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Lucchini, Costanza; Rocci Andrea; Battaglia, Elena; Boogaart, Ronny; Garssen, Bart; Jansen, Henrike; ... ; Reuneker, Alex

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Epistemic and Evidential Expressions as Context-Specific Argumentative Indicators in Institutional Dialogues

A Corpus Study of Interactions in the Financial Domain

COSTANZA LUCCHINI, ANDREA ROCCI & ELENA BATTAGLIA

Institute of Argumentation, Linguistics and Semiotics
Università della Svizzera italiana
Switzerland
costanza.lucchini@usi.ch

Institute of Argumentation, Linguistics and Semiotics
Università della Svizzera italiana
Switzerland
andrea.rocci@usi.ch

Institute of Italian studies
Università della Svizzera
italiana Switzerland
elena.battaglia@usi.ch

ABSTRACT: This paper presents initial results from a corpus study aimed at exploring the argumentative function of evidential expressions in financial dialogues. We assume a macro-argumentative perspective to verify the hypothesis that evidentials correlate with argumentative moves, focusing on inferential and hearsay. We find both inferential and hearsay markers to be highly correlated with argumentative discourse units with hearsay evidentials occurring in premises and inferential ones occurring along the argumentative inferential chain.

KEYWORDS: argumentative indicators, earnings conference calls, epistemics, epistentials, evidentiality, financial communication, macro-argumentation, micro-argumentation

1. INTRODUCTION

The relevance of argumentative indicators as linguistic cues for argumentative reconstruction has been already noted in several studies. Van Eemeren et al. (2007) highlight that argumentative indicators, i.e., “all words and expressions that refer to any of the moves that are significant to the argumentative process”, are “keystones in discourse” that can “facilitate the identification and reconstruction” of such moves. The reconstructive task can be a complex one for human analysts, let alone for algorithms, given the highly implicit nature of argumentation itself. Argumentative indicators, which guide the identification of argumentative moves and relations and which, moreover, constrain the argument schemes at issue (Musi and Rocci, 2016; 2017), are a useful tool for

reconstruction by human analysts and for automatic argumentative Argument Mining tasks.

Previous works (Musi, 2014; 2015; Musi & Rocci, 2016; 2017; Rocci, 2008a; 2008b; 2009; 2012; 2017; Rocci et al., 2019; Miecznikowski & Musi, 2015; Miecznikowski, 2015; 2018; 2020) showed that linguistic markers of evidentiality and epistemic modality, namely linguistic markers that express respectively the source of knowledge and the degree of certainty, can serve as argumentative indicators. Musi and Rocci (2017) observe that the indicative power of evidential and epistemic markers is tightly connected to their lexically encoded meaning, and hence less fluctuating across contexts compared to the shallow features (e.g., sentence length) that have typically been used in Argument Mining tasks. Yet, it is also true that the specifics of their distribution reflect the features of the genre and interactional context in which they occur, and while the basic type of evidential relation is semantically encoded, their specific pragmatic and argumentative function can be related to the activity type, its goals and constraints. Moreover, certain linguistic structures may occur frequently with an indicative function in a discourse genre, while they seldom or never occur in other genres. That's why, in order to extract their full indicative potential, linguistic resources susceptible to play an indicative role are to be identified and studied through context and genre specific quantitative corpus studies, to observe the correlation between linguistic items and argumentative discourse units, as a preliminary step to conducting an in-depth analysis of the retrieved indicators to verify and define their semantic and pragmatic features.

Consider example (1), below:

- (1) You just talked about having this record day. I think you said last Saturday.

The expressions you just talked about, and you said make explicit the source of the knowledge of the speaker. – which, in this case, pertains to the hearsay, i.e. what is heard from a source – the hearer in this case – while, in the second sentence, I think expresses a moderate degree of epistemic certainty, introducing also an element of subjectivity in the evidential source, possibly associated with the mediation of fallible memory.

Following the lead of Miecznikowski (2020), we maintain that suchlike evidential expressions signal an argumentative relation, first of all, at a micro-argumentative level, that is, they by themselves succinctly express a reason for the acceptance of the proposition in their scope, and that they also relate to the macro-argumentative level marking the propositions in their scope as premises or conclusions with respect to other utterances within a broader argumentative structure. According to Miecznikowski (2020), at a micro level an evidential frame always constitutes an argumentative construction, providing different types of reasons (arguments) for the scope, according to the type of source they refer to. In (1), the propositional scope (having a record day) is made acceptable through the expression you talked about, which attributes it to a knowledgeable source, source, i.e., the company management, realizing a micro-argument from authority. Interestingly, while the ascription is lexical, the argument crucially depends on the knowledgeable status of the hearer of the utterance in the specific financial context we study.

For Miecznikowski (2020) the micro-arguments of evidential frames have a clear affinity with loci from authority as presented in the Argumentum Model of Topic (Rigotti & Greco, 2019): hearsay evidentiality (referring to someone else's words) is clearly related

to arguments from expert or common opinion, while direct evidentials (which denote that something is known in virtue of a direct perception procedure) like ‘to see’ or ‘to observe’ can be linked to arguments from testimony. To analyse inferential evidential frames, which represent the acquisition of a certain piece of knowledge in virtue of an inference (e.g. verbs as ‘to seem/look like’ or ‘to demonstrate’ but also adverbs as ‘obviously’, ‘clearly’ or ‘evidently’¹) Miecznikowski (2020) introduces locus from reliable procedure, by marking the scope as the result of an inference the speaker points to a trusted knowledge acquisition procedure – even if the details of that reasoning are not immediately available to the hearer. As long as the inferential path is not displayed, the micro-argument can be likened to an argument from authority: “Trust me, I’ve done my reasoning” – as it were. Yet sometimes the premises of the reasoning supporting the scope are available in the discourse. In this case the inferential expression does not convey anymore an argument by itself: its micro-argument is dissolved in the macro-argument and the expression behaves mostly as a connective pointing to the link between the proposition in the scope and the premises. This is what happens to the inferential evidential sounds like, in example (2), below, which marks the connection between its scope and the preceding premise.

(2) You had a record day last Saturday. Soundslike things are good.

Finally, it can also happen that evidential markers “co-occur with further argumentation to support the proposition in their scope” (Miecznikowski, 2020) without being completely “resolved” into them. In this case, evidential frames become ancillary arguments (Herman and Oswald, 2022) lending additional credibility to the steps made in the main line of argument.

In the present work, we focus on evidential expressions, leaving out purely epistemic ones, and on macro-arguments, examining the correlation between evidential expressions and argumentative moves. Our aim is to test the hypothesis that evidential expressions function as argumentative indicators in the specific context of institutional dialogue (Drew & Sorjonen, 2011), represented by earnings conference calls, and are informative as regards argumentative reconstruction and Argument Mining tasks. In Sect. 2 we illustrate the corpus and the adopted annotation procedure, while Sect. 3 presents the results of the quantitative analysis conducted to corroborate our hypothesis. In Sect. 4 we propose the in-depth analysis of an example that shows how the macro-argumentative dimension and the micro- are intertwined.

2. DATA AND METHODOLOGY

2.1 Corpus

Our corpus includes the Q&A sections of 8 earnings conference calls (ECCs) held by two different companies, AirBnb (ABNB) and Door Dash (DDASH), for the four quarters of the financial year 2021 (53,000 words).

¹ See (Musi and Rocci, 2016) and (Musi and Rocci, 2017) for a detailed account of the adverbial expressions of inferentiality.

Earnings conference calls (ECCs) are communicative events with a fixed structure akin to press conferences, in which listed companies' managers present the quarterly results and answer to financial analysts' questions. Studies of argumentation in finance (Palmieri et al., 2015; Rocci & Raimondo, 2017) have observed that these exchanges are highly argumentative, and highlighted that argumentation represent a significant component of their value for the markets. In sum, these events are worth studying since they are key events in the financial context, they prominently feature argumentation, and argumentation may well be part of the reason why they are important. Furthermore, such dialogues embody the classic information asymmetry between insiders and outsiders that underpins so many interactions in finance, making the marking of sources of knowledge particularly prominent in them. In fact, Rocci et al., (2019). found that the epistemic positioning of the participants is mirrored by the distribution of evidential – and epistemic – expressions indexing the information asymmetry between managers – corporate insiders with full access to company information – and analysts – outsiders needing to gain that information to evaluate the company. Thus, the specific pragmatic functions of evidentials in ECCs are expected to relate to the characteristic of the socio-epistemic configuration of the activity, and to the incentives and (argumentative and dialogical) roles of participants.

2.2 Annotation schemes and process

A multi-layered, step-by-step annotation has been carried out in INCEpTION (Klie et al., 2018). First, a team of trained annotators annotated a layer for dialogue moves, aimed at distinguishing and retrieving answers, questions (and different types of questions) and prefaces, i.e., assertive prefatory statements “that can either precede, follow or be contained in a question sentence within a question turn, conveying information related to the question” (Lucchini et al., 2022). On top of that, two layers, presented in the next section, were implemented to the specific purposes of this work.

2.2.1 Epistential frames annotation

In order to identify the evidential strategies used in the financial dialogues and their correlation with ADUs, we adopted an onomasiological and corpus-driven approach. Unlike Rocci et al. (2019), which relied on a literature-derived dictionary of evidential expressions, we proceeded to the identification in the corpus of the expressions having an evidential function.

Drawing from the relevant literature (Chafe & Nichols, 1986; Bednarek, 2006; Lavid et al., 2016; Musi & Rocci, 2016; 2017; Pietrandrea, 2018) we defined an annotation scheme for epistential frames, adopting a “broad” definition of evidentiality as “attitude to knowledge” (Chafe & Nichols, 1986).

We use the term epistentials which was introduced by Faller (2002) to indicate linguistic expressions that carry either an evidential or an epistemic modal function, or both at the same time, as we are interested in identifying expressions that have an evidential and/or an epistemic modal function and because these two dimensions are often difficult to disentangle prior to a fully-fledged analysis. We also use the term frames, following (Miecznikowski, 2020), to indicate predicate-argument(s) structures representing an epistemic experience, i.e., a knowledge acquisition experience by a subject, in which the

cognizer (the subject of the knowledge process), the scope (the propositional content under the scope of the epistential expression, which constitute the fact or piece of reality object of the knowledge), and the source (the element through which the cognizer knows the content) are arguments of a predicate or operator corresponding to the epistential expression. Following (Pietrandrea, 2018), we considered them as constructional units.

The annotation scheme in Fig. 1 was then implemented in INCEpTION (Fig. 2).

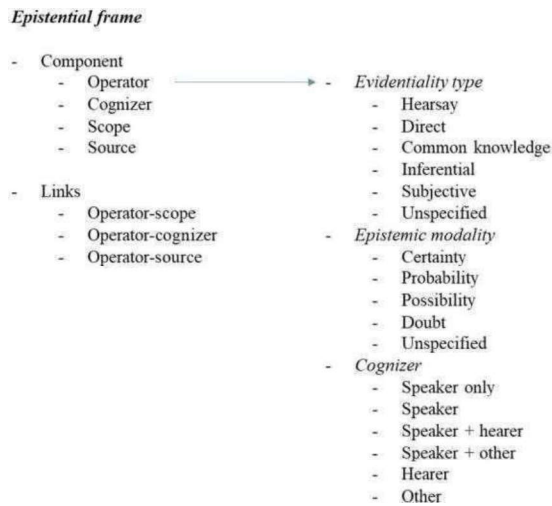


Figure 1

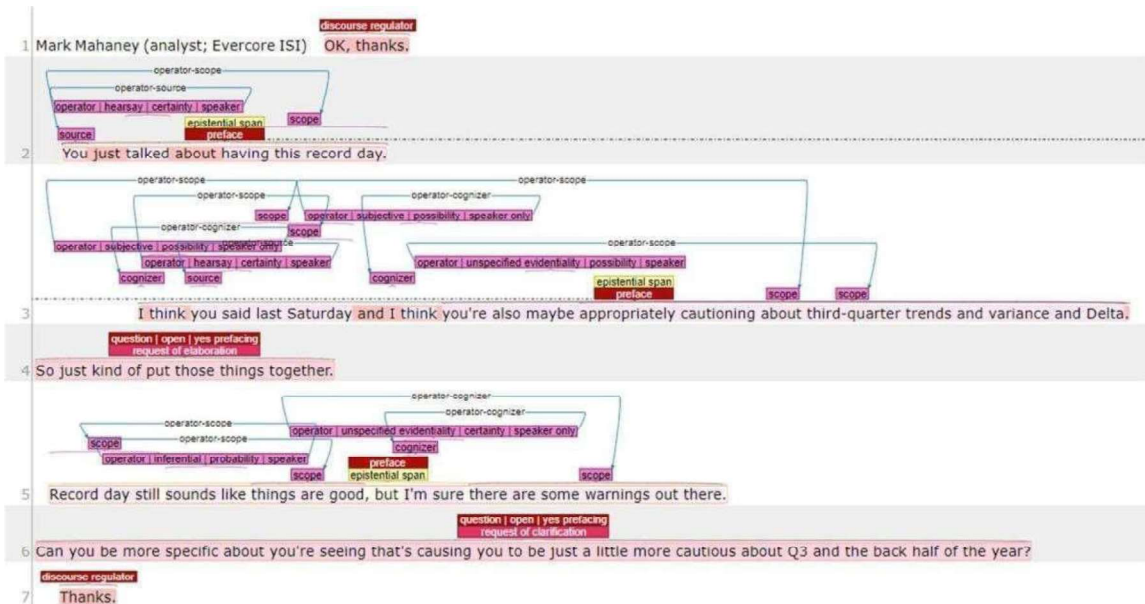


Figure 2

2.2.2 Argumentative moves annotation

A second layer was then implemented to annotate argumentative moves in both questions and answers turns on the basis of the scheme in (Fig. 3). Two tags, premise and conclusion, were set to describe the moves, and to signal intermediate conclusions in subordinative structures we annotated both tags on the unit; the length of the move spans was not predetermined. In order to easily identify the relations between moves – and thus have an overview of the argumentative structure of the annotated passages – we added a relational layer (Fig. 3)².

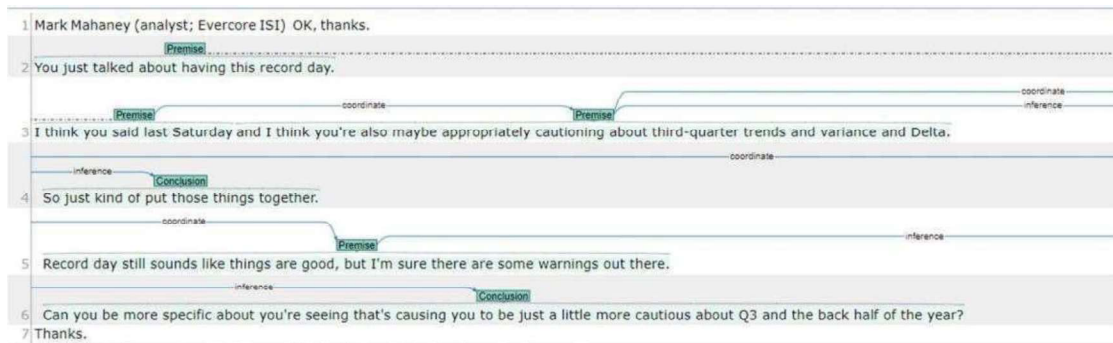


Figure 3

We first annotated the epistential frames layer on the entirety of the corpus; subsequently, we annotated the argumentative moves layer in one call (ABNB Q1) to conduct a pilot study. Since we were interested in observing the correlation between evidentials and ADUs, we decided to annotate the argumentative moves layer only on passages containing at least one epistential frame.

The results of the pilot (see Sect. 3) suggested an interesting relation between inferential and hearsay evidentiality and premises, hence we focused only on these two types in further analyses. We annotated all the remaining calls of the corpus for the argumentative moves layer, in passages featuring hearsay and inferential evidentials.

3. ANALYSIS OF THE RESULTS

As previously said, we first focused on the correlation between evidentiality and argumentative moves in one call (ABNB Q1). Table 1 shows the distribution of evidentials among argumentative vs. non-argumentative moves, respectively in absolute numbers and in percentage. These results overall indicate that evidential expressions tend to appear in argumentative moves and are therefore consistent with the hypothesis that they can serve as argumentative indicators.

² The layer expresses all the relevant information pertaining to argumentation structure: relation types represent links between two premises (coordinate), and between a premise and its conclusion (inference). To signal a multiple structure, we used the compound inference arrow, starting from the last premise of the chain and pointing toward the conclusion.

According to a Pearson's Chi-squared test, common knowledge, hearsay and inferential evidentials are statistically associated to (namely, more frequent than expected under chance) argumentative moves (from 73% to 92% of the occurrences).

Crucially, within argumentative moves, inferential and hearsay evidentials are significantly more frequent in premises (respectively 100% and 75% of the argumentative occurrences). In contrast, subjective evidentials, which include the expressions of opinions, evaluations and feelings presented as individually elaborated interpretations, and direct evidentials are equally distributed among argumentative and non-argumentative units.

Table 1. Distribution of evidentiality types across argumentative vs. non-argumentative moves in ABNB Q1 (X-squared = 38.712, df = 15, p-value = 0.0007075)

ABNB Q1	premise		conclusion-premise		conclusion		subtotal		non-argumentative		total	
common knowledge	2	67%	1	25%	0	0%	3	75%	1	25%	4	100%
direct	14	56%	5	10%	6	13%	25	52%	23	48%	48	100%
hearsay	11	100%	0	0%	0	0%	11	92%	1	8%	12	100%
inferential	27	75%	5	10%	4	8%	36	73%	13	27%	49	100%
subjective	15	44%	9	13%	10	15%	34	50%	34	50%	68	100%
unspecified	1	33%	1	8%	1	8%	3	25%	9	75%	12	100%
total	70	63%	21	11%	21	11%	112	58%	81	42%	193	100%

To validate the results concerning hearsay and inferential, we took a closer look at these two types in the whole corpus (8 calls). Tables 2 and 3 show that hearsay and inferential evidentials have a strong tendency to occur in argumentative moves. Respectively, the mean is 90% and 84% of the occurrences. Within argumentative moves, both occur more often in premises, which confirms the results from the pilot study. There is no significant difference among the 8 calls, which is evidence for the consistency of the trend we have found. We must note, however, that there is a difference between these two types.

INFERENCEIAL	premise		conclusion-premise		conclusion		subtotal		non-argumentative		total	
ABNB Q1	2	70%		20		10	4	82%		18	4	100%
ABNB Q2	1	64%		9		27	2	81%		19	2	100%
ABNB Q3	1	67%		10		24	2	88%		13	2	100%
ABNB Q4	1	52%		16		32	3	86%		14	3	100%
DASH Q1	1	52%		17		30	2	85%		15	2	100%
DASH Q2		80%		0		20	1	91%		9	1	100%
DASH Q3	1	61%		17		22	1	72%		28	2	100%
DASH Q4	1	62%		8		31	2	93%		7	2	100%
total	11	62%	2	14%	4	24%	19	84%	3	16%	22	100%

Table 2. Distribution of hearsay evidentiality across argumentative vs. non-argumentative moves in the whole corpus

Table 3. Distribution of inferential evidentiality across argumentative vs. non-argumentative moves in the whole corpus

HEARSAY	premise		conclusion-premise		conclusion		subtotal		non-argumentative		total	
ABNB Q1	1	100%		0%		0%	1	92%		8%	1	100%
ABNB Q2		88%		0%		13%		100%		0%		100%
ABNB Q3	1	91%		0%		9%	1	85%		15%	1	100%
ABNB Q4	1	85%		5%		10%	2	95%		5%	2	100%
DASH Q1	2	100%		0%		0%	2	91%		9%	2	100%
DASH Q2	1	91%		9%		0%	1	92%		8%	1	100%
DASH Q3	1	93%		0%		7%	1	75%		25%	2	100%
DASH Q4		80%		0%		20%	1	100%		0%	1	100%
total	9	92%		2%		7%	10	90%	1	10%	11	100%

Respectively, the mean is 92% and 62% of the occurrences; this tells us that even though both tend to appear more often in premises than in other moves, this tendency is stronger for the hearsay. In fact, while inferential evidentials are preferentially associated with premises, they can also occur (14%) in intermediate steps of the inference chain (conclusion- premise) and, almost one time in four (24%), in the very conclusion or standpoint of the argument.

Musi (2016) and Musi and Rocci (2017) maintain that inferential and hearsay evidentials have usually scope on propositions that play the role of local or general standpoints, which is *prima facie* contradicted by our findings. More in detail, however, Musi (2016) observes that reportative evidentials are used to introduce third parties' opinions, while inferentials introduce propositions that can be "both the main standpoint or a local standpoint playing the role of a non-basic assailable premise in the whole argumentative structure".

However, this divergence disappears if we then consider that Musi looks at the type of propositions over which evidentials take scope, and the proposed analysis concerns the micro-argumentative level, where the scope always corresponds to the standpoint of the micro-argument.

Hearsay evidentials are shown to take scope over opinions or evaluations and in this sense, they are used to report the standpoint of a third party, with whom the author either agrees or disagrees. In our data, hearsay expressions appear especially in prefaces, i.e., statements used by analysts to contextualize and justify their questions, usually directly or indirectly quoting managers. Locally, the quotation provides the support to the proposition in the scope, which is often an opinion, or a standpoint that may even be justified somewhere else. However, in a macro perspective, the argumentative discourse unit containing the evidential has the role of providing a justification for the performance of the question act (Lucchini et al., forthcoming).

Inferentials are slightly more complex. Their semantic meaning is precisely that of indexing a premise-conclusion relation and signalling that a reasoning took place, the result of this reasoning being the proposition over which the inferential takes scope. When they occur in conclusions (24%) or in intermediate steps (14%) they are likely to function as quasi-connectives indexing the link between the scope and the supporting argument. Here,

as in example (2) above, the micro-argument is resolved into the macrostructure. Yet, when they occur in premises (62%) they retain at a micro-level the function of signalling a conclusion, of an implicit argument, which is, in turn, used as premise for a subsequent, higher standpoint at the macro-level. Along these lines, (Musi, 2016) already maintains that inferentials can introduce “a local standpoint playing the role of a non-basic assailable premise in the whole argumentative structure”. In such cases the premises of the micro- inference can be left implicit, either as trivially recoverable or out a strategic voluntary choice.

These micro- and macro-argumentative dimensions are constantly intertwining and cooperating, building complex structures whose double-layered nature is not always easy to disentangle. In the next section we provide an example from the corpus containing both hearsay and inferential expressions.

4. EVIDENTIALS IN MICRO- AND MACRO-ARGUMENTATION AT WORK. ANALYSIS OF AN EXAMPLE

To better understand how evidentials work as argumentative indicators and to look more in detail at the interaction of the two levels of micro- and macro-argumentation, we present here the in-depth analysis of an analyst’s question turn from AirBnb (Q2). We are in presence of an argumentative construction in which the preface serves as argument for the interrogative illocutionary act (the preface is meant to justify the utterance of the question showing the relevance of the latter); in this example, the evidential frames play out an interesting argumentative dynamic, where micro and macro levels are entangled and cooperate.

(3) Mark Mahaney (analyst; Evercore ISI): OK, thanks. [You just talked about having this record day. I think you said last Saturday, and I think you're also maybe appropriately cautioning about third-quarter trends and variance and Delta.]Preface [So just kind of put those things together.]Question [Record day still sounds like things are good, but I'm sure there are some warnings out there.]Preface [Can you be more specific about what you're seeing that's causing you to be just a little more cautious about Q3 and the back half of the year?]Question Thanks.

In this turn, the analyst performs two questions. The second one is actually a reformulation of the first one, so it can be considered as part of a single complex act of questioning (D’Agostino et al., under review). In the first preface, we find two hearsay evidentials (You talked about and you said) that report information given by the managers as background for the question; at a micro-level, since we can consider the company’s management as a reliable source on matters concerning the company, these frames serve as micro-arguments supporting the truth of the content (namely, that ‘Air Bnb had a record day – last Saturday’). The second occurrence is modalized and mitigated by the presence of a subjective (I think) which has scope on the entirety of the hearsay frame. The analyst means that ‘probably they said last Saturday – but could be otherwise’.

The event ‘having a record day’ is put in contrast with another event, namely that ‘the company is cautioning about third-quarter trends and variance and Delta’; this

proposition is introduced by the expression I think, which suggests a lower degree of certainty. However, the same content is taken for granted in the following part of the turn through a presupposition (that's causing you to be just a little more cautious about Q3 and the back half of the year). We could hypothesise that this 'I think' does not really evoke a subjective frame to represent an opinion but serves a politeness intent.

The conflict between what the managers said – the occurrence of a record day for the company – which is represented as justified by means of the hearsay, and an incompatible event – the company acting cautious – is the trigger of the question. The analyst asks to put those things together, presupposing that they can be put together and therefore implying that the contrast must be just apparent. More specifically, the conflict lays at the level of implicit conclusions: a record day means that the company is doing well and therefore should be optimistic about the future quarters (expected state of affairs), but they are acting cautiously (actual state of affairs), meaning that they are not optimistic.

The second part of the question turn rephrases and clarifies the previous one, making the conflict more explicit. The inferential expression it sounds like means that based on a premise (the fact that there has been a record day) the analyst inferred that things are good. While this conclusion was left implicit in the first part of the preface, the analyst makes it explicit here and indexes the inferential path he made. Analogously to the previous preface, we find a conflict with the following proposition (I'm sure there are some warnings out there) verbally signalled by the means of 'but'. However, in this case we have a different conflict at the level of the premise-conclusion relations. In fact, we claim that the entirety of the inferential frame Record day still sounds like things are good (the premise, the conclusion and the inference signalled by the evidential) is conflicting with I'm sure there are some warnings out there, the warnings being (implicitly) indexed as the reasons why the company acts cautiously. This relation is made explicit by the question (what you're seeing that's causing you to be just a little more cautious) that specifically asks for a clarification of what these warnings are. Such a formulation presupposes the existence of the warning signs, and this is line with the use of 'I'm sure', which expresses a high degree of certainty. The existence of some warning signs is, actually, inferred from the fact that the company is cautioning; interestingly, the speaker asserts with a stronger certainty degree the conclusion than the premise (I think you are cautioning). Nevertheless, he does not have, or at least doesn't say to have, evidence for it – to be sure expresses the epistemic modality but has not an evidential value and doesn't indicate a specific type of source.

We can schematize the complex argumentative construction we tried to describe above as follows (Fig. 4):

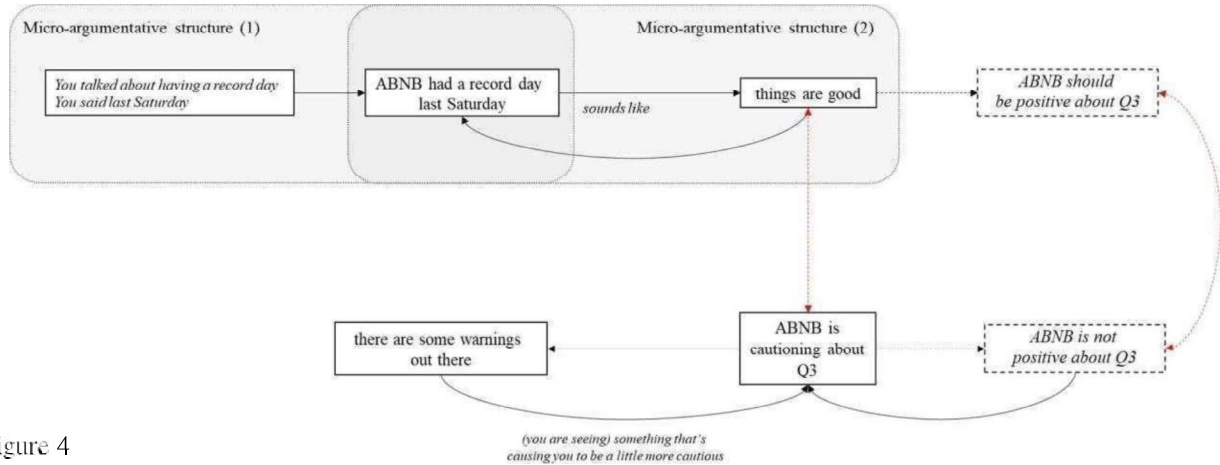


Figure 4

The straight arrows represent argumentative inferences, while rounded arrows causation; for instance, the fact that things are good is the reason behind the fact that the company had the record day, but the analyst inferred the former from the latter – the existence of the cause from the presence of its effect.

Similarly, the fact that there are warnings is the cause – i.e., the subjective reason – of their acting cautiously – as made explicit in the formulation of the question. Again, the speaker inferred the cause (there must be warnings) on the basis of the effect (because you are cautious). The dashed arrows and boxes signal implicit conclusions. We can identify the conflict (red dashed arrow) at the level of implicit conclusions, between the expected state of affairs and the actual state of affairs; however, as the speaker explicitly contrasts the two premises – things being good and the management acting cautiously – we can also represent at the level of premises.

The grey boxes highlight the two micro-argumentative structures: (1) represents the hearsay frame justifying the premise, while (2) represents the inferential frame that signals the path toward the conclusion. This reconstruction tries to capture inferential and causal relations to grasp the complex reasoning in the analyst’s question.

At a macro level, this entire architecture works as an argument for the performance of the questioning illocutionary act, i.e., these prefaces frame an issue (conflict) that makes the question worth asking. Consequently, we consider the preface as a single argumentative move, namely a premise. The conclusions are pragmatic ones and can be identified through the question acts themselves. Remarkably, the first question points at the conflict, asking for a resolution of it (put these things together). The second one is a specification of the former and request for clarification. It suggests that the resolution of the conflict hinges upon the identification of the warnings (what are you seeing that’s causing you to be a little more cautious) as missing premises.

The micro-argumentation in the prefaces has the role of framing the conflict and of representing the analyst’s reasoning in support. The presence of a conflict between the expected state of affairs and the actual state of affairs fulfils a precondition for asking the

first question; the evidence for the existence of warnings that are known to the managers but not to the analyst satisfies a precondition for the utterance of the second question.

5. CONCLUSION AND FUTURE WORK

The present work aimed at the exploration of the argumentative role played by evidential frames in financial dialogues and at verifying their potential as argumentative indicators by observing their distribution in argumentative units.

The preliminary results of the corpus annotation study showed that in the corpus evidential expressions tend to appear in argumentative moves, and that statistically hearsay and inferential evidential constructions are associated not only to argumentative moves but specifically to premises. To validate this result, we conducted a study focused on these two categories. It turned out that while for hearsay the association with premises is strict, inferentials prefer premises, but can occur in argumentative moves all along the inferential chain, with a substantial possibility of appearing in conclusions. Since such observations seemed to be in contrast with what observed in the literature, we reflected in Sect. 3 on a possible explanation, which essentially turned out to lay in the interplay between micro- and macro- argumentation.

The detailed analysis of the example (3) sought to unravel the inferential configuration of the analyst's turn, and with a special attention to examining how the micro and macro-argumentative dimensions are intertwined.

As to future work, we plan to extend the annotation to a larger corpus and to the whole class of epistentials, including the other categories of evidentiality as well as the expressions of epistemic modality. On the basis of such investigation, we aim at developing a lexicon of epistentials and at building large annotated corpora, in order to provide tools for Argument Mining. Further investigation of micro and macro-argumentative dimensions and of their interrelation in discourse represents another interesting path that could give insights for argumentative reconstruction.

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