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Coding relevance

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ABSTRACT

Relevance is one of the crucial criteria for assessing the quality of argumentation in education. In argumentation and education, relevance has never been analyzed or coded. While several theories have included in their analysis some indicators of cohesion or clarity, this characteristic of dialogue and discourse has never been addressed as a distinct phenomenon. This paper builds on the existing studies in linguistic and philosophy to advance criteria for assessing relevance, which in turn can be used for developing a coding scheme for evaluating dialogue moves. Relevance is analyzed starting from the pragmatic principle that dialogue moves are instruments for pursuing a common dialogical goal. Starting from a classification of the possible types of dialogue moves, defined based on the possible dialogue that they propose or continue, five criteria of relevance are illustrated, capturing both pragmatic and topical coherence. Such criteria are shown to provide guidance for distinguishing not only relevant from irrelevant moves, but also the degrees of strength of relevance. The theoretical framework and the assessment criteria will be illustrated through a corpus of classroom interactions collected in Portuguese middle-grade schools.

A crucial challenge in social sciences, and more specifically in the field of education, concerns the assessment of the quality of students' argumentation, considered as the process of developing arguments in support of or against a viewpoint. The assessment of the quality of argumentative discourse, both verbal and written (Erduran, Simon, & Osborne, 2004; Ferretti, Lewis, & Andrews-Weckerly, 2009; Goldstein, Crowell, & Kuhn, 2009; Kuhn & Crowell, 2011; Kuhn, Shaw, & Felton, 1997) requires the essential pragmatic notion of relevance, which, however, remains only implicitly addressed in the education and argumentation literature. For example. the evaluation of the presence of the elements of an argument (Erduran et al., 2004) or their relation to another's viewpoint (Felton & Kuhn, 2001) presupposes the *relationship* between such elements (Rapanta, 2019a). The assessment of the critical stance towards and the integration of the interlocutor's position are based on the existence of a *connection* between the interlocutors' turns or moves (Mayweg-Paus, Macagno, & Kuhn, 2016). The "relatedness" or coherence between the parts of an argument or of discourse has been thus acknowledged as an important element of argumentative classroom discourse (Baker, 2009, p. 135). However, it is treated as an intuitive notion, leaving its definition and more importantly the criteria for its evaluation unexplored (Macagno, 2016).

To find an explicit analysis of this concept of "relatedness," we need to take into account the fields of linguistics, philosophy of language, and argumentation, where it is investigated in terms of "relevance." These disciplines have distinguished three aspects of relevance, which have been developed independently from each other: topical (Giora, 1997; Van Dijk, 1977), probative (Walton, 2004), and pragmatic relevance (Sperber & Wilson, 1995). These three aspects correspond to three implicit and intuitive uses of the concept of "relevance" in education, applied as criteria for measuring the quality of argumentation. *Topical* relevance (Walton, 2004) can be defined as the reference to and cohesion with the subject matter of the discussion. Topical relevance emerges in education studies as "explicitness," and more specifically as a) the direct reference to the components of the interlocutor's argument or viewpoint (Erduran, 2008, p. 51), or b) the explicitness of students' conclusions (Zohar & Nemet, 2002, p. 57). The former guarantees

cohesion, while the latter allows the identification of the claim defended and thus a coherent reply. *Probative* relevance concerns the quality of the logical relation between premises and conclusion, and more specifically the increase (or decrease) of the acceptability of the conclusion as a result of the acceptability of the premises (or the counterargument). In education, this criterion underlies the notions of "relevant justification" of a viewpoint (Zohar & Nemet, 2002, pp. 45–46), the "coherence" between premises and conclusions (Sandoval & Millwood, 2005), or the *possibility* that a counterargument or a rebuttal *can* contradict or undermine the other's position (Kuhn, 1991, p. 160). The third aspect of relevance is commonly referred to as "*conversational*" or "*pragmatic*" and concerns the adequacy of a move (utterance) to another. In education, pragmatic relevance has been directly addressed in terms of "in-adequacy" of the questions in argumentative discussions (Nussbaum, 2003). However, this pragmatic relevance is presupposed also by other approaches that include among the indicators of argument quality the relationship between the turns (or moves), such as the existence of counterarguments and rebuttals (Erduran, 2008; Erduran et al., 2004; Felton, 2004; Garcia-Mila, Gilabert, Erduran, & Felton, 2013; Kuhn, 1991, 1992; Osborne, Erduran, & Simon, 2004; Perkins, Allen, & Hafner, 1983).

The challenge that this paper addresses is to develop criteria for capturing and assessing relevance in argumentative dialogues that can mirror the three aforementioned different intuitive uses of this concept. After describing its essential characteristics, the criteria for detecting them will be developed and illustrated through examples from a dataset taken from a classroom discourse corpus constructed as part of a one-year exploratory research project (IMPACT) and collected in Portuguese middle-grade schools between October 2016 and May 2017[1] (Rapanta, 2019b).

1. Relevance and irrelevance in pragmatics

The first challenge for analyzing relevance is to define it. The aforementioned aspects or intuitive notions of relevance capture the ways in which relevance or irrelevance is manifested at specific communication levels (topic, argument, or utterance level). However, what have these manifestations of relevance in common? To describe relevance, it is useful to go back to its origin – or better to the origin of the modern concept thereof – namely Grice's philosophical theory of communication and interpretation.

According to Grice, our talk exchanges are characterized by cooperative efforts, namely the pursuance by the participants of a common purpose or direction of the dialogue (Grice, 1975, p. 45). This feature of conversation was captured in a specific maxim, or common presumption we rely on in communication, called "maxim or relation." As Grice put it (Grice, 1975, p. 47):

Relation. I expect a partner's contribution to be appropriate to the immediate needs at each stage of the transaction. If I am mixing ingredients for a cake, I do not expect to be handed a good book or even an oven cloth (though this might be an appropriate contribution at a later stage).

A relevant move is thus a move that is adapted to a higher and common purpose. The ordinary concept of relevance can be defined a relation characterized by five logical arguments (Gorayska & Lindsay, 1993, pp. 302–303): an Agent, pursuing a Goal (proving, informing, making a decision, etc.), through an Element (an utterance or dialogue move) of a Plan designed to achieve it, within its cognitive environment and resource limitations (speaker's knowledge can be different from hearer's) (Model). The structure can be represented as follows (Fig. 1):
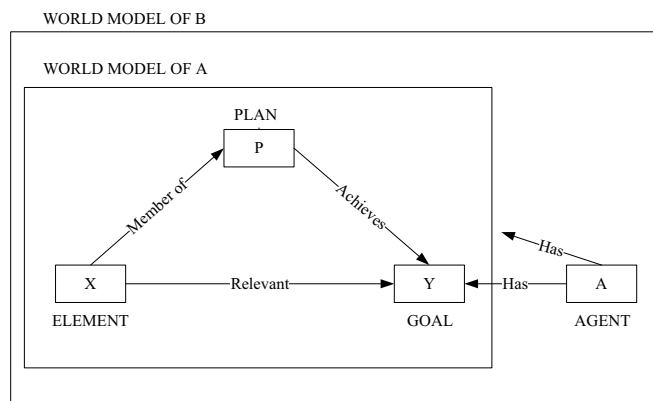

Fig. 1. Structure of relevance relation.

Relevance can be described as characterized by specific properties. It is a (1) relative, functional notion, as it is a relation between utterances and "concerns" or conversational demands (Holdcroft, 1987; Seuren, 1986, p. 125), (2) aimed at addressing a presumed (or expected) need or requirement of the conversation (Levinson, 1983, p. 306). For this reason, the judgment of relevance or irrelevance is (3) context dependent but (4) objective, as the appropriateness of a move is evaluated based on the presumptions that in the specific context need to be fulfilled (Gorayska & Lindsay, 1993). The last property is (5) scalarity. The relationship with the conversational demand (or the previous move) can be *explicit* at different degrees and requiring the reconstruction of a different number of premises needed for bridging it. In this sense, a move can be more or less relevant depending on the explicitness of the premises connecting it to the conversational demand.

The ordinary understanding of relevance can be illustrated using two examples drawn from the corpus. In the following exchanges from a civil education class, the teacher and the students are engaged in a dialogue concerning the rules that should to be complied with in school. The teacher previously instructed the students that they need to provide reasons for their opinion:

Case 1.

1. S1: A rule is to recycle.
2. T: To recycle, correct? Do you all agree or none agrees?
3. S2: Yes.
4. T: This is good. But why do you agree?
5. S2: Because it is a good rule.
6. T: Because it is a good rule. Speak, Luiz. What do you want to say, concerning this rule that Mariana proposed, what do you think?
7. S3: I think it is correct. Because I hate when my brothers enter my room and start to mess up everything. […]
8. T: They are upsetting your space. Therefore, to respect the space of everyone. What do you think? Respecting the space of everyone. Do you agree?

Case 2.

9. S4: Not using the mobile phone during the classroom.
10. T: Ah, the mobile phone. How should the mobile phone be?
11. S5: Do not make chaos.

These two excerpts represent typical cases in which classroom conversation is problematic. In both Case 1 and Case 2, the students fail to continue the dialogical activity. The purpose of the interaction, pre-established by the teacher, consists in supporting one's position towards a rule proposed. The moves of both Student 2 and Student 3 in Case 1 show a mismatch with the overall goal of the dialogue and the teacher's move. At 3, Student 2 replies to the teacher's request of opinion without providing any reason. After being requested to support her opinion, Student 2 simply expresses her value judgment on the conclusion, failing to comply with the teacher's request. At 7, Student 3 provides his opinion on the proposed rule, and gives a reason to back it up. However, the reason is not connected with the conclusion, and thus fails to achieve the goal that he intends to pursue. In Case 2, at 11 the student ignores the previous move, and contributes to the main goal of the discussion by adding a specific rule without considering the teacher's request of supporting the proposal made by reasons and specifying it. These two cases illustrate different instances in which the phenomenon commonly referred to as "relevance" fails, leading to repairs (Schegloff, 2007, p. 151), namely strategies for solving communicative problems.

The theories of relevance developed in pragmatics and linguistics, Relevance Theory (Sperber & Wilson, 1995) and the Coherence approaches (Giora, 1985, 1988; Van Dijk, 1976, 1977; Van Dijk & Kintsch, 1983), provide only partial explanations of the afore-mentioned phenomena (Macagno, 2018b). They fail to capture a characteristic that is crucially important in education, namely the relationship of a move with a common goal that the interlocutors pursue in their discourse. In these theories, discourse is regarded only considering one of its dimensions, either its "textual" aspect (the informational content of the moves, as in the Coherence approaches) or the hearer's interpretative process conceived in cognitive terms, as in Relevance theory. For this reason, relevance is analyzed only partially, considering only one or at most a limited number of its properties and its components. What is missing is an interactional approach that takes into account not only the subject matter of the dialogue or its cognitive effects, but also the activity that is carried out and co-constructed and how a move can contribute to it. In order to account for the different quality of students' argumentation and discourse in general, it is necessary to integrate the existing theories of relevance with the dimension of the pragmatic function of the discourse (or the preceding utterances in a dialogue) namely the "point" (Schank et al., 1982; Van Dijk, 1976, p. 55) or "conversational goal" (Leech, 1983, p. 99).

To address this challenge, we need to relate the components of relevance and their characteristics to specific indicators, which jointly combined can lead to a justified assessment – namely a codification of the relevance of a move. This relation can be developed by translating the components of relevance into specific dimensions, i.e. the coordinates of a move that can be evaluated. From the analysis of these dimensions, it is possible to detect a set of presumptions – or general criteria – of relevance, namely defeasible generalizations concerning what counts as a relevant or irrelevant move considering a specific dimension. These presumptions will be then used for drawing the indications and the procedure that allow connecting specific features of a move with the assessment of relevance.

2. Developing a coding scheme for relevance

The challenge of coding relevance is a fundamental one in educational studies (McCrudden & Schraw, 2007) and more generally

in the fields of research addressing the quality of dialogical interactions. The problematic aspect consists in setting out a procedure whereby coders can establish whether a move or turn in a dialogue is relevant. Coding relevance is extremely complex, as it requires considering the following dimensions that can be drawn from the aforementioned components and properties of the common understanding of this notion:

1. A *dialogical* dimension. Relevance is a property of speech acts and more specifically of moves in a dialogue. We can talk about relevance only when we consider what the speaker intends to do with his or her moves, and whether his or her intention is compatible with the current dialogue or dialogical setting (usually questions are replied with assertions; orders used as replies are usually perceived as irrelevant).
2. A *semantic* dimension. To be relevant, the moves need to address or be related to the same topic (normally I cannot continue a dialogue on climate change by commenting on a goal of a famous soccer player).
3. A *common-ground* dimension. To pursue the goal, and thus to be functional to a conversational objective, the moves need to be understood by the interlocutor, and the relationship between a move and the goal that it is intended to achieve need to be grasped by the latter (in Case 2 above, the relationship between "do not make chaos" and a reply to the question "how the mobile phone needs to be?" can be very hardly understood).

These three dimensions are partially analyzed by the three distinct approaches to relevance mentioned in the introduction. The linguistic theories addressing the aspect of "topical" relevance provided insights in its semantic dimension, while the pragmatic and argumentation approaches have focused especially on the dialogical (conversational) and common ground dimensions. These dimensions, however, are not independent parts, but only theoretical distinctions. They are intertwined, as their respective definitions show. It is impossible to provide a judgment of relevance only considering one dimension, as it would implicitly presuppose or imply the others. In the following subsections, these distinctions will be used for developing interrelated criteria for the assessment of the relevance of a move.

2.1. The dialogical dimension: relatedness of dialogic goals

The ordinary intuition of relevance rests on the concepts of "point" and "concern" of a communicative situation. As Seuren pointed out, an utterance can be considered as relevant when it "contributes something new to some concern of the moment," linking up with it (Seuren, 1986, p. 125). Grasping and addressing this contribution distinguish comprehension from mere understanding. An utterance, or rather a sequence pursuing a specific communicative goal commonly referred to as "move" (Pontecorvo & Girardet, 1993, p. 370), needs to be adequate to a joint or global conversational goal that is proposed and negotiated or developed in the previous utterances (Dascal, 2003, p. 37). The starting point for capturing relevance in discourse is thus the classification of the possible *joint* goals that moves can pursue. The "point" of a move needs to be described going beyond the standard correlation between grammatical form and illocutionary force underlying speech act theory (Sperber & Wilson, 1995; Strawson, 1964; Streeck, 1980), and take into account units longer than single utterances, the conversational situation (including the interlocutors' roles), and the interactive, joint construction of meaning (Allwood, 1977; Clark, 1996).

In education, the importance of the goal-directed dimension – which we specify as the interactional dimension of the units of discourse – and the need of identifying such pragmatic differences among the moves has been acknowledged as crucial for assessing the quality of students' writing and argumentation (Ferretti et al., 2009; Macagno, 2016), and improving the accessibility of information in written texts (McCrudden & Schraw, 2007). Nussbaum distinguished different types of interactional goals of questions, differentiating between teacher questions (moves aimed at seeking information that is presumed to be held by students), wonderment questions (moves requesting an explanation or the discovery of an explanation), clarifying question (requesting the definition or the explanation of the meaning of terms) (Nussbaum, 2003), and requests of support (assessing the acceptability of a claim) (Nussbaum, 2003, 2011; Nussbaum & Edwards, 2011). Moreover, the possibility of pursuing different dialogical goals (for example, in order to reach an agreement on the evaluation of a problem, it is useful to analyze how it can be solved) has been explored for the purpose of designing or facilitating classroom discussions (Nussbaum, 2011, p. 94).

The most complete existing description of goal-oriented types of dialogical interactions is provided by Walton's dialogue types (Macagno, 2008; Walton, 1989; Walton & Krabbe, 1995). Dialogue types can be translated into a system for classifying speaker's *proposals* to engage in a specific joint activity (such as exchanging information or making a joint decision), modifying the conversational situation in a specific way (Levinson, 2012, p. 107). In this sense, they can represent abstract dialogical goals that a move can pursue.

The moves can be classified in dichotomous categories, concerning 1) the level of dialogue, namely whether they negotiate the conditions of the dialogue (meta-dialogical) or begin, continue, or contribute to it (dialogical); 2) the level of action, namely whether a move aims at creating the conditions of cooperation (rapport building) or pursuing a joint action; and 3) the type of joint action (cognitive vs. practical). In turn, a cognitive joint action can focus on a) sharing or discovering new information, or b) establishing the acceptability of a proposition by assessing the pro and con arguments or evaluating the available evidence. Likewise, a course of action can be characterized by a common goal and a possible doubt concerning the means, or by different goals and the need of cooperation. These distinctions result in the following tentative classification of the most important and more generic dialogical moves (a detailed description of the moves and their criteria is provided in Macagno & Bigi, 2017, 2019; Macagno & Walton, 2017) (Fig. 2):
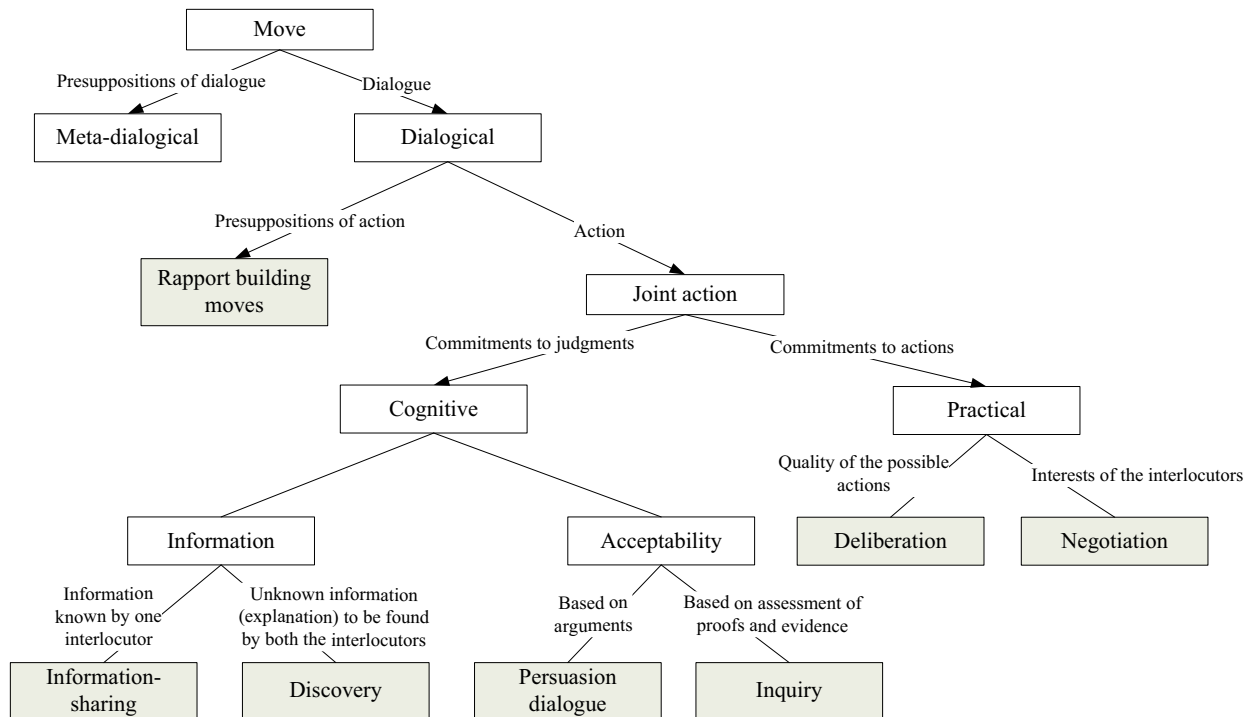
Fig. 2. Classification of dialogical intentions.

Clearly, this typology is only partial, tentative, and extremely generic, and can be adapted to different communicative settings, specifying further the moves that are considered as the relevant ones for the dialogical context (Macagno & Bigi, 2017, 2019; Rapanta, 2018). Table 1 describes the dialogue moves and illustrates them through examples from the aforementioned corpus (the relevant moves in the examples are marked in bold).

Table 1
Categories of dialogue moves.

Category (code)	Description of category	Example
Rapport building (E)	Dialogue moves aimed at managing an interaction, or establishing, building or correcting the interlocutor's relationship within a dialogue.	T: **You're talking simultaneously, and I can't understand! I've already asked you to talk one at a time**…
Information sharing (IS)	Moves aimed at acquiring and providing information, including information about previous understanding or comprehension.Starting point: One party lacks the information that the other has.	T: We've been talking about the excretory system and the two systems inside the excretory system: the Urinary System and the Integumentary System. We've been talking about that, it's… the functions, we've been talking about the different diseases. **What can contribute or, what measures can we implement to improve or excretory function?S: Drink a lot of water!T: Yes! Can you explain why?S: Because, if we drink water, the kidney won't be… the urine will be less concentrated and we won't waste it…S: Teacher the hydroxyls are the alcohols?T: They are, that's right.**
Discovery (Dis)	Dialogue moves aimed at finding an explanation of facts. Starting point: An unexplained fact.	T: Funny… yesterday… I experimented with the candle and it was clearly… faster! And I have a yellow flame… Yesterday, I figured out that it was faster with the candle! I also put a little of magnesium… S: **Isn't the air in the room too moist, teacher?**

(*continued on next page*)

Table 1 (*continued*)

Category (code)	Description of category	Example
Inquiry (I)	Dialogue moves aimed at finding and verifying evidence.Starting point: An existing explanation of a fact.	T: This is still a metal, don't forget this is not a paper sheet… and I'm using a… candle, maybe, if I wore a lamp… then you'll still…S: If it was a blue lamp it would be easier!T: **And why would it be easier if it were a blue flame…S: Because it would be hotter!T: And how do you know it would be hotter?S: Because I already knew… [ ] … (laughter)… through the evidence!**
Persuasion (P)	Dialogue moves aimed at providing reasons for or against the acceptability of a viewpoint. Starting point: A doubt on viewpoint	T: Your classmate said: Do not smoke! **And I was asking what…whether or not you agree that not smoking also for the system…we we're talking about the excretory function, what do you think?** S: **Yes I do.** T: But, why? S: **It's because…because…the cells…It kills the cells and… and…provokes cell's death.**
Deliberation (D)	Dialogue moves aimed at solving a practical issue or suggesting a specific type of behavior. Starting point: A practical problem (a decision to be made)	S1: Teacher? But, how is it… if we put protector, we don't capture any vitamin D? if not it is also wrong to put it… I apply protector or absorb vitamin D? that's not right… we need to have the protector T: **So? How do we fix it?** S2: **We should sunbath during the least hot hours!…that is…we can't get sun between 10 in the morning and 4 afternoon…** T: Now, why is this happening, I haven't got a clue… but it has to… I even think it's funny… **I think you could help me think about why this is happening!** S: **Teacher what if you try both things at the same time… [then you would burn] even to burn and then all the heat focus would be greater…**
Negotiation (N)	Moves aimed at making a joint decision on a problem or task satisfying the interests of all or most the interlocutors. Starting point: A problem or activity to solve together with the contributions of the whole group.	S1: In order to have a stable family, we need S2: **It is necessary!** S1: **It is necessary, agreed!** S3: **It is necessary to have rules!** S1: What kind of rules? S2: **To stay with the family** S3: **To have rules and to spend time with the family** S1: But what kind of rules? S3: Rule, such as having a day per week S1: Having rules is this! S2: I disagree. S4: **Then to have obedience** S1: **Collaboration….**
Meta-dialogue	Moves aimed at clarifying the meaning of other moves. Starting point: A misunderstanding or some unclarity issue.	S: I hate when my brothers enter my room and start to mess up everything. T: **What are your brothers doing??** S: **To upset it.** T: **They are upsetting your space. Therefore, to respect the space of everyone.**

These distinctions can be useful instruments for capturing the purpose of a move and providing a first indication for detecting the cases of pragmatic inappropriacy (Humphreys-Jones, 1986, p. 100; Macagno, 2018c; Tzanne, 2000), namely when an interlocutor is ignoring the other's move and continues the dialogue not constructively, without integrating the other's contribution thereto (Nussbaum, 2003). The incoherence between the moves needs to be assessed carefully, taking into account not only the previous move but the overall goal of the exchange (a move can be inhomogeneous with the previous one but homogeneous with the overall purpose of the dialogue). Moreover, inhomogeneous moves are not necessarily irrelevant, but represent a shift in the dialogical intention that can be irrelevant in specific circumstances. Thus, the difference between the type of move performed and the overall dialogical goal of the conversation in which it occurs is an indicator that can lead to the further assessment of the other dimensions of relevance.

The detection of the purpose of the moves and the conversational goal is complex and depends on several presumptions that can be used at the same time (Macagno & Bigi, 2017, 2019), such as the ones related to the conversational setting, the topic and the interlocutors' roles, and the linguistic manifestation (syntactic structures, pragmatic markers, etc.). Clearly, the detection of the

communicative intention in institutionalized settings relies on more and clearer (more explicit) indications than exchanges occurring in "peer-to-peer" settings. In our corpus, for example, the interaction between teacher and students is governed by the specific goal that the teacher sets out at the beginning and imposes to the students. In case of students freely discussing with each other, the identification of the joint goal becomes more complex – and in some cases impossible. The judgment of relevance would be then more uncertain, as it would be guided only by the coherence between the individual moves.

2.2. The semantic dimension: relatedness of topics

The general categories of joint action can be used as a pragmatic principle for detecting general cases of incompatibility between the interlocutors' global goals. However, the relatedness of communicative goals is neither a sufficient nor necessary condition of relevance, as a proposed action can be pursued through a different one necessary for achieving it (a proposal can be followed by a request of information), and two actions of the same kind can concern incompatible topics. We referred to this aspect as the semantic dimension.

The problem of the relatedness of the topics is complex, as it involves two distinct types of relation, namely identity (or similarity) and inference. Two moves can be related either because their specific topics are the same or similar, or because they are different, but a link between them is made explicit or can be reconstructed and is acceptable in the given context. In linguistics, this relationship is usually assessed in terms of coherence, namely the relationship between a proposition expressed by a discourse segment and a discourse topic, which in turn is conceived as a prototypical proposition (representing a predicate attributed to a noun phrase) under which the other propositions of the discourse can be subsumed (Giora, 1985, p. 711). The discourse topic is understood as a "summary" (Van Dijk, 1976, p. 57, 1977; Van Dijk & Kintsch, 1983, p. 273) or a generalization that makes explicit the global meaning of a discourse (Giora, 1988, p. 549). As Giora maintains, the discourse topic provides a principle for organizing discourse, and not merely the relations between sentences (Giora, 1985, p. 711):

> In order for a text segment to be coherent, it is not enough for it to be interpretable as being about an NP as its discourse topic. Its range of predicates, too, has to bear a relevance relation to or be subsumable under the discourse topic, which should thus take the form of argument and predicate. Hence a coherent text segment that seems to revolve around an NP as its discourse topic is in fact a text segment that has an NP and a subsuming predicate for its discourse topic.

The semantic dimension of relevance, namely coherence, can be described as an inferential (usually genus-species) relation of a text segment to the discourse topic, i.e. the general message that the discourse is about.

The coherence requirement can explain why the moves in Case 2 above are perceived as unrelated. "Not to make chaos" is presented by the student as connected to the topic of "ways of keeping the mobile phone in the classroom." The two topics are not similar, and the only relation that can be found is that in certain conditions mobiles phone are causes of chaos. However, this information it is made explicit by the student, and considering the existence of other simpler interpretations (the student wanted to provide a general rule), it is hard to presume that this is the most reasonable one. Moreover, it is hardly acceptable by the interlocutors, as it does not explain how refraining from chaos can be considered as a way of storing the mobile phone.

2.3. The common-ground dimension: relatedness of presuppositions

The classification of the dialogical goals is necessary for defining better the notion of "concern" of a relevance relation and how two concerns or "points" of a move are incompatible. The compatibility between the points, however, does not result automatically in the relevance of a move to another, as the topics can be unrelated. However, when discussing this relationship, an additional aspect of relevance emerged, namely the interlocutor's possibility of grasping and accepting it. In pragmatics, this aspect is analyzed in relationship with the common-ground between the interlocutors (Atlas, 2008; Macagno & Capone, 2016; Stalnaker, 2002), namely the propositions that the participants to a dialogue can presume to be shared, i.e. known and accepted, among them.

The common-ground dimension captures the possibility of a move to contribute to the conversation by meeting the conversational needs (Bing & Redish, 2009; Van Fraassen, 1980). Van Fraassen (Van Fraassen, 1980, p. 142) pointed out how relevance is a relation concerning not only the conversational "topic" (a discourse topic), but also the "contrast class" namely the contribution to the part of the common ground concerned by the topic. This aspect is compatible with Kuhn's notion of integrating the interlocutor's viewpoint, as a move that does not take into account what has been previously claimed by the interlocutor can hardly be considered as relevant (it does not fall into the "class" of contributions that are taken into account). Moreover, it captures the common understanding that moves merely repeating what has been said or what is already known are commonly perceived as irrelevant (they do not add anything to the common ground).

The common-ground dimension is essentially related to the semantic dimension (coherence). As pointed out in the previous subsection, the relationship between the topics is grounded on the hearer's possibility of retrieving their relationship. If the hearer cannot understand and accept how two topics are related, and unless the speaker makes explicit the premises not directly retrievable from the context and the common ground, the two moves are perceived as unrelated.

The common-ground dimension can be captured considering two conditions: the accessibility and the acceptability of the premises needed for linking a move with the topic and the conversational needs. To represent these conditions, we can imagine the relevance relation in terms of inferences, based on *topoi* or warrants. A move U is *relevant* to a communicative purpose expressed in the previous utterance(s) Q if there is a sequence of argumentation leading from the message expressed by U (represented as a premise) to a conclusion that is compatible with Q (see also Walton, 2007, p. 114). If we conceive the "point" (y) of a move (x) as a

possible conclusion that fits in the concern of the exchange, the relevance of such a move can be assessed by trying to reconstruct the general inferential rule (the warrant) linking *x* and *y*. This reconstruction can lead to two possible outcomes. In the first case, the move cannot support the conclusion, as the conclusion that it presumptively supports is different from the category of the ones that can provide a contribution. The cases analyzed so far illustrate this failure, including the most problematic Case 2, in which in lack of an explicit connection between "ways of storing the phone" and "chaos," the two topics are considered as unrelated and thus pursuing different goals. In the second case, the move *can* support a relevant conclusion, but this relation can have different degrees of relevance, which depend on the *number* and *acceptability* of the implicit premises needed for connecting the move to its potential contribution, i.e. guaranteeing its relationship with the conclusion expressing the "point" of the move for the concern (Clark, 1977, p. 261; Freeman, 2005, p. 192; Pennington & Hastie, 1991, p. 528; Walton, 2014, p. 198).

The degrees of relevance depend on the availability of the additional premises needed for connecting a move to the conclusion, namely on *explicitness*, an indicator of argumentative quality commonly used in education (Erduran et al., 2004). If the intended relationship between a move and its "point" is based on premises that are not obvious and are left unstated, it can lead to different interpretations, which need to be compared and evaluated. This process is much more complex and effortful than the case in which the tacit premises are commonly shared, and the potentially unshared ones are stated. In this circumstance, the relationship would be clearly communicated, avoiding possible interpretive doubts. The perception of relevance depends on this possibility and easiness of retrieving the implicit relation, namely to its explicitness. Explicit premises, namely assumptions made manifest, require less effort for retrieving them and they can be strongly attributed to the speaker based on clear evidence (Sperber & Wilson, 1995, p. 45). Some premises can be left implicit because they are shared (Kecskes & Zhang, 2009), namely frequently used and not conflicting with the other existing commitments (or from a cognitive perspective, assumptions) (Sperber & Wilson, 1995, p. 77). However, when they are not accepted or not acceptable, the relevance relation can be perceived as weak or even inexistent. Clearly, it is not possible to know the other's mind, namely what s/he knows and accepts. However, it is possible to know what is commonly held as acceptable based on the previous dialogues, and what is commonly considered as not acceptable (Macagno, 2018a).

The common-ground dimension of relevance can be thus assessed based on the criteria of explicitness and acceptability. The higher the number of implicit premises required to bridge the logical gap between a move and the "point" (Leech, 1983, p. 99), the weaker its relevance (Kintsch & Van Dijk, 1978; Van Dijk & Kintsch, 1983, p. 45). The less acceptable (namely controversial) such implicit premises, the weaker the relevance.

2.4. The presumptions of relevance

Considering the three dimensions of relevance described above and the analysis of the possible indications that they can provide on the relevance of a move, it is possible to set out a series of presumptions that can be used for the assessment of dialogues and more importantly the development of the criteria for coding relevance:

Criterion 1 Different general dialogue moves can be a *sign* of *irrelevance* (they are judged as certainly irrelevant when they are incompatible, i.e. after assessing Criteria 2 and 5);
Criterion 2 Different general dialogue moves with unrelated topics are *usually irrelevant* to each other;
Criterion 3 Same general dialogue moves with different or unrelated topics (different specific moves) are *usually irrelevant*;
Criterion 4 Same general dialogue moves having the same or related topics (same or similar *specific* moves) are *usually relevant*.
Criterion 5 A move that cannot be presumed to contribute to the point of the previous one(s) is *irrelevant*. A move is presumed to fail to contribute to the point when the relation between *U* and other moves:
a. Is based on premises that are *not explicit, and*
b. It is *not* possible to reconstruct the *implicit* ones, *and*
c. The *reconstructed* premises *not acceptable.*

These criteria are not normative, as they provide guidelines for detecting the possibility of an irrelevance. The sign of an irrelevance simply indicates a potential problem, which can be confirmed by the other criteria. For example, the difference between the types of moves (criterion 1) can arise the suspicion of irrelevance and justifies the analysis of the coherence between their topics (criterion 2); then, in case of doubt, the analyst can assess the possibility and the strength of the contribution of one move to the point of the previous one (criterion 5). The order of these presumptions follows the criterion of the number of dimensions taken into account. The most basic presumption is the first one, which is based only on the identity between the types of dialogue moves, regardless of their topic. The second, the third, and the fourth presumption combine the pragmatic criterion with the semantic one, while the fifth one is focused on the common ground and presupposes both the pragmatic and the semantic dimension (the "point" of the moves needs to be reconstructed).

3. A coding scheme for relevance

The five criteria described and illustrated in the previous sections translate the variables on which relevance depends into presumptions, which can be used indicators of irrelevance or relevance. As pointed out above, the presumptive nature of such criteria leads to defeasible assessments; however, the combination of two or three criteria can lead to hardly rebuttable judgments. This background can be used for developing a coding procedure and a coding scheme for assessing relevance, of which this paper intends to provide a first outline.

The coding procedure sets out the steps that an analyst can follow to assess the relevance of a move. This procedure can be conceived as a sequence of questions leading to binary (yes or no) answers, starting with the ones concerning the types of moves (the coherence between the goals of the moves) (1) and moving to the consideration of the topic (2) and then of the background (3). The succession of the steps is indicated with an arrow, whose color intensity increases according to the answers given, leading from the state of lack of hypothesis concerning the relevance of a move to the judgment of relevance. This arrow represents the strength of the relevance assessment based on the presumptions relied upon. If we consider only question 1, we rely only on the simplest type of criterion (presumption), and our assessment can be subject to error unless we have other evidence. However, if we combine this criterion with the other ones, our assessment becomes less defeasible. A similar representation has been provided for the judgment of irrelevance: the intensity of the three arrows connecting the question with the judgment of irrelevance increases when more questions are replied negatively. The procedure can be represented as follows (Fig. 3):
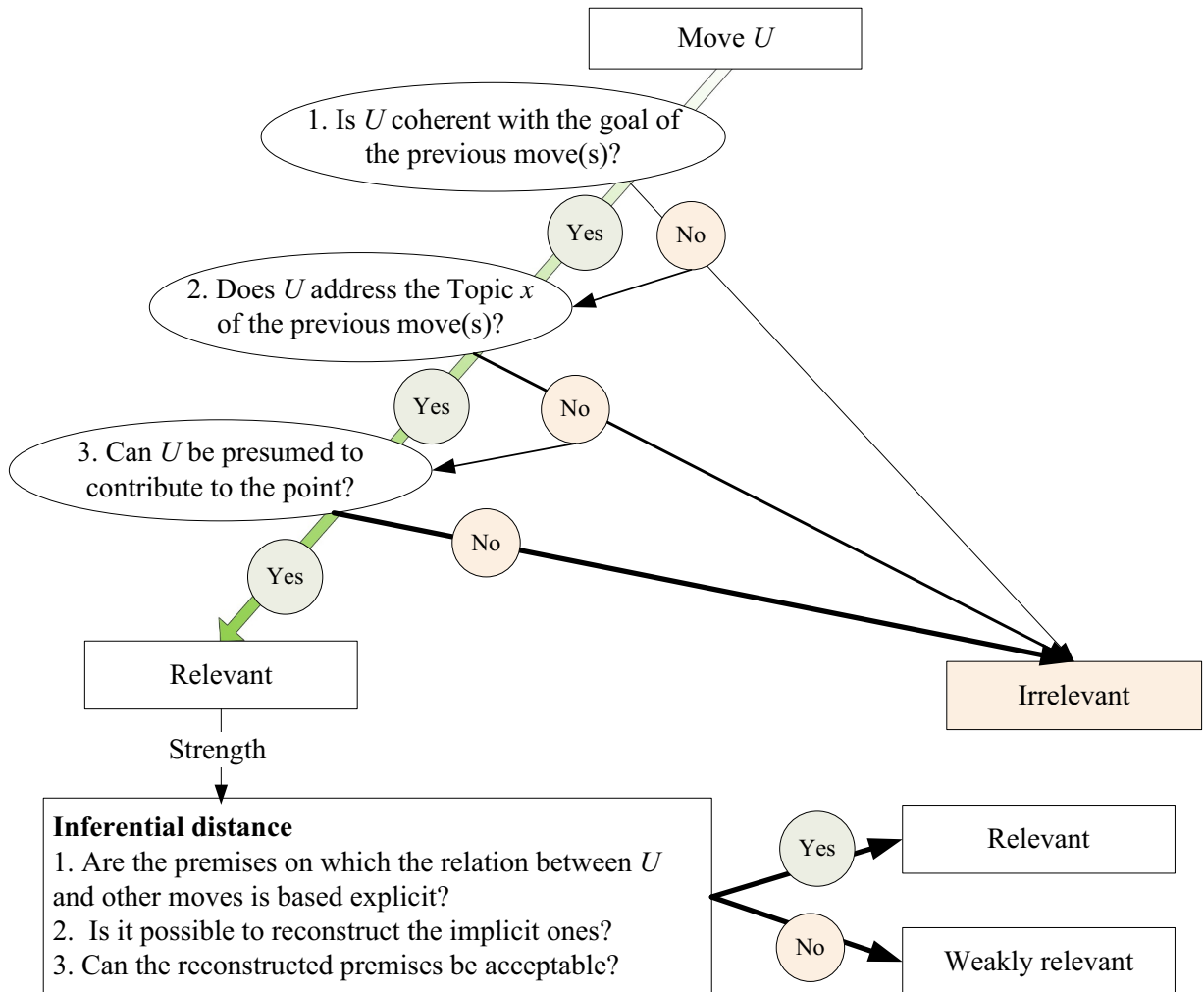

Fig. 3. Assessing relevance.

This procedure can be used for detecting the possibility of irrelevance, and then focusing on the specific moves that are perceived as irrelevance by analyzing at different levels of depth. The same criteria used for developing the succession of steps are the basis of the coding scheme, which includes the same three categories: Irrelevant, Weakly relevant, and Relevant. Each category is defined based on the distinct dimensions of relevance (pragmatic, semantic, and common ground), and described according to the indicators (criteria) (Table 2):

Relevance assessment	Characteristics
Irrelevant	1. Different general dialogue moves (Criterion 1).
	2. Topical incoherence.
	a. Different general dialogue moves with unrelated topics (Criterion 2).
	b. Same general dialogue moves with different or unrelated topics (Criterion 3).
	3. Lack of contribution to the point (Criterion 5). Move *U* fails to contribute to the point as:
	a. It cannot possibly accomplish the goal purported as it not connected to it; or
	b. It fails to increase the common ground.
Weakly (scarcely) relevant	1. The premises connecting *U* with the *Topic x* or goal are implicit and can be reconstructed (accessible), but cannot be presumed to be acceptable; or.
	2. The connection between *U* and the *Topic x* or goal is implicit and can be reconstructed only by supplying poorly acceptable premises (low accessibility).
Relevant	Contribution to the point
	1. *U* is coherent with the goal of the previous moves; and
	2. *U* addresses the Topic x of the previous moves; and
	3. *U* contributes to the "point" as:
	a. It is connected to it *explicitly* or it is possible to retrieve the premises connecting *U* with the point *(Topic x and goal)*; and
	b. It contributes to the common ground.
	Accessibility (grades of relevance)
	1. All/most/many/few premises connecting *U* with the Topic x or goal are *explicit*; and
	2. All/most/many/few implicit premises can be easily reconstructed (accessible); and
	3. All/most/many/few implicit premises can be presumed to be acceptable.

The level at which we perceive an irrelevance (whether at the level of the goal of the move, or the topic, or the common ground) can be used also for explaining the perceived seriousness of the irrelevance. A *move incoherent* with the type of move required by the previous one(s) necessarily fails to contribute to the common ground, even though it addresses the same topic. A move coherent with the type of move required but addressing a *topic incompatible* with the one under consideration fails *a fortiori* to contribute to the common ground. These two cases are perceived as more problematic than a move's *lack of relation* with the interlocutor's common ground, as they imply the last type of irrelevance, while the last one presupposes the compliance with the two first conditions. The seriousness of the irrelevance needs to be distinguished from the criteria (presumptions) indicated above. The *incoherence* of a move and the *incompatibility* of the topic are assessments that can be made based only considering the three aforementioned dimensions, and thus the corresponding presumptions.

4. Coding relevance in different educational settings

The procedure described above and the criteria (presumptions) set out can be used for assessing the relevance of moves in different situations. Considering the corpus collected, characterized by institution (one public school in Portugal) and age (middle grade students), it is possible to identify different types of irrelevance, whose identification and justification will be illustrated in the following subsections. The criteria used for assessing relevance can be applied to different types of settings.

4.1. Incoherence between the moves

The clearest case of incoherence between the moves is Case 1. In this excerpt, the teacher is engaging in a persuasion dialogue, and at move 4 she underscores the proposed action ("But why do you agree?"), requesting arguments and reasons. However, at 5 ("Because it is a good rule") the student continues the dialogue disregarding the persuasion goal proposed and advances her own evaluation (information sharing). The evaluation is based on the following steps:

1. The move is different from the requested one (information sharing vs. persuasion) (criterion 1, presumption of irrelevance);
2. The topic is the same;
3. The move cannot possibly accomplish the goal required by the preceding move (criterion 5a), as it is unrelated to the type of implicit conclusion needed ("*reasons* to agree with the rule").

In this case, the irrelevance is perceived as incoherence, as the moves are incoherent, even if they share the same topic. The interlocutors are perceived as engaging in two different dialogues.

The same type of irrelevance can be found in the following case (civic education class):

Case 3.

1. T. The rule of having time for studying does not make sense in school. Now, let us all think why studying is what one does at school. […]
2. S. I have got a rule that I have made up at home!
3. T. Wait! Can't we focus on this first?

At 1, the teacher is proposing a persuasion goal, requesting the students to find reasons pro or against considering studying the only activity characterizing the school. However, at 2 the student ignores the goal, and engages in the proposal of a new rule that he

developed at home and wants to be considered (deliberation). Here, the Criterion 1 (difference between the moves) results in a presumption of irrelevance that is confirmed by Criterion 2, as both the general type of move and the topics are different.

Case 2 above is similar, but slightly more complex. At move 11, the student advances a proposal ("Do not make chaos"), namely a deliberation move, as a reply to the teacher's request to *specify* further and *justify* another preceding proposal ("How should the mobile phone be?").

1. The move is different from the requested one (deliberation vs. persuasion/specification of a preceding deliberation move) (criterion 1, presumption of irrelevance);
2. The topic is not the same (criterion 2, presumption of irrelevance);
3. The move cannot possibly accomplish the goal required by the preceding move (criterion 5a), as it is unrelated to the type of implicit conclusion needed ("*specification* or *justification* of the proposed rule").

The assessment of this case depends on Criterion 2, as the incoherence between the moves is not straightforward (the dialogue could move forward, as a specific deliberation move could be coherent). The incoherence is confirmed considering the relatedness of the topics, as the general topic of chaos is not related to the very specific one concerning the way mobile phones should be kept in classroom.

4.2. Topical incompatibility

A more complex type of irrelevance assessment concerns the incompatibility between the topics addressed by the moves. We consider the following example (civic education class):

Case 4.

1. S1: To take care when we cook
2. T: To take care when we cook…
3. S1: It is clear, so that we do not get burned.
4. T: Yes, but we need to take care only when we cook?
5. S1: No.
6. S2: We need to take care of the feelings of the others.
7. T: Here we are. We need to take care of the feelings of the others.
8. S3: What has cooking to do with feelings?
9. S2: My mother cooks a dinner that she thinks is very good, and I think it is bad and my mother can feel, like…

In this example, at turns 1 and 3, Student 1 is providing a justification for a rule of good behavior proposed. However, the justification concerns the topic of performing an operation, not adopting a behavior towards the others, which is the subject matter of the main activity. The assessment is based on the following steps:

1. The move is the same as the requested one (persuasion);
2. The topic is not the same (operation vs. behavior) (criterion 3, presumption of irrelevance);
3. The move cannot possibly accomplish the goal required by the preceding move (criterion 5a), as it is unrelated to the type of implicit conclusion needed ("justification of adopting a specific behavior *towards the others* in the activity of cooking").

For this reason, Student 1 is irrelevant because he fails to connect his move with the general topic of the discussion. At turn 4, the teacher is trying to bring the conversation on the subject matter of the discussion, and at turns 5 and 6 the students provide relevant replies, as their moves are both pragmatically and topically coherent (Criterion 4). At turn 8, however, Student 3 addresses the relationship between the previous moves, taking the teacher's move at 4 as a development of Student 1's move, and not as a repair of his irrelevance.

In the following move, Student 2 tries to make explicit the relation between the topics of move 1 and 6, which, however, requires adding a high number of premises that could not have been retrieved considering what was said in the two moves and the overall context of dialogue. For this reason, the interlocutors cannot be expected to reconstruct a very specific premise (concerning the example of a mother cooking and getting frustrated by the child's dissatisfaction) when no hint or indication thereof is provided. This latter type of relation needs more specific analyses, namely the assessment of its possibility to contribute to the common ground and, in case it is judged as relevant, the strength of its relevance.

4.3. Failure to contribute to the common ground

The failure to contribute to the common ground can be caused by either the lack of relation of a move with what has been previously granted (such as in Case 2 and Case 4) or the failure to increase the granted knowledge in the required way. A clear example in which these two criteria combine is the following (civic education class):

Case 5.

1. S1. I think that Laíssa can be wrong as there are people that play during the classes while they should study. And then there is time

for playing.

2. T: When?
3. S1: In the breaks. […]
4. S2: I agree with Laíssa because a break is for breaking, for avoiding that we spend the whole morning closed in a room.
5. S3: Yes, we can use it for playing.
6. S2: Obviously we can use it for playing, but the point is that come to school only thinking about the break, not about the classes. […] For them what matters only is the break.

The move of Student 3 at turn 5 can be considered as irrelevant because Student 3 merely repeats what Student 2 takes already for granted at turn 4 (based on the preceding turns), and at the same time fails to contribute to the dialogue. As a result, at turn 6 Student 2 underscores the fact that the contribution misses the point, reinstating the contribution of her move. The assessment can be made as follows:

1. The move is the same as the requested one (persuasion);
2. The topic is the same (meaning and use of the breaks) (criterion 4, presumption of relevance);
3. The move cannot possibly contribute to the common ground, as it is unrelated to the type of implicit conclusion needed (reasons for defining breaks and distinguishing them from the rest of the school activities) (criterion 5a, presumption of irrelevance) and repeats an already granted piece of information (criterion 5b, presumption of irrelevance).

The failure to contribute to the point of the preceding move(s) can be more complex to capture. For instance, we consider the following information-sharing exchange between teacher and student in a biology class. The dialogue concerns the excretory system, and more specifically the importance of drinking water for the urinary system:

Case 6.

1. T: Your colleague was talking on an operation level of the urinary system, of course… Duarte added why ⟨drinking a lot of water⟩ is important to…?
2. S: … skin hydration!
3. T: skin hydration… but… Luiz had not finished yet… it's… he was…… are two things, of course that… they work together, it's logic. … but, we were talking about two different things. One, very well, it's skin hydration. But, Luiz was still talking about the importance of water for the functioning of the urinary system. He… was talking about the functioning… of water to…, the drinking of water for the functioning of the integumentary system, therefore, the skin!

In this exchange, the teacher is requesting information on a specific topic, the importance of water for the functioning of the urinary system. The student's reply addresses the communicative goal of the teacher, but not the specific topic of the move. The student's move can be considered as irrelevant based on Criterion 5a): even though the topics are related, it cannot possibly contribute to informing the fellow students on how water can be important for the functioning of the *urinary system*.

A similar example, but more controversial, is Case 7, taken from a chemistry class and concerning the topic of the transformation of matter and the generation of energy.

Case 7.

1. T: We will only put here (writes on the board) "gained energy." Therefore, in Eduardo's group, the atoms had less energy, they linked together and, therefore, there was more energy and it was released in form, in form of light
2. S1: A while ago you said that there was generated energy, but it is true that the energy is not lost, it's only transformed… Right, but you said they generated… It's was only an observation […] But according to what you are saying, the energy cannot be generated.
3. S2: The generator, the principle of the generator, is that you have a magnet that comes back in a copper wire, which generates a bobbin, and this makes the […] kinetic energy then as it turns round, it also creates an electromagnetic charge which produces electric energy, therefore, the generator produces electric energy.
4. T: Gonçalo, I'll ask you a favor, your argument is well said, but it can be confused with a physical phenomenon here. But we are talking about a chemical phenomenon here, the appearance of a new substance! This is just for us not to deviate, I understood the context of generator, but it's for us not to forget that we are in the production of a new substance.

Student 2's move (at 3) can be regarded as irrelevant despite the goal (discovery) and the topic (the generation of energy) are the same. The assessment is thus focused on the two aspects of Criterion 5, which involve the analysis of the context. The class is engaging in a discovery dialogue aimed at explaining the chemical phenomenon of the transformation of matter. The move of turn 3 provides information that concerns the same general topic but considering a different field (physics). The assessment of this example depends on the overall purpose of the dialogue. In this specific context, the teacher is imposing a specific objective, explaining a phenomenon from a sole and specific perspective (chemistry). For this reason, the student's move is unrelated to the common ground, and thus cannot possibly accomplish the goal requested by the dialogue (the explanation of a *physical* phenomenon vs. the explanation of a *chemical* one) (Criterion 5a). Moreover, the student is repeating information already shared, which cannot increase the common ground concerning the specific topic. Therefore, the move fails to increase the shared knowledge (Criterion 5b). This interpretation, however, can be considered as controversial, as physics is in most educational dialogues regarded as relevant to chemistry, and the move can be perceived as intended to broaden the dialogue to other disciplines. The assessment of the common ground dimension is in this case more complex as involving the specific purpose of the dialogical

exchange – whether it is intended to provide a *specific* type of explanation or finding *possible* explanations.

4.4. Degrees of relevance

As pointed out above, the possibility to contribute to the point of a move needs to be distinguished from the degrees of the relevance relation. To assess the latter dimension, we need to take into account the premises that are needed for relating the move to its relevant conclusion (the contribution) and evaluate their number and acceptability (Macagno, 2018b; Macagno & Walton, 2017, Chapter 5). The analysis of the degrees of relevance can be illustrated through the following interaction between the teacher and a student concerning the failure of an experiment in a chemistry class (the magnesium fails to ignite after exposed to the light of a candle):

Case 8.

Teacher: Weird… [ ]… maybe I'll take… yesterday I used a candle…
Student: Why don't you rather use a light bulb?
T: There is a reason for not using a light bulb!
S: Because it's too scientific!
T: Oh! Gonçalo, I wouldn't come with the candle if I hadn't experimented it… first… so, there was a reason for the candle… later, you'll also say why I wanted… the candle, all right?

In this interaction, the teacher addresses two distinct moves. First, the student makes a proposal for solving a problem, and the teacher refuses it. Her reply is relevant, as it continues the dialogue excluding the advanced proposal. However, her move leads to a justification, which is sought by the student in the following move. The student is trying to discover the reason why a bulb cannot be used and is proposing a possible explanation. Again, the teacher addresses the purpose of the student's moves, as she indicates the existence of a reason for her preference (she experimented the candle first). However, her reply is circular, as it fails to provide explicitly reasons for excluding the student's proposal. The set of implicit premises that are needed for connecting the teacher's move to the conversational goal reconstructed from the dialogue can be represented as follows (Fig. 4):
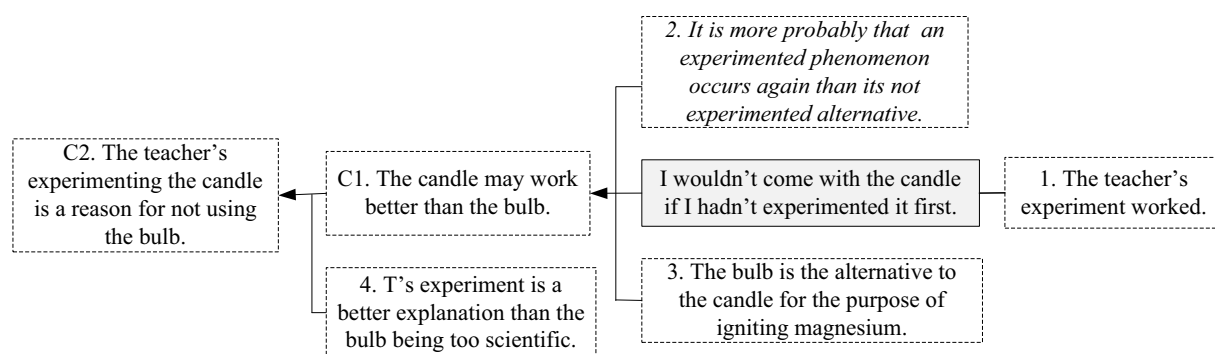

Fig. 4. Scalarity of relevance in Case 8.

This analysis shows a possible reconstruction of the relationship between the possibly intended purpose of the teacher's move and the student's discovery move. The student may take teacher's move as intended to provide an explanation, better than the student's, of the choice not use the bulb. The teacher's move (in grey) can support this implicit conclusion (distinguished in C1 and C2) only by reconstructing some tacit and necessary premises (represented as premise 1–4). In particular, the tacit major premise (Premise 2) can be hardly presumed to be acceptable, as the successful use of an instrument does not imply that the unexperimented alternative may not be equally successful. The inferential relation between the move and its contribution to the point depends on several implicit premises that can be hardly accessible to the student. For this reason, it can be judged as only *weakly* relevant.

5. Conclusion

The assessment of the quality of argumentative discourse, both verbal and written, presupposes the intuitive notion of relevance. A move, before being judged as expressing a better or a more complete or critical argument, needs to be assessed as relevant; however, in the literature, the criteria and the procedure for such an assessment have never been provided. The coding scheme and procedure developed in this paper set out some tentative criteria, which identify the different conditions of relevance concerning its three distinct dimensions. The five presumptions that are used as guidelines for determining the relevance or the irrelevance of a move and the degrees of relevance, are only defeasible and extremely problematic if used separately. However, when jointly used, they can lead to assessments that can be reliable.

The assessments of relevance, weak relevance, or irrelevance are clearly judgments on the quality of the relations between moves, namely actual instances of discourse. They are judgments that concern the structure of discourse, not the intentions of the interlocutors.

The explanation of why speakers are irrelevant depends on multiple factors and different circumstances. Irrelevant moves can be caused by lack of understanding or misunderstanding of the purpose or the goal of the dialogue (Bazzanella & Damiano, 1999; Humphreys-Jones, 1986), but also by other elements, including the speaker's incompatible dialogical intentions. In teacher-students discussions, students can be irrelevant not only because they do not understand the subject matter under discussion, but also because they are distracted, or want to engage in a type of dialogue different from the ongoing one. In students' interactions, characterized by the lack of the strict control of the communication (and the joint conversational goal) by the teacher, irrelevance can be explained in terms of negotiation between the different goals of the students (for example, engaging in the proposed activity or using the interaction for having fun).

In this perspective, the detection, justification, and assessment of relevance can be a fundamental instrument for educational research. The coding scheme of relevance has been applied in this paper to the analysis of dialogical exchanges but can be even more easily used for coding the relations between written statements in argumentative essays – which presuppose a clear and stated dialogical goal and topic. For this reason, the coding of relevance can be used primarily for assessing the quality of students' written and oral arguments, a fundamental dimension of the argumentative skills that the research in the field of argumentation and education aims at improving. The assessment of the quality of the relationship between the interlocutors' contributions can be also used to measure the engagement of the students, or their understanding of the topic under discussion.

This proposal is only a first step in the attempt to transform the abstract notion of relevance, commonly determined subjectively, into an objective variable that can be measured and justified – and thus validated. This paper intended to gather and build on the research in the fields of pragmatics, discourse analysis, and linguistics to develop some criteria for assessing relevance in an objective and justifiable way, so that the analyses of different analysts can be compared and Rapanta, 2019a discussed. The analyses proposed of the examples can be controversial, but they can be justified and challenged based on the application of the very criteria on which they are grounded. In this sense, the disagreements between raters can be resolved through discussion and reliance on other analytic instruments (such as the coding schemes for dialogue moves).

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