Monologue in Dialogue: Modelling Discourse Relations with Exhaustive Interpretation and QUDs

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This paper presents a theoretical approach to the inference of discourse relations based on the view of discourse topic as the question under discussion (QUD) and exhaustification as the default mode of interpretation. Although the main focus of this study is on relations that hold between utterances produced by one speaker, I will discuss findings related to spontaneous dialogue that bear on central issues in the analysis of monologue. The proposed theory features some non-standard predictions that, interestingly enough, seem to be born out in spontaneous speech, rather than written texts. In other words, the two speech modes turn out to exhibit non-trivial differences wrt. the inference of discourse relations.

The paper is structured as follows. Section 1 presents the philosophical motivation for the central role of the notions of QUD and exhaustive interpretation in the inference of discourse relations; Section 2 spells out the main positions of the theory, while Section 3 considers some relevant predictions. Finally, Section 4 discusses findings of some previous empirical studies on spontaneous dialogue that support the proposed approach.

1 Motivation

The focus of this study is on discourse relations that involve coreference relations between eventualities presented by the sentences, e.g. certain cases of *Elaboration* (1), and causal *Explanation* (2), cf. Danlos (2001), in contrast to relations that do not involve such coreference, e.g. *Narration* (3).[1]

(1) Fred damaged a garment.
He stained a shirt.

(2) Fred broke the carafe.
He hit it against the sink.

(3) The lone ranger jumped on the horse
and (he) rode into the sunset.

A comprehensive explanatory theory of discourse interpretation must provide an answer to the questions how and why such relations are inferred, especially in cases where they are not signalled by any explicit markers like *because* (for *Explanation*) or *then* (for *Narration*), as in the examples above.

Previous approaches to the inference of discourse relations can be very crudely divided into two major groups: *coherence-based*, and *relevance-based* approaches. In the first group, the most basic assumption is that the discourse must be coherent; discourse relations in turn are inferred along with figuring out in which way a discourse fulfils this requirement. One of the most prominent representatives of this view is SDRT (Asher and Lascarides, 2003). The other position does not view coherence as an aim in itself. Instead, a discourse must be *relevant*, i.e. fulfil its communicative goal in the situation in which it occurs. In this type of framework, coherence (and with it the inference of discourse relations) must be construed as a by-product of figuring out in which way a discourse is relevant. Pragmatic theories that are based directly or indirectly on Gricean ideas, e.g. Neo-Gricean pragmatics and Relevance Theory, as well as approaches based on intentional structure such as Grosz and Sidner (1986) and the QUD-based models (e.g. van Kuppevelt, 1995; Ginzburg, 1996) can be counted to this category.

A relevance-based approach to discourse relations is appealing since it attempts to explain coherence rather than simply postulating it, but this issue is nevertheless controversial. One of the most challenging points of criticism put forward by Asher and Lascarides (2003) is that making the inference of discourse relations entirely dependent on the recognition of the speakers' goals or in-

[1] The eventualities in (1) corefer in the sense that they describe the same action of Fred. According to Danlos (2001), the causal relation between the sentences in (2) can be derived by establishing coreference between hitting and the action part of breaking which in turn causes the subsequent "broken" state of the object. *Narration*, i.e. the relation of temporal sequence, is incompatible with event coreference since the latter implies simultaneity.

tentions as well as any other "private" features of their mental states introduces unnecessary conceptual and computational complexity into the model. Not always, but often discourse relations can be successfully inferred by the hearer without having perfect information about the speaker's communicative intentions. The following example illustrates this.

Suppose A sees B all black and blue and eyes swollen with tears; A asks *What happened?*; speaker B gives the answer in (4), and A eventually notices pieces of broken glass on the floor.

(4) **A:** What happened?
B: Fred broke the carafe.
He hit it against the sink.

Hearing this answer, A will probably have doubts whether B, unintentionally or deliberately, got his question right. The question A had meant was 'What happened to you that made you weep and caused the bruises?' The question answered by B is apparently 'What happened such that there is all this broken glass on the floor?' But in spite of this "misunderstanding," A will be able to infer from B's answer that Fred broke the carafe *by* hitting it against the sink. That is, the inference of coreference between the breaking and the hitting event in (4) does not require sharing the communicative goals by the speakers.

The main purpose of the present study is to formulate a fragment of a relevance-based theory of discourse relations which nevertheless can accommodate the above observation. Rather than developing special machinery for dealing with coherence, discourse relations should be derived from relations between discourse goals associated with the sentences. However, the theory should *predict* where and when the exact knowledge of the underlying goals is necessary or unnecessary for the inference of a discourse relation. Thus, the fact that this information is unnecessary in (4) should be derived as a theorem in this framework.

In this paper, communicative goals of utterances are modelled as questions under discussion. Following van Rooij and Schulz (2004), the exhaustive interpretation of an utterance with respect to its QUD is intended to implement the Gricean mechanism of conversational implicature—the pragmatic meaning that comes on top of the conventional semantics of the sentence which results from the assumption of the speakers' rational and cooperative communicative behaviour.

2 Outline of the theory

The present proposal is cast in the framework of dynamic update semantics (MDPL, Dekker, 1993) enriched with a notion of exhaustive update (Zeevat, 1994; van Rooij and Schulz, 2004). In this framework, the interpretation of a discourse—a monologue or a dialogue turn of a single speaker produced without intervention from other discourse participants—is a sequence of exhaustive and non-exhaustive updates of the initial information state s with the meanings of individual utterances (represented schematically in Figure 1). As Figure 1 is intended to suggest, the update function is sensitive to the QUD or the *discourse topic* T of the current utterance. Section 2.1 cites the necessary definitions that elucidate the relationship between the topic and the (exhaustive) interpretation of an utterance. Then Section 2.2 presents some constraints on topics and other parameters of discourse update.

2.1 Definitions

The notion of QUD or discourse topic can be implemented formally in a number of different ways. In this paper it will be identified with what is often called the *question predicate* or the *question abstract*—an atomic predicate symbol or a complex λ-term that is obtained by abstracting over the *wh*-elements of an interrogative sentence, e.g. the predicate *happen* for the question *What happened?*, or $\lambda x[kissed(john, x)]$ for *Who did John kiss?* The non-exhaustive update $s[\![\phi]\!]^T$ wrt. the predicate T is defined just like the standard dynamic update function with an additional definedness condition that T be contained in ϕ.[2]

For the exhaustive update, I borrow the definition of dynamic exhaustification (5) proposed by van Rooij and Schulz (2004):

(5) $s[\![\phi]\!]^T_{exh} = min_{<_T}(s[\![\phi]\!]^T)$

The exhaustive update $s[\![\phi]\!]^T_{exh}$ is a subset of the non-exhaustive update $s[\![\phi]\!]^T$ that only contains world-assignment pairs that are minimal wrt. to a topic-sensitive order $<_T$.[3] The latter orders

[2] Note that the natural language sentence that corresponds to ϕ might not and often will not overtly contain T. The predicate will have to be recovered at the level of semantic representation, perhaps in a similar way as elided material is recovered.

[3] For an adequate account of event coreference relations embedded in longer discourses one might need to adjust the definition of exhaustive update to disregard the information on T accumulated in the common ground when minimising the extension of T. This is achieved in (i) by applying min-

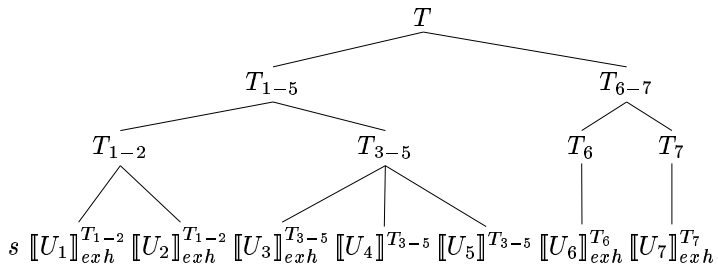

Figure 1: Interpretation of a sequence of utterances $\langle U_1, ..., U_7 \rangle$ and its topic structure.

worlds-assignment pairs along the inclusion relation between the extensions of the predicate T in their respective worlds while keeping other properties of those worlds as well as the assignment functions constant:

(6) $\langle w_1, g_1 \rangle <_T \langle w_2, g_2 \rangle$ iff
a. $F(T)(w_1) \subset F(T)(w_2)$, and
b. for every R that is syntactically independent from T:
$F(R)(w_1) = F(R)(w_2)$, and
c. $g_1 = g_2$.

Thus minimisation wrt. $<_T$ boils down essentially to minimisation of the the extension of the question predicate T, which in the case of $s[\![T(a)]\!]^T_{exh}$, for instance, leads to the implicature that e.g. a is the *only* individual that has property T.

2.2 Constraints

The desired theory of discourse interpretation is expected to provide the parameters on which discourse update depends: the segmentation of the discourse flow into basic update units, utterances (e.g. U_1, U_2, etc. in Figure 1), the choice of topic T, as well as the choice between the exhaustive $[\![\cdot]\!]_{exh}$ and the non-exhaustive update $[\![\cdot]\!]$.

For simplicity, let's assume that an utterance equals a sentence. Determining the topic is a particularly difficult task since topics, as reflections of the agents' discourse goals, belong to the set of *a priori* "private features" of the agents' mental states that Asher and Lascarides (2003) talked about. However, one can already get quite far by adopting a number of constraints that regulate relations between topics without determining the topics themselves. A constraint that is of special interest for our present purposes is the *Principle of Topic Continuity*, named so after Givón (1983) and first applied to QUDs by Zeevat (2005). The principle requires that by default subsequent utterances be interpreted with respect to the same question predicate T:[4]

(7) *The Principle of Topic Continuity:*
By default, the discourse topic does not change.

Concerning the choice between exhaustive and non-exhaustive update, the constraint in (8) states that by default, update is exhaustive.[5]

(8) *The Principle of Exhaustive Interpretation:*
By default, an utterance is interpreted exhaustively.

Both (7) and (8) are default principles and a crucial question is under which circumstances they can be overridden. In the rest of this paper I explore the consequences of assigning a relatively high rank to these constraints. It will be assumed that these defaults can only be cancelled by explicit linguistic cues that either indicate specific discourse relation (e.g. *then*), a topic change (e.g. contrastive topic), or non-exhaustivity (e.g. continuation intonation).

imisation to the non-exhaustive update of the "minimal" information state s_0 that contains no information about the world except some lexical semantic restrictions (meaning postulates) and highly conventionalised world knowledge, but preserves all information about the introduced variables.

(i) $s[\![\phi]\!]^T_{exh} = s[\![\phi]\!]^T \cap min_{<_T}(s_0[\![\phi]\!]^T)$

For space reasons the discussion of this modification is skipped here, but see Jasinskaja (2006) for details.

[4] In Figure 1 the sequences of utterances $\langle U_1, U_2 \rangle$ and $\langle U_3, U_4, U_5 \rangle$ satisfy topic continuity, whereas e.g. in $\langle U_6, U_7 \rangle$ this principle is violated at the local level.

[5] This principle is violated in utterances U_4 and U_5 in Figure 1.

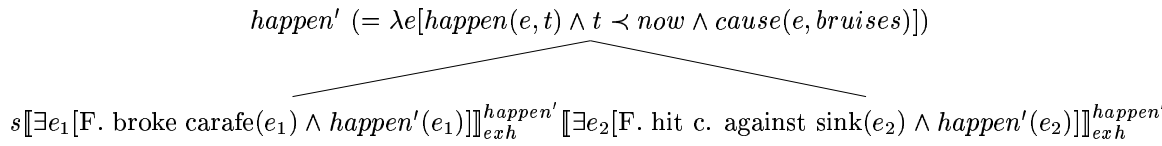

Figure 2: Interpretation of (4)

3 Predictions

3.1 The default case

The discourse in (4) presents a case where both default principles apply, since the sentences do not contain any explicit markers of discourse relations, topic change, etc. The sentences are connected asyndetically and we will assume that they are uttered with the neutral (falling) declarative intonation, indicated by a period at the end of each sentence. Thus both sentences are interpreted exhaustively with respect to the same topic. Let's assume that the topic is the question predicate $\lambda e[happen(e,t) \wedge t \prec now \wedge cause(e, bruises)]$, i.e. what happened that caused B's bruises, abbreviated as *happen′* in Figure 2.

For simplicity, suppose that the initial information state s contains no information on events that caused B's bruises, so it will equally contain worlds where there is one, two, three, etc. events in the extension of *happen′*, where those events belong to one, two, three or more different types, e.g. falling down from the ladder, having a row with the neighbour, as well as Fred breaking the carafe (even if the latter is a rather unlikely cause in the given situation, but suppose A is unprejudiced on this matter). The non-exhaustive update of s with the first sentence *Fred broke the carafe* will only contain world-assignment pairs where there is at least one event of Fred breaking the carafe in the extension of *happen′* and the referent of e_1 is mapped to that event. Since all the worlds where $F(happen')$ contains more than just that event are *happen′*-greater (in terms of $<_{happen'}$, cf. (6)) than the worlds where Fred broke the carafe exactly once and nothing else *happen′*-ed, only the latter will survive in the exhaustive update, i.e. after minimisation wrt. $<_{happen'}$, cf. (5). Thus in all worlds of the resulting information state the extension of *happen′* will contain a single event that matches the description *Fred broke the carafe*. The subsequent update with the second sentence will only pick out those worlds where that event also matches the description *He hit it against the sink* & *happen′*, since there simply is no other event that this description could consistently apply to. As a result, the information state will entail that the two event types are always instantiated by the same event individual, so an event coreference relation is derived between the sentences.

Note that the choice of question predicate does not affect this inference. If A's question in (4) is interpreted as 'What happened such that there is all this broken glass on the floor?,' i.e. if the question predicate is $happen'' = \lambda e[happen(e,t) \wedge t \prec now \wedge cause(e, \textit{broken glass})]$, the result is the same: since Fred breaking the carafe is the only event that *happen″*-ed and his hitting it against the sink is also the only event that *happen″*-ed, they must be the same event. If the sentences were interpreted with respect to distinct topics, event coreference would not necessarily follow. However, as long as the topic is the same, which is a consequence of the principle of topic continuity (7), the inference is valid *regardless* of what exactly the topic is. Thus the proposed relevance-based theory predicts that perfect information of the participants' communicative goals is unnecessary for the inference of discourse relations based on event coreference, and therefore meets Asher and Lascarides' critique, at least for this group of discourse relations.

The present approach also predicts that event coreference is inferred always if both default principles—topic continuity and exhaustive interpretation—are maintained. This means that at least one of the defaults must be violated in order to establish some other discourse relation, e.g. *Narration*, which involves temporal succession of events and is therefore incompatible with event coreference. Alternatively, a discourse relation must be established utterance-internally (within the scope of a single exhaustification operator). The next section discusses the role played by continuation intonation and the conjunction *and* in this process.

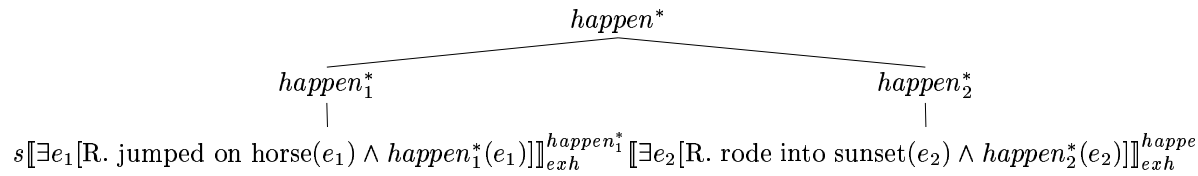

Figure 3: Interpretation of (10)

3.2 The effect of continuation intonation and the conjunction *and*

As was already mentioned, this paper explores the possibility that the principles of topic continuity and exhaustive interpretation can only be violated by explicit linguistic means that either encode (a) a specific discourse relation, e.g. *then* for *Narration*, (b) a topic change, e.g. contrastive topic accent, or (c) non-exhaustivity, e.g. utterance-final continuation intonation. This section will concentrate on continuation intonation and the conjunction *and*.

There are two possibilities concerning the analysis of *and*. One possibility is to assume after Blakemore and Carston (1999) that the conjunction makes one sentence/utterance out of two, i.e. conjoined clauses constitute a single update unit. Thus in (3) neither default principle is violated; however, both clauses are interpreted in the scope of a single exhaustification operator:

(9) $s[\![\exists e_1[\text{Ranger jumped on horse}(e_1) \wedge \mathit{happen}^*(e_1)] \wedge \exists e_2[\text{R. rode into sunset}(e_2) \wedge \mathit{happen}^*(e_2)]]\!]^{\mathit{happen}^*}_{exh}$

The resulting information state entails that an event of type the lone ranger jumping on the horse happened in some relevant sense *happen**; in addition, his riding into the sunset *happen**-ed, but nothing else. It does not follow from this that jumping on the horse and riding must be the same event. In fact, the world knowledge will probably exclude the coreference reading and create a bias for temporal succession.

The second possibility for the analysis of *and*, which might be necessary to account for cases of sentence-initial *and* like (10), is to view the conjunction as a topic management device that indicates that the current topic (question predicate) T_2 is different from the previous topic T_1 but stands in an *additive relation* to it, i.e. there is an overarching topic T such that $T = T_1 + T_2$, where (11) could be a first approximation for the definition of $+$.

(10) The lone ranger jumped on the horse.
And he rode into the sunset.

(11) For predicate symbols T, T_1, and T_2:
$T = T_1 + T_2$ iff
$\forall w[F(T)(w) = F(T_1)(w) \cup F(T_2)(w) \wedge F(T_1)(w) \cap F(T_2)(w) = \emptyset]$

The definition says that in every world the extension of T_1 and T_2 partitions the extension of T.[6] For example, suppose *happen** is understood as what happened at the end of the film, and suppose the time span meant by "end of the film" can be partitioned into subsets of time points t_1 and t_2. Then *happen** can constitute the sum of happen^*_1 'happen at a some point in t_1' and happen^*_2 'happen at some point in t_2' in the sense of (11), so happen^*_1 and happen^*_2 form a possible topic sequence triggered by sentence-initial *and*. Thus (10) can be interpreted as shown in Figure 3. The exhaustive interpretation principle is maintained, but topic continuity is violated. The sentences are exhaustivized wrt. distinct topics, so the event coreference effect is blocked: if the lone ranger jumping on the horse is the only event that happened at t_1 and his riding into the sunset is the only event that happened at t_2, it does not follow that riding and jumping are the same event.

Finally, let's consider continuation intonation (↗), which is typically realised as an utterance final pitch rise distinct from completion intonation in a vast variety of languages (Cruttenden, 1981). Some usages of (↗) are probably best analysed along the same lines as sentence-internal *and*, cf. (9), as indicating that the utterance, and hence the update unit, is not complete yet, so exhaustive update should be postponed until the next completion. However, here I will concentrate on intonational realisation of items in *open lists* like (12):

(12) The lone ranger jumped on the horse (↗) ,
he rode into the sunset (↗) ...

[6] The definition can be easily generalised to sequences of more than two subtopics.

Since a completion might never come, such a discourse does not provide a unit to interpret exhaustively in any reasonable sense; nevertheless, the hearers seem to have no difficulty in understanding such "incomplete" discourses. Therefore, I propose that open list intonation signals that the current utterance should undergo non-exhaustive update:

(13) $s[\![\exists e_1[\text{R. jumped on horse}(e_1) \wedge happen^*(e_1)]]\!]^{happen^*}$
$[\![\exists e_2[\text{R. rode into sunset}(e_2) \wedge happen^*(e_2)]]\!]^{happen^*}$

This analysis represents (12) as a usual dynamic conjunction of the sentences. It says nothing about whether the listed events exhaust the relevant *happen**-ings, and it has no entailments regarding coreference relations between e_1 and e_2. This illustrates the case where the event coreference effect is cancelled by violating exhaustivity, while maintaining topic continuity.

In sum, this section has shown three different ways of cancelling the event coreference effect that arises in the default case. This cancellation is necessary in order to make possible the inference of discourse relations such as *Narration*, *List*, *Parallel*, etc., which either have incompatible or weaker semantics than event coreference. Obviously, additional machinery is needed to actually *infer* e.g. temporal relations in the case of *Narration*, here we were only concerned with consistency of such an inference with the rest of the theory. Crucially however, given the assumption that the default principles of exhaustive interpretation and topic continuity can only be violated by explicit linguistic cues, the proposed approach implies that *Narration* and other relations in its category must be explicitly triggered, at least by such semantically weak cues as the conjunction *and* or continuation intonation. The next section discusses the empirical validity of this implication.

4 Intonation and conjunction in spontaneous dialogue

The approach presented above leads to a rather strong prediction that discourse relations such as *Narration* or *List* cannot be inferred between two asyndetically connected sentences that are both uttered with (falling) completion intonation. At first glance this appears simply wrong. The literature on pragmatics abounds in examples like (14) where it is claimed that the sentences present a temporal sequence of events, although they are not connected by a conjunction *and*, and although they both end in a period, which normally corresponds to a final fall in reading.

(14) The lone ranger jumped on the horse.
He rode into the sunset.

However, there are reasons to believe that spontaneous dialogue is different from written language and read speech in this respect. This section recapitulates some previous findings that suggest that asyndetic connection in combination with completion intonation is indeed somewhat suboptimal with *Narration*.

First of all, it is an old observation that the sentence-initial conjunction *and* is much more frequent in spontaneous spoken narrative than in writing (see e.g. Chafe, 1982). For example, if the conjunctions were removed in (15),[7] and especially if the *Narration* markers *then* were removed as well, the discourse would sound much less natural, or at least much less "conversational" with the utterance-final falling completion intonation, indicated by periods in the conversation transcripts. At least part of the reason for this could be a more restricted usage of asyndetic connection with *Narration* in spontaneous dialogue. In order to prevent an event coreference interpretation, the speakers have to use an *and* after completion intonation either to put the next clause into the scope of the same exhaustification operator as the previous one, or to indicate that the topic of the current sentence stands in an additive relation to the previous topic: what happened? what else happened? etc., cf. (11).

(15) **A:** a. You lived in West Philly? Whereabouts?
B: b. Well, I was born at 52nd and em... tsk... oh: I forgo- well..... I think its 52nd and Chew.
c. And um... and uh I grew up really in the section called Logan.
d. And then, I went into the service, for the two years,
e. and then when I came back, I married... I- I- I got married.
f. And I- then I lived at uh 49th and Blair.

At the same time, it is not the case that asyndetic connection does not co-occur with completion intonation at all in spontaneous speech—

[7] The example stems from Schiffrin (1987).

only when they co-occur, the discourse relation is normally *Elaboration* or *Explanation*, rather than *Narration*, as in the following examples that illustrate *Elaboration*:

(16) **A:** a. Do either one of your daughter in laws work?
B: b. No but they did.
c. Both my daughters in laws worked.

(17) a. *And* uh: that's- that's the answer.
b. That's why I say they're the most prejudiced.

Further support for this hypothesis comes from Nakajima and Allen's (1993) study of intonation in elicited spontaneous task-oriented dialogue.[8] For the purposes of the study, the dialogue was segmented into utterance units (UUs) and the transitions between consecutive utterance units were annotated with discourse relations, which included what Nakajima and Allen called *elaboration class* and *speech-act continuation* transitions. The *elaboration class* relations hold when "the current utterance adds some relevant information to the previous utterance." Judging by the examples given in the paper, cf. (18) and (19), this transition type corresponds roughly to our notion of *Elaboration* based on event coreference.

(18) **H:** a. are there oranges available in warehouses in both cities H and I
S: b. uhh let's see there're oranges available in uhh yes, in H and in city I
c. They have oranges in both places, enough for uhh uhm several boxcars of oranges

(19) **H:** a. let's do that
b. let's move E2 to city E

Speech-act continuation holds when "a single speech-act continues over several UUs." The authors note that most of the speech-act continuations occur in "sequential conjunctions," cf. (20). Note that speaker H presents a list of actions that should be taken one after the other, thus in our present terms, the discourse relation between (20c) and (20d) could be analysed as *Narration*.

(20) **H:** a. now let's uhh assume the oranges are already loaded into the boxcar B6
S: b. hnn-hnn
H: c. and we'll take the engine that's at city H
d. we'll move the boxcar with engine down to city A

Among other prosodic features, Nakajima and Allen study utterance-final fundamental frequency (F_0). They find that F_0 at the end of an utterance preceding an *elaboration class* boundary tends to be significantly *lower* than before a *speech-act continuation* boundary. In other words, utterances like (18b) and (19a) are more likely to be pronounced with a lower final F_0, presumably associated with a completion fall, whereas utterances like e.g. (20c) end high more often, which could be a reflex of various kinds of continuation tunes. This is again consistent with the prediction that the usage of completion intonation is restricted with relations like *Narration* that are distinct from event coreference.

But if our predictions are born out for spontaneous dialogue, the question that arises immediately is why written language is different in that it allows narrative sequences to be expressed by asyndetically connected sentences ending with a period, like (14). One possible answer is that the function of period in writing is dramatically different from that of completion fall in speaking. However, this hypothesis is not so easily substantiated given the pervasive tendency to read periods as falls. Another possibility is that the role of the opposition of asyndetic connection and the sentence-initial conjunction *and* is not the same in the two speech modes. Historical studies on the development of written language support this hypothesis. For instance, Dorgeloh (2004) finds that sentence-initial *and* used to be much more frequent in texts of the Early Modern English period. Sentence-initial *and* in texts of that period is particularly typical of narrative sequences, and the narrative sequence in turn constitutes the prevailing discourse strategy not only in texts narrative "by nature," such as historical texts, but also in scientific prose where evidence is often recounted in the form of experience. Dorgeloh's corpus study shows a clear decline of the frequency of sentence-initial *and* in both scientific and historical texts, especially between the first and the second stage of the Early Modern English period (1500–1570 vs. 1570–1640). Dorgeloh explains this decline by a

[8] The participants of the study are involved in a game, where the task of one participant, called "Human" (H) is to achieve a specific goal by making plans to manufacture and ship various goods to specified locations in the game's world by the due date. The other participant, called "System" (S), has up-to-date information on the state of the world and assists H in making plans to achieve the given goal. The authors obtain about three hours of spontaneous dialogue.

general shift from narrative to argumentative organisation of scientific text. Translating this into the terminology of discourse relations, scientific writing experienced increasing avoidance of *Narration*, presumably, in favour of such discourse relations as *Explanation* and *Evidence*. Thus "the usage of sentence-initial *and* became associated with the older, more narrative, and hence less professional style and thus became increasingly stigmatized" (Dorgeloh, 2004, p. 1770), which ultimately led to its more general banishment from larger parts of the written language, even in narratives. This must have affected the division of labour between sentence-initial *and* and asyndetic connection, expanding the usage of the latter to include *Narration*. In an optimality-theoretic setting, it would be elegant to model this property of written language by introducing a relatively high-ranked stylistic constraint "Avoid sentence-initial *and*," which is absent in the discourse model of spontaneous dialogue. The development of this proposal goes beyond the scope of this paper.

Finally, it should be noted that previous empirical studies have mainly concentrated either on discourse markers or on intonation in isolation, but the proposed theory makes predictions primarily on the interaction between the two. Therefore conclusive evidence for or against our proposal can only be gained when intonation and conjunction are studied simultaneously, which remains a task for the future.

5 Conclusion

This paper has presented a fragment of a theory of discourse relations that has the explanatory appeal of relevance-based approaches to pragmatics and at the same time meets some points of criticism raised by the opponents of such approaches. The central role played by the principles of topic continuity and exhaustive interpretation in this framework, which remained concealed by the specifics of the written mode of communication, revealed itself once we took a closer look at spontaneous dialogue. This shows that the study of dialogue is apt to shed light on issues in the interpretation of monological discourse.

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