic manifestation, as presented in excerpt 8:

- (8) a. *zhe ge shihou dai loufang hai jicongjicong.*
 this C time PRT buildings still everywhere
 In recent times DAI, buildings exist everywhere.
- b. *rou dai wo de ji ke chi.*
 meat PRT I get a few C eat
 I (only) got a few dices of meat DAI to eat.

The connotation of a segment following the turn-medial particle *dai* can be inferred from the context so that speakers can omit the following segments. In this case, *dai* manifests itself as a marked one, as presented in excerpts 9a and 9b:

- (9)a (Food Markets)
 ((S and D are coworkers in a food market. S grumbles about D's eating outside))
- S: *wo dengxia chuqu chi suanlafen.*
 I later go outside to eat (local snack)
 I will go outside to eat hot and sour rice noodles later.
- D: → *wo fan dou bang ni zhu le, ni dai^m::*
 I rice already help you cook PRV, you PRT::
 I have already cooked the meal for you, but you DAI (do not eat it).
- b (Shopping Malls)
 ((Z is B's client. They complain about their dark circles to each other))
- Z: *ni kan wo dou you heiyanguan.*
 you see, I already have dark circle
 Look, I already have dark circles.
- B: → *wo haiyao geng hei xie, wo dai^m::*
 I even more black C, I PRT::
 Mine (dark circles) are even worse; my dark circles
 DAI (is so heavy).

5. Sequential functions of the turn-medial particle *dai*

This section presents findings from a detailed analysis of the negative stance marker *dai* in the initiative and responsive turns, respectively. The particle mainly contributes to achieving a negative stance through increasing variation in volume, pitch, stress, and other prosodic resources; different uses of gestures and other types of embodiment; and accounting or other types of orientations toward these turn-at-talks, etc.

5.1. Initiative turn

In the present corpus, *dai* occurs regularly in initiating turns where the speaker expresses a complaint or criticism toward a prominent piece of information in that turn, as is illustrated in excerpt 10:

- (10) (Households)
 (M first complains to F that A1's relatives ate up all the agents' consigned beverages, and then M and F reach an agreement that it is not good for people to drink too many beverages)
- 1M: → *yi jian dai::, aiyou.*
 one C PRT, (exclamation),
 A2 shuo, hai mei fanying guolai,
 A2 say, N react ASP,
 mei you le.
 N have PRV.
 A full box DAI (of beverages), well, A2 said, had been emptied before others knew it.
- 2M: *A1 la, ta wu naxie qinqi yi lai, jiu*
 A1 PRT, 3sg family: once those relatives
 come,
 han tamen chi.
 ask them to eat.
 When A1's relatives visit, she always treats them
 (with these beverages).
- 2F: *A1 han, [<kuai chi kuai chi*
 A1 say, [<quick eat quick eat
 A1 told them to drink freely.
- 3M: *um. zhexie chi duo le bu hao.*
 PRT, these eat many CRS N good.
 Um, it is harmful to drink too many beverages.
- 4M: *Tamen shuo hanyou fuermalin, hai you naxie sesu.*
 they say contain formalin, then have those pigment
 They said that there are formalin and pigments in
 those beverages.
- 5F: *um, you dian, duoshao you xie.*
 PRT, have C, more or less have C
 True, there are, more or less.
- 6M: *xiaode man, chi naxie chi duo le bu hao a.*
 know Q, eat those eat many CRS N good PRT
 Get it? It is not good for you to drink too many (beverages).

In excerpt 10, the *dai* turn-at-talk delivers some prominent information about the conversation (line 1); that is, A1 complains that A1's relatives emptied a box full of beverages, and the verbal practice “*yi jian dai::*/a box full DAI (of beverages)” produced with a prolonged *dai* invites other speakers to join in with speaker M's complaints and criticisms. Preceding the *dai* turn, speaker M's complaints and criticisms of A1's selfishness are evident throughout the conversation. Primarily, through the choice of words conveying a sense of complaining (*naxie*/those, *buhao*/not good), speaker M expresses a recognizable negative stance. In line 1, M showed her discontent by referring to A1's relatives with the deictic expression “*naxie*” (those). According to Fang (2002),

the deictic word “*na*” (that) indicates that the stated event lies in the marginal area of a speaker’s inner world and is used to express a negative or disapproving stance toward the event. The *dai* turn-at-talk simultaneously elicits F’s evaluation of A1’s selfish behavior: given that the practice of giving an identical repetition of A1’s utterance “*kuaichikuaichi*” (eat at a quick pace) in a quick tempo, F vividly depicts the situation where A1 urges her relatives to drink free beverages, implying his complaints on such selfish behavior. Moreover, in lines 4–6, both M and F believe that A1’s behavior is not only selfish but harmful to her relatives’ health. Lexical and prosodic resources form the evidence of the conversation as being “affect-laden”; reflexively, the *dai* utterance itself shapes the development of the interaction; that is, as the whole conversation seems to be complaining about the event from the start with the *dai* turn-at-talk, the negative stance is co-constructed in the whole conversation.

Excerpt 11 provides another instance in which the *dai* turn-at-talk is used to express complaints and criticism toward a recipient. *dai* turn-at-talk, in this case, mainly exists among family members:

(11) (Supermarkets)

((M rebukes R for his improper wearing of shoes in the hot summer))

1M: ni dai chuan qi na xiezi huilai,
you PRT wear CRS that shoes back,
zheme re.
so hot.
How could you DAI wear these shoes back in
this heat?

2R: *ai::ya::, chuan shenme xiezi? ni xiaode shenme?*
(exclamation), wear what shoes? you know what
Ah, what’s wrong with my shoes? You know
nothing (about fashion).

As shown in excerpt 11, M uses *dai* turn-at-talk to blame R for wearing high heels in the hot summer. Then, R responds to the previous turn with the stressed exclamation “*aiya*”(Ah) and two consecutive rhetorical questions, expressing his strong impatience. R’s responses indicate that he has M’s complaints in the previous turn. Considering this, through the selection of “*na*”(that) as in excerpt 10 and syntactic design—rhetorical questions—speaker M showed her negative stance, and the whole conversation is filled with a negative flavor, such as the prolonged injection *aiya*.

Despite *dai* turns-at-talk in the data signaling speaker’s negative stance, the above excerpts demonstrate that the particle *dai* itself can be used to construct complaints and criticisms to some extent. Excerpt 12 is a case in point:

(12) (Supermarkets)

((M, A2, A3 gossip about their relative—CQ. They thought that CQ bought PH a hat because CJ (PH’s mother) buys almost all the goods that she needs in CQ’s shop.))

1A2: *zhe maozi hao chou.*
this hat very ugly
This hat is really ugly.

2M: *xiao yaer bu guan.*
little boy N care
Little boy does not care about that (he wears an ugly hat).

3A2: → *ta ((CQ)) dai hao, ta gei ni yaer mai maozi la.*
3sg PRT good, 3sg give your child buy hat PRT
She DAI (is) not bad, she bought your son this hat.

4A3: *CJ changsi dao ta((CQ)) nail mai dongxi da=*
CJ often go 3SG there buy thing PRT=
CJ often goes to her((CQ)) shop to buy something=

5M: =*ta ((CJ)) zhaogu ta((CQ)) shengyi da.*
=3sg patronize 3sg business PRT
She ((CJ)) patronizes her ((CQ)) place.

6A3: *zhe yaer ((CJ)) shenme dou dao ta((CQ)) naer mai,*
this guy what all go 3sg there buy
This guy ((CJ)) goes to her ((CQ)) shop
whenever she needs to buy something.

7A3: *ni bu gei ta mai, ta bu gei ni yaer mai.*
you N give 3sg buy, 3sg N give your child buy
(if) you do not buy something
from her ((CQ)) shop, she will
not buy your child (the hat).

8A3: *buguo ta((CQ)) ye keyi, ni de ge maozi dai. hhh*
but 3sg also okay, you get C hat wear(laugh)
But she ((CQ)) is not bad, you got a hat from her (at least). hhh

9A2: *jiu shi jiang lo, gei ni mai maozi.*
then be say PRT, give you buy hat
That’s right. She ((CQ)) bought your (son) a hat.

In excerpt 12, “*ta dai hao*” (she is not bad) is a format of “*dai* + good.” The particle *dai* contributes to the display of a negative stance to some extent, whereas the adjective “*hao* (good)” usually displays a positive stance. Thus, combining these two words is supposed to accomplish a speaker’s mixed stance; that is, the topic in focus is both bad and good. Excerpt 12, involving positive and negative aspects simultaneously on a topic in a conversation, might serve as evidence regarding *dai* itself as a negative stance marker to some extent. To begin with, in line 1, A2 is saying, “*zhe maozi hao chou* (This hat is really ugly),” thereby displaying a strong negative stance toward the hat’s style and design. Then, M’s initiation, “*xiao yaer buguan* (Little boy does not care about that he wears an ugly hat)” in line 2, elicits A2’s response, “*ta ((CQ)) dai hao, ta gei ni yaer mai maozi la* (She is not bad, she bought your son this hat.)”. At first, A2 complains that the hat is ugly. M seems to criticize that complaint by claiming that the boy does not care about being ugly, thereby also implicitly defending the giver, and A3 seems to take up on the implicit defense of the giver by explicitly praising the giver for giving the hat. A3’s lines 4 and 6 provide evidence for A2’s implication: A3 thinks that it is because CJ often takes care of CQ’s business that CQ buys a hat for PH, which indicates that this action should not be CQ’s willingness but a kind of exchange of benefits. In addition, A2 uses the intensified responsive marker “*jiushi jianglo* (That’s right)” in the closing line 9 to show that she does not just agree with A3 but rather positively assesses that A3 repeated her own previous *dai*-complaint in line 3 (Qu, 2006: p. 78; Yao, 2012: p. 76). From the above, we can conclude that “*ta dai hao*” (she is not bad) is a mixed stance toward her (CQ), where the positive aspect comes from the adjective “*hao* (good)” and the negative aspect, without any doubt, is brought about by the turn-medial particle *dai*.

5.2. Responsive turn

A speaker mainly uses the turn-medial particle *dai* in responsive turns to construct a self-accusation when faced with criticisms from others. We count 820 *dais* in the responsive turn and find that 648 cases, or about 80% of the total, belong to this pattern, as is illustrated in excerpt 13:

(13) (Hair Salons)

((T questions hair stylist H for ignoring his regular customer C10))

- 1T: *ta han ni ji sheng,*
3sg call you several sound,
wo kan ni dou mei li ta.
I see you even N respond 3sg
She called you several times, but I saw that you did not respond to her.
- 2H: → *wo dai^m zhe tiao yanjing bu ren ren. hhhh* Qishi man, dou shi shuren.
I PRT this C eyes N know person (laugh). Actually PRT, all be acquaintances
I'm DAI not good at recognizing others. hhhh. Actually we are all acquaintances.
- 3T: *oh, deng xia gei renjia jieshi yi xia,*
PRT, wait C give people explain one C,
Yeah, then you'd better explain to her,
- 4T: *yaoburan jiang ni bu li ren hhhh*
otherwise say you N respond people (T and H laugh together)
otherwise, she would think that you ignore her (deliberately). hhhh

In excerpt 13, in the face of T's blame for "ignoring the regular customer," H uses a format of "wo *dai^m* (I *dai*) + reason" to express self-accusation in a self-deprecating way. In excerpt 14, J, in the third position in the responsive turns, responds to the blame for "mistaking soy sauce for vinegar" from T and R in the same way.

(14) (Tea Houses)

((T, R and J are close friends. T and R blame J for his mistaking soy sauce for vinegar))

- 1T: *aiya, ni gao shenme la? Shi jiangyou, ni kan qingchu qi lo.*
(exclamation), you do what PRT? Be soy sauce, you see clear ASP PRT
Ah, what are you doing? It is soy sauce (not vinegar), you had better see more clearly (next time).
- 2R: *na tiao J ou.*
That C J PRT.
What a (sloppy) person J is.
- 3J: → *wo dai^m dou meng le, wo yiwei zhe tiao shi cu.*
I PRT even stupid PRV, I think this C be vinegar
I DAI was thoroughly lost, I thought it was vinegar.
- 4: *hhhh.*
(J, T and R laugh)

What is notable in the above two excerpts is that their self-deprecating blame on themselves triggers the "laughter" of participants. The laughter, caused by H's neglect of a regular customer and J's ridiculous mistakes, is employed by the speakers simultaneously to alleviate the embarrassment caused by the criticism (Levinson, 1983: p. 70). In other words, the non-verbal practice of "laughter" demonstrates that other participants accurately catch the self-deprecating blame of the speaker's turn.

The turn-medial *dai* is also used by speakers to directly express negative evaluations of the participants in the interaction. Nevertheless, in line with the politeness principle, such direct complaints and criticism are not common. This conclusion is supported by statistics, which indicate that *dai* of this type occurs 57 times, accounting for only a small portion (7%) of the entire corpus of 820 *dais* in responsive turns, as presented in excerpt 15:

(15) (Photographic Studios)

((A customer complained that studio employee S accidentally deleted a photographic plate. S' boss is now talking to him about it.))

- 1S: *wo gang gen ta jieshi le, ta ziji jiang bu yaojin, ta diannao litou cun de you.*
I just with 3sg explain CRS, 3sg self say N matter, 3sg computer in save CSC have
I just explained it to him, and he said that it did not matter, for he had already saved them (the pictures) on his computer.
- 2Q: → *ni dai^m zuo shi tai meiyou zhuntou le, renjia tousu ni le, ni hai guai renjia.*
You PRT do a thing so N reliability PRT, other complain you PRT, you still blame other
You DAI are so unreliable. The customer has complained about you, and you are still blaming the customer.
- 3S: *na zhende buhaoyisi, wo buxiaoxin shan cuo de.*
Then really sorry, I careless deleted mistake ASP
I'm really sorry, then. I deleted (the pictures) by accident.

In excerpt 15, speaker Q's negative stance in line 2 can also be verified from the next turn by recipient S: S uses an apologetic expression "*buhaoyisi* (I'm sorry)" with an intensifier "*zhende* (really)" to respond to Q's criticism in the prior marked *dai* turn, displaying that he orients to *dai* turn-at-talk as a negative stance-laden statement.

6. Conclusions

Particles are viewed as key contributions to speakers' fluency, although some are stigmatized as informal, disfluent elements of speech (Crible et al., 2017; Degand, 2018; Degand and Van Bergen, 2018). By combining syntax, pragmatic functions, and syntagmatic variables (co-occurrence and clusters of words, pauses, silence, etc.), as well as rich corpus-based observations, our study might obtain a more comprehensive picture of the turn-medial particle *dai*, which is an overt marker of speakers' negative stance, including complaining and criticizing. The study shows that a negative stance is treated as an emergent product shaped continuously by diverse factors in talk-in-interaction and shapes the subsequent development of conversation. In other words, CA of the turn-medial particle *dai* takes an interactional approach, which is different from some

previous studies of stance (e.g., Biber and Finegan, 1988, 1989; Field, 1997), whose focus has been on the realization of linguistic stance markers. Specifically, the current study is focused on how stance can be accomplished in interaction by means of linguistic and other resources, such as context, sequential positioning, and prosodic manifestation.

Context is a key factor in accomplishing language functions (Hopper, 1998; Heine and Kuteva, 2002). In this study, displaying the negative stance is both “context-sensitive” and “context-renewing.” On the one hand, the turn-medial particle *dai* exists in contexts featuring complaints and criticisms with high frequency, which further embodies and reinforces its interactional function by absorbing the sense of the complaints and criticisms implied in the context. On the other hand, there is a “reflexive relationship” between the particle *dai* and the context in which it occurs. The speaker uses it to establish a “stance frame” and sets a baseline of negative evaluation for the subsequent conversation.

Furthermore, the turn-medial particle *dai* interacts with different sequential positions and realizes multivariate interactional functions. Positioning the particle in the first pair of an adjacency pair allows the speaker to initiate a new sequence and take control of the interaction. Thus, a turn with *dai* in this sequential position is responsible for drawing the listener’s attention to key information in the conversation. When the particle *dai* is positioned in the second or third part of an adjacency pair, it refers to the current speaker’s response and achieves a negative assessment of what others just said or intended in a preceding turn (or turns).

With respect to the prosodic manifestation of the turn-medial particle *dai*, we noted that there are two types of distinctive *dai* in the present corpus: the unmarked *dai* produced with a flat, low pitch, and the marked *dai* produced either with a markedly high pitch or with some dynamic pitch movements, such as a rising or a falling-rising pitch contour. Unmarked forms occur regularly in initiating turns where speakers complain or criticize a prominent piece of information. Unmarked *dai* registers the matter being addressed as new information. A speaker mainly uses the unmarked *dai* in responsive turns to construct a self-accusation when faced with criticism from others.

However, the marked *dai* is characteristically used to register a stronger negative stance. It is commonly used to alert the recipient to some negatively valenced interactional work that the *dai*-suffixed turn-at-talk is attempting to accomplish. It is worth noting that the connotation of a segment following a marked *dai* can be inferred from the context so that speakers can omit the following segment; that is, the *dai* utterance is prosodically, syntactically, and pragmatically excluded.

The examples in “Section 5” reveal that both *dai* in initiating turns and in responding turns are indexing a complaint or criticism already established in the sequence. *Dai* also serves different functions in the first, second, or third positions, whether in a turn of informing or in a turn that both receives and informs. In other words, while unmarked *dai* in the first pair of an adjacency pair and marked *dai* in the second or third position can be used to register a new delivery as well as a new assessment, the former characteristically invokes a sense of emphasis, which is not displayed in the latter, and the additional layer of import exhibited in the use of marked *dai* may be achieved by the interaction among distinctive prosody and sequential position.

Our findings regarding the interactional functions of the turn-medial particle *dai*, with its distinctive prosodic characteristics, contribute to our existing body of knowledge on the Jishou dialect.

The present study, based on an extensive corpus of naturally occurring interactions, is a new attempt to describe and explain the interactional functions of the turn-medial particle *dai* and the underlying logic and regularity using the CA. The work done here is just the tip of the iceberg; it serves only as a starting point for more investigation. Further CA research is needed to develop the interaction analysis of a wide range of discourse particles in the Jishou dialect from the following three aspects: (1) investigating the actual usage of particles based on naturally occurring interactions; (2) implementing positionally sensitive grammar by carrying out a dynamic analysis of different particles’ sequential organization; and (3) exploring the patterns and emergent conditions of different particles. Apart from occurring in both initiative and responsive turns, there seems to be a pattern in the use of the particle *dai* in the current turn, e.g., X *dai*, + clause, X *dai* + the rest of the clause, X *dai*^m... Its role in these structures may have been different, such as a topic marker for the division of theme and rhyme. As an important discourse marker, the analysis of what particle *dai* contains should not be limited to the sequential position but its position in the turns. More research is also needed to elucidate this matter.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical review and approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants in accordance with the national legislation and the institutional requirements.

Author contributions

FL contributed for article writing. XL and RL for data collection and analysis. JZ for data collection. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1018648/full#supplementary-material>

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