

EVENTS¹ UNDER NEGATION

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Abstract

The paper centers on the problem of how the event role of verbs interacts with sentence negation. We investigate the behavior of sentence negation in the syntax-semantics mapping, placing special focus on the influence of sentence negation on the readings of DPs and its contribution to the truth-conditions of sentence meaning. We claim that the readings of DPs and their status of being presuppositional depend on the syntactic position of the DPs relative to a possible sentence-negation operator. Furthermore, we present a few examples, proving how, under the same structural preconditions, sentence negation has an impact on the aspectual reference of event descriptions and temporal modification. The observations made lead us to locating sentence negation at a fixed syntactical position immediately above the focus domain, thereby excluding that natural language grammaticalizes an equivalent to the sentence-external negation of Propositional Logic. Concluding on these assumptions, we discuss some logical, ontological, and compositional prerequisites that reveal the problems raised by internal negation. A formal approach to the syntax-semantics mapping finally demonstrates how sentence negation can be compositionally realized within the scope of the existential binding of the event argument, and how this solution interacts with the referential status of DPs and event descriptions.

1 Data

1.1 DPs and existential presupposition

We postulate that sentence negation closely relates to the readings of semantic constituents such as, for instance, to the readings of DPs. It is a commonly accepted assumption that presuppositions remain constant under negation. (1) represents a straightforward but quite familiar definition which is exemplified by the pair of sentences and their existential presuppositions in (2).

- (1) "A is a presupposition of B, if B entails A and not-B entails A". (Hajičová, 1984)
- (2) (a) *Das Kind schläft.* → The child exists.
(b) *Das Kind schläft nicht.* → The child exists.

The definition, however, does not elucidate which semantic structure justifies our assumption. We know that the existential presuppositions resist negation since we understand the sentences. Thus the definition in (1) is only based on an intuitive interpretation but not on a grammatical test. Beyond this, it is obvious that the position of sentence negation on the syntactic surface structure does not necessarily reflect the position at which we actually interpret

¹ Throughout this talk, we will often use the term *event*. To avoid any confusions, we should mention in advance that we regard *events* as the ontological category of spatiotemporal entities. This category reflects the ontological notions of *eventualities* or *occurents* and is completely neutral with respect to the aspectual classes of any linguistic descriptions.

the negation. Thus the discrepancy between semantic input and presuppositional interpretation and, respectively, between syntactic position and semantic integration raises the following issues:

- Which syntactic positions are conceivable positions for sentence negation?
- Which of these positions lead to semantically appropriate interpretations of sentence negation?
- On which syntactic and semantic domains does sentence negation operate?

It is a well-known fact that Propositional Logic treats sentences as statements which can be negated.

- (3) For every valuation V and for all formulas Φ :
 $V(\neg\Phi) = 1$ iff $V(\Phi) = 0$ (cf. GAMUT, 1991: p. 44)

Natural-language sentences, however, are expression with a complex internal structure. We achieve an expression ϕ only by obeying the rules of semantic composition. Example (2a), for instance, combines a verbal predicate (*sleep*) with its argument (the DP *the child*).

- (4) (a) $\exists x[[Child(x)] \wedge [Sleep(x)]]$

In simpler terms, (4a) would be the result of the semantic composition. If we now apply the negation of Propositional Logic to the semantic representation of a natural-language sentence, negation operates on the whole expression and thus produces an external negation (cf. (4b)).

- (4) (b) $\neg\exists x[[Child(x)] \wedge [Sleep(x)]]$

Several investigations from the seventies (e.g. Givón, 1978; Fodor, 1979; Hajičová, 1984), however, argue that the external representation results in incorrect semantic forms. If we paraphrase the external negation as in (5b), we can show clearly that, by expanding the negation domain to the entire sentence, external negation produces inadequate truth conditions.

- (5) (a) *Sarah cannot sleep because of her headache.*
 (b) *It is not the case that [Sarah can sleep because of her headache].*

Rejecting the solution of Propositional Logic and turning instead to Predicate Logic as the familiar format of semantic representation, we can make use of the fact that natural-language sentences are internally structured expressions. Accordingly, sentences are nested and coordinated functions or function-argument structures. This presumption enables us to determine an internal scopal position for the negation functor. The resulting internal negation corresponds to the negation of the nuclear scope.

- (6) $\exists x [[Child(x)] \wedge \neg[Sleep(x)]]$

We might postulate furthermore that presupposition is the result of an inference triggered by the definite article. This position is supported by many approaches, including recent investigations of discourse structure and text coherence (e.g. Chierchia, 1995; Asher/Lascarides, 1998; and others). This cannot be the whole truth though. Even languages without an article system, such as most Slavic languages, generate analogous existential presuppositions, although there is no definite article serving as an alleged trigger of these presuppositions.

- (7) (a) *Dítě nespí.* (Czech)
 \emptyset *child neg sleeps.*
 (b) Internal negation:
 $\exists x [[Child(x)] \wedge \neg[Sleep(x)]]$

We recognize that the DP is located outside the scope of negation. Therefore, as in the German example before, the DP is not subject to sentence negation.

The problems addressed so far are still common ground, but internal negation raises further issues: What is the actual descriptive content of the existential presupposition? Is it nothing more than asserting the unique existence of a child?

- (7) (c) Unique existential presupposition:
 $\exists!x [Child(x)]$

It seems that (7c) is not really informative. We can derive the same information from every sentence which has *das Kind* as its subject. Thus the presupposition is detached from the state of affairs which the carrier sentence denotes. Seuren's (1991) text-acceptability test for presuppositions (cf. (7d)), however, demonstrates that presuppositions somehow depend on the state of affairs underlying the proposition of the carrier sentence.

- (7) (d) [There is exactly one child]_{Presupposition} and [it is sleeping]_{Propositional condition}.

This encourages us to claim that we have to interpret the presupposition with regard to the particular event that the sentence describes. The event predetermines the spatial and temporal domain to which the assertion of the existence of the referent applies, that is, it predetermines the discourse model of which the discourse referent is a part. Thus sentence negation always impacts those qualities which the sentence attributes to the event. But can we conclude on this that sentence negation automatically negates the existential assertion of the event, as represented in (8)?

- (8) Negating the existential assertion of the event:
 $\exists x [[P(x)] \wedge \neg \exists e [\dots e \dots x \dots]]$

This solution would lead us straight back to the same problem: negating the existence of an event, we would not be able to anchor the referent within an asserted spatiotemporal context and thus we would not be able to link it to the underlying state of affairs. Moreover, we have to consider what the truth-conditions following from the negation of the event's existence would predict for other grammatical phenomena, such as, for instance, anaphoric reference.

- (9) *Es regnet nicht.*
 'It isn't raining.'
- (a) *Das freut Maria.*
 'Mary is pleased about that.'
- (b) *Deshalb geht Maria mit ihren Kindern spazieren.*
 'Therefore Mary goes for a walk with her children.'
- (c) *Das erleichtert das Autofahren.*
 'This facilitates driving.'

The verb *regnen* involves only one argument which is the event argument. Thus negating the existence of this event excludes the possibility of establishing any discourse referents in the discourse model, raising the question of how we would then be able to establish anaphoric reference in the subsequent sentences ((9a) to (9c)), given that the previous sentence denoted an empty set of discourse referents. It seems that, in equating sentence negation with the negation of the existence of an event, we accept that sentence (9) tells us nothing about the universe of discourse at all. But obviously, the sentence does express something and, in particular, it does assert the existence of a spatiotemporal entity to which we can refer. Therefore it seems more conclusive to assume that the sentence expresses that it is the case that it is not raining, and the fact that this is the case pleases Mary.

The data discussed so far suggests that sentence negation is an operator with a fixed syntactic position. The specific-unspecific dichotomy with respect to DP readings provides further evidence for this hypothesis. (10) compares the unspecific reading (a) of the internal argument DP with its specific reading (b).

- (10) (a) *Der Richter hat [keinen ZEUGen vereidigt]_{Focus}*
 The judge has [**neg-art_{indef}** witness sworn_in]
- (b) *Der Richter hat einen Zeugen [nicht verEIDigt]_{Focus}*
 The judge has a witness [**neg** sworn_in]

A number of analyses explain the difference by referring to the Tree-Splitting Mapping Hypothesis. According to this well-known methodic framework, the DP in (10a) is regarded as non-presuppositional and therefore is mapped onto the nuclear scope, whereas the presuppositional DP in (10b) is mapped onto the restrictor. This analysis rests on the syntactical precondition of LF-movement.

The Mapping Hypothesis, on the one hand, indeed reflects an empirically correct observation, namely that DPs with different readings show different scopes. On the other hand, the theory regards the actual reading of a DP as the only decisive factor for whether the DP is presuppositional or non-presuppositional. Such an actual reading, however, is produced by our conceptual interpretation and not by semantic composition or the syntax-semantics mapping. Hence the theory suggests that the feature of being (non-)presuppositional is independent of any syntactic constellations before LF. In contrast to this consequence, nonetheless, it is obvious that we can derive the respective reading of the DP *einen Zeugen* in the examples (10a) and (10b) simply by inspecting the syntactic surface structure.

We conclude that the trigger of presuppositional and specific readings is the DP's position in relation to a possible negation operator – based on the syntactic precondition that sentence negation operates below the existential event quantification.

(11) Negating the propositional condition:

$$\exists x [[P(x)] \wedge \exists e [\neg(\dots e \dots x \dots)]]$$

In this way, the surface structure already determines the relevant scope relations (e.g. between DPs and sentence negation), such that the negation scope only comprises the propositional condition of the sentence.

1.2 Eventive reference under negation

Up to now, we have only considered DP readings in dependency on sentence negation. The examples in (10) shows that the presupposed existence of a DP referent can be derived from the surface structure of a sentence. If sentence negation is an adjunct of VP, this also leads to crucial consequences for any expressions above and below the sentence-negation operator that specify temporal and aspectual reference. Sentence negation cancels the privative properties expressed by the propositional condition. The remaining semantic content may be highly unspecific since negated descriptions of event normally do not correspond to an 'opposite' positive description of the same event. What a scenario described by a sentence such as (12a) looks like, for instance, is almost undetermined and even hardly inferable from the context. Beyond this, sentence negation cancels the complete aspectual information of the propositional condition. The default case is that the aspectual classes of negative sentences are non-bounded (cf. 12a & b), but not necessarily stative (cf. 12b).

- (12) (a) *Eli did not run for an hour / *in an hour.* → ?
- (b) *Eli did not stop for an hour / *in an hour.* → Eli moved for (at least) 1 hour

Temporal and aspectual modifiers circumscribe characteristics of an event referent by introducing a further spatiotemporal² referent *t* with the quality χ and setting this spatiotemporal referent into a temporal relation **R** with the event argument of the VP.

(13) Temporal modifier: $\lambda P \lambda x_n \dots x_l \lambda e [\exists t [P(e, x_n \dots x_l) \wedge \chi(t) \wedge \mathbf{R}(e, t)]]$

Assuming that (11) is the target structure for representing sentence negation, it is obvious that sentence negation has an impact on whether or not the existence of this spatiotemporal referent introduced by the modifier is presupposed.

- (14) (a) *Eli hat zwei Stunden lang [nicht angehalten].*
 Eli **aux** for two hours [**neg** stopped]
- (b) *Eli hat [nicht zwei Stunden lang angehalten]*
 Eli **aux** [**neg** for two hours stopped]

In (14a), we are talking about a certain time period within which an event occurred that is described by the negative propositional condition. This event is temporally non-bounded and thus can be modified by a duration adverbial. In (14b), in contrast, the modifier is part of the propositional condition and thus is interpreted within the scope of negation.³ Therefore, in analogy to DPs enclosed in the negation scope, the time period's existence is not presupposed by the modification operator but might fail to exist. The table in (15) shows how temporal modifiers group around the sentence-negation operator.

(15) The syntactic positions of aspectually relevant modifiers relative to sentence negation

presupposed					non-presupposed					
	sentence adverbs	frame-setting modifiers	sequential / habitual modifiers	event-related duration / time-frame modifiers		event-related duration / time-frame modifiers		process-related time-frame modifiers	further process-related modifiers	
<i>weil</i>	<i>wohl</i>	<i>letztes Jahr</i>	<i>wieder</i>	<i>2 Monate lang</i>	<i>nicht</i>	<i>3 Stunden</i>	<i>ein Pianist</i>	<i>in weniger als 60 Sekunden</i>	<i>wenig gefühlvoll</i>	<i>einen Walzer spielte</i>
since	probably	last year	again	for 2 months	neg	for 3 hours	a pianist	in less than 60 seconds	with little feeling	a waltz played
				[+durative]	DEL	[+durative]		[+resultative]		[+telic]

In accordance with Frey and Pittner (1998), and Maienborn (1998), we presume that adverbial modifiers are adjuncts of projections of either lexical or functional categories. We disregard furthermore the question of whether adverb-like modifiers of different types are generated in specific basic positions. We assume instead that the hierarchical positions these adjuncts hold in relation to each other are motivated by purely semantic reasons. This view justifies regarding the syntactic linearization of modifiers only as a reflection of the intended scope relations.

² These spatiotemporal referents may be interpreted ontologically either as events or as time periods individuated by some external ontological criterion (such as time measurement).

³ Note that this structure based on sentence negation has to be kept apart from a constituent negation such as in (14c). Constituent negations open sets of alternatives and are subjected to certain rigid prosodic patterns.

- (14) (c) *Eli hat [nicht zwei STUNDen lang] angehalten(, sondern...)*
 Eli **aux** [**neg** for two hours] stopped(, but...)

Accordingly, the syntactic position of sentence negation divides the aspectual and temporal description of the main event into presupposed and non-presupposed information.

Sentence negation cancels the entire aspectual and modificational information within its scope. The remaining information about the event is the verb's semantic presupposition of a pre-existent situation, which, as usual, is negation-resistant. Modifiers above the sentence negation operate on this presupposed information (which normally is quite poor, cf. (12a)).

2 Structured eventive predications under negation: logical, ontological, and compositional prerequisites

The structural solution proposed in (11) perfectly satisfies the grammatical requirements listed in section 1. However, does it also lead to an intended logical form and an ontologically appropriate conceptual interpretation?

The problem we encounter if we try to place negation below the event quantification is that the expression in the negation scope is, in its own right, a complexly structured expression.

(16) ... $\exists e$ [[\neg ... e ... x ...]]

Thus we still have more than one option for internal negation, as a closer look at the complex propositional condition will show. Reichenbach (1947) assumes that predications may constitute higher-order predications on event arguments. We suppose that the instantiation relation introduced by Bierwisch (1988), or even simple bracketing serve the same purpose in an equivalent way⁴.

(17) Structured eventive predications

- | | | | |
|-----|--|----------------------------------|--|
| (a) | Reichenbach's fact function ⁵ | $\exists e$ [[$P(x)$]*(e)] | with * \in $\langle t, \langle e, t \rangle \rangle$ |
| (b) | Bierwisch's instantiation relation | $\exists e$ [e inst $P(x)$] | |
| (c) | Instantiation by bracketing | $(P(x))(e)$ | |

We will refer to all these descriptions of events as *structured eventive predications*.

Starting off with these representational formats, (16) turns out to be syntactically ambiguous. The ambiguity derives from the fact that the enclosed expression is itself a proposition and thus a truth-functional expression to which we can attribute a truth-value. Hence we can interpret (16) in two ways:

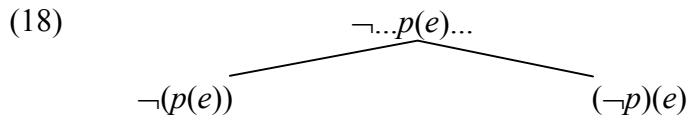
⁴ The Davidsonian and Neo-Davidsonian variants of Reichenbach's fact function, however, have to be regarded more critically with respect to their logical and semantic behavior. In general, both representation formats disguise the higher-order character of the structured eventive predication:

Davidson ... $\exists e$ [$P(x, \dots, e)$]

Neo-Davidson ... $\exists e$ [$P(e) \& \dots(\dots e) \& \dots$]

In terms of Reichenbach's distinction between expressive and denotative terms (cf. Reichenbach (1947), p. 319-320), the functor-argument relation between the propositional condition and the event argument is represented using both denotative and expressive terms (the bracketing, the asterisk, and the syntax) in the fact function. The Davidsonian and the Neo-Davidsonian strategies, in contrast, hide this relation behind a purely expressive notation (the syntax of the main predication) and thereby make it impossible in advance to place a negation operator within the propositional condition – a possibility, nevertheless, that we will discuss in the following. Furthermore, the two strategies raise further serious problems concerning the compositional computability of a semantic sentence meaning and concerning the ontological adequacy of its conceptual interpretation.

⁵ The asterisk marks that 'P of x' is used as a higher-order function.



Obviously, the two alternative readings do not receive the same interpretation. Thus in total, internal negation can be split up into three negative expressions⁶.

- (19) (a) $\neg \exists e [e \text{ inst } p]$ (b) $\exists e [\neg(e \text{ inst } p)]$ (c) $\exists e [e \text{ inst } \neg p]$

For Reichenbach, (19a) and (c) are in any case equivalent. He derives this equivalence from his definition of the fact function.

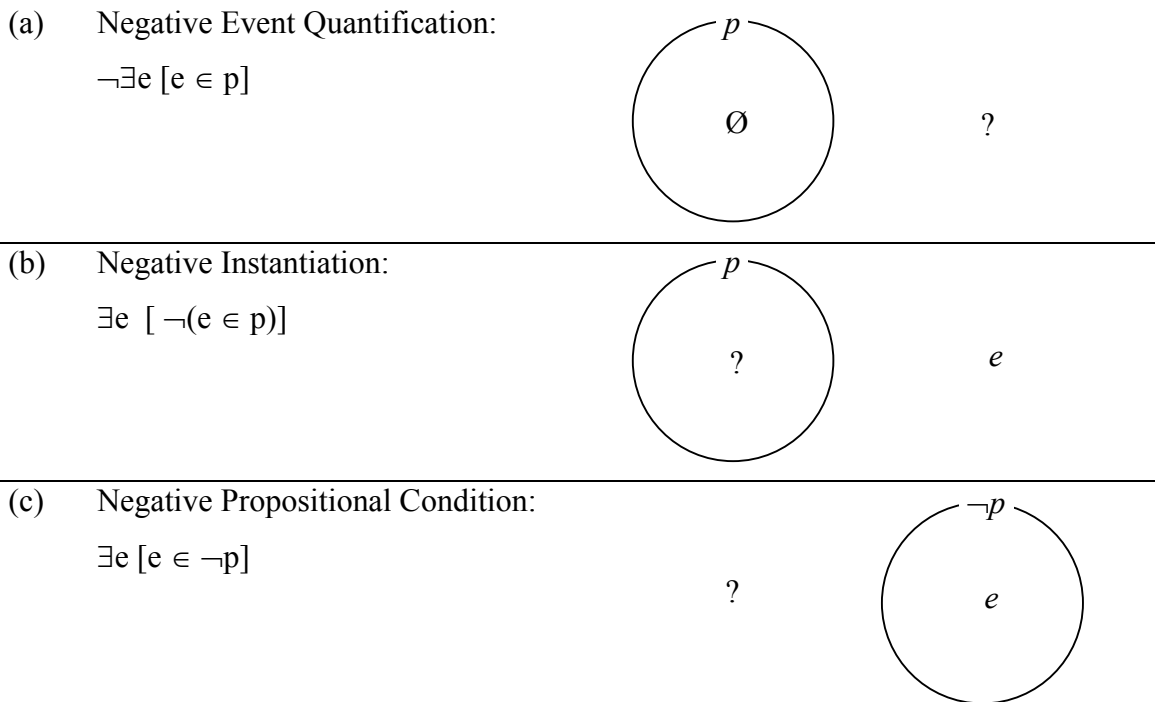
(20) Reichenbach's equivalence:

$$p \equiv \exists e [(p)^*(e)] \quad \rightarrow \quad \neg p \equiv \neg \exists e [(p)^*(e)] \equiv \exists e [(\neg p)^*(e)]$$

But is this equivalence actually desirable? What do the three different negative expressions actually denote from the viewpoint of conceptual interpretation?

Let us use an oversimplifying extensional interpretation, which (i) treats episodic propositions as sets of events and which (ii) equates instantiation with set-theoretic elementhood.

(21) Extensional Interpretation



At first glance, these extensional interpretations do not seem informative. Given that (i) p is a grammatically well-formed, non-tautological proposition and that (ii) sufficiently many eventives are regularly distributed across the universe, we will necessarily always find an event in the universe which is an instance of p and thus proves **negative quantification** false. In contrast, we will necessarily always find events which are not an instance of p and, respectively, which are instances of $\neg p$, such that **negative instantiation** and **negative propositional condition** would be true in any context. It is obvious therefore that we have to restrict the quanti-

⁶ For better clarity, we use Bierwisch's instantiation function. We furthermore disregard the possibility of placing the negation in the main predication (cf. $\exists e [e \text{ inst } [\neg P(x)]]$), which is completely out from a compositional and extensional view.

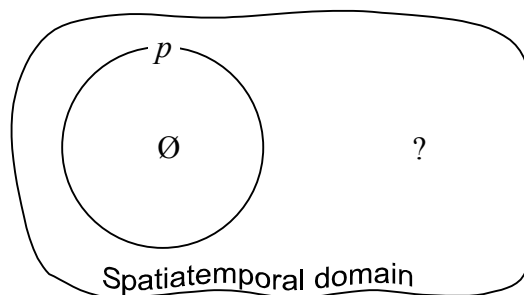
fication to a certain spatiotemporal domain. This domain is determined by all temporal information encoded in a sentence (tense, modifiers, etc.) and the relevant context of utterance.

(22) Extensional Interpretation

(a) Negative Event Quantification:

$$\neg \exists^{<t,t>} e [e \in p]$$

$$\nrightarrow \neg \exists^{<t,t>} e_j [e_j \in \neg p]$$



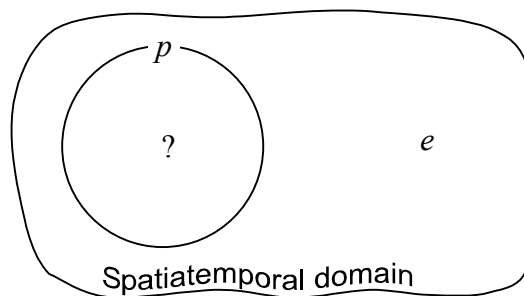
But do we thereby reach our goal? As before, **negative quantification** yields bad models. We only know that the class p is empty. We know nothing else, however, about the rest of the domain. In particular, we do not know whether there is an instance of $\neg p$.

(22) (b) Negative Instantiation:

$$\exists^{<t,t>} e [\neg(e \in p)]$$

$$\nrightarrow \neg \exists^{<t,t>} e_j [e_j \in \neg p]$$

$$\rightarrow \diamond \exists^{<t,t>} e_j [e_j \in p]$$

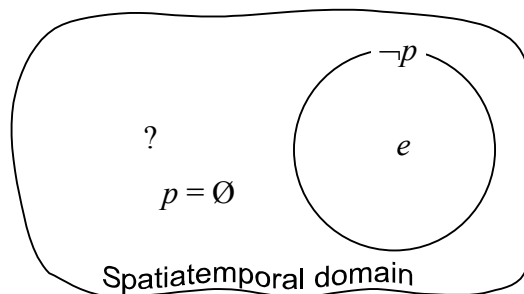


Reichenbach also rules out **negative instantiation**. We know that there is an event which is not an element of p . But we still do not know whether this event is an element of $\neg p$. And, even worse, it is possible that there are events in this domain which are elements of p , although our negative sentence intends this very case to be excluded.

(22) (c) Negative Propositional Condition:

$$\exists^{<t,t>} e [e \in \neg p]$$

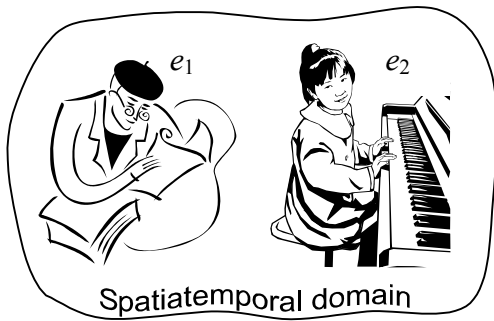
$$\rightarrow \neg \exists^{<t,t>} e_j [e_j \in p]$$



Negative propositional condition does not tell us much about the domain's events outside $\neg p$. Nevertheless we know that there cannot exist an event in the domain which is an element of p , and this is actually a possibility we wanted to exclude. Thus this solution is perfectly intended by our negative sentence.

So why do we meet all these problems, especially with negative instantiation? According to Reichenbach's conception, propositions are **privative** descriptions. This means that an entity, which is not an instance of a certain description, is not automatically an instance of a complementary negative description. Imagine that we have two events in one spatiotemporal domain, the first one being Peter's reading the newspaper, the second being Mary's playing the piano.

(23) Events and Privative Descriptions



- (a) $\exists e [e \in [\text{Read} (\mathbf{Peter}, \mathbf{Newspaper})]]$
- (b) $\exists e [\neg (e \in [\text{Read} (\mathbf{Peter}, \mathbf{Newspaper})])]$

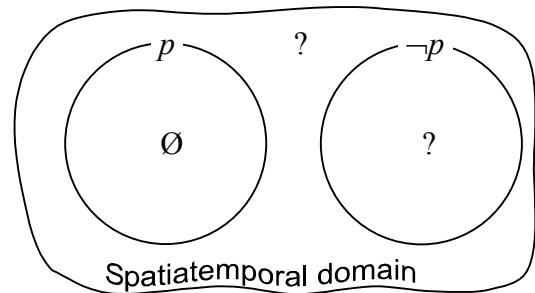
Disregarding the linguistic description and thinking of the two pictograms as ontological entities, we then are able to apply both (23a) and (23b) to this context without producing a contradiction since Mary's playing the piano is naturally not an instance of *Peter is reading the newspaper*. As a consequence, we have to redraw the schema one more time. Now the entailments derived from the respective assumptions (and in particular those derived from negative instantiation) become clear.

(24) Extensional Interpretation Taking Privativity into Account

- (a) Negative Event Quantification:

$$\neg \exists^{<t,t>} e [e \in p]$$

$$\nrightarrow \neg \exists^{<t,t>} e_j [e_j \in \neg p]$$

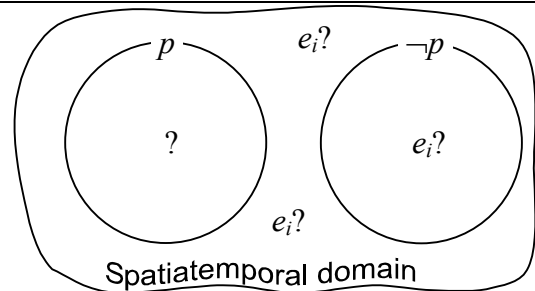


- (b) Negative Instantiation:

$$\exists^{<t,t>} e [\neg (e \in p)]$$

$$\nrightarrow \neg \exists^{<t,t>} e_j [e_j \in \neg p]$$

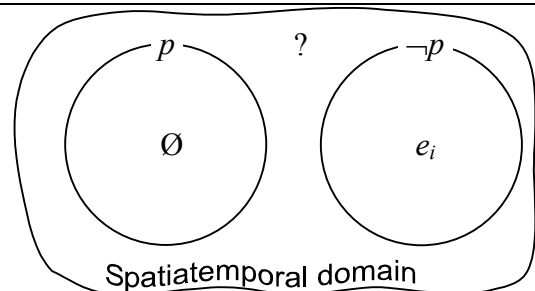
$$\rightarrow \diamond \exists^{<t,t>} e_j [e_j \in p]$$



- (c) Negative Propositional Condition:

$$\exists^{<t,t>} e [e \in \neg p]$$

$$\rightarrow \neg \exists^{<t,t>} e_j [e_j \in p]$$



Negative quantification still provides a very poor description of the domain. Negative instantiation does not let us see of which sort e_i actually is. The intended interpretation is the **negation of the propositional condition**. Thus we may ask if the negation of the propositional condition is an option for compositional semantics. Unfortunately it is not - at least not a comfortable one. It seems that Montague Semantics has its limits here.

(25) Compositionally (im)possible sentence-negation operators

- (a) **S:** $\exists e [\mathbf{p}(e)]$
NEG₁: $\lambda p [\neg p]$
 $\lambda p [\neg p] (\exists e [\mathbf{p}(e)])$ Negative existential quantification
 $\neg \exists e [\mathbf{p}(e)]$
- (b) **VP:** $\dots \lambda e [\mathbf{p}(e)]$
NEG₂: $\lambda Q \dots \lambda e [\neg(Q(e))]$
 $\lambda Q \dots \lambda e [\neg(Q(e))] (\lambda e [\mathbf{p}(e)])$ Negative instantiation
 $\dots \lambda e [\neg(\lambda e [\mathbf{p}(e)](e))]$
 $\dots \lambda e [\neg([\mathbf{p}(e)])]$
- (c) **V^o:** $\dots \lambda x \lambda e [[\mathbf{P}(x, \dots)](e)]$
NEG₃: ? Negative propositional condition

There are simple solutions with plain negation operators which enable us to derive negative quantification and negative instantiation but not derive negated propositional condition. The problematic point is that the propositional condition is bound as an argument such that modifiers or negation cannot access it after lexical insertion. To separate the eventive argument and the instantiation from the core proposition and add it later on with the sentence mood also does not provide a real option since the event argument has to be accessible for temporal operators and any kinds of modifier during the composition of the sentence.

We conclude that the syntactic surface structure is not congruent with the logical structure of negation. We cannot simply map the semantic-negation operator directly onto the logical scheme. We need instead an interpretation rule that translates the semantic constellation into the intended logical structure (which is equivalent to *negative propositional condition*).⁷

(26) Conceptual interpretation⁸

$$\llbracket \dots \exists e [\dots \neg [\dots \mathbf{p}(e) \dots] \dots] \dots \rrbracket^{c, g} = \dots \varepsilon e [\dots (\neg \mathbf{p})(e) \dots] \dots$$

On no account can the semantic instantiation prime be equated with plain set-theoretic elementhood, as we did above just for demonstration. We have to find the conceptual interpretation of instantiation instead on a well-axiomatized ontology which rules out unintended models and which keeps the intended ones. It is obvious that there is no direct way from the syntax-semantics mapping to a plain logical format that could deliver us an appropriate ontological interpretation for free. As far as the generation of semantic form is concerned, we therefore concentrate on the more grammatical constraints, namely on the crucial task of the syntax-semantics mapping of committing ourselves to that syntactic position for the interpretation of sentence negation at which we can derive adequate scope relations.

⁷ Choosing this strategy raises the question of why we do not apply an analogous interpretation rule for deriving the intended form from negative quantification. Two central arguments against such a solution present themselves: (i) The existential closure of the event role is supplied by the sentence-mood operator (cf. discussion in section 3). A negation above sentence mood, however, would also comprise the grammatical realization of the illocutionary type in its scope. And (ii), as a consequence, it would be quite unnatural to claim that the non-assertion of an event's existence is interpreted as the assertion of the existence of an event with a negative description.

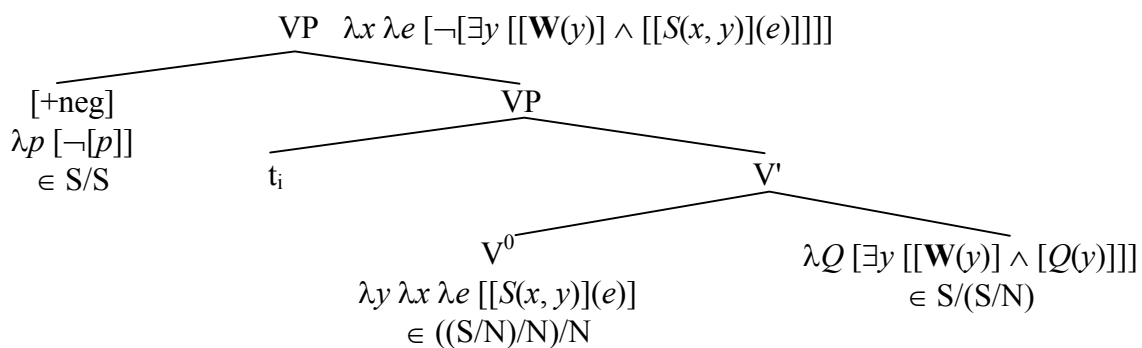
⁸ We presume that Reichenbach's definition (16) cannot be interpreted as an equivalence relation holding within one representation level. Rather it seems to be intended as an interpretation rule for the case that we switch between a purely logical to a linguistic representation level. Accordingly, external negation cannot be derived from the resulting conceptual structure in (24).

3 Syntactic preconditions for semantic mapping

We have already seen that the focus domain and the scope of negation interrelate. Dölling (1988) demonstrated in detail that the scope of negation coincides with the focus domain of the sentence. Contrasting examples (10a) and (10b) shows that specific presuppositional DPs move outside the negation scope and thereby move outside the focus. In opposition, non-presuppositional DPs remain in situ or, at least, within the focus. They thereby remain within that part of the sentence that we are able to negate.

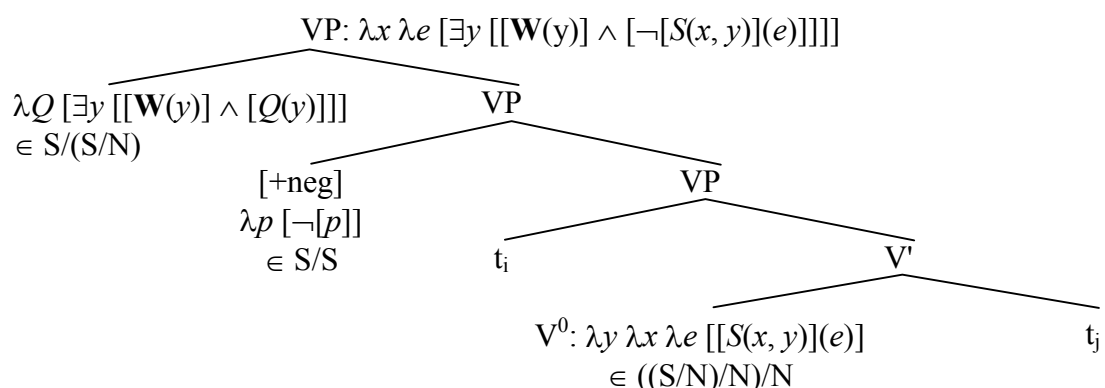
The focus-background structure divides a sentence into anaphoric, i.e. given by presupposition, constituents on the one hand, and non-anaphoric constituents on the other hand. Anaphoric constituents move above the negation functor whereas non-anaphoric constituents remain in situ and thus remain a part of the focus domain. Speaking with Fodor (1979, p. 211), they are "excused from having to refer in the real world." In this respect, the two sentences in (10) differ in their way of referring to a discourse model. In (10a), the existence of a witness is under negation and is excused from having to refer to the real world, that is from having to refer to a given discourse referent. In contrast, sentence (10b) is only true if the existence of a witness is presupposed in the given discourse model. The truth-conditions of the two sentences differ exactly in this point. With respect to semantic composition, we assume that, in accord with Haftka (1994), the negation functor is a VP-adjunction, just as the position functor is a VP-adjunction in affirmative sentences. The morphosyntactic feature in negative sentences is specified as [+neg]. The following structure tree for sentence (10a) shows that the DP remains in situ and thereby within the negatable sentence part.

- (27) (a) Example: *Der Richter_i hat [keinen ZEUGEN _{t_i} VEREIDIGT]_{NegScope}]_{Focus}*
 'The judge did not swear in any witness.'



In contrast, we observe in (27b) that the DP has been moved outside the sentence focus and thus outside the negatable part of the sentence.

- (27) (b) Example: *Der Richter_i hat einen Zeugen_j [[nicht _{t_i} _{t_j} VEREIDIGT]_{NegScope}]_{Focus}*
 'The judge did not swear in a witness.'



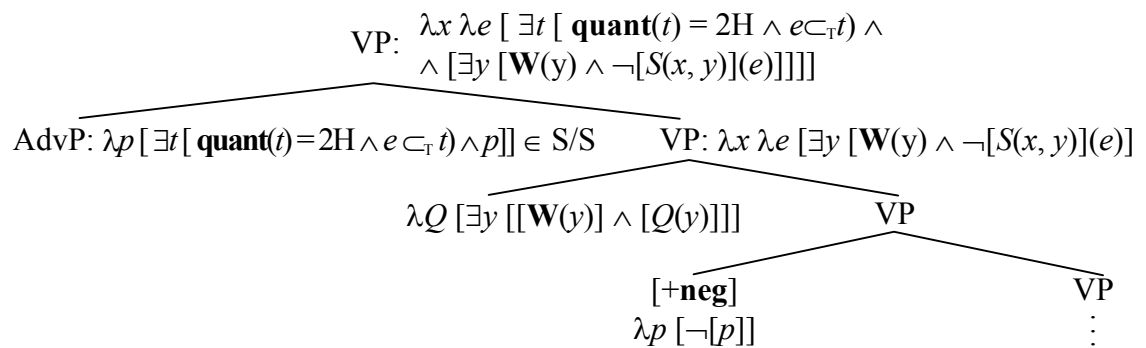
The specific reading is brought about by the syntax-semantics mapping. The DP is located outside the scope of negation such that the negation cannot access the existential assertion of the internal argument DP. The structural preconditions of the resulting syntactic constellation equal those that obtain on individual terms, for individual terms, too, cannot be negated. We finally accomplish the conceptual interpretation of the indefinite DP using an equivalence.

$$(28) \quad \exists x \left[\underset{\text{SF}}{[\mathbf{P}(x)]} \wedge \neg[\mathbf{Q}(x)] \right] \equiv \neg \mathbf{Q} \left(\underset{\text{CS}}{\exists x [\mathbf{P}(x)]} \right)$$

At the level of compositional semantics, we receive a structure constituted by a main functor, i.e. the DP, and a secondary functor, i.e. the propositional condition. In example (27a), in contrast, the DP is part of the complex function that corresponds semantically to the focus domain and hence is part of the negatable function of the sentence. Therefore the DP in (27a) cannot be a presuppositional one.

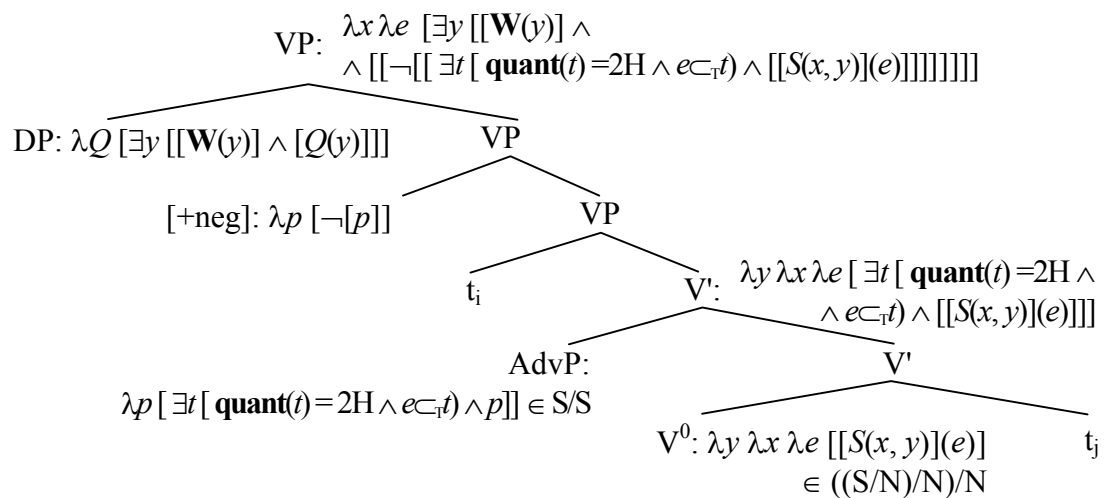
In an analogous way, a temporal modifier can be applied to a VP above or below the sentence-negation operator, depending on its referential status.

(29) (a) *Der Richter_i hat 2 Stunden lang einen Zeugen_j [[nicht t_i t_j VEREIDIGT]_{NegScope}]_{Focus}*



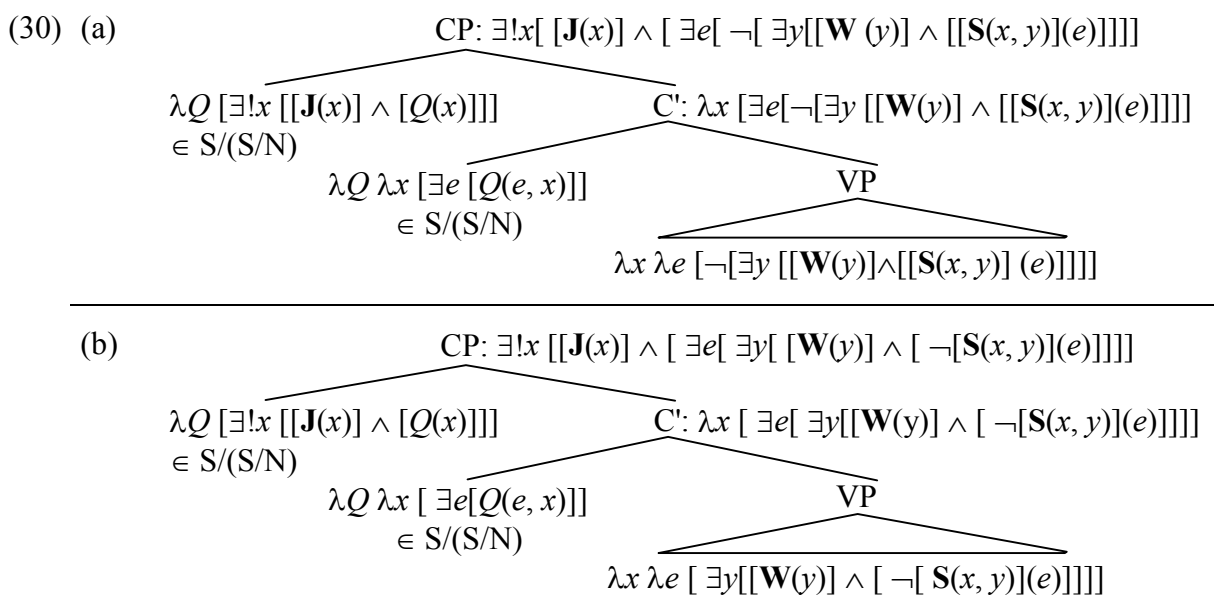
In (29a), the modifying operator is applied to the VP resulting from (27b). The existential quantification over time periods is outside the negation scope and is read as specific. In (29b), in contrast, the same temporal modifier is applied to V' and thus is in the negatable part of the sentence, such that we do not know anything about its referential status.

(29) (b) *Der Richter_i hat einen Zeugen_j [[nicht t_i 2 Stunden lang t_j VEREIDIGT]_{NegScope}]_{Focus}*



The fact that sentence negation also cancels the aspectual information of the verb and of respective temporal and aspectual modifiers – if there are any – is implicitly presumed in the semantic derivations.⁹

During the next steps of semantic composition, the sentence-mood operator binds the event role in the head of CP. The sentence-mood operator introduces the existential assertion of the event. It is a crucial point that the sentence-negation operator does not move up to C⁰ (cf. the structure trees in (30)) since otherwise, we would erroneously postulate identical truth-conditions for (10a) and (10b).



The following example provides further justification for excluding a movement of the sentence-negation operator to CP. If the negation in sentence (28) were hosted by the head of CP and took scope over the rest of the sentence, it would be unclear how we are able to interpret the presuppositional object DP outside the negation scope.

(31) [CP *Der Richter* [C **neg** [... [*hat den Zeugen nicht vereidigt*] ...]]]

Even the assumption that the definite article triggers an existential presupposition does not provide us a way out of this problem: the following example from Czech shows that, under the same syntactical and prosodic conditions, we arrive at a specific or referential reading even though Czech cannot use a definite article.

(32) *Soudce svědka nezáł do přísahy.* (Czech)

Ø judge Ø witness **neg**-take-pret to Ø oath.

Soudce svědkai [NEVZÁL do přísahy t_i] Focus/Negation scope

Remaining in situ and thus within the focus domain, the DP would trigger a non-specific reading. Hence the definite article cannot be the only and exclusive trigger of existential presuppositions. Rather it is the case that, in the first place, information structure rules the processes of semantic mapping (i.e. the mapping of the focus function onto the next embedded constitu-

⁹ There are attempts to make aspectual information visible within the semantic form (cf. Trautwein, 2002). In this way, we are able to comprehend the interaction of the SF of the verbs, modifiers, and sentence negation with respect to their respective relative syntactic position in the surface structure and the resulting scope of their aspectual information.

ent as its argument, and – in our case – the mapping of the focus function onto the internal argument).

4 Results

Sentence negation does not affect the complete sentence but only parts of it. Hence external negation is not applicable to the conditions of truth and usage in natural language. Nevertheless, sentence negation has a fixed position in the sentence and operates on the focus domain. The syntactic position of sentence negation solely results from scopal requirements. Constituents outside the negation scope are presuppositional. The resulting scope relations furthermore condition the usage of a sentence. The conceptual interpretation of sentence negation results from ontological requirements. The grammatical format of negative sentence is mapped onto the intended conceptual structure by applying an appropriate interpretation to the semantic instantiation prime.

Reference

- Asher, N. and A. Lascarides: 1998, 'Bridging', *Journal of Semantics* **15(1)**, 83–113.
- Bierwisch, M.: 1988, 'On the Grammar of Local Prepositions', in M. Bierwisch, M. Motsch, W., and I. Zimmermann (eds), *Syntax, Semantik und Lexikon*, studia grammatica 29, Berlin, 1–65.
- Chierchia, G.: 1995, *Dynamic of meaning: anaphora, presupposition and the theory of grammar*, Chicago.
- Dölling, J.: 1988, 'Natürlichsprachliche Negation und Logische Negationsoperatoren. Ein Beitrag zur semantischen Analyse der lexikalischen Einheit *nicht*', in *Linguistische Studien Reihe A, Arbeitsberichte 182*, 1–106.
- Fodor, J. D.: 1979, 'In defense of the truth-value gap', in C.-K. Oh and D. A. Dineen (eds), *Presuppositions, Syntax and Semantics 11*, Academic Press, New York, 199–294.
- Frey, W. and K. Pittner: 1998, 'Zur Positionierung der Adverbiale im deutschen Mittelfeld', in *Linguistische Berichte 176*, Opladen, 489–534.
- GAMUT, L. T. F.: 1991, *Logic, Language, and Meaning, Volume 1: Introduction to Logic*, The University Of Chicago Press, Chicago.
- Givón, T.: 1978, 'Negation in Language: Pragmatics, Function, Ontology', in P. Cole (ed.), *Syntax and Semantics 9: Pragmatics*, Academic Press, New York, 69–112.
- Haftka, B.: 1994, 'Wie positioniere ich meine Position? Überlegungen zu funktionalen Phrasen im deutschen Mittelfeld', in Haftka, B. (ed.), *Was determiniert Wortstellungsvariation? Studien zu einem Interaktionsfeld von Grammatik, Pragmatik und Sprachtypologie*, Westdeutscher Verlag, Opladen, 139–159.
- Hajičová, E.: 1973, 'Negation and Topic vs. Comment', *Philologia Pragensia* **2**, 81–93.
- Maienborn, C.: 1998, 'The Grammar and Pragmatics of Locative Modifiers', Draft, Humboldt University.
- Reichenbach, H.: 1947, *Elements of Symbolic Logic*, MacMillan, London and New York.
- Seuren, P.: 1991, 'Presuppositions', in A. von Stechow and D. Wunderlich (eds), *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung, Handbücher zur Sprach- und Kommunikationswissenschaft 6*, Berlin and New York, 286–318.

Späth, A.: 2002a, 'The Linearization of Argument DPs and Its Semantic Reflection', to appear in H. Härtl. and H. Tappe (eds), *Mediating between Concepts and Grammar-Processing Structures*, Berlin and New York.

Späth, A.: 2002b, 'Slavic DPs and Their Contribution to Discourse Linking', in P. Kosta (ed), *Current Approaches to Formal Slavic Linguistic*, Contributions of the 4th European Conference on Formal Description of Slavic Languages FDSL IV.

Trautwein, M.: 2002, 'The Time Window of Language: The Interaction between Linguistic and Non-Linguistic Knowledge in the Temporal Interpretation of German and English Texts', doctoral thesis, University of Leipzig, Leipzig.