

# Anankastic relatives

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## Preface

In my dissertation, I focus on a semantic phenomenon involving multiple intensional quantifiers and relative clauses. The phenomenon appears in sentences like in (i) below. The most striking observation concerning this sentence is that in an un-specific reading, which comes out in the context of a job opening for instance, it can be paraphrased with the two examples in (ii) and (iii). Hence, (i) can be paraphrased both with a sentence containing an unmodalized relative clause, and with a paratactic discourse where each clause of (i) is turned into a main clause.<sup>1</sup>

- (i) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*
- (ii) Die EZB sucht einen Juristen, der EU-Bürger ist.  
the ECB seeks a lawyer who EU-citizen is  
*‘The ECB is looking for a lawyer who is an EU-citizen.’*
- (iii) Die EZB sucht einen Juristen. Er soll EU-Bürger sein.  
the ECB seeks a lawyer he should EU-citizen be  
*‘The ECB is looking for a lawyer. He should be an EU-citizen.’*

I am not aware of any literature that has discussed the phenomenon that appears in (i) and the relationship between examples (i) to (iii). The aim of this work is to outline the phenomenon, to explain the mysterious relationship between the three examples above and, lastly, to present an analysis that can capture what is going on in sentence (i).

This thesis consists of six sections: In Section 1, I present the puzzle surrounding the three sentences above in greater detail, and do a first outline of the phenomenon I am interested in. In this section, I discuss two important questions the data raises, and define the true nature of the phenomenon, which does not become clear when only considering sentences like (i) above. Section 2 contains a thorough data discussion with a wide range of German data to help us further understand the characteristics and challenges of this phenomenon. In this section, I answer one of the two major questions addressed in Section 1.

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<sup>1</sup>The first explicit reference to this observation can be found in the project proposal for the project *INT*, which is part of the Forschergruppe *Relativsätze* funded by the *Deutsche Forschungsgemeinschaft*. This thesis is part of the research done in that project.



To answer the second major question, I need more tools and background on the topic of relative clauses. Hence, in Section 3, I focus on the semantics of relative clauses in intensional contexts in general and discuss the options available to deal with the relative clauses in our data.

In Section 4, I discuss why a traditional analysis fails to capture our data. Subsequently, in Section 5, I investigate different instances of anaphoric modality in order to find inspiration for my analysis from existing literature on other possibly related phenomena. The most evident phenomenon that may be related to my data includes *modal concord* sentences. We will see, however, that the parallelism between the two phenomena only exists on a superficial level. Instead, there may be more similarities in the semantics between our sentences and *anankastic conditionals*, which I also discuss in this section.

As it turns out, the adaptation of analyses of other phenomena to our data will not be convincing, and in the end, my discussion about the relation between our phenomenon and the ones discussed in Section 5 will remain incomplete in this thesis. In Section 6 I finally propose my own analysis of the data. This analysis can capture most of the features outlined in the first two sections of this thesis, as well as handle the technical obstacles these sentences offer.

# 1 Description of the phenomenon

This thesis is concerned with the analysis of a special instance of intensionality in sentences containing relative clauses. In particular, I am going to have a closer look at the interaction between two sources of intensionality – one inside and one outside a relative clause. The sentences I am interested in are of the type presented in (1). They are characterized by the appearance of an intensional (transitive) verb in matrix position and an object-modifying, modalized relative clause. I am interested in the unspecific object reading of this sentence. This reading emerges in a scenario in which the European Central Bank (ECB) has a job opening for a lawyer.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*

The semantic phenomenon that appears in this reading is not obvious, but it can be made clear when comparing (1) with other sentences. Therefore, the point of departure for this investigation will be a data puzzle that has been observed in connection with sentences like (1). This puzzle not only reveals the interesting semantic characteristics of the reading I am interested in, but also raises important questions concerning the theoretical implications for sentences like (1). Apart from that, I will discuss further data in this section in order to outline the phenomenon and generalize the features of the sentences that exhibit the reading we are interested in.

This outline will be partly inconclusive since I will mainly focus on the data puzzle in this section. The loose ends will be tied up in a detailed descriptive data discussion, which follows in Section 2. There I will look at a wider range of data in order to outline the true nature of the phenomenon, which is not apparent when only considering the data puzzle which started the whole investigation.

## 1.1 Zimmermann’s puzzle

Although as a first impression, the sentence in (1) does not seem to be particularly striking, sentences of this sort deserve linguistic attention because of two observations that can be made in connection with possible paraphrases of the unspecific reading. The comparison of the original sentence with its two paraphrases in (1)–

(3) represents what I will call *Zimmermann’s puzzle*.<sup>2</sup> The first paraphrase in (2) displays the same sentence as in (1), just lacking the embedded modal. The second paraphrase in (3) consists of a paratactic discourse version of (1) where the relative clause is transformed into a main clause. On an intuitive level, both paraphrases can be used in the same scenario that fits the unspecific reading of (1), for instance a job opening scenario. This leads to the unexpected conclusion that the three examples of Zimmermann’s puzzle are partially synonymous, i.e., they share a reading. To fully understand the phenomenon, we need to examine all three examples in more detail.

*Zimmermann’s puzzle:*

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*
- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
the ECB seeks a lawyer who EU-citizen is  
*‘The ECB is looking for a lawyer who is an EU-citizen.’*
- (3) Die EZB sucht einen Juristen. Er soll EU-Bürger sein.  
the ECB seeks a lawyer he should EU-citizen be  
*‘The ECB is looking for a lawyer. He should be an EU-citizen.’*

In the following, we will discuss inferences that can be drawn from the observation that these paraphrases are possible as well as related questions that will be relevant for a semantic analysis of the sentence in (1). The following discussion is divided into two parts, corresponding to two distinct aspects of the paraphrasing options, one concerning problems in connection with the modal (see Section 1.1.1), the other one dealing with issues concerning the relative clause (see Section 1.1.2).

### 1.1.1 Part A: Redundancy of the modal

The first question arising in the comparison of the original example (1) with the first paraphrase in (2) is how it is possible that the obvious difference on the surface – the omission of the modal in (2) – does not have an effect on the reading. Since both sentences can describe the same kind of scenario, they seem to share an unspecific

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<sup>2</sup>Ede Zimmermann brought up this particular puzzle in a project proposal, which is why I have chosen to name it after him.

object reading with the same truth conditions.<sup>3</sup>

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*'The ECB is looking for a lawyer who should be an EU-citizen.'*
- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
the ECB seeks a lawyer who EU-citizen is  
*'The ECB is looking for a lawyer who is an EU-citizen.'*

One conclusion that can be drawn from this observation is that the modal in (1) does not actually contribute to the meaning of the sentence, therefore its omission has no effect. This might be the case either because the modal is semantically empty or because it is semantically redundant in this specific environment. To be sure, though, in other environments the modal cannot be omitted, as for instance in the paratactic, second paraphrase (3).

- (3) Die EZB sucht einen Juristen. Er soll EU-Bürger sein.  
the ECB seeks a lawyer he should EU-citizen be  
*'The ECB is looking for a lawyer. He should be an EU-citizen.'*

If the modal is dropped in the paratactic discourse version as in (4), the sentence lacks an unspecific interpretation and thus can no longer function as a paraphrase of (1). Therefore, the modal fulfills a function in the discourse which it apparently does not have in the corresponding relative clause construction.

- (4) Die EZB sucht einen Juristen. Er ist EU-Bürger.  
the ECB seeks a lawyer he is EU-citizen  
*'The ECB is looking for a lawyer. He is an EU-citizen.'*

### 1.1.2 Part B: Ambiguity of the relative clause

From a structural perspective, the relative clause in the original example may be restrictive or appositive.<sup>4</sup> However, in the intended reading, the relative clause appears to be restrictive. This is so because we have the impression that the relative clause restricts which lawyers are eligible for the open job at the ECB. The paraphrase in (2) actually supports this view since with an unspecific object reading the relative

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<sup>3</sup>In this respect, most Romance languages including French differ from German. In French, the sentence lacking the modal can only be interpreted specifically. The unspecific object reading requires the subjunctive.

<sup>4</sup>In the English translations of the apparently ambiguous examples, I choose to omit the comma which orthographically marks an appositive relative clause in order to avoid confusion.

clause in this sentence can only be interpreted restrictively. This can be shown by adding a sentence negation to the example as in (5): in an unspecific reading, the relative clause can only be interpreted below the sentence negation, which means that it is restrictive.<sup>5</sup> The relative clause can also receive an appositive reading, but only when the object argument is interpreted specifically.

- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
 the ECB seeks a lawyer who EU-citizen is  
 ‘*The ECB is looking for a lawyer who is an EU-citizen.*’
- (5) Es ist nicht der Fall, dass die EZB einen Juristen sucht, der EU-Bürger  
 it is not the case that the ECB a lawyer seeks who EU-citizen  
 ist.  
 is  
 ‘*It is not the case that the ECB is looking for a lawyer who is an EU-citizen.*’

This observation is further supported by the fact that the paratactic discourse version of (2) in (4) can also only receive a specific interpretation.

- (4) Die EZB sucht einen Juristen. Er ist EU-Bürger.  
 the ECB seeks a lawyer he is EU-citizen  
 ‘*The ECB is looking for a lawyer. He is an EU-citizen.*’

The parallelism of examples like (2) and (4) has been used to support the hypothesis that appositive relative clauses share features with main clauses.<sup>6</sup> The appositive interpretation of (2) is therefore captured by the paratactic discourse example in (4). However, when turning to the original example with the modal in the relative clause, we observe that transforming the relative clause into a main clause – a strategy which results in the second paraphrase of Zimmermann’s puzzle – has no effect on the availability of the unspecific reading: the example in (3) is perfectly compatible with an unspecific reading.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
 ‘*The ECB is looking for a lawyer who should be an EU-citizen.*’
- (3) Die EZB sucht einen Juristen. Er soll EU-Bürger sein.  
 the ECB seeks a lawyer he should EU-citizen be  
 ‘*The ECB is looking for a lawyer. He should be an EU-citizen.*’

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<sup>5</sup>More details about the negation test can be found in Section 3.2.

<sup>6</sup>Cf. Emonds (1979) and Demirdache (1991); see Section 3 of this thesis for more background information.

The hypothesis mentioned above that appositives and main clauses have similar features would lead to the conclusion that the relative clause in (1) with the intended reading may actually be appositive. However, if it is appositive, what about the paraphrasability of the example with a sentence containing an unambiguously restrictive relative clause in (2)? Are both the restrictive and the appositive interpretation available with the intended reading in (1)? And can we trust the parallelism of appositives and main clauses?

In the following section, we are going to outline the phenomenon in greater detail so that we can systematically tackle the problems raised by Zimmermann's puzzle concerning both the role of the modal and the status of the relative clause in sentences like (1).

## 1.2 Outline of the phenomenon

So far I have not discussed the general characteristics of the phenomenon we are interested in in this thesis. I will make up for this shortcoming in this section. Because it is not trivial or uncontroversial how I choose to outline the phenomenon, I will describe my line of reasoning beforehand.

### 1.2.1 Preliminary considerations

As we discussed in Section 1.1.1, the starting observation concerning the original example (1) is that the modal inside the relative clause appears to be redundant, as demonstrated by the first paraphrase in Zimmermann's puzzle. In contrast, the modal in Zimmermann's second paraphrase, the parataxis in (3), is not redundant. In this example, we get the impression that the modal has a semantic affinity to the preceding attitude verb. The second clause in this example expresses the requirements the search object should have in order to be considered as a search object, and the modal is responsible for this interpretation because it somehow refers back to the semantics of the preceding attitude.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
*'The ECB is looking for a lawyer who should be an EU-citizen.'*
- (3) Die EZB sucht einen Juristen. Er soll EU-Bürger sein.  
 the ECB seeks a lawyer he should EU-citizen be  
*'The ECB is looking for a lawyer. He should be an EU-citizen.'*

I will classify the relationship between the attitude verb and the modal in the paratactic example as a special kind of anaphoric relation. In the original example with the modalized relative clause, this anaphoric relation is not evident. Instead, the modal seems to be semantically empty. It is actually questionable whether in a sentence like (1) we can even speak of a properly embedded modal, and whether redundancy of the modal automatically means a lack of embedding. For a conclusive answer to this question, we have to wait until the final analysis. However, in this data section, we will start investigating this issue by comparing sentences with a redundant modal like (1) with parallel sentences with embedded modals that do not appear redundant.

For this comparison, we will present three different types of data in this thesis. Firstly, we will discuss data with a properly embedded modal where the modal behaves as it is expected to, contributing in an ordinary way to the sentence meaning (6). In this case, both paraphrases of Zimmermann’s puzzle are unavailable. In the modal-free sentence in (7), Anna is looking for a guy who is eating thirty hotdogs at the moment she is looking for him instead of a guy who is able to eat thirty hotdogs as in (6) with a dynamic interpretation of the embedded modal. Both sentences are perfectly compatible with an unspecific object reading. In the paratactic discourse in (8), Anna is looking for a guy with the ability to eat thirty hotdogs, however, this example can only be interpreted specifically.

- (6) Anna sucht einen Mann, der dreißig Hotdogs essen kann.  
 Anna seeks a man who thirty hotdogs eat can  
*‘Anna is looking for a guy who can eat thirty hotdogs.’*
- (7) Anna sucht einen Mann, der dreißig Hotdogs isst.  
 Anna seeks a man who thirty hotdogs eats  
*‘Anna is looking for a guy who is eating thirty hotdogs.’*
- (8) Anna sucht einen Mann. Er kann dreißig Hotdogs essen.  
 Anna seeks a man he can thirty hotdogs eat  
*‘Anna is looking for a guy. He can eat thirty hotdogs.’*

The second type of data we want to investigate involves examples with embedded modals in which the modal neither appears to be redundant nor behaves as it is expected to; instead, the modal exhibits a similar or perhaps even the same anaphoric semantics as it does in the case of the parataxis in Zimmermann’s puzzle. In these sentences, the modal-free paraphrase is not available, whereas the parataxis (in an

unspecific reading) is very close to a paraphrase of (9). We will discuss these examples in Section 2.

- (9) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
 Anna seeks a hotel in which the invited speakers be accommodated  
 sollen.  
 should  
 ‘*Anna is looking for a hotel in which the invited speakers should be accommodated.*’
- (10) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen.  
 Anna seeks a hotel in which the invited speakers are accommodated  
 ‘*Anna is looking for a hotel in which the invited speakers are accommodated.*’
- (11) Anna sucht ein Hotel. Dort sollen die Gastsprecher unterkommen.  
 Anna seeks a hotel there should the invited speakers be accommodated  
 ‘*Anna is looking for a hotel. There, the invited speakers should be accommodated.*’

And thirdly, there are also examples with modals of different force where the modals cannot be viewed as being semantically redundant, but rather appear to be anaphoric to the matrix attitude. In these cases, again, the modal-free paraphrase is not available, whereas the paratactic one is.

- (12) Die EZB sucht einen Juristen, der EU-Bürger sein darf.  
 the ECB seeks a lawyer who EU-citizen be may  
 ‘*The ECB is looking for a lawyer who may be an EU-citizen.*’
- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
 the ECB seeks a lawyer who EU-citizen is  
 ‘*The ECB is looking for a lawyer who is an EU-citizen.*’
- (13) Die EZB sucht einen Juristen. Er darf EU-Bürger sein.  
 the ECB seeks a lawyer he may EU-citizen be  
 ‘*The ECB is looking for a lawyer. He may be an EU-citizen.*’

It can be argued that because of the lacking redundancy-feature of the modal, examples (6), (9) and (12) display a different phenomenon than the sentence in (1). I, however, will argue that only (6) is truly different because the modal here is actually conservatively embedded, whereas the other two examples belong to the same category as (1) and represent instances of the same phenomenon. From this perspective, redundancy of the modal can no longer be viewed as a crucial characteristic feature of the phenomenon in question. Instead of focusing on the redundancy-effect in



sentences like (1), we should rather focus on (9) and (12) and carefully examine the anaphoric relationship between the attitude and the modal in these examples. Hence, (1) will be treated as a special instance of the phenomenon. Our discussion about sentences like (9) and (12) will ideally not only solve the mystery about the modal's contribution in anaphoric cases in general, but also explain why in the special case of (1) the modal appears to be semantically redundant.

Since I will trace back sentences with the redundancy-feature to sentences with an anaphoric relation, and argue for a uniform treatment of all of these cases, I will call the reading these sentences share an anaphoric reading, despite the fact that this description does not appear in the original example of Zimmermann's puzzle.

### 1.2.2 Distinguishing the anaphoric reading from other readings

The sentences of interest are ambiguous on multiple levels, which have to be distinguished carefully. The different causes of ambiguity are listed below:

- i. The teleological matrix verb allows both a specific and an unspecific interpretation.
- ii. The relative clause can be both restrictive and appositive.
- iii. The modal can receive different interpretations, which are partly
  - a. lexically determined (epistemic vs. deontic) and partly
  - b. determined by the context.

The ambiguity aspects of i. and ii. have already been discussed: while we can safely say that the intended reading only appears with an unspecific interpretation, we are left undecided about the status of the relative clause. This will be a major component of our investigation. Concerning the third layer of ambiguity, the modal, we have to be very careful in distinguishing the different readings. Besides the reading that we are interested in in this thesis, the sentence in (1) can also have other readings with an unspecific object interpretation. For instance, it is possible to understand the modal as an epistemic instead of a deontic modal. In this case, the ECB is looking for a lawyer who allegedly is an EU-citizen. In our intended reading, the modal is not interpreted epistemically. This ambiguity is lexically determined (iii.a.). However, modals can also differ in their interpretation due to the context (iii.b.). For the sentence in (1), the job opening context suggests a reading in which

the modal does not contribute to the sentence meaning. In a different context, the modal might not appear semantically empty. For instance, we can imagine a scenario in which there are independent regulations that lawyers must be EU-citizens. In this scenario, the ECB may be looking for a lawyer who is allowed to work there, but the obligation to be an EU-citizen is independently motivated and is not imposed by the ECB itself.<sup>7</sup>

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*

The sentence in (14) does not feature the reading we are looking for as prominently. Instead, a conventional, or – as I will call it – ‘independent’ interpretation of the modal seems to be more readily available.<sup>8</sup> This reading would fit a context in which the FAZ<sup>9</sup> is looking for a juvenile offender who has been sentenced to several hours of community service. In the anaphoric reading, however, the part with the community service is not an obligation put on a juvenile offender, but can be understood as a requirement by the FAZ for the juvenile offender they are looking for. It is compatible with the anaphoric reading that the juvenile offender they eventually find has been sentenced to a monetary fine, but is doing community service voluntarily.

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<sup>7</sup>It seems to be possible to bring out the difference between the two readings by using the paraphrases below. In (i), the anaphoric reading seems to come out more prominently, whereas the construction in (ii) rather supports the reading with an independent interpretation of the modal. It is not clear why these paraphrases support the availability of one reading over the other, but they can help to differentiate the readings.

- (i) Die EZB sucht einen Juristen, der die Eigenschaft haben soll, EU-Bürger zu sein.  
 the ECB seeks a lawyer who the property have should EU-citizen be  
*‘The ECB is looking for a lawyer who should have the property of being an EU-citizen.’*
- (ii) Die EZB sucht einen Juristen, der die Eigenschaft hat, EU-Bürger sein zu sollen.  
 the ECB seeks a lawyer who the property has EU-citizen be to should  
*‘The ECB is looking for a lawyer who has the property of having the obligation to be an EU-citizen.’*

<sup>8</sup>We introduced the independent reading in the previous section with example (6). However, this example is not ambiguous between the independent and the anaphoric reading, which is why we choose to discuss example (14) here instead.

- (6) Anna sucht einen Mann, der dreißig Hotdogs essen kann.  
 Anna seeks a man who thirty hotdogs eat can  
*‘Anna is looking for a guy who can eat thirty hotdogs.’*

<sup>9</sup>The *Frankfurter Allgemeine Zeitung (FAZ)* is a major newspaper in Germany.

- (14) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit leisten soll.  
 the FAZ seeks a juvenile offender who community service perform should  
*‘The FAZ is looking for a juvenile offender who should perform community service.’*

The paraphrasing techniques featured in Zimmermann’s puzzle can only paraphrase the anaphoric reading described above. Hence, the examples in (15) and (16) replicate the anaphoric reading, while eliminating the (unspecific) independent modal reading.<sup>10</sup>

- (15) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit leistet.  
 the FAZ seeks a juvenile offender who community service performs  
*‘The FAZ is looking for a juvenile offender who is performing community service.’*

- (16) Die FAZ sucht eine jugendliche Straftäterin. Sie soll gemeinnützige Arbeit leisten.  
 the FAZ seeks a juvenile offender she should community service perform  
*‘The FAZ is looking for a juvenile offender. She should perform community service.’*

In conclusion, the reading we are interested in is tied to a specific, ‘anaphoric’ construal of the modal – as opposed to an ‘independent’ reading, which is always available but sometimes less prominent than the anaphoric reading. However, the anaphoric nature of the modal must not be confused with the redundancy-effect in sentences like (1). The reading we are looking for is characterized by appearing with an unspecific object interpretation and a modal that is anaphoric to the modality of the matrix intensional verb. It is not characterized by a semantically empty or redundant modal.

### 1.2.3 Identifying compatible environments

The two sentences we have discussed so far both feature the same intensional elements and structural characteristics: the teleological attitude verb *seek* in matrix

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<sup>10</sup>It is possible to get an independent modal interpretation for the discourse in (16), however, only with a specific reading of *a juvenile offender*.

position and the weak necessity modal *should* embedded in an object-modifying relative clause. However, the reading we are interested in is not limited to sentences featuring only these two intensional verbs or this specific structure. We will discuss other possible environments in the following.

### 1.2.3.1 Intensional verbs in matrix position

A cursory inspection of a wider range of intensional verbs reveals more verbs that are compatible with the reading in question, but there are certain limitations. Focusing on verbs that take nominal arguments, apart from teleological attitude verbs, we can observe the reading in sentences with buletic attitude verbs (17) in matrix position as well as with verbs of demand (18).

- (17) Otto wünscht sich eine schwarze Katze, die weiße Pfoten haben soll.  
 Otto wishes a black cat which white paws have should  
 ‘*Otto wants a black cat which should have white paws.*’
- (18) Anna besteht auf einer Gehaltserhöhung, die mindestens vier Prozent  
 Anna insists on a raise which at least four percent  
 ihres jetzigen Gehalts betragen soll.  
 of her current salary amount should  
 ‘*Anna insists on a raise which should amount to at least four percent of her current salary.*’

These sentences feature the same behavior concerning their paraphrasability as the original example with the teleological attitude verb *seek*: specifically, the intended reading can be replicated with a sentence lacking the modal and a paratactic version of the example. This parallelism is demonstrated below, using the sentence in (18) as an example.

- (19) Anna besteht auf einer Gehaltserhöhung, die mindestens vier Prozent  
 Anna insists on a raise which at least four percent  
 ihres jetzigen Gehalts beträgt.  
 of her current salary amounts  
 ‘*Anna insists on a raise which amounts to at least four percent of her current salary.*’
- (20) Anna besteht auf einer Gehaltserhöhung. Sie soll mindestens vier  
 Anna insists on a raise it should at least four  
 Prozent ihres jetzigen Gehalts betragen.  
 percent of her current salary amount  
 ‘*Anna insists on a raise. It should amount to at least four percent of her*

*current salary.*'

Apart from these verbs, the reading seems to also be available in sentences with verbs of creation (21) and verbs of absence (22).

(21) Anna baut ihrer Familie ein Haus, das zwei Stockwerke haben soll.  
Anna builds her family a house which two floors have should  
'*Anna is building a house for her family which should have two floors.*'

(22) Anna braucht einen Elektriker, der sich um die Verkabelung kümmern soll.  
Anna needs an electrician who for the wiring take care should  
'*Anna needs an electrician who should take care of the wiring.*'

With modal verbs in both matrix and embedded position (23), it may appear more difficult to distinguish between the anaphoric and the independent reading. However, I argue that both are available. The difference between both readings lies in the source of modality of the two modals involved. I argue that in the anaphoric reading, the obligation from both modals comes from exactly the same source, putting the obligation *to bring a gluten- and lactose-free cake to the party* on Anna. For the anaphoric reading Anna herself has to make sure that the cake she brings is gluten- and lactose-free. In contrast, in the independent reading, the two modals have different sources, and Anna is obligated to bring a certain kind of cake, but this cake stands under an independent obligation. It is compatible with this reading that Anna herself does not know that the cake she has to bring with her should not contain gluten and lactose.

The use of modals in matrix position shows that the anaphoric reading is also compatible with matrix verbs which take clausal arguments.

(23) Anna soll einen Kuchen zur Party mitbringen, der gluten- und  
Anna should a cake to the party bring which gluten- and  
laktosefrei sein soll.  
lactose-free be should  
'*Anna should bring a cake to the party which should be gluten- and lactose-free.*'

We mentioned earlier that not all verbs in the class of intensional verbs bring out the anaphoric reading. Below are some examples that only feature an independent

reading of the modal.

- (24) Anna stellt sich ein ängstliches Kind vor, das allein in den Keller  
Anna imagine a frightened child who alone in the basement  
gehen soll. (*\*anaphoric reading*)  
go should  
'Anna imagines a frightened child who should go to the basement alone.'
- (25) Otto ähnelt einem ängstlichen Kind, das alleine in den Keller  
Otto resembles a frightened child who alone in the basement  
gehen soll. (*\*anaphoric reading*)  
go should  
'Otto resembles a frightened child who should go to the basement alone.'

Our discussion shows that verbs that are compatible with the anaphoric reading do not fall into one single class. Not only do they differ structurally by taking either nominal or clausal arguments,<sup>11</sup> they also cover a broader, but distinct semantic range: there are classic buletic attitude verbs among them (like *want* or *wish*) as well as verbs of demand, different kinds of referentially opaque verbs (like *seek* or *need*), verbs of creation (like *build*) and modals. All of these verbs share the feature that they are intensional, and that part of their semantic content reflects the non-epistemic version of the modal *should*. In particular, they reflect one of the three modal flavors which Portner (2007) categorizes as being associated with *Priority Modals*: the teleological, the buletic and the deontic modal flavors. This observation is compatible with the hypothesis that we are dealing with an anaphoric relation between matrix intensional verb and embedded modal. Basically, this would mean that an embedded priority modal is able to anaphorically refer to the embedding matrix intensional verb, as long as it can be associated with the same modal flavor.

Although some verbs from our discussion are not analyzed as attitude verbs or modals, they arguably involve some kind of prioritizing modality: since verbs of demand like in (18) introduce demands, claims or requests, they seem likely to involve some kind of deontic modality. Verbs of creation as well as verbs of absence can to a certain extent be associated with a goal, which makes them appear somehow teleological.

Intensional verbs that under no circumstances are compatible with the anaphoric

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<sup>11</sup>For more details about the structural differences, see Section 1.2.3.3.

reading show no association in their semantics with the modal flavor of priority modals. This seems to be the reason why examples (24) and (25) do not feature the reading we are interested in. Assuming that there has to be an anaphoric relation between the attitude and the modal, and assuming that a prioritizing modal flavor is necessary for this relation, we can conclude that a lack of it in one of the intensional elements involved makes this reading unavailable.

In this subsection, we have seen that the intensional verb in matrix position in our sentences must involve some kind of modality that is associated with priority modals in the sense of Portner (2007) in order to produce the anaphoric reading.

### 1.2.3.2 Use of other modals

All the sentences that we have discussed so far in connection with the anaphoric reading have featured the necessity modal *soll* inside the relative clause. However, this is not the only modal that is compatible with this reading. The sentence in (18), repeated here in (26), is also compatible with the anaphoric reading when the modals *muss* or *sollte* are used instead of *soll*:

- (26) Anna besteht auf einer Gehaltserhöhung, die mindestens vier Prozent  
 Anna insists on a raise which at least four percent  
 ihres jetzigen Gehalts betragen sollte/soll/muss.  
 of her current salary amount ought/should/must  
 ‘Anna insists on a raise which ought to/should/must amount to at least four  
 percent of her current salary.’

What is the difference in meaning between the use of *sollte*, *soll* and *muss* in this case? We will leave this discussion for later, and for now just conclude with the observation that necessity modals of varying modal strength are compatible with the anaphoric reading.

Moreover, the anaphoric reading does not seem to be limited to only necessity modals. When considering examples with a possibility modal, the speaker intuitions are that the modal is equally capable of harmonizing with the modality of the matrix verb.<sup>12</sup>

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<sup>12</sup>Following up on the observation from the previous section about modals in matrix position, possibility modals can also appear in matrix position while maintaining an anaphoric reading.

- (27) Anna besteht auf einer Gehaltserhöhung, die (nur) vier Prozent ihres  
 Anna insists on a raise which (only) four percent of her  
 jetzigen Gehalts betragen kann/darf.  
 current salary amount can/may  
 ‘*Anna insists on a raise which can/may amount to (only) four percent of  
 her current salary.*’

When we try to use the paraphrasing techniques from Zimmermann’s puzzle to bring out the anaphoric reading in sentences involving modals other than *soll*, we run into a major problem. The modal-free version produces the exact same sentence as a paraphrase for all variants of (26) and (27). While this is not so much of a problem for the sentences with *muss* and *soll* – one can argue that there is no difference between the use of these two modals in this sentence, leading to the conclusion that the modal-free variant indeed can paraphrase both sentences – it is certainly a big problem for the versions where the other modals are used. The modal-free variant in (19) can under no circumstances paraphrase the anaphoric reading of (27).

- (19) Anna besteht auf einer Gehaltserhöhung, die mindestens vier Prozent  
 Anna insists on a raise which at least four percent  
 ihres jetzigen Gehalts beträgt.  
 of her current salary amounts  
 ‘*Anna insists on a raise which amounts to at least four percent of her current  
 salary.*’

However, the anaphoric reading of all versions of (26) and (27) can still be paraphrased with a paratactic discourse.

- (28) Anna besteht auf einer Gehaltserhöhung. Sie kann/darf/sollte/soll/  
 Anna insists on a raise it can/may/ought/should/  
 muss vier Prozent ihres jetzigen Gehalts betragen.  
 must four percent of her current salary amount  
 ‘*Anna insists on a raise. It can/may/ought to/should/must amount to four  
 percent of her current salary.*’

The discussion about the use of different modals and their compatibility with the anaphoric reading has shown us that our initial observation about the modal-free paraphrase cannot be generalized. Since the modal-free paraphrase is only available

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(i) Anna darf einen Kuchen mitbringen, der Alkohol enthalten darf.  
 Anna may a cake bring which alcohol contain may  
 ‘*Anna is allowed to bring a cake which may contain alcohol.*’



in sentences with *soll* and *muss*, but not in sentences with other modals, it can of course be questioned whether all of these sentences are examples of the same phenomenon. On the other hand, concerning the paratactic paraphrase, all sentences work in the same way, supporting our hypothesis that they should be analyzed as instances of the same phenomenon. Anaphoricity should not be defined in terms of redundancy, because the parallelism between the variants in (26), (27) and (28) would be lost.

As mentioned in Section 1.2.1, based on speaker intuitions and the similar behavior concerning the paratactic paraphrasing option, we categorize all sentences discussed in this subsection as instances of the same phenomenon. We will see more arguments that support this analysis in Section 2. Under the assumption that all sentences discussed in this section feature the same phenomenon, i.e., they share an anaphoric reading, one can no longer argue that the modal in our sentences generally has no semantic contribution or is semantically empty. An in-depth investigation of the role of the modal in such environments is crucial in order to figure out what role it plays and how it interacts with the preceding intensional verb. Such an investigation will eventually offer an explanation as to why the modal *soll* appears to lack a semantic contribution in sentences like (1).

### 1.2.3.3 Structural deviances

So far, we have mainly discussed sentences with intensional transitive verbs in matrix position. In these sentences, the intensional verb takes a direct object which is modified by a modalized relative clause. Due to the anaphoricity of the modal, it is crucial that the succession of the antecedent intensional verb and the anaphoric modal not be confused. Additionally, for this reading, the relative clause needs to modify an unspecific head noun, which in this structure is the object argument of the matrix verb. Therefore, these structural characteristics are vital for the reading to surface.

However, we do not necessarily need a transitive structure in the matrix clause; clausal structures are also compatible with the anaphoric reading. There are two arguments we can find in the data supporting this perspective. Firstly, we have already seen that sentences with modal verbs both in matrix position and inside the relative clause can bring out the anaphoric reading. For semantic reasons, modals are traditionally analyzed as involving covert propositional material; therefore it is

assumed that the sentence in (23) has (29) as an underlying structure.

- (23) Anna soll einen Kuchen zur Party mitbringen, der gluten- und  
Anna should a cake to the party bring which gluten- and  
laktosefrei sein soll.  
lactose-free be should  
*'Anna should bring a cake to the party which should be gluten- and lactose-free.'*
- (29) Es ist notwendig, dass Anna einen Kuchen zur Party mitbringt, für  
it is necessary that Anna a cake to the party brings for  
den es notwendig ist, dass er gluten- und laktosefrei ist.  
which it necessary is that it gluten- and lactose-free is  
*'It is necessary that Anna bring a cake to the party for which it is necessary that it be gluten- and lactose-free.'*

Since the anaphoric reading is available for (23) and (29), we can conclude that both covert and overt propositional content is compatible with the phenomenon in question.

Secondly, buletic verbs like *wish* and *want*, for which we have shown that they are compatible with the anaphoric reading when they are used as an intensional transitive verb, allow not only a direct object argument, but also a clausal argument. The anaphoric reading also appears in sentences where these attitude verbs take a clausal argument. The sentence in (30) is a case in point. The modalized relative clause modifies the object (which is also interpreted unspecifically for our purposes) inside the clausal argument. Intuitively, the embedded modal in this sentence is anaphoric to the intensionality of the matrix verb in the same way as in a sentence like (17).

- (30) Otto wünscht sich, dass Anna ihm eine schwarze Katze schenkt, die  
Otto wishes that Anna him a black cat gives which  
weiße Pfoten haben soll.  
white paws have should  
*'Otto wants Anna to give him a black cat which should have white paws.'*
- (17) Otto wünscht sich eine schwarze Katze, die weiße Pfoten haben soll.  
Otto wishes a black cat which white paws have should  
*'Otto wants a black cat which should have white paws.'*

The parallel behavior concerning the paraphrases of Zimmermann's puzzle supports

this intuition. This sentence actually behaves exactly like (1) since it also has the redundancy-feature. It can not only be paraphrased by the parataxis in (32), but also by the modal-free version (31).

- (31) Otto wünscht sich, dass Anna ihm eine schwarze Katze schenkt, die  
 Otto wishes that Anna him a black cat gives which  
 weiße Pfoten hat.  
 white paws has  
 ‘*Otto wants Anna to give him a black cat which has white paws.*’
- (32) Otto wünscht sich, dass Anna ihm eine schwarze Katze schenkt. Sie  
 Otto wishes that Anna him a black cat gives it  
 soll weiße Pfoten haben  
 should white paws have  
 ‘*Otto wants Anna to give him a black cat. It should have white paws.*’

We conclude that the matrix clause does not have to include a transitive structure for the reading to be available. Syntactically more complex structures involving clausal arguments are also an option. Therefore, both modals and propositional attitude verbs can appear in matrix position without compromising the availability of the anaphoric reading.

### 1.3 Summary

The goal of this section was to describe and outline the phenomenon which is demonstrated in Zimmermann’s puzzle. After establishing two main issues related to the puzzle directly – one concerning an apparent redundancy of the embedded modal, one concerning an ambiguous status of the relative clause – we moved on to explore the distribution of the phenomenon by discussing a wider range of data. In order to do this, we first had to sketch preconsiderations which determined our strategy of how to tackle the data. These preconsiderations are based on data, intuition and linguistic reasoning, and led to the conclusion that the reading we are interesting in is characterized by an anaphoric relation between the matrix modal/attitude and the embedded modal, which is why we call it an *anaphoric reading*. It should become clear in the course of Section 2 at the latest why we are dealing with anaphoricity in our data instead of redundancy, which is the initial idea one might have when only considering a limited range of data.

Based on our preconsiderations, we tried to detect the distribution of the reading

in question by using different intensional verbs in matrix position, different modals inside the relative clause and different structures. We saw that the phenomenon appears only in very specific environments. The findings are summarized below:

- The matrix intensional verb can be an intensional transitive verb (including verbs of creation), a propositional attitude verb, a verb of demand or a modal verb as long as it depicts a modality that is associated with priority modals (deontic, buletic, teleological).
- The embedded intensional verb has to be a priority modal. It can have any strength and force.
- The relative clause modifies an unspecific or intensional object which can be either a direct object in the matrix clause or appear inside a clausal argument.
- To bring out the intended reading, the two intensional verbs must harmonize with respect to their modality (which is either deontic, buletic or teleological).

The last point is not an observation, but a conclusion which is based on our assumption that we are not dealing with redundancy in the data but with anaphoricity.

Zimmermann's puzzle features two paraphrases that seem to capture this exact reading, one being a modal-free variant (lacking the modal inside the relative clause), the other one a paratactic version of the sentence. However, since we were not able to confirm the redundancy-feature in all of the data we classified as anaphoric, we had to conclude that the availability of the modal-free paraphrase cannot be seen as a crucial characteristic of the anaphoric reading.

However, it still has to be explained why the modal-free paraphrase is available for some sentences, but not for others. Also, we still need more proof that in all of these sentences, including the ones where the modal appears redundant, the modal is actually anaphoric. We will address these issues and other topics related to the modal in the next section. In addition, we will put emphasis on exploring the question concerning the status of the relative clause, which so far is still very much unclear.

## 2 Data discussion

In Section 1.2.3, we identified different environments in which our phenomenon can appear. However, we were not able to find answers to the two main questions raised by Zimmermann's puzzle, one concerning the semantic contribution of the embedded modal, the other one the ambiguous status of the relative clause. While the last section did not bring to light any new revelations about the second issue, it did advance the question concerning the modal: we are now hesitant to classify redundancy of the modal as a general semantic feature of the sentences exhibiting the discussed phenomenon. Our hypothesis is that redundancy of the modal appears in particular cases with anaphoric readings, but can generally be traced back to a modal that stands in an anaphoric relationship to the matrix intensional verb. However, the discovery that the modal cannot always be redundant does not make it clear what role the modal plays in the sentence. It is in fact the opposite: Now there are two things that have to be explained. We have to figure out the general semantic contribution of the modal in anaphoric readings, and also why in some cases it appears to be redundant. In this section, first, we will focus on the complex problem concerning the modal. We will investigate a wider range of data in order to figure out what information the modal is picking up and how it influences the sentence meaning. This discussion will also offer an explanation as to why the sentences behave differently concerning their paraphrasing options. In the second part of this section, we will concern ourselves with the topic of the ambiguous status of the relative clause, which so far has remained completely untouched.

### 2.1 Semantic contribution of the embedded modal (Part A)

In this section, we want to examine a wider range of data in order to find out more about our phenomenon, keeping the focus on the role of the embedded modal. This section is divided into individual observations that can be made concerning specific examples that feature more interesting details regarding the semantic contribution of the modal element.

#### 2.1.1 Attitude-dependency and intent

In this section we will mainly focus on observations concerning minimal pairs like in (1) and (2). One part of Zimmermann's puzzle is based on the observation that the modal in (1) appears to lack a semantic contribution to the sentence meaning

because the reading can be paraphrased by the modal-free counterpart in (2). Additionally, we discussed parallel examples with other modals, where the modal cannot be omitted without changing the meaning – (12) cannot be paraphrased by (2). However, all of these sentences can be paraphrased with the discourse paraphrase. So far, we have no clue how to deal with the apparent emptiness of the modal *soll* in (1), especially since there are parallel sentences in which the modal has an impact on the sentence.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
 ‘*The ECB is looking for a lawyer who should be an EU-citizen.*’
- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
 the ECB seeks a lawyer who EU-citizen is  
 ‘*The ECB is looking for a lawyer who is an EU-citizen.*’
- (12) Die EZB sucht einen Juristen, der EU-Bürger sein darf.  
 the ECB seeks a lawyer who EU-citizen be may  
 ‘*The ECB is looking for a lawyer who may be an EU-citizen.*’

Intuitively, we have the feeling that the modal is empty in (1), whereas with other modals in embedded position, the modality in the relative clause seems to influence the modality coming from the matrix verb, for instance by restricting it when using a possibility modal. However, the possibility modal *darf* can in fact be omitted in sentences in which the matrix intensional verb expresses some kind of possibility too:

- (33) Anna darf einen Kuchen mitbringen, der Alkohol enthalten darf.  
 Anna may a cake bring which alcohol contain may  
 ‘*Anna is allowed to bring a cake which may contain alcohol.*’
- (34) Anna darf einen Kuchen mitbringen, der Alkohol enthält.  
 Anna may a cake bring which alcohol contains  
 ‘*Anna is allowed to bring a cake which contains alcohol.*’
- (35) Der Verein erlaubt Mitglieder, die unter zwölf Jahre alt sein dürfen.  
 the club allows members who under twelve years old be may  
 ‘*The club allows members who can be below the age of twelve.*’
- (36) Der Verein erlaubt Mitglieder, die unter zwölf Jahre alt sind.  
 the club allows members who under twelve years old are  
 ‘*The club allows members that are below the age of twelve.*’

In this section, we will discuss sentences which prove that the modal in our sentences

is actually anaphoric, and we will once and for all dismiss the hypothesis that the modal is semantically empty in our data. In order to do this, we will have a closer look at a certain type of example that we already introduced in Section 1.2.1 to argue for anaphoricity instead of redundancy as the crucial feature of the reading, but have not discussed in detail yet. Structurally these examples look the same as the sentence in (1), and they also intuitively have the same reading, but the modal in these cases cannot be described as being semantically redundant. One could argue that these examples feature a different phenomenon, but because they intuitively share the same reading as the original example, we opt for putting them in the same category. Consider (9) and (37) below:

- (9) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
 Anna seeks a hotel in which the invited speakers be accommodated  
 sollen.  
 should  
*‘Anna is looking for a hotel in which the invited speakers should be accommodated.’*
- (37) Otto sucht ein Musikstück, das auf Annas Hochzeit gespielt werden  
 Otto seeks a piece of music which at Anna’s wedding played be  
 soll.  
 should  
*‘Otto is looking for a piece of music which should be played at Anna’s wedding.’*

A suitable scenario for (9) in an anaphoric reading can be that Anna is the organizer of a conference and is looking for a hotel which still has rooms available for all the invited speakers that are coming. The hotel should have certain qualities like being tidy, having a nice breakfast, but may also not be too expensive. Also, ideally all invited speakers can get a single room there. In this scenario, the modal receives an anaphoric interpretation, and the relative clause expresses that it is a requirement for the successful search that the hotel be able to accommodate the invited speakers. With an independent (deontic) modal reading, the sentence would mean that Anna is looking for a hotel which stands under the obligation of accommodating the invited speakers. Clearly, in an anaphoric reading, the modal is not interpreted in this way, but instead, it seems to refer back to the search goals, making its complement a requirement for the search object. Different from example (1), this sentence is not synonymous with its modal-free counterpart, meaning that we definitely can rule out that redundancy of the modal plays a part in this sentence.

- (10) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen.  
 Anna seeks a hotel in which the invited speakers are accommodated  
 ‘*Anna is looking for a hotel in which the invited speakers are accommodated.*’

(10) is true in a context in which there are several hotels accommodating invited speakers and Anna is looking for one of them. This is not the reading of (9). But how is this example different from the minimal pair consisting of (1) and (2)? One major aspect is that the modal in (9) supports a forward-shifted interpretation of its complement. However, this is not the crucial difference between these two examples. The important difference is that the complement of the modal receives an attitude-dependent interpretation in (9), but not in (1).

To understand what I mean by *attitude-dependency*, we have to compare the complements of the modal in (9) and (1): In (1), the complement of the modal is *being an EU-citizen*. We know that the existence of a lawyer as well as his or her characteristic of being an EU-citizen are not dependent on the ECB’s successful search, search goals or search in general. Therefore, being a lawyer and an EU-citizen are both independent qualities of the person in question. In contrast, in (9), in the anaphoric reading the invited speakers are only going to be accommodated in a hotel if this particular hotel has been found and chosen by Anna first. Therefore, the modal’s complement expresses content that is dependent on the matrix attitude, in particular, the successful outcome of the attitude. In such an environment, the anaphoric modal cannot be dropped without changing the sentence meaning.

Because of the forward-shifted reading of (9), one may now argue that (10) does not represent an adequate modal-free counterpart of this sentence because the relative clause is in the present tense. However, including a simple future tense in the relative clause, as in (38), does not improve the paraphrasability. A suitable context for (38) would be similar to that of (10): various hotels have already been booked for the invited speakers. However, because of the future tense, the guests have not yet checked in in this case.

- (38) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
 Anna seeks a hotel in which the invited speakers be accommodated  
 werden.  
 will  
 ‘*Anna is looking for a hotel in which the invited speakers will be accommodated.*’



To see that not forward-shiftedness but attitude-dependency is crucial for the appearance of the modal, we have to look at examples with a forward-shifted reading but without attitude-dependency. In these examples, the omission of the modal should again result in a synonymous modal-free counterpart. A minimal pair that displays exactly this behavior is the following:

- (39) Die Investmentgesellschaft sucht ein Unternehmen, das in Konkurs  
the investment company seeks a company which in bankruptcy  
gehen soll.  
go should  
*'The investment company is looking for a business which should go bankrupt.'*
- (40) Die Investmentgesellschaft sucht ein Unternehmen, das in Konkurs  
the investment company seeks a company which in bankruptcy  
geht.  
goes  
*'The investment company is looking for a business which is going bankrupt.'*
- (41) Die Investmentgesellschaft sucht ein Unternehmen, das in Konkurs  
the investment company seeks a company which in bankruptcy  
gehen wird.  
go will  
*'The investment company is looking for a business which will go bankrupt.'*

In (39), we again can have a forward-shifted interpretation of the modal's complement. However, assuming that going bankrupt is something that happens independently of the attitude displayed in this sentence, our hypothesis would predict that we can omit the modal without changing the sentence meaning. And indeed, this is possible. Depending on the likeliness of interpreting the simple present in (40) with a forward-shifted interpretation, one might find the version with the simple future in (41) more adequate as a paraphrase of (39).

As mentioned in Section 1.2.3, verbs of creation can trigger the same interpretation of the embedded modal as teleological opaque verbs. In these cases, the modal behaves in line with our hypothesis about attitude-dependent properties, but because of the specific nature of creation verbs, dropping the modal has an interesting effect in these sentences. Consider again the example in (21). The sentence fits a scenario in which Anna is building a house that eventually will have two floors. She may have just started with the process – so the building is not even close to having two floors yet – or she is further along with the construction. It does not matter for the

sentence to be true. The use of the modal enables us to interpret its complement as being dependent on the completion of the building process.<sup>13</sup>

- (21) Anna baut ihrer Familie ein Haus, das zwei Stockwerke haben soll.  
Anna builds her family a house which two floors have should  
'*Anna is building a house for her family which should have two floors.*'

When omitting the modal, we interpret the sentence as if the house Anna is building already has two floors. She may be busy with the roof or the windows, but the building already has two levels. The house with its two floors seems to already exist and is somehow specific, although it is not yet finished.<sup>14</sup>

- (42) Anna baut ihrer Familie ein Haus, das zwei Stockwerke hat.  
Anna builds her family a house which two floors has  
'*Anna is building a house for her family which has two floors.*'

In principle, attitude-dependency can also appear in non-anaphoric readings. There are sentences in which the relative clause expresses something that is dependent on the attitude, but still the sentences do not receive an anaphoric reading. Consider the different readings of the following pair of sentences:

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<sup>13</sup>In the context of verbs of creation, object arguments are usually referred to as *effected objects* (cf. Piñón 2007). In sentences with creation verbs, these objects have to be factive whenever the process of creation has ended, and – depending on the theory – it is assumed that the object is specific. Stechow (2001) shows the difference between the object arguments of creation verbs and of opaque verbs by using an intensionality test with the past tense: Whereas the second line is valid in (i), it is not in (ii). In order to have an adequate context for (ii), we can imagine that John recently passed away and was not able to settle the debt.

- (i) John baked a cake.  
∴ There is a cake that John baked.
- (ii) John owed me a pair of custom-made shoes.  
∴ There is a pair of custom-made shoes that John owed me/has given me.

However, this difference seems to have no effect on the availability of the intended reading with the embedded modal. The conclusion in (iii) is not valid.

- (iii) Anna hat einen Kuchen gebacken, der vegan sein sollte.  
Anna has a cake baked which vegan be should (*past*)  
'*Anna has baked a cake which should be vegan.*'  
∴ There is a vegan cake that Anna baked.

More details about the anaphoric modal and its interaction with the past tense are discussed in Section 5.3.3.

<sup>14</sup>This observation would support the extensionalist view on objects of verbs of creation by Parsons (1990) stating that these objects exist even if the creation process has never been completed.

- (43) Anna sucht einen guten Rechtsanwalt, der sie ein Vermögen kosten soll.  
 Anna seeks a good lawyer who her a fortune cost should  
 ‘*Anna is looking for a good lawyer who should cost her a fortune.*’
- (44) Anna sucht einen guten Rechtsanwalt, der sie ein Vermögen kosten wird.  
 Anna seeks a good lawyer who her a fortune cost will  
 ‘*Anna is looking for a good lawyer who will cost her a fortune.*’

There is a clear difference between the two sentences although in both cases, the complex property *costs her a fortune* is dependent upon a successful completion of Anna’s search. In the first sentence however, Anna is looking for the lawyer with the intention that she will spend a lot of money when hiring him. In the second sentence with the simple future tense inside the relative clause, Anna may or may not be aware of the fact that any good lawyer she eventually is willing to hire will be an expensive one. She may be aware of this fact, but – differently from the first example – here the sentence does not express that it is her aim to spend a lot of money on a lawyer. These examples show that it is not attitude-dependency on its own that makes the appearance of the modal necessary, but only attitude-dependency in combination with intent. Basically, the anaphoric modal can be seen as an intention-marker of the attitude holder of the matrix clause. However, intent on its own does not make the use of the modal obligatory in a sentence. We will examine this issue further in Section 2.1.2.

In conclusion, the examples discussed in this section show that attitude-dependency in combination with intent are the crucial features a sentence has to exhibit in order to make the modal indispensable. Although the anaphoric modal can be seen as an intention-marker, so far we have not come across examples in which intent alone is able to prevent the modal from being redundant. However, we will discuss such examples in the next section.

### 2.1.2 More on intentions and the ‘third reading’

In the previous section, we were able to discover the semantic contribution the anaphoric modal verb makes to a sentence, which is that it marks the intention of the matrix attitude holder. However, this specific meaning of the modal is only visible in examples where the modal’s complement in the relative clause is attitude-dependent. This is the reason why in an example like (1), the modal seems to be

redundant, and the sentence can be paraphrased with the modal-free counterpart in (2).

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
'The ECB is looking for a lawyer who should be an EU-citizen.'
- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
the ECB seeks a lawyer who EU-citizen is  
'The ECB is looking for a lawyer who is an EU-citizen.'

In this section, we will discuss why the two sentences above are not necessarily equivalent in their meaning, and how the modal in (1) contributes to the sentence although it does not display attitude-dependent content inside the relative clause. Actually, the omission of the modal leads to an ambiguity in the reading of the relative clause. Hence, when the speaker decides to use the modal, she disambiguates the reading she intends to communicate. The ambiguity of the sentence in (2) concerning the content of the relative clause is exactly the issue of intention of the attitude holder, which I already touched upon briefly in the previous section when discussing examples (43) and (44). In the most prominent context of both (1) and (2) – which can be described as the context of a job opening – the sentences mean that the ECB itself has an intentional attitude towards finding a lawyer with an EU-citizenship. The modal seems to be redundant in marking the intention because the relative clause is attached to the object argument of the attitude, and, at least when assuming that it is a restrictive relative clause, it is already in the scope of the attitude verb.

However, it has been noted in the literature that not everything that appears inside the argument of an attitude also has to be interpreted in the scope of the intensional operator or as part of the attitude holder's attitude. For a sentence like (45), Fodor (1970) finds at least three readings: (i) When interpreted in the *specific transparent*-reading, Mary saw a coat in a shop window, and Mary wants to buy this particular coat. She may or may not know how much it costs. (ii) On the second reading, Mary needs a new coat and her main aim is to spend as little money as possible for it. Fodor calls this reading the *unspecific opaque*-reading. (iii) In the *unspecific transparent*-reading, Mary wants to buy a coat of a specific design or brand but has not yet picked out one particular coat. She may or may not be aware of the low prices. In this last reading, we have a scope paradox since the object-NP *an*

*inexpensive coat* has to be interpreted outside the scope of the attitude, but due to unspecificity also has to somehow stay inside the scope of *want*. This reading is known as the *third reading* (cf. Heim and Fintel 2011).

(45) Mary wants to buy an inexpensive coat. (cf. Keshet 2008:29)

There are various subtypes of the third reading. Schwager (2009) subsumes examples like the one in (45) under the label *buyers' intentions* and lists two more, the *Burj Dubai* (46), which has to do with empty extensions, and *Foyle's investigation* (47). Consider her examples below.

- (46) a. *Mary is looking at the Burj Dubai, which has 191 floors and is currently the highest building in the world. Also, no other building has more floors. Mary doesn't know this. She also doesn't know how many floors Burj Dubai has. She thinks, 'Wow, I want to buy a building that's even one floor higher!'*  
b. Mary wants to buy a building with (at least) 192 floors.
- (47) a. *A murder has occurred on campus, people with offices in the left wing of the building might have seen it. Detective CS Foyle decides, 'I want to talk to someone who has his office in the left wing of the building.' Unbeknownst to him, all offices in the left wing belong to the English department, and only professors have offices.*  
b. Foyle wants to interrogate an English professor.

A related, but different problem was pointed out by Bäuerle (1983). He cites the example in (48) to argue that transparency and opacity do not necessarily correspond to quantifier scope:

- (48) Georg glaubt, dass eine Stuttgarterin jeden VfB-Spieler liebt.  
Georg believes that a woman from Stuttgart every VfB-player loves  
'*Georg believes that a woman from Stuttgart loves every VfB-player.*'

Bäuerle describes a scenario in which Georg sees some guys in a bus, not knowing who they are, but believing that there surely is one woman from Stuttgart that is in love with all of those men. In such a scenario, *eine Stuttgarterin* receives an opaque interpretation because Georg does not believe that one particular woman is in love with the group of guys in the bus. Therefore, *eine Stuttgarterin* can vary in each possible belief-world of Georg. However, the existential quantifier has to take wide

scope over *jeden VfB-Spieler* because Georg believes that there is one woman that loves each guy he saw in the bus. Finally, Bäuerle says that the attribute *VfB-Spieler* is not part of Georg's beliefs but an expression the speaker of the utterance uses to describe the scenario, and is therefore transparent. Usually, when transparent, the quantifier receives wide scope in order to be interpreted outside Georg's beliefs. However, this strategy cannot give us the truth conditions we need for the intended reading since then, the existential quantifier would only receive narrow scope, which leads to a reading in which for each VfB-player there is a woman who loves him.

When we return to our sentences with the verb *seek*, similar observations can be made. Suppose Otto wants to augment his wardrobe with a new jacket. Both examples from below are compatible with this scenario.

- (49) Otto sucht eine neue Jacke, die aus Kunstleder sein soll.  
 Otto seeks a new jacket which of imitation leather be should  
 'Otto is looking for a new jacket which should be made of imitation leather.'
- (50) Otto sucht eine neue Jacke, die aus Kunstleder ist.  
 Otto seeks a new jacket which of imitation leather is  
 'Otto is looking for a new jacket which is made of imitation leather.'

But when we modify the scenario a little bit, we get a different result. The new scenario is that Otto wants a new jacket made out of imitation leather because it is not as expensive as real leather. Imitation leather is also vegan but Otto does not care about veganism. Consider the examples in (51) and (52). Now, only the modal-free sentence (51) is suitable in this new context.

- (51) Otto sucht eine neue Jacke, die vegan ist.  
 Otto seeks a new jacket which vegan is  
 'Otto is looking for a new jacket which is vegan.'
- (52) ?#Otto sucht eine neue Jacke, die vegan sein soll.  
 Otto seeks a new jacket which vegan be should  
 'Otto is looking for a new jacket which should be vegan.'

The difference between the two examples is that in (52), the modal marks *being vegan* as part of Otto's search intentions when he is looking for a new jacket. This clearly contradicts the suggested context. The use of the modal in these examples makes it very difficult to have a third reading because the modal identifies its com-

plement as part of the attitude-holders intentions.<sup>15</sup>

Cécile Meier (p.c.) has pointed out to me that it is not necessarily a *De Re*-reading that is difficult to get with this kind of modalized relative clause. She uses Schwager's Burj Dubai example to make her point: Suppose Anna is looking for a building that is one floor higher than the Burj Dubai, but she does not know how many floors the Burj Dubai has, and she is not aware of the fact that the Burj Dubai is the highest building in the world. In such a scenario, it is still possible to say both sentences in (53). The relative clause in (53-b) is perfectly compatible with this scenario, although Anna herself does not know that she is looking for a building with 192 floors.

- (53) a. Anna sucht ein Gebäude, das 192 Stockwerke hat.  
Anna seeks a building which 192 floors has  
'Anna is looking for a building which has 192 floors.'
- b. Anna sucht ein Gebäude, das 192 Stockwerke haben soll.  
Anna seeks a building which 192 floors have should  
'Anna is looking for a building which should have 192 floors.'

If someone told Anna that the Burj Dubai has 191 floors, then she would agree to the sentence in (53-b) because what is expressed in the relative clause is actually in line with her intentions, which are to find a building with a certain height. This seems to be the reason why the anaphoric modal can be used in this scenario. As we already said earlier, the anaphoric modal can be seen as an intention-marker, making clear what intentions the attitude holder has. This is the case even if the intentions are represented differently in the mind of the attitude holder. Therefore, (53-b) works with a *De Re*-reading.

We have to take into account that with a more elaborate context, the third reading might become available with sentences containing an anaphoric modal. We cannot completely rule out that the third reading can appear in these cases. But it is definitely easier to get in cases without the modal.

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<sup>15</sup>Klaus von Heusinger (p.c.) pointed out to me that the third reading might also be available in sentences containing the anaphoric modal. For instance, suppose that Otto's girlfriend is vegan and she cares a lot about the material of the jacket Otto wants to buy. In such a scenario, it might be possible to understand the example in (52) with a third reading. However, I am not sure whether in that particular example, such an interpretation actually can be seen as a third reading or whether it should be categorized as an independent modal reading.

We conclude that a sentence lacking the anaphoric modal in the relative clause can easily be ambiguous in an unspecific reading between the interpretation in which the content expressed by the relative clause is meant to be part of the intentions of the attitude holder, and the interpretation in which the relative clause is categorized as not being a part of the intentions of the attitude holder. The second interpretation is harder to get in a sentence with an anaphoric modal.

For our original minimal pair (1) and (2), this means that the sentences are not necessarily semantically equivalent. The modal contributes to the interpretation by clarifying that the realization of the modal's complement in the relative clause is actually part of the intentions of the attitude holder, and since the modal is anaphoric, these intentions are connected to the attitude expressed in the matrix clause. In examples like (1) and (2), the context suggests that this exact reading is the natural reading for both sentences. Therefore, it is hard to discern the semantic contribution of the modal in these cases. However, we see the difference when we consider minimal pairs like (51) and (52). Here, the context suggests that in (51), a reading is intended that cannot be replicated with (52). We conclude that the anaphoric modal indeed is an intention-marker. In our data, it is used to indicate that the content of the relative clause is part of the attitude holder's intentions that also determine the matrix-attitude.

### 2.1.3 Modal strength and anaphoric compatibility

In the last two sections, we were able to discover the true semantic contribution of the embedded modal in sentences with an anaphoric reading. In this section, we will concern ourselves with more details of the use of the modal in our data, more specifically with semantic subtleties in the language regarding the ability to establish an anaphoric relation between the matrix intensional verb and the embedded modal. This discussion will shed more light on the anaphoric nature of the modal and the potential for the anaphoric reading to appear in specific data.

We have already seen in previous sections that in general the phenomenon is compatible with modals of varying force and strength. In the example in (54), all variants bring out the anaphoric reading.

- (54) Die EZB sucht einen Juristen, der EU-Bürger sein kann/darf/sollte/  
the ECB seeks a lawyer who EU-citizen be can/may/ought/



soll/muss.  
 should/must  
 ‘The ECB is looking for a lawyer who can/may/ought to/should/must be an EU-citizen.’

The difference in meaning between the use of *kann* and *darf* is that the modal possibility is slightly different. Both versions mean that it is compatible with the search aims of the ECB that the lawyer is an EU-citizen. I argue that the example with *kann* rather says that it is an irrelevant feature for the ECB, whereas in the case of *darf*, it is explicitly allowed that the lawyer have this characteristic. The difference between these two examples does not have to do with modal strength, but with different nuances in the modal flavoring. In contrast, the modal strength definitely has an impact on the interpretation of the sentence with *sollte*, *soll* and perhaps also with *muss*. It is expected that the modal *sollte* expresses a preference, and *soll* a stronger preference, whereas the modal *muss* in (54) means that it is a necessary requirement for the lawyer to be an EU-citizen. This hypothesis seems to be true for the interpretation of the modal *sollte*, but there seem to be other factors that influence the readings of the other two modals as well.

My intuition is that in both the scenarios with *soll* and *muss* we would like to say that the ECB will only hire the lawyer if she is an EU-citizen. Therefore, this quality seems to be a necessary requirement for both cases.<sup>16</sup> However, I believe that there

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<sup>16</sup>An argument in favor of this view is that in (i), we do not get the reading that only in the most ideal worlds does the asthmatic the research group finds also have heart problems. I argue that there is no different value or priority associated with the property of being an asthmatic and being a cardiac patient. If it is not necessary for the context that the property of being an asthmatic be expressed first, then (ii) and (iii) should be intuitively equivalent to (i).

- (i) Die Forschergruppe sucht einen Asthmatiker, der zusätzlich Herzpatient sein soll.  
 the research group seeks an asthmatic who additionally cardiac patient be should  
 ‘The research group is looking for an asthmatic who additionally should be a cardiac patient.’
- (ii) Die Forschergruppe sucht einen Herzpatienten, der zusätzlich Asthmatiker sein soll.  
 the research group seeks a cardiac patient who additionally asthmatic be should  
 ‘The research group is looking for a cardiac patient who additionally should be an asthmatic.’
- (iii) Die Forschergruppe sucht jemanden, der Asthmatiker und Herzpatient sein soll.  
 the research group seeks someone who asthmatic and cardiac patient be should  
 ‘The research group is looking for someone who should be an asthmatic and a cardiac

is another difference between the use of the two modals. In my opinion, (54) with the strong necessity modal leads to a more prominent independent interpretation of the modal, which potentially blocks the anaphoric reading. This becomes evident when we go back to our example in (14) and compare it with (55). We already discussed the competing anaphoric and independent reading in the first example. Here, the context leads to a much more prominent independent reading than in an example like (1). However, in the second example, the independent, deontic interpretation of the modal seems to be even more prominent, in fact so prominent that I find it almost impossible to get an anaphoric reading here at all.

- (14) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit leisten soll.  
 the FAZ seeks a juvenile offender who community service perform should  
*'The FAZ is looking for a juvenile offender who should perform community service.'*
- (55) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit leisten muss.  
 the FAZ seeks a juvenile offender who community service perform must  
*'The FAZ is looking for a juvenile offender who must perform community service.'*

A similar behavior concerning the distribution of necessity modals can be witnessed with creation verbs. In (56), the use of *muss* seems to block the anaphoric reading. The most prominent interpretation of the sentence with *muss* is compatible with a scenario in which the house Anna is building has to have two floors due to the regulations of the building authority. The difference between the use of *soll* and *sollte*, however, seems to be one of strength: while with *soll*, the two floors are a prominent goal for Anna, with *sollte*, we get the impression that only ideally will the finished house have two floors.

- (56) Anna baut ihrer Familie ein Haus, das zwei Stockwerke haben sollte/soll/muss.  
 Anna builds her family a house which two floors have ought/should/must  
*'Anna is building a house for her family which ought to/should/must have*  


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*patient.'*

*two floors.'*

It seems to me that the weak necessity modal *soll* harmonizes better with the teleological aspect connected to search-verbs and verbs of creation than the strong necessity modal *muss* does. This observation cannot be generalized to all attitudes that are compatible with the anaphoric reading. In the examples (57) and (58), the strong necessity modal harmonizes well with the verbs *need* and *owe*, resulting in an anaphoric interpretation of the sentence. Here, the different modals indeed express different strengths of necessity.

- (57) Google braucht einen Juristen, der im Bereich Steuerrecht firm sein  
Google needs a lawyer who in field tax law proficient be  
sollte/soll/muss.  
ought/should/must  
'Google needs a lawyer who ought to/should/must be proficient in the field of tax law.'
- (58) Anna schuldet Otto eine Flasche Wein, die mindestens dreißig Euros  
Anna owes Otto a bottle wine which at least thirty euros  
kosten sollte/soll/muss.  
cost ought/should/must  
'Anna owes Otto a bottle of wine which ought to/should/must cost at least thirty euros.'

A reason for this may be that both *need* and *owe* have a deontic flavor involved rather than a teleological one, and the deontic flavor may be picked up perfectly by the modal *must*. Additionally, it seems to me that the weak necessity modal *soll* is better suited to target specific intentions that belong to an attitude holder that is also the subject of the matrix clause, whereas the modal *must* can be used to target other sources of mood, like for instance collectively accepted betting rules in the case of (58). Rubinstein (2012) actually suggests that the issue of collective commitment plays a crucial role in the decision of whether to use a strong or a weak necessity modal. If a sentence presupposes a collective commitment, then the strong necessity modal is adequate. In the other case, the weak necessity modal is used. Perhaps this observation is also reflected in the different uses of weak and strong necessity modals in combination with personalized attitudes like *seek*. Following this argument, the modal *soll* in (1) is used to indicate that the speaker is not committing to the search aims of the ECB, and therefore she distances herself from what is expressed in the relative clause by the use of the weak necessity modal. The

use of the strong necessity modal on the other hand would include commitment from the speaker, suggesting that it is not anaphoric to the attitude of the matrix attitude holder. The following two examples with first person plural seem to support this hypothesis. I find that the anaphoric reading is more available with *muss* in these examples, whereas the use of *soll* in my opinion strengthens either an independent or a weaker anaphoric interpretation of the modal.

- (59) Wir suchen einen Juristen, der EU-Bürger sein soll/muss.  
 we seek a lawyer who EU-citizen be should/must  
 ‘We are looking for a lawyer who should/must be an EU-citizen.’
- (60) Wir suchen eine jugendliche Straftäterin, die gemeinnützige Arbeit  
 we seek a juvenile offender who community service  
 leisten soll/muss.  
 perform should/must  
 ‘We are looking for a juvenile offender who should/must perform community service.’

The preference of certain combinations of embedding and embedded intensional verbs is also relevant for sentences with multiple embeddings or recursion of the relative clause. Consider the example in (61). Here, sentence (12) is embedded in an intensional context introduced by the doxastic verb *consider*. In this example, the modal *darf* seems to behave as in (12), being anaphoric to the teleological verb.

- (12) Die EZB sucht einen Juristen, der EU-Bürger sein darf.  
 the ECB seeks a lawyer who EU-citizen be may  
 ‘The ECB is looking for a lawyer who may be an EU-citizen.’
- (61) Anna zieht es in Betracht, dass die EZB einen Juristen sucht, der  
 Anna considers that the ECB a lawyer seeks who  
 EU-Bürger sein darf.  
 EU-citizen be may  
 ‘Anna is considering that the ECB is looking for a lawyer who may be an EU-citizen.’

However, changing the modal from *darf* to *kann*, which hardly makes a difference for the sentence with only two intensional verbs (62), does seem to make a difference for the anaphoric behavior in the sentence with multiple embeddings. Although in (63), the modal can still be interpreted as picking up the modality of the search-verb, another reading appears in which the modal is anaphoric to the doxastic matrix verb and is interpreted epistemically.

- (62) Die EZB sucht einen Juristen, der EU-Bürger sein kann.  
 the ECB seeks a lawyer who EU-citizen be can  
 ‘*The ECB is looking for a lawyer who can be an EU-citizen.*’
- (63) Anna zieht es in Betracht, dass die EZB einen Juristen sucht, der  
 Anna considers that the ECB a lawyer seeks who  
 EU-Bürger sein kann.  
 EU-citizen be can  
 ‘*Anna is considering that the ECB is looking for a lawyer who can be an EU-citizen.*’

We can conclude from this section that although modals of differing strength and force are compatible with the anaphoric reading, some combinations of attitude and modal work better than others. The modal seems to be very sensitive to the source of modality, and the availability of the anaphoric reading is strongly dependent on the context and the concordance of attitude and modal. Only if the modal can harmonize with the attitude does the anaphoric reading emerge.

#### 2.1.4 Conclusions

This section has focused on the discussion of the embedded anaphoric modal in the sentences of interest, its semantic contribution to the sentence meaning and details concerning its anaphoric nature. The semantic contribution of the anaphoric modal has three dimensions: (i) The modal is relevant in cases in which its modal strength does not match the attitude. (ii) In a sentence in which the modal’s complement inside the relative clause is attitude-dependent, the modal is responsible for expressing that its complement is part of the attitude holder’s intentions. (iii) The modal disambiguates readings in which the relative clause is interpreted as part of the attitude holder’s intentions from readings in which the relative clause is not part of those intentions.

These aspects already give us deep insight into the question of why the modal in the original example (1) seems to lack a semantic contribution.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
 ‘*The ECB is looking for a lawyer who should be an EU-citizen.*’

Considering the three aspects of the semantic contribution of the modal discussed above, the reasons why the modal in (1) appears to lack a semantic contribution are

the following:

- The necessity modal *soll* matches the attitude in modal force, strength and flavor. Because of the lack of mismatch in this area, the modal appears to be redundant in this regard.
- The modal's complement inside the relative clause in this example is not attitude-dependent.
- The differentiation between a reading where the relative clause is not seen as part of the attitude holder's intentions can only surface with an adequate motivation through context and world knowledge. Therefore, this reading is not the first interpretation that comes to mind in a modal-free sentence.

If any of these aspects are changed, the modal is immediately crucial for the interpretation of the sentence.

Apart from the semantic contribution of the modal, we also examined the anaphoric relation between the embedded modal and its antecedent intensional verb in greater detail. This discussion showed why the anaphoric reading is sometimes not easily available, whereas in other examples it is the most prominent interpretation. The preference for a reading has to do with a suggestive context, a competing independent reading of the modal, and, last but not least, the choice of the modal itself. As it turns out, some combinations of attitudes and modals work better than others.

## 2.2 Relative clause dilemma (Part B)

In this section, we will finally turn to the second part of Zimmermann's puzzle, which concerns the ambiguous status of the relative clause. Before we discuss more data, we will first have to update the problems raised in the beginning because we have made a lot of new discoveries since then. Subsequently, I will mainly focus on the discourse paraphrase in Zimmermann's puzzle, which is said to reflect appositive features of the relative clause. We will discuss a wider range of data in order to determine whether the availability of a discourse paraphrase can be seen as a general feature of the anaphoric reading. This investigation should deepen our understanding of the semantic relation the relative clause has to its anchor, and perhaps even answer some open questions concerning its ambiguous features.

### 2.2.1 Reevaluating the problem

The second part of Zimmermann’s puzzle consists of the question whether the relative clause in (1) is restrictive or appositive with the intended anaphoric reading of the modal. The question is based on the observation that the reading is paraphrasable by both a parallel sentence with an unambiguously restrictive relative clause in (2) and a parallel paratactic version (3), which is said to reflect the sentence-like properties of an appositive relative clause.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*
- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
the ECB seeks a lawyer who EU-citizen is  
*‘The ECB is looking for a lawyer who is an EU-citizen.’*
- (3) Die EZB sucht einen Juristen. Er soll EU-Bürger sein.  
the ECB seeks a lawyer he should EU-citizen be  
*‘The ECB is looking for a lawyer. He should be an EU-citizen.’*

We saw in the last section that the observation concerning the semantically empty modal cannot be generalized to apply to all modals in the sentences in question. The discussion showed that not all sentences that feature the reading are paraphrasable with a sentence containing an unambiguously restrictive relative clause like in (2). For instance, (2) cannot paraphrase the same sentence with a possibility modal (12).

- (12) Die EZB sucht einen Juristen, der EU-Bürger sein darf.  
the ECB seeks a lawyer who EU-citizen be may  
*‘The ECB is looking for a lawyer who may be an EU-citizen.’*

Since the availability of a paraphrase with a restrictive relative clause served as an indication that the intended reading of the examples with modals contains a restrictive relative clause, the dismissal of this generalization takes away from the validity of this hypothesis. However, the unavailability of this paraphrasing option does not automatically mean that the relative clause in (12) cannot be interpreted restrictively. We have seen that there are independent reasons why some sentences can be paraphrased by a modal-free counterpart while others cannot.

However, we also cannot rule out that there in fact is a difference between the types of relative clauses in (1) and (12), meaning that the relative clause in the first ex-

ample is in fact restrictive in the reading in question whereas the relative clause in the latter is not restrictive in this reading. Such a hypothesis is supported by the intuition that in the sentence with the possibility modal, the relative clause does not function as a restriction to the head noun as the relative clause in (1) does, but rather serves as an additional comment, which is a function that is usually attributed to appositive relative clauses. On the other hand, in Section 2.1.2, we were also able to show that even (1) and the modal-free sentence (2) are not completely synonymous when considering the option of a third reading. Hence, we should be cautious when we talk about the general significance of the modal-free paraphrase as an indicator that the original modalized relative clause has a restrictive interpretation which is reflected by the modal-free relative clause.

In the following subsection, we will mainly focus on the paratactic discourse paraphrase and its significance as an indicator of the compatibility of the anaphoric reading with an appositive relative clause.

### 2.2.2 Availability of the discourse paraphrase

By discussing a wider range of examples featuring the intended reading, but containing different intensional verbs and modals, we managed to call into question the modal-free counterpart as a general option for paraphrasing the reading. In this section, we will investigate whether the observation concerning the paratactic paraphrase stands up to a wider range of data. This discussion will show whether the appositive features reflected in the paratactic discourse option are available in all examples that bring out the anaphoric reading.

I will not discuss all the data in detail, but only pick out the examples that are worth a closer look because they deviate from the observations made in Zimmermann's puzzle. The other ones, like for instance cases with different modals inside the relative clause or sentences with creation verbs, behave like the original example concerning the availability of a discourse paraphrase. Hence, (64) can paraphrase each counterpart in (54), and (65) can paraphrase (21).

- (54) Die EZB sucht einen Juristen, der EU-Bürger sein  
the ECB seeks a lawyer who EU-citizen be  
kann/darf/sollte/soll/muss.  
can/may/ought/should/must



*‘The ECB is looking for a lawyer who can/may/ought to/should/must be an EU-citizen.’*

- (64) Die EZB sucht einen Juristen. Er kann/darf/sollte/soll/muss  
the ECB seeks a lawyer he can/may/ought to/should/must  
EU-Bürger sein.  
EU-citizen be  
*‘The ECB is looking for a lawyer. He can/may/ought to/should/must be an EU-citizen.’*

- (21) Anna baut ihrer Familie ein Haus, das zwei Stockwerke haben soll.  
Anna builds her family a house which two floors have should  
*‘Anna is building a house for her family which should have two floors.’*

- (65) Anna baut ihrer Familie ein Haus. Es soll zwei Stockwerke haben.  
Anna builds her family a house it should two floors have  
*‘Anna is building a house for her family. It should have two floors.’*

### 2.2.2.1 Exploring continuation in appositives

When discussing sentences with an attitude-dependent complement of the modal, we can identify a difference between the hypotactic and the paratactic example. In the intended anaphoric reading of (37), the modal’s complement in the relative clause is not only attitude-dependent, but it also appears to influence Otto’s search for the adequate piece of music. The purpose of this piece of music, which is to be played at Anna’s wedding, indirectly determines Otto’s search aims. In the discourse version in (66), this indirect relationship between the first and the second clause does not seem to be established.

- (37) Otto sucht ein Musikstück, das auf Annas Hochzeit gespielt werden  
Otto seeks a piece of music which at Anna’s wedding played be  
soll.  
should  
*‘Otto is looking for a piece of music which should be played at Anna’s wedding.’*

- (66) Otto sucht ein Musikstück. Es soll auf Annas Hochzeit gespielt  
Otto seeks a piece of music it should at Anna’s wedding played  
werden.  
be  
*‘Otto is looking for a piece of music. It should be played at Anna’s wedding.’*

The example in (66) is compatible with a scenario in which it does not matter

which piece of music Otto chooses, it will be played at Anna’s wedding no matter what. This interpretation is reminiscent of the interpretation of continuative relative clauses (*Weiterführende Relativsätze* in German), which are also categorized as being non-restrictive (cf. Holler 2005). An extensional example from Holler (2005) is given in (67). Here, the past tense of the example makes it easier to understand the continuative character concerning the interpretation of the two events of meeting and asking the farmer for directions as two independent incidents.

- (67) Emil traf einen Bauern, den er später nach dem Weg fragte.  
 Emil encountered a farmer who he later for the way asked  
*‘Emil encountered a farmer who he later asked for directions.’*

Turning to intensional examples with the structure we are interested in, I believe that the continuative relative clause can also appear in these environments. I would categorize the prominent reading of sentence (68) as featuring a continuative relative clause. Here, the property of sharing an office with the addressee of the sentence does not seem to be a relevant determiner for the search aims of the new lawyer the ECB is looking for. However, in the case of (1), there is clearly no continuative relative clause involved since there is no attitude-dependency, and more importantly, the complement of the modal inside the relative clause does not depict an event.

- (68) Die EZB sucht einen neuen Juristen, der dann mit dir das Büro teilen  
 the ECB seeks a new lawyer who then with you the office share  
 soll.  
 should  
*‘The ECB is looking for a new lawyer who then should share the office with you.’*
- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*

Because of the attitude-dependency and the depiction of an event in the relative clause, example (37) behaves more like (68) than like (1) concerning its ability to be interpreted continuatively. Due to the suggested context in this sentence, this interpretation may not be as prominent as the anaphoric reading we have discussed previously in connection with this example, but there is no reason to assume that this reading is not available with the relative clause, which then is paraphrased in the discourse version. Eventually, we have to figure out whether there is actually

a truth-conditional difference between what I categorized as the anaphoric reading and the continuative reading. Additionally, if there is a difference, then we have to determine whether this difference has to do with the type of relative clause or the interpretation of the modal as being anaphoric. The question then would be whether the continuative reading can also involve an anaphoric modal.

We conclude from this discussion that an attitude-dependent, event-depicting property inside the relative clause opens up the possibility of having a continuative interpretation of that relative clause, which then can be paraphrased by a discourse. Therefore, although the paratactic paraphrase does reflect appositive features of the relative clause, it seems to paraphrase a continuative appositive reading instead of an anaphoric one with a restrictive character. However, this observation does not say anything about the paratactic paraphrase of sentences where the relative clause does not contain an attitude-dependent, event-depicting property and cannot be interpreted continuatively.

#### 2.2.2.2 Exploring monotonicity effects

We established in Section 1.2.3 that only certain intensional verbs in matrix position are compatible with the interesting behavior of the embedded modal. Among these verbs are buletic attitude verbs and verbs of demand. In this section, we will discuss sentences featuring these two types of verbs in connection with the availability of the discourse paraphrase. As mentioned, in sentences like (69) or (70), the embedded modal is just as anaphoric to the attitude displayed in the matrix clause as in sentences with the verb *seek*.

- (69) Anna wünscht sich eine Katze, die schwarz sein soll.  
 Anna wishes a cat which black be should  
 ‘*Anna wants a cat which should be black.*’
- (70) Otto wünscht sich eine Klausur, die einfach sein soll.  
 Otto wishes a written exam which easy be should  
 ‘*Otto wants a written exam which should be easy.*’

However, when it comes to the question whether these cases can be paraphrased by a paratactic discourse, we get mixed results. The discourse versions of the sentences above would be (71) and (72), but only the first one is able to paraphrase the intended reading of the respective original example.

- (71) Anna wünscht sich eine Katze. Sie soll schwarz sein.  
 Anna wishes a cat it should black be  
 ‘*Anna wants a cat. It should be a black one.*’
- (72) Otto wünscht sich eine Klausur. Sie soll einfach sein.  
 Otto wishes a written exam it should easy be  
 ‘*Otto wants a written exam. It should be an easy one.*’

Although (72) is a perfectly acceptable example with an unspecific reading, the discourse cannot paraphrase the anaphoric reading that is available in the original sentence. Unlike (70), Otto explicitly wishes for a written exam in the discourse example, and in addition, he wishes for that written exam to be simple. A scenario for this interpretation would be that Otto can choose between an oral and a written examination. Due to his better experience with written tests, he chooses the latter, but of course, he also wants it to be an easy one. This interpretation actually is also available in (70). However, the other interpretation in which Otto does not want to take any exam but if he has to take one, he hopes that it will be an easy one, cannot be paraphrased by (72).

Only when we are certain that the attitude holder wants the things expressed both in the direct object argument and in the relative clause can we paraphrase the sentence with a discourse. This would be the suggested context for (69), but not for (70). Can we conclude from this observation that in (69) the anaphoric reading stems from an appositive relative clause, but not in (70)? This seems peculiar, but believing in the significance of the discourse paraphrase as reflecting appositive behavior, this is the conclusion we have to draw. An explanation of why this behavior is possible with these examples but not with examples containing teleological search-verbs can be traced back to the specific nature of buletic attitudes: the attitude does not hold for the (accommodated) presuppositions of the sentence. For the scenario that applies to (70) but not (72), it is possible to assume that Otto already knows that he has to take the written exam and cannot avoid it. Still, he can wish for the exam to have specific features, like being easy. Of course that does not mean that he wants to take the exam, which however is explicitly expressed in the first sentence of the discourse in (72).

A similar observation also holds for sentences with verbs of demand. Consider the examples below.

- (73) Herr Schmidt verlangt eine Rückerstattung, die mindestens fünfzig  
 Mr. Schmidt demands a refund which at least fifty  
 Euro betragen muss.  
 euros amount must  
 ‘*Mr. Schmidt demands a refund which must amount to at least fifty euros.*’
- (35) Der Verein erlaubt Mitglieder, die unter zwölf Jahre alt sein dürfen.  
 the club allows members who under twelve years old be may  
 ‘*The club allows members who can be below the age of twelve.*’

We can see below in (74) that the paratactic paraphrase is available for the sentence in (73), which suggests that the anaphoric reading is compatible with an appositive relative clause. However, this does not seem to be the case for (35) and its paratactic counterpart in (75). (75) expresses something different than the original sentence. The statement *The club allows members* on its own sounds quite odd. The sentence in (35) means something different since it explicitly states that children under twelve years are permitted to join the club as members.

- (74) Herr Schmidt verlangt eine Rückerstattung. Sie muss mindestens fünfzig  
 Mr. Schmidt demands a refund it must at least fifty  
 Euro betragen.  
 euros amount  
 ‘*Mr. Schmidt demands a refund. It must amount to at least fifty euros.*’
- (75) Der Verein erlaubt Mitglieder. Sie dürfen unter zwölf Jahre alt sein.  
 the club allows members they may under twelve years old be  
 ‘*The club allows members. They can be below the age of twelve.*’

Examples with buletic verbs and verbs of demand differ crucially in this respect from teleological verbs. Consider the sentences below, where only the inference in (77) is true, but not the one in (76).<sup>17</sup>

- (76) John wants an easy exam.  
 ∴ John wants an exam.
- (77) Mary is looking for a red pen.  
 ∴ Mary is looking for a pen.

One of the major observations of this section is that there are examples featuring an anaphoric reading which cannot be paraphrased by a paratactic discourse. If we rely on the hypothesis that the discourse paraphrases examples with appositive

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<sup>17</sup>The observation concerning buletic verbs can be attributed to Asher (1987) and Heim (1992).

relative clauses, the unavailability of this paraphrasing option in an example with an anaphoric reading indirectly leads to a conclusion concerning the restrictive nature of the relative clause: we have additional evidence now that the anaphoric reading definitely appears with the restrictive relative clause. What these examples additionally show is that the phenomenon of the anaphoric modal seems to be independent of an ambiguous nature of the relative clause and the related question whether there is a coincidence of the restrictive and appositive readings in these examples.

The discussion of the examples in this section proves that the observation of the discourse paraphrase does not apply to all of our data, and that sentences containing bulletic verbs or verbs of demand differ from the original examples with *seek* in this respect. Although all of them are compatible with the anaphoric reading, they perform differently regarding the discourse paraphrase: only if the bulletic attitude or demand is valid for both the direct object and the predicate expressed in the relative clause is the discourse paraphrase available. However, we do not exactly know how to interpret this observation. It can be a general coincidence, an epiphenomenon, or it can actually mean that only in those specific cases does the reading appear with an appositive relative clause, whereas there is no appositive with an anaphoric reading in cases like (35) or (70). To decide this, we need to know more about the significance of the discourse paraphrase as an indicator of the availability of an appositive structure. We will discuss this topic in greater detail in Section 3

### 2.2.3 Conclusions

In this section we have mainly discussed issues relating the observation that the anaphoric reading can be paraphrased by a paratactic discourse. This observation contradicted the intuition that the anaphoric reading involves a restrictive semantics concerning the relative clause. In order to evaluate the general availability of the discourse paraphrase, we discovered at least two cases where the discourse counterpart deviated in its interpretation from the original examples in Zimmermann's puzzle. The deviances concern examples with attitude-dependent, event-depicting properties in the relative clause and examples with bulletic attitudes and verbs of demand. All of these cases involve discourse counterparts that bring out different readings than the intended anaphoric one. Believing in the significance of the dis-

course paraphrase as an option to bring out the appositive features of a relative clause, these examples show that (i) the anaphoric reading is also available when there is no appositive relative clause, hence, the relative clause is definitely restrictive in these cases, and (ii) the appearance of an anaphoric reading is not tied to an ambiguous status of the relative clause and the possible coincidence of a restrictive and an appositive reading. An alternative conclusion would be to question the validity of the discourse paraphrase as an indicator of an appositive interpretation. We will discuss more background related to this topic in the next section.

## 2.3 Summary

The goal of this section was to examine the two main problems connected to the anaphoric reading that are exhibited in Zimmermann's puzzle, the first problem being the question of the semantic contribution of the modal in an anaphoric reading, the second one the ambiguous status of the relative clause, which shares both restrictive and appositive features. Our investigation included a thorough discussion of a wide range of data with the reading in question. We managed to discover the role of the embedded modal in these cases by extending our view to examples with different features, and came to the conclusion that the modal-free paraphrase which is part of Zimmermann's puzzle is not always available in cases with an anaphoric reading. Additionally, even in examples where the modal-free counterpart can paraphrase the modalized sentence, it is not completely synonymous since the embedded modal functions as an intention-marker, ruling out the occurrence of any third readings a modal-free sentence might have.

A similar observation was made when discussing the second part of Zimmermann's puzzle, the dubious status of the relative clause. Here, too, we discovered that the discourse paraphrase in Zimmermann's puzzle is not always available with examples featuring the anaphoric reading. We came to the conclusion that the anaphoric reading is definitely available with a restrictive relative clause, but were left undecided as to how to interpret the results concerning the appositive features.

The main discovery of this section, however, is that Zimmermann's puzzle cannot be applied to all sentences in which the anaphoric reading occurs. The phenomenon we are interested in appears in a much wider range of data than initially expected, and in many of them, the paraphrasing options which make up Zimmermann's puzzle

are not available. Therefore, although peculiar, this puzzle represents only a tiny part of the data we have to consider, since, if taken alone, it raises the wrong questions concerning the phenomenon of the anaphoric reading, like for instance the seemingly empty embedded modal that turns out not to be empty at all. In this section, we managed to find the true questions we need to ask in order to explain both the anaphoric reading and the peculiarity of Zimmermann's puzzle, as well as to generally gain a deeper understanding of the mechanisms that are at play within this phenomenon.



### 3 Relative clauses in intensional contexts

Although a purely descriptive data discussion was able to answer a number of questions related to the phenomenon of interest, there are certain limitations to this kind of investigation, especially concerning the status of the relative clause involved in our examples. For example, we were able to detect that the appearance of the anaphoric reading is independent of the availability of a discourse paraphrase, and since the discourse paraphrases a sentence with an appositive, we concluded that the anaphoric reading therefore is definitely compatible with a restrictive relative clause. However, there are still doubts about the significance of the discourse paraphrase as proof of the existence of an appositive relative clause, and we do not know how to interpret cases where the discourse paraphrase is in fact available. Do these examples then contain appositives instead of restrictives or are both types of relative clauses available? If they are, do the restrictive and appositive readings fall together or can we detect a truth-conditional difference? Also, in cases where the discourse paraphrase is not available, does this necessarily mean that there, the anaphoric reading is not available with an appositive relative clause? Basically, what we need to do now is to discuss and determine the significance of the discourse paraphrase for our data.

In this section, we will investigate the theoretical background of relative clauses in general and as attachments to intensional anchors. This discussion will motivate the reasons for taking the paratactic discourse as a significant test to prove the existence of an appositive relative clause. Additionally, we will introduce more tests that are based on the features of both appositive and restrictive relative clauses in order to get even more clues about the ambiguous relative clause in our data.

#### 3.1 General assumptions

In this subsection, I will give a short synopsis of general assumptions about restrictive and appositive (or non-restrictive) relative clauses. I will focus on their semantic function inside a sentence and the different features that set them apart from each other. This demonstration will be inconclusive and focuses only on the issues relevant for the purposes of this thesis. This means that I will also ignore the extensive literature concerning the syntactic representation of relative clauses.

### 3.1.1 Restrictive and appositive relative clauses

It is an established convention that relative clauses are categorized in the two classes of restrictive and appositive relative clauses.<sup>18</sup> Since Partee (1975), these classes of relative clauses have been distinguished by their attachment to their head: restrictive relative clauses attach to the nominal projection excluding the determiner (in more recent terms, the NP), whereas appositive relative clauses attach to a projection including the determiner (the DP or higher). Type-driven approaches have tried to account for the distinction by attributing different semantic types to both types of relative clauses. Restrictive relative clauses have been categorized as predicates of type *et* that modify nominal predicates, which are also of type *et*. In this respect, restrictives function like adjectives modifying common nouns. The denotation of the restrictive relative clause intersects with the extension of its head-NP. Appositive relative clauses, in contrast, are assumed to be of type *t* (cf. Sells 1985) and to modify only referential nominals of type *e* (cf. Del Gobbo 2003). In written English, commas are used to mark the appositive while restrictives are unmarked. Additionally, speakers tend to use the relative pronouns *who* or *which* in appositives, while in restrictives the complementizer *that* is also frequently used.

- (78) a. Mary tutors the neighbor who/that is bad in Latin. (*restrictive*)  
b. Mary tutors the neighbor, who is bad in Latin. (*appositive*)

The theories about the different attachment sites and semantic types of restrictive and appositive relative clauses go hand in hand with the observation that the two types of relative clauses differ in their distribution. Whereas restrictive relative clauses are incompatible with referential head nouns like proper nouns, appositive ones are restricted in their attachment to NPs with strong quantifiers like *every* (cf. Smith 1964, Ross 1967).

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<sup>18</sup>There have been discussions in the literature about relative clauses that fall outside this dichotomy – e.g. Carlson (1977) and Heim (1987), who discuss degree relatives, which more recently have been labeled relatives of the third kind by Grosu and Landman (1998). An example of this kind of relative clause is given below.

- (i) It will take us the rest of our lives to drink the champagne that they spilled that evening. (Heim 1987)

Other linguists, like for example Sternefeld (2008), deny that there is a configurational distinction between restrictive and appositive relative clauses. Nevertheless, I will stick to the traditional opposition of restrictive and appositive relative clauses in the discussion of the relevant data since the relative clauses this thesis is concerned with have a great deal to do with the topic of restrictivity, and the uncertainty regarding their nature is seen most clearly within this model.

- (79) a. \*Mary tutors John that is bad in Latin.  
b. Mary tutors John, who is bad in Latin.
- (80) a. Mary tutors every guy that is bad in Latin.  
b. \*Mary tutors every guy, who is bad in Latin.

While both types of relative clauses appear to be very similar in a sentence, their function and contribution to the sentence meaning differ on a basic level, which in prototypical cases makes it easy to tell them apart. As the name suggests, restrictive relative clauses restrict the denotation of the head noun. In contrast, appositive ones are said to add additional information about the referent of the NP to which they attach. This perspective leads to the conclusion that appositives can be omitted without compromising the meaning or interpretation of their host. The information given in the sentence is only reduced. Restrictives, however, are crucial for the interpretation of the head noun, and in general, an omission of them significantly changes the truth conditions of the sentence. The different functions of restrictive and appositive relative clauses are also reflected in the use and distribution of both relative clause types in the sentence, providing an explanation for the observation that appositives are compatible with proper nouns, but restrictives are not. However, the differences between both types do not necessarily mean that they must be viewed as two excluding opposites. It has been suggested that the restrictive-appositive dichotomy be viewed as two ends on a continuum with a wide range of grey area in between (cf. Fabricius-Hansen 2009 on prenominal modification).

While it is fairly established in the literature that restrictive relative clauses function like adjectives on a semantic level, for appositives the picture is not so clear as they share features of both independent and subordinate clauses. For this thesis, I will pursue the idea of the *Main Clause Hypothesis (MCH)*, a term introduced in Emonds (1979) (attributable to himself and various other linguists: Ross 1967, Sells 1985, McCawley 1988), which captures the idea that despite their syntactic subordination, appositive relative clauses behave and, therefore, should be treated like independent sentences. This hypothesis would explain why complex sentences containing an appositive relative clause can be paraphrased with a two-sentence discourse where the relative clause appears as an independent sentence. Applied to a standard appositive relative clause like the one featured in (79-b), the MCH predicts that the discourse in (81) has the same interpretation as (79-b). In contrast, (82) shows that the reading of (80-a) with the restrictive relative clause cannot be paraphrased with

such a mini-discourse. Moreover, trusting in the MCH, the degraded acceptability of (82) would suggest that the appositive interpretation is indeed unavailable in (80-a). In the case of an ambiguity of both types of relative clauses, like in (78), a corresponding mini-discourse would only bring out the appositive interpretation of the relative clause, see (83), which implies that a unique referent can be determined for the object *the neighbor*. Example (83) is therefore semantically equivalent to (78-b), but not to (78-a).

- (81) Mary tutors John. He is bad in Latin.  
 (82) Mary tutors every guy. ?He is bad in Latin.  
 (83) Mary tutors her neighbor. He is bad in Latin.

In addition to the different distributions of restrictive and appositive relative clauses that are due to their semantics, they are also said to behave differently on a syntactic level (cf. Potts 2005, de Vries 2006). We will leave the discussion of any syntactic issues concerning relative clauses aside as this appears to be orthogonal to the purposes of this thesis.<sup>19</sup>

When considering attachment of relative clauses to unspecific indefinites, it is observed that restrictive relative clauses are far more likely to appear in this environment than appositive ones. In fact, Del Gobbo (2003) suggests that based on type mismatch, appositives generally are excluded from attaching to unspecific indefinites,<sup>20</sup> resulting in the pattern displayed in (84) and (85): When it is interpreted specifically, an indefinite has wide scope and is interpreted referentially. In this case, both a restrictive and an appositive reading are available. However, when the indefinite receives an unspecific interpretation and thus appears as a narrow scope existential, an appositive relative clause cannot take it as its host, which is why the appositive interpretation fails in an unspecific reading of (85).

- (84) Mary is looking for a student that is bad in Latin. (*restrictive*)  
 a. *specific: ‘There is one particular student and he is bad in Latin and Mary is looking for him.’*

<sup>19</sup>For more information about restrictive and appositive relative clauses, see for instance Bianchi (2002a, 2002b) or Yuasa (2005).

<sup>20</sup>Del Gobbo (2003) argues that the quantificational type (*et, t*) cannot combine with the type *t* of the appositive relative clause, nor can *t* intersect with the denotation of the sortal, which is of type *et* (Del Gobbo 2003:76f).

- b. *unspecific: ‘Mary’s search is successful if there is any student such that he is bad in Latin and she finds him.’*
- (85) Mary is looking for a student, who is bad in Latin. (*appositive*)
- a. *specific: ‘There is one particular student Mary is looking for and he is bad in Latin.’*
  - b. *\*unspecific: ‘Mary’s search is successful if there is any student such that Mary finds him, and the student she finds is bad in Latin.’*

Following this line of thought, one would conclude that the German sentences which are discussed in this thesis and contain intensional, and thus unspecific, objects are only compatible with restrictive but not with appositive relative clauses. However, in the literature, there is evidence that in some limited environments, appositives do appear next to unspecific head nouns. As it turns out, these environments – which Sells (1985) analyzes as instances of *discourse subordination* – exhibit features that are also distinctive for the German examples which I am interested in. Hence, in light of these observations, a discussion of these cases is needed in order to determine whether we have to consider both the restrictive and the appositive interpretations of our German examples.

### 3.1.2 Appositives with unspecific heads (Sells 1985)

Sells (1985) convincingly argues that in certain contexts, appositive relative clauses do appear productively with unspecific head nouns. Sells focuses on quantified expressions and is not interested in intensional data.<sup>21</sup> Nevertheless, unspecificity plays a crucial role in his examples, two of which are given below. In either case the intended reading requires an unspecific interpretation of the relative clause’s head. The reason for the unspecific interpretation of the indefinite can be traced back to the quantified matrix subject. (86) says that each single chess set has its own spare pawn and each spare pawn is taped to the top of the box of each respective chess set. A similar pattern can be observed in (87): every Korean rice-grower owns a different wooden cart and each rice-grower uses his wooden cart when he harvests the crop. In both sentences, the relative pronoun relates to the unspecific indefinite. Both relative clauses have an appositive interpretation; the relative clause can be omitted without changing the truth conditions of the sentence, and the relative clause does

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<sup>21</sup>Busch and Schumann (2016) discuss different cases of appositives combining with unspecific indefinite NPs. As it turns out, an appositive may also modify intensional object-NPs.

not modify the head noun, but adds additional information.

- (86) Every chess set comes with a spare pawn, which you will find taped to the top of the box.
- (87) Every rice-grower in Korea owns a wooden cart, which he uses when he harvests the crop.

Sells (1985) discusses two alternatives of (86), which are displayed in (88). Although the meaning of (86) is very similar to the one in (88-a) containing a restrictive relative clause, they are not synonymous: whereas the former says that each chess set comes with only one spare pawn, in (88-a) there is no such requirement. The sentence with the restrictive relative clause is compatible with a situation in which every chess set comes with more than just one spare pawn, but at least one spare pawn is such that it is taped to the top of the box.

The other alternative in (88-b), however, does represent a paraphrase of (86). The paraphrasability of sentences like (86) and (87) with a discourse counterpart is actually a productive pattern. Based on this observation, Sells categorizes all of these examples as instances of the same phenomenon, which he calls *quantificational subordination*, and argues for a similar approach to both the discourse data and the data with relative clauses.

- (88) a. Every chess set comes with a spare pawn that is taped to the top of the box.
- b. Every chess set comes with a spare pawn. It is taped to the top of the box.

The observation that appositive relative clauses like in (86) can be paraphrased with an independent sentence goes hand in hand with Emonds' MCH, although Emonds originally did not consider sentences with unspecific head nouns. In (88-b), the relative pronoun is exchanged for the personal pronoun *it*, which is equally able to refer to an unspecific wooden cart. Pronouns that can do this are known as E-type pronouns (cf. Evans 1977). This type of pronoun appears unbound on the surface, which means that it may lie outside the scope of its antecedent. Additionally, an E-type pronoun is said to have a maximality effect as a result of a uniqueness condition. Hence, there is a strong parallel between E-type pronouns and the relative pronouns of Sells' appositives.

Crucially, however, Sells already observes that it is not the case that the discourse version and the appositive relative version are always equally available. Consider his examples in (89).

- (89) a. \*Every student has submitted a proposal, which is too long.  
b. Every student has submitted a proposal. They are all too long.

Sells argues that the reason for the ungrammaticality of (89-a) is that the appositive needs some kind of temporal subordination in order to be interpretable, something the discourse version apparently does not need. This means that the availability of an appositive relative clause with an unspecific head is more restricted than the availability of a parallel discourse version. Hence, you can produce discourse versions from data with appositive relatives, but not necessarily the other way around.

## 3.2 Testing the data

In this section, we will return to the German examples with the modalized relative clause. As we saw in the previous section, an unspecific head as such does not make it apparent which type of relative clause is attached to it. Since in the sentences in question, the natural language intuition of German speakers is of no help in determining whether the relative clause is restrictive or appositive, we are going to apply linguistic tests in the hope of getting a clearer impression of the examples. I have divided the tests into two groups, one that confirms the availability of the restrictive interpretation in the sentence, and another one that states that the appositive interpretation prevails.<sup>22</sup> When applying the tests, I will only focus on the reading that includes an anaphoric interpretation of the modal. Of course, other readings are also available, but we are not concerned with them here. We are only interested in verifying the availability of the anaphoric reading while forcing either a restrictive or an appositive structure via the respective test.

### 3.2.1 Confirming the availability of the restrictive anaphoric reading

#### 3.2.1.1 Negation test

The two types of relative clauses behave differently if the matrix clause contains a scope-taking element. Whereas restrictive relative clauses behave like any other

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<sup>22</sup>For a detailed theoretical motivation of the tests, see Busch and Schumann (2016).

subordinate clause and are interpreted within the scope of an operator, appositive relative clauses are usually located outside the operator's scope and are not affected by it.<sup>23</sup> This theoretical conclusion comes directly from the evidence given in numerous examples: In (90-b), the restrictive relative clause is interpreted below the sentence negation. In (91-b), however, the negation scopes only over the matrix clause. The sentence negation negates Mary's tutoring of John, but not him being bad in Latin, which is equally true in (91-a) and (91-b).

(90) *Restrictive relative clause*

- a. Mary tutors a neighbor who is bad in Latin.
- b. It is not the case that Mary tutors a neighbor who is bad in Latin. (She tutors a neighbor who is bad in French.)

(91) *Appositive relative clause*

- a. Mary tutors John/the neighbor, who is bad in Latin.
- b. It is not the case that Mary tutors John/the neighbor, who is bad in Latin. (He will not pass his class.)

In the case of appositives with unspecific heads, the result of the negation test might be different. In (92) for instance, the negated sentence is unacceptable since we do not know how to interpret the content of the relative clause outside the scope of the negation (92-b).

(92) *Appositive relative clause*

- a. Every rice-grower in Korea owns a wooden cart, which he uses when he harvests the crop.
- b. #It is not the case that every rice-grower in Korea owns a wooden cart, which he uses when he harvests the crop.

What we conclude from these examples is that if a sentence containing a relative clause can be negated in such a way that the relative clause falls under the scope of

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<sup>23</sup>However, counterexamples do exist, as Schlenker (2013) shows with his locally interpreted appositives. In (i), the relative clause is appositive. Still, it is interpreted in the scope of the conditional and contributes locally to the truth conditions.

(i) If tomorrow I called the Chair, who in turn called the Dean, we would be in trouble.

These cases are quite different from our data. Therefore, we will leave them out of our discussion. Nevertheless, they clearly show that one has to be careful in assessing the significance of scope behavior as evidence for or against a certain structure.



the negation, then the restrictive interpretation of the relative clause seems to be available.

When applying the test to our data, the result shows the same behavior as the example in (90-b): the negation takes wide scope over the relative clause. Assuming that the relative clause is appositive, we would expect a behavior like in (92). It is hard to say whether this unacceptable reading is available in (93) since the restrictive reading is so prominent that it influences the intuitions about the other reading. However, the test result clearly supports the view that the restrictive reading is available for the relative clause.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*'The ECB is looking for a lawyer who should be an EU-citizen.'*
- (93) Es ist nicht der Fall, dass die EZB einen Juristen sucht, der EU-Bürger  
it is not the case that the ECB a lawyer seeks who EU-citizen  
sein soll.  
be should  
*'It is not the case that the ECB is looking for a lawyer who should be an EU-citizen.'*

For sentence (1), this is not too surprising since it is not only paraphrasable by the modal-free counterpart with an unambiguously restrictive relative clause, but is also intuitively restrictive. However, sentences where the modal-free paraphrase does not work, like sentences whose interpretation reflects an appositive nature rather than a restrictive one – as in examples with embedded possibility modals (12), as well as cases featuring attitude-dependency in the relative clause (37) – reveal the same result as (1). They all behave like they contain a restrictive relative clause.

- (12) Die EZB sucht einen Juristen, der EU-Bürger sein darf.  
the ECB seeks a lawyer who EU-citizen be may  
*'The ECB is looking for a lawyer who may be an EU-citizen.'*
- (94) Es ist nicht der Fall, dass die EZB einen Juristen sucht, der EU-Bürger  
it is not the case that the ECB a lawyer seeks who EU-citizen  
sein darf.  
be may  
*'It is not the case that the ECB is looking for a lawyer who may be an EU-citizen.'*

- (37) Otto sucht ein Musikstück, das auf Annas Hochzeit gespielt werden soll.  
 Otto seeks a piece of music which at Anna's wedding played be should  
 'Otto is looking for a piece of music which should be played at Anna's wedding.'
- (95) Es ist nicht der Fall, dass Otto ein Musikstück sucht, das auf Annas Hochzeit gespielt werden soll.  
 It is not the case that Otto a piece of music seeks which at Anna's wedding played be should  
 'It is not the case that Otto is looking for a piece of music which should be played at Anna's wedding.'

These results support the hypothesis that not only in examples where the paraphrase with a modal-free restrictive relative clause is available, but also in the other ones, the modalized relative clause is actually restrictive.

### 3.2.1.2 Coordination test

This test is based on the assumption that appositives contain supplementary information that does not affect the interpretation of the head noun. Therefore, appositives are omissible without changing the truth conditions of the sentence. The test is exemplified in (96), where the a-sentence displays coordination involving restrictive relative clauses, and the b-sentence coordination involving appositive ones. In the first example, the coordination is fine. In contrast, the b-sentence with the two appositives is ungrammatical. This is because the b-sentence actually boils down to something like (97) since appositives in principle are said to be omissible.

- (96) a. *restrictive:*  
 John tutors a student that is bad in Latin and a student that is bad in French.
- b. *appositive:*  
 #John tutors a student, who is bad in Latin, and a student, who is bad in French.
- (97) #John tutors a student and a student.

Coordination involving appositives is not ruled out per se, as demonstrated in (98). Therefore, independent reasons might be involved in the ungrammaticality of (96-b) and (97).

- (98) *appositive:*
- a. John tutors a girl, who is bad in Latin, and a boy, who is bad in French.
  - b. John tutors a girl and a boy.

When applying the test to our data, the result appears to be similar to the result in (96) in terms of acceptability, supporting the intuition that the relative clause has a restrictive interpretation. Due to the ungrammaticality of the b-sentence, the test also rules out that the relative clause has an appositive reading, but there might be other reasons for this. I will come back to this issue in Section 3.3.

- (99) a. Die EZB sucht einen Juristen, der EU-Bürger sein soll, und einen  
the ECB seeks a lawyer who EU-citizen be should and a  
Juristen, der Norweger sein soll.  
lawyer who Norwegian be should  
‘*The ECB is looking for a lawyer who should be an EU-citizen, and a  
lawyer who should be Norwegian.*’
- b. #Die EZB sucht einen Juristen und einen Juristen.  
the ECB seeks a lawyer and a lawyer  
‘*The ECB is looking for a lawyer and a lawyer.*’

### 3.2.2 Confirming the availability of the appositive anaphoric reading

#### 3.2.2.1 Parataxis test

Basically, the second paraphrase in Zimmermann’s puzzle, the discourse paraphrase, represents the parataxis test. We already discussed the application of this test with different data in Section 2.2.2. The test works on the basis of the observation that the reading of appositives can be paraphrased with an independent sentence. Hence, when we have a sentence with an appositive relative clause, the sentence can be transformed into a two-sentence discourse like (101). In contrast, when the relative clause is restrictive, this strategy creates a discourse that cannot paraphrase the original example, as in (100).

- (100) *restrictive:*
- a. Mary likes the guy that has dimples.
  - b. Mary likes the guy. He has dimples.
- (101) *appositive:*
- a. Mary likes John, who has dimples.
  - b. Mary likes John. He has dimples.

As already mentioned, only part of our data can be paraphrased by the paratactic discourse. Therefore, the test would predict that only in those cases does the relative clause in the intended reading have an appositive structure. In examples featuring attitude-dependency, a very prominent continuative reading appears in the paratactic discourse; compare (37) to (66). We do not know how to handle the continuative reading. It seems to also be available in the example with the relative clause, although not very prominently, and it may overlap with the anaphoric reading. Apart from that, in certain examples with bulletic verbs and verbs of demand, the anaphoric reading simply cannot be replicated by the paratactic discourse. Examples are in (70) and (72). In these cases, the parataxis test would predict that the anaphoric reading is simply not available with an appositive relative clause.

- (37) Otto sucht ein Musikstück, das auf Annas Hochzeit gespielt werden  
 Otto seeks a piece of music which at Anna's wedding played be  
 soll.  
 should  
*'Otto is looking for a piece of music which should be played at Anna's wedding.'*
- (66) Otto sucht ein Musikstück. Es soll auf Annas Hochzeit gespielt  
 Otto seeks a piece of music it should at Anna's wedding played  
 werden.  
 be  
*'Otto is looking for a piece of music. It should be played at Anna's wedding.'*
- (70) Otto wünscht sich eine Klausur, die einfach sein soll.  
 Otto wishes a written exam which easy be should  
*'Otto wants a written exam which should be easy.'*
- (72) Otto wünscht sich eine Klausur. Sie soll einfach sein.  
 Otto wishes a written exam it should easy be  
*'Otto wants a written exam. It should be easy.'*

### 3.2.2.2 Adverb test

Emonds (1979) observes that certain adverbs can occur in appositive but not in restrictive relative clauses. He cites the sentences in (102) as an example (Emonds 1979:239). The a-sentence demonstrates the incompatibility of a restrictive relative clause with the adverb *frankly*, while the b-sentence shows the grammaticality of an appositive relative clause with the same adverb. The supplement of the adverb can bring out an appositive reading of the relative clause, however it makes no statement about the restrictive reading of the sentence.

- (102) a. \*The boys who have frankly lost their case should give up.  
 b. The boys, who have frankly lost their case, should give up.

When applying the adverb test to our data, it leads to a similar result to the parataxis test: there is still an anaphoric reading in all versions of (103), where the relative clause is appositive. On the other hand, in sentences with a bulletic verb which failed the parataxis test, the adverb test is also not able to show that the appositive relative clause is compatible with the anaphoric reading. We interpret sentence (104) as meaning that Otto indeed wishes for a written exam, which is not the prominent reading we get in the sentence without the sentence adverb.

- (103) Die EZB sucht einen Juristen, der zudem/allerdings/übrigens  
 the ECB seeks a lawyer who additionally/however/by the way  
 EU-Bürger sein kann/darf/sollte/soll/muss.  
 EU-citizen be can/may/ought/should/must  
*'The ECB is looking for a lawyer who additionally/however/by the way  
 can/may/ought to/should/must be an EU-citizen.'*
- (70) Otto wünscht sich eine Klausur, die einfach sein soll.  
 Otto wishes a written exam which easy be should  
*'Otto wants a written exam which should be easy.'*
- (104) Otto wünscht sich eine Klausur, die übrigens einfach sein  
 Otto wishes a written exam which by the way easy be  
 soll.  
 should  
*'Otto wants a written exam which by the way should be easy.'*

Sentences featuring attitude-dependency produce an interesting result. Whereas in the case of the parataxis test, the discourse was only able to replicate a continuative reading, the adverb test in this case brings out both a continuative reading and the intended anaphoric one (105). This would mean that – different to the parataxis test – the adverb test clearly confirms the availability of the appositive relative clause with an anaphoric reading in examples with attitude-dependency.

- (37) Otto sucht ein Musikstück, das auf Annas Hochzeit gespielt werden  
 Otto seeks a piece of music which at Anna's wedding played be  
 soll.  
 should  
*'Otto is looking for a piece of music which should be played at Anna's wed-  
 ding.'*

- (105) Otto sucht ein Musikstück, das übrigens auf Annas Hochzeit  
 Otto seeks a piece of music which by the way at Anna's wedding  
 gespielt werden soll.  
 played be should  
*'Otto is looking for a piece of music which by the way should be played at  
 Anna's wedding.'*

### 3.2.3 Test results

In this section, we have applied different tests to our data with the anaphoric reading in the hope of gaining a better understanding of the status of the relative clause and its ambiguous features. The tests were able to confirm the intuition that the restrictive relative clause is compatible with the anaphoric reading in the whole range of data. In contrast, the tests confirming an appositive structure led to mixed results. In some sentences with bulletic verbs (70), the test results indicate that the intended reading is not available with an appositive relative clause. In sentences featuring an attitude-dependent property inside the relative clause (37), the results are not that clear. However in all the other cases (54), the tests showed that the anaphoric reading is compatible with an appositive relative clause. An overview of the test results is presented in Table 1.

- (70) Otto wünscht sich eine Klausur, die einfach sein soll.  
 Otto wishes a written exam which easy be should  
*'Otto wants a written exam which should be easy.'*
- (37) Otto sucht ein Musikstück, das auf Annas Hochzeit gespielt werden  
 Otto seeks a piece of music which at Anna's wedding played be  
 soll.  
 should  
*'Otto is looking for a piece of music which should be played at Anna's wed-  
 ding.'*
- (54) Die EZB sucht einen Juristen, der EU-Bürger sein kann/darf/sollte/  
 the ECB seeks a lawyer who EU-citizen be can/may/ought/  
 soll/muss.  
 should/must  
*'The ECB is looking for a lawyer who can/may/ought to/should/must be an  
 EU-citizen.'*

example	anaphoric + restrictive	anaphoric + appositive
(70)	✓	×
(37)	✓	?
(54)	✓	✓

Table 1: Compatibility according to the test results

In Table 1, we have ignored the results of the coordination test concerning the appositive relative clause, which was ruled out by this test. This is because we suspect there are independent reasons for this result. Since the compatibility of the anaphoric reading with an appositive relative clause is confirmed by the other tests in sentences like (54), we will stick with this result.

We conclude from this discussion that there seems to be no doubt that the restrictive relative clause is truly available in all the data featuring the anaphoric reading. The test results regarding the appositive relative clause, however, are not coherent throughout the data. And even in cases where the appositive relative clause seems to be available, like in (54), we still do not know whether or why the reading coincides with a restrictive anaphoric reading. Especially in data with attitude-dependency, the results are confusing. In these cases, there seems to be a strong tendency to interpret appositive structures with a continuative reading, but we cannot rule out that this reading overlaps with the anaphoric one, nor can we rule out that the anaphoric reading definitely is or is not available in these cases. Only in specific sentences with bulletic verbs were we able to rule out the availability of an appositive relative clause with the anaphoric reading.

### 3.3 Distinctive features of appositivity

Since the test results of the last section were not completely satisfactory, in this section, we will discuss more features that set appositive relative clauses apart from restrictive ones. This discussion will eventually show us that there are indeed two distinct anaphoric readings, a restrictive one and an appositive one, and how we can tell them apart.

In Section 3.1.1, I mentioned that the difference between restrictive and appositive relative clauses manifests itself in their distribution. However, there are environ-

ments that are compatible with both types of relative clauses. To identify the distinctive semantic features that set the two types apart, we have to examine those cases in depth. The sentence in (106) shows an ambiguity concerning the relative clause: Both types of relative clauses can attach to the indefinite head. Strikingly, however, in this sentence, it is impossible to discern the difference in meaning between the appositive and the restrictive reading.

- (106) Mary tutors a student(,) who is bad in Latin.
- a. restrictive: ‘*There is a student that is bad in Latin and Mary tutors him.*’
  - b. appositive: ‘*There is a student that Mary tutors and he is bad in Latin.*’

The only difference between the restrictive and the appositive interpretation here is based on the different functions of the relative clauses, and concern the question whether we need the information expressed in the relative clause in order to know which student Mary tutors. However, it is not clear how this issue affects the truth conditions of the sentence.<sup>24</sup>

There are also other environments that allow both types of relative clauses, but where the choice of the relative clause has a greater effect on meaning. Consider for instance a sentence containing the quantifier *most*.<sup>25</sup>

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<sup>24</sup>Geach (1962) argues that in cases with indefinite heads the choice of the relative clause type has no effect on the truth conditions. For a more recent investigation on this topic, see Martin (2013).

<sup>25</sup>For a DP with *most* in object position, the attachment of an appositive relative clause is fairly uncontroversial. However, there is an ongoing debate whether an appositive can attach to this type of DP in subject position. Del Gobbo (2003) observes a difference in grammaticality between the two sentences in (i) and makes the syntactic position responsible for it. Nouwen (2007) on the other hand argues that both relative clauses in (i) are grammatical, but in (i-b), the relative clause refers to all students (in the context) and not just to the ones that came to the party, which is the intersective set. However, such an interpretation is a contradiction in this particular context, and this is the reason for the degraded acceptability of (i-b).

- (i) a. Paul invited most students, who came very late.  
 b. \*Most students, who arrived late, came to the party.

In an empirical investigation into German sentences containing different determiners in subject position including the German version of *most*, Poschmann (2013) – contra Del Gobbo (2003) – discovered that speakers are in fact willing to interpret a relative clause attached to a subject-NP with the determiner *most*. Additionally, an unavailability of the intersective interpretation in these cases, which is suggested by Nouwen (2007), could not be detected in German: in (ii), the relative clause is indeed able to refer to the whole set of bricks belonging to the fire station,



(107) Mary tutors most students(,) who are bad in Latin.

With the relative clause interpreted restrictively, (107) expresses that most students that are bad in Latin are tutored by Mary. This reading implies that there are students who are bad in Latin but not tutored by Mary. In contrast, with an appositive interpretation, (107) expresses that Mary tutors most students (for instance compared to other tutors) and, additionally to this, all of the students Mary tutors are bad in Latin. There is no implication about other students being bad in Latin. In the appositive reading, the relative pronoun refers to the whole set of students tutored by Mary. This exhaustive reading is based on the maximizing effect of appositive relative pronouns, which can be viewed as a distinctive feature of an appositive interpretation, setting it apart from the restrictive reading of relative clauses.<sup>26</sup> The relative clauses of interest to us can also attach to a host with the quantifier *most*.

(108) Google sucht die meisten Praktikanten, die (alle) unter zwanzig sein  
Google seeks the most interns who (all) under twenty be  
sollen.  
should  
*'Google is looking for the most interns who all should be below the age of twenty.'*

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and does not have to refer to all of the bricks in the Lego set.

(ii) Das Lego-Set City umfasst über 300 Steine verschiedener Farben und Größen,  
the Lego set City includes more than 300 bricks of different color and size  
unter anderem für eine Poststelle und eine Polizeistation. Die meisten Steine, die  
for example for a post office and a police station the most bricks which  
natürlich alle rot sind, gehören zu einem Feuerwehrhaus.  
of course all red are belong to a fire station  
*'The Lego set City includes more than 300 bricks of different colour and size, for example for a post office and a police station. Most bricks, which are of course all red, belong to a fire station.'*

<sup>26</sup>The exhaustive reading of relative pronouns in appositive relative clauses is something that also appears in examples with discourse anaphors and E-type pronouns in particular (cf. Evans 1977, Heim 1990).

(i) Mary tutors most students. They are bad in Latin.

The maximizing effect is not the only parallel between relative pronouns in appositive relative clauses and discourse anaphors. For a more detailed discussion on this issue, see Busch and Schumann (2016).

As in the other cases with these relatives, the relative clause in (108) seems to be ambiguous. However, here, we now find a truth-conditional difference between the restrictive and the appositive interpretation: The restrictive interpretation fits a context where different companies are looking for teenage interns, but Google has the most job openings for them. However, it is compatible with the scenario that another company is willing to hire more interns than Google in general, but only because it is considering older people too. In an appositive interpretation, different companies may be looking for interns, but Google wants most of them. There is no other company that looks for more interns than Google, regardless of their age. The appositive reading is supported by the use of *alle*, which strengthens the exhaustive reading of the relative pronoun.

This example shows that we indeed have a truth-conditional difference between the anaphoric reading of a restrictive and of an appositive relative clause. However, it seems that in our original examples, the difference is not easy to recognize. For instance, in (1), the maximizing effect present in the appositive interpretation does not play a big role in the interpretation of the example. In a singular example, the maximizing effect leads to a uniqueness condition (cf. Evans 1977). This means that (1) in an appositive reading suggests that the ECB in general is looking for only one lawyer. In contrast, it is compatible with the restrictive reading that the ECB is looking for several lawyers. However, this does not necessarily have to be the case. It is also perfectly acceptable to assume that the ECB is looking for only one lawyer in a scenario suitable for the sentence with the restrictive reading, a lawyer who is an EU-citizen, but still, only one lawyer in general. In this example, although the relative clauses function differently and contribute differently to the sentence meaning, they can still be uttered in the same situation, which is the situation in which the ECB is only looking for one lawyer. We will discuss this issue in more detail in Section 3.4.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
*'The ECB is looking for a lawyer who should be an EU-citizen.'*

However, if the uniqueness effect does play a role in the reading, the appositive interpretation should be ruled out in a context in which it is established that the ECB has more than one job opening for lawyers. And indeed, with this context established in (109), the sentence with the appositive relative clause (supported

by the use of the sentential adverb *übrigens*) in (109-b) is degraded. Whereas the restrictive interpretation only says that one of the two lawyers should be an EU-citizen, because of the uniqueness condition, the appositive interpretation suggests that the ECB is only looking for one lawyer, which clearly contradicts the established context.

(109) *The ECB is looking for two lawyers.*

- a. Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
*(restrictive)*

*‘The ECB is looking for a lawyer who should be an EU-citizen.’*

- b. #Die EZB sucht einen Juristen, der übrigens EU-Bürger sein soll.  
 the ECB seeks a lawyer who by the way EU-citizen be should  
*(appositive)*

*‘The ECB is looking for a lawyer who by the way should be an EU-citizen.’*

The same behavior seems to be the reason for the results of the coordination test we discussed in Section 3.2.1, which stated that the appositive relative clause is unavailable in such environments. It produced the following two sentences.

- (99) a. Die EZB sucht einen Juristen, der EU-Bürger sein soll, und einen  
 the ECB seeks a lawyer who EU-citizen be should and a  
 Juristen, der Norweger sein soll.  
 lawyer who Norwegian be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen, and a lawyer who should be Norwegian.’*

- b. #Die EZB sucht einen Juristen und einen Juristen.  
 the ECB seeks a lawyer and a lawyer  
*‘The ECB is looking for a lawyer and a lawyer.’*

Since appositives should be omissible, but clearly, the relative clauses in (99-a) are not, one might conclude that the relative clauses in this example cannot be appositive. However, based on the findings of this section, we can conclude now that the appositive is not available in this example because it would evoke the maximality or uniqueness effect, which contradicts the meaning of the sentence. Therefore, for independent reasons, this test is inappropriate for our purposes, and we can disregard its results.

Our conclusion from this discussion is that the phenomenon of the anaphoric reading appears with both types of relative clauses, and that the readings do not necessarily coincide since there is a distinctive feature that sets the appositive reading apart from the restrictive one. This feature is a maximizing effect that leads to an exhaustive interpretation of the relative pronoun only in the case of an appositive relative clause. Since this feature is truth-conditionally significant, it distinguishes the appositive reading from the restrictive one.

### 3.4 Is the appositive reading restrictive?

In the last section, I identified a distinctive feature, the maximizing effect, which sets the appositive reading apart from the restrictive one, even in data where the readings seem to coincide. However, although this feature represents a semantic behavior of the appositive reading, it does not constitute the appositive semantics. Therefore, in scenarios in which the maximizing effect does not play a significant role, we still do not know how to differentiate the appositive from the restrictive reading. This is particularly striking because it means that the appositive reading has a similar restrictive interpretation to the restrictive reading. However, since the two types of relative clauses are said to contribute differently to the sentence, we would expect the difference to be reflected on a semantic and pragmatic level that goes beyond the maximizing effect.

Ede Zimmermann (p.c.) had the idea that one key difference between restrictives and appositives is based on the intensionality involved in our data. More concretely, he proposes that in a sentence with a search-verb in matrix position the restrictive relative clause has the function of saying something about the search object, whereas the appositive relative clause says something about the object that has been found as a result of the preceding search. For sentence (1), this means that a restrictive interpretation makes a statement about the lawyer the ECB is looking for, and an appositive interpretation makes a statement about the lawyer who has been found in a successful world in which the search has ended.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*

This semantic characteristic can be explained by the syntactic features of the two types of relative clauses, the restrictive one being integrated, thus modifying on a deeper syntactic level, and the appositive one (generally) not being integrated. In an intensional context, this leads to the modification of two distinct entities: In the case of a search, the restrictive relative clause modifies the intensional searched-for entity, whereas the appositive relative clause modifies the intensional found entity. In an anaphoric reading, due to the anaphoric relation between the two intensional operators, the difference between the two interpretations does not come out easily, and it is questionable whether it necessarily makes a truth-conditional difference. However, the restrictive character of the appositive reading then can be explained by an implication that the properties of a found entity also represent its requirements for the search, especially since the anaphoric modal is determined by the same search goals and functions as an intention-marker of the matrix attitude holder. Such an implication would lead to the intuition that there is no significant difference between the restrictive reading and the appositive one.

With this description of the appositive interpretation we might be able to view examples featuring attitude-dependency in a different light. In these sentences, we discovered an additional continuative interpretation or one which overlaps with the anaphoric reading when we force an appositive structure of the relative clause. We presume that both interpretations are available in (37), but the anaphoric one seems more prominent here (perhaps due to the fact that this sentence also has the restrictive anaphoric reading). However, the discourse version in (66) seems to very prominently paraphrase the continuative reading instead of an anaphoric one, whereas the sentence with the adverb in (105) brings out both a continuative reading and an anaphoric one. Therefore, I argued earlier that the appositive relative clause might bring out two possible interpretations, an anaphoric ('restrictive') one and a continuative one.

- (37) Otto sucht ein Musikstück, das auf Annas Hochzeit gespielt werden  
 Otto seeks a piece of music which at Anna's wedding played be  
 soll.  
 should  
*'Otto is looking for a piece of music which should be played at Anna's wedding.'*
- (66) Otto sucht ein Musikstück. Es soll auf Annas Hochzeit gespielt  
 Otto seeks a piece of music it should at Anna's wedding played

werden.

be

*'Otto is looking for a piece of music. It should be played at Anna's wedding.'*

- (105) Otto sucht ein Musikstück, das übrigens auf Annas Hochzeit  
Otto seeks a piece of music which by the way at Anna's wedding  
gespielt werden soll.  
played be should  
*'Otto is looking for a piece of music which by the way should be played at  
Anna's wedding.'*

Applying our new insights from above to these examples, we conclude that both appositive interpretations are the result of an appositive construction in which the relative clause says something about the piece of music eventually found by Otto instead of the piece of music Otto is searching for. However, only if the modal is interpreted anaphorically are we able to imply that the content expressed with the relative clause is understood as the purpose of the search – thus, a requirement for the searched-for entity – leading to some kind of a ‘restrictive’ interpretation. In the case of a continuative interpretation, in contrast, the modal is not interpreted anaphorically, meaning that it does not pick up Otto’s search intentions, which renders a ‘restrictive’ interpretation impossible.<sup>27</sup>

Although such an explanation sheds new light on the two different appositive readings, it does not answer the question of why in the paratactic discourse only the continuative reading seems to be paraphrased. I believe, however, that actually both may be available but that the continuative reading is much more prominent. In a different example, like in (9), an anaphoric reading might be more available in the paratactic version (11). Therefore, the availability of the anaphoric reading in discourses might depend on the example and the discourse relation we are able to establish between the two sentences. If the second clause is more likely to be understood as an explanation or purpose behind the matrix attitude, the likeliness of interpreting the modal anaphorically also increases in the discourse version.

- (9) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
Anna seeks a hotel in which the invited speakers be accommodated  
sollen.  
should

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<sup>27</sup>We will come back to this topic at the very end in Section 6.2 when discussing an analysis for the appositive cases.

*‘Anna is looking for a hotel in which the invited speakers should be accommodated.’*

- (11) Anna sucht ein Hotel. Dort sollen die Gastsprecher unterkommen.  
Anna seeks a hotel there should the invited speakers be accommodated  
*‘Anna is looking for a hotel. There, the invited speakers should be accommodated.’*

### 3.5 Summary

In this section, we discussed relative clauses in intensional contexts both in a more general and in a more in-depth way concerning our German data. We did this to investigate the second part of Zimmermann’s puzzle, which addresses the ambiguous status of the relative clause in the examples of interest. First, we discussed issues concerning the background of the paratactic discourse, which is crucial in Zimmermann’s puzzle for hinting at an appositive nature of the relative clause. This background information touched on theoretical assumptions concerning the two types of relative clauses and their behavior when attached to unspecific heads.

In order to get more clues about the behavior of the ambiguous relative clauses in our data, we applied various tests to the examples that are based on the semantic and syntactic features of each type of relative clause. These tests were helpful since they clearly showed that the anaphoric reading is definitely available with a restrictive relative clause. However, they yielded contradicting results in terms of the compatibility of this reading with an appositive structure.

One major problem of the whole discussion apart from the status ambiguity is that speakers are not really sure what the appositive reading of the sentence means and whether or how it distinguishes itself from a restrictive interpretation. Therefore, in the subsequent discussion, we examined the semantics of the appositive relative clause in greater detail, and we were able to discern a distinct feature of the appositive reading, which is a maximizing effect in the interpretation of the relative pronoun in this relative clause type. With this information, we were finally able to differentiate appositive from restrictive readings in various examples featuring the anaphoric reading. Additionally, we detected another semantic difference between restrictive and appositive relative clauses which seems to come out only in specific intensional contexts like in our data. This difference concerns the entity the rela-

tive clause modifies. In a sentence with a search-verb, the restrictive relative clause modifies the search object, whereas an appositive modifies the object that has been found as the result of a search. Although it is questionable whether this difference necessarily has a truth-conditional effect, this insight can serve as an explanation for the puzzle of the coincidence of the restrictive and appositive readings while maintaining the idea that the appositive contributes differently to the sentence than the restrictive relative clause.



## 4 Problems of a traditional restrictive account

In this section, we will discuss the obstacles a traditional analysis faces when it is applied to our examples, and the reasons why we need an alternative way to capture the reading we are interested in. To understand why a traditional analysis leads to the wrong results, we first have to sketch the basics of attitude semantics and modal semantics that we are going to use in this thesis. Therefore, before we discuss a conservative approach of the sentence with an anaphoric reading, I will give a short synopsis of the theoretical background that will be relevant for such an analysis.

In this section, I will focus solely on the restrictive version of the relative clauses in our data since it is the more troubling one.

### 4.1 Intensional semantics and intensional operators

The background section will summarize the theoretical assumptions of the two intensional operators for which we assume an anaphoric relation in our data. We will first discuss intensional transitive verbs and attitude verbs, and then modal verbs. We will discuss all of these verbs on the basis of a possible world semantics where they are analyzed as quantifiers over possible worlds. Following a Kripke-Hintikka tradition, the domain of the quantifiers is determined by an accessibility relation which at least in the case of attitude verbs is lexically determined. This means that for instance the doxastic attitude verb *believe* receives a doxastic accessibility relation which picks out belief-worlds of the attitude holder, the desire verb *wish* receives a buletic accessibility relation which picks out desire-worlds of the attitude holder, and so on. We will discuss in Section 4.1.1 how attitude semantics can be used to analyze intensional transitive verbs. In the case of modals, the accessibility relation is tied to the contextually determined interpretation of the modal. We will discuss more details of the approach we will be using for modals in this thesis in Section 4.1.2.

#### 4.1.1 Intensional transitive verbs and attitude semantics

In our data, we mainly deal with opaque verbs – also known as *intensional transitive verbs* – and propositional attitude verbs in matrix position. The relationship between intensional transitive verbs and propositional attitude verbs has a long history in linguistic study, which I, however, will not focus on in this thesis since it

does not play a role in our data and in our analysis. In this thesis, I will use the classic Hintikka-approach for propositional attitude verbs, and a Quine-Hintikka-Zimmermann-approach for intensional transitive verbs.

As already mentioned in the introduction, following Hintikka (1962, 1969), attitude verbs are analyzed as universal quantifiers over possible worlds. The domain of the quantifier is restricted by a lexically determined accessibility relation. In the case of a buletic attitude verb like *want*, the accessibility relation is buletic and makes the set of worlds  $w'$  accessible in which the desires of the attitude holder  $x$  in  $w$  are met.

$$(110) \quad \llbracket \text{want} \rrbracket^w = \lambda p_{st} . \lambda x_e . \forall w' \in \text{Acc}_{\text{buletic}}(w, x) : [p(w')=1]$$

The main obstacle in analyzing intensional transitive verbs concerns the question of how to account for the unspecific object reading or how to account for the intensionality of these verbs. After all, the traditional, strictly sententialist view on intensionality acts on the assumption that intensionality occurs by the embedding of sentences under intensional operators, a perspective that is not compatible with the transitive argument structure of opaque verbs. Although intensional transitive verbs on the surface look very different from propositional attitudes – the latter take a clausal argument – Quine (1956) very influentially proposes analyzing both types of intensional verbs in the same manner. In particular, his analysis of intensional transitive verbs is designed following the account of classic propositional attitude verbs, and he argues that opaque verbs underlyingly have the same structure as propositional attitude verbs. Therefore, this approach is based on the assumption that opaque verbs express an attitude towards a proposition, and that the proposition is the true argument of an intensional verb, regardless of whether it is overtly transitive or not.

For verbs like *want* or *hope (for)*, which overtly allow both direct objects and propositions as arguments, this treatment does not seem far-fetched at all. The analysis is also supported by the fact that the two sentences in (111) share the same meaning in an unspecific reading. Under the clausal analysis, then, the underlying structure of both sentences has to be something like (112) since the embedded infinitival clause needs a PRO-subject in this context which is co-indexed with the subject of the matrix clause. The embedded clause basically represents the proposition *John has*

*a commemorative stamp.*

- (111) a. John wants a commemorative stamp.  
b. John wants to have a commemorative stamp.
- (112) John<sub>i</sub> wants [PRO<sub>i</sub> to have a commemorative stamp].

When analyzing both sentences in (111) as (112), the intensionality is captured by the embedding of the proposition *John has a commemorative stamp* in a construction headed by the intensional operator expressed by the attitude verb *want*, a construal which represents the classic Hintikka approach to propositional attitudes (cf. Hintikka 1962, 1969). The unspecific reading of the object argument *a commemorative stamp* can be explained in a straightforward way. If, *pace* Quine, it is interpreted along the lines of Hintikka, the unspecific object turns out to be an existential quantifier (expressed by the indefinite object *a commemorative stamp*) in the scope of a universal quantifier (expressed by the attitude verb *want*). From this Quine-Hintikka-approach, the unspecificity of the indefinite in (111-a) is no more mysterious than that in (111-b) or, indeed, in the purely extensional scope constellation in (113):

- (113) Everybody bought a commemorative stamp.

Following this lead, the semantic paraphrases given in (114) then apply equally to both sentences in (111). The first paraphrase in (114-a) expresses the unspecific reading. Here, the intensional operator of the attitude verb scopes over the existential quantifier. This reading comes out in a context in which John sees a bunch of different commemorative stamps in the post office, and he wants to buy one of them, but does not care which one. The semantic paraphrase for this reading is that in all worlds in which John's needs are met, there is a commemorative stamp that John has. Due to the wide scope of the intensional operator, the stamp may vary from each possible world to the other. The specific reading, which is paraphrased in (114-b), comes out in a situation in which John is a stamp collector and wants to exchange stamps with a friend to get a specific commemorative stamp from his friend's stamp collection. In the semantic paraphrase, the specificity is captured by the wide scope of the existential quantifier. Since it takes scope over the universal quantifier expressing the attitude, we observe existential impact of *a commemorative stamp*: we can infer from (114-b) that there is actually a certain stamp and in all worlds in which John's wishes come true, this particular stamp is in his possession.

In this reading, *a commemorative stamp* is interpreted *De Re* (Kaplan 1968).

- (114) a.  $\Box_{\text{Desire,John}} \exists x[\text{x is a commemorative stamp and John has x}]$   
 b.  $\exists x[\text{x is a commemorative stamp and } \Box_{\text{Desire,John}}[\text{John has x}]]$

For intensional transitive verbs that do not allow clausal arguments, Quine proposes a lexical decomposition that is valid on both the semantic and the syntactic level.<sup>28</sup> In this context, he discusses the semantics of sentences containing search-verbs, which he proposes decomposing into a propositional attitude (originally *endeavour*) and a binary relation among individuals (*find*). In this thesis, we use the paraphrase *try to find* for search-verbs, which is the paraphrase most commonly used in the literature referring to Quine’s analysis from Montague (1973) onward. As a case in point, (115-a) is attributed the same structure as (115-b). In analogy to the examples with *want* in (111), the underlying structure of both sentences in (115) has to be something like (116). The propositional argument of the attitude expressed by *try* is *John finds a commemorative stamp*.

- (115) a. John searches for a commemorative stamp.  
 b. John tries to find a commemorative stamp.

- (116)  $\text{John}_i$  tries [ $\text{PRO}_i$  to find a commemorative stamp].

Following this approach, the semantic paraphrases for the sentences in (115) can be produced analogously to (114). The subscript ‘Goal’ indicates the teleological perspective of the verb.

- (117) a.  $\Box_{\text{Goal,John}} \exists x[\text{x is a commemorative stamp and John has x}]$   
 b.  $\exists x[\text{x is a commemorative stamp and } \Box_{\text{Goal,John}}[\text{John has x}]]$

The Zimmermann-amendment of the Quine-Hintikka-approach is based on the observation presented in Zimmermann (1993) that opaque readings generally only appear with weak quantifiers, like existentially quantified NPs, and not with all quantificational expressions. Consider Zimmermann’s examples below. In (118-a), we have a classic example that is ambiguous and allows both a specific and an unspecific reading of *a comic-book*. In contrast, (118-b) only has one reading, which is the

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<sup>28</sup>This aspect may vary in subsequent approaches following Quine’s idea. See Geenhoven and McNally (2005) for a more moderate interpretation, and Larson et al. (1997) for a strict implementation of the propositionalistic view. The latter has also been called *sententialism* (cf. Larson 2002).

transparent reading. The opaque reading seems to be unavailable in the b-sentence.

- (118) a. Alain is seeking a comic-book.  
 b. Alain is seeking each comic-book.

To avoid overgeneralization, Zimmermann takes this observation as a motivation to restrict the kind of object argument opaque verbs allow when they open up intensional contexts. In particular, Zimmermann uses an idea that both Lerner and Zimmermann (1981) and Barwise and Cooper (1981) developed independently, saying that existential quantifiers are in a 1:1-correspondence with their restricting property. Zimmermann (1993) originally argued for a predicational approach to opaque verbs in line with Montague’s analysis of opaque verbs (Montague 1968, 1970, 1973) instead of a clausal approach. However, his insight is also compatible with the Quine-Hintikka-approach, which is the chosen approach for our purposes. The equivalence between the predicational and the propositional version of the opaque verb *seek* is shown below:<sup>29</sup>

$$(119) \quad \text{seek}'(P)(x)(w) = \text{try}'(\lambda w'.\exists y[P(y)(w') \ \& \ \text{find}'(y)(x)(w')])(x)(w)$$

The Quine-Hintikka-Zimmermann-style analysis of opaque verbs basically means that we combine Quine’s treatment of opaque verbs as propositional attitudes (including lexical decomposition of opaque verbs like *seek*) with Hintikka’s analysis of attitudes as universal quantifiers over possibilities and Zimmermann’s (1993) proposal to analyze opaque verbs as taking properties as arguments.<sup>30</sup>

The propositionalist strategy of dealing with opacity has the advantage that it can account for the parallelism between opaque verbs and propositional attitude verbs, especially for those intensional verbs that are compatible with both clausal and NP-complements. This is a big advantage of Quine’s approach compared to other approaches to intensional transitive verbs, especially since in our data, both intensional transitive verbs and propositional attitude verbs are equally compatible with

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<sup>29</sup>This exact formula is taken from Schwarz (2015). The original proposal is in Zimmermann (1993:168).

<sup>30</sup>Zimmermann’s amendment to the Quine-Hintikka-approach that is used in this thesis concerns only the lexical semantics of the intensional verb. In the final semantic construal, the amended approach is not distinguishable from a non-amended Quine-Hintikka-approach. The difference between these two versions manifests itself only in the lexical semantics of the search-verb and the introduction of the existential quantifier into the syntax. There is only a different result in examples with strong quantifiers.

the phenomenon we are interested in. Our data does not support the view that opaque verbs should be treated differently from propositional attitude verbs, nor can we benefit from such an account. Therefore, there is no reason for us to pursue analyses that treat both types of verbs differently.

#### 4.1.2 Modal semantics

In this thesis, we will use the Lewis-Kratzer-approach to modality. In this approach intensionality is accounted for in terms of quantification over possible worlds, which means that we have a parallel treatment of modals, attitudes and opaque verbs. Differently from attitude verbs and opaque verbs, however, modals receive a context-dependent interpretation in the Lewis-Kratzer-approach, and are attributed a finer grained semantics, which involves an ordering of the accessible worlds (Lewis 1973, Kratzer 1981, 1991).

Kratzer (1981) introduces conversational backgrounds to the technical framework of modal semantics for a unitary analysis of the different interpretations a modal can have on the basis of a single lexical entry of the modal. Conversational backgrounds are functions from worlds to sets of propositions. The two conversational backgrounds Kratzer uses are the modal base  $f$ , which determines which worlds are accessible, and the ordering source  $g$ , which is used to induce an ordering to the accessible worlds. If  $f(w)$  is the conversational background for the modal base, then the function that takes any world  $w$  to intersection  $\cap f(w)$  corresponds to a modal accessibility relation, making the worlds accessible in which the set of propositions determined by  $f(w)$  have to be true. In the case of an epistemic modal base, the modal base is determined by what is known in  $w$ ; in the case of a circumstantial modal base, the modal base is determined by the relevant facts in  $w$ .<sup>31</sup> For the ordering source, these determining propositions can be ideals, goals, etc., and the ordering ranks the accessible worlds from best to worst. The ordering determined by the ordering source and the selection of best worlds according to the ordering are defined as follows (cf. Fintel and Iatridou 2005):

- (120) For any set of propositions  $P$ , we define a strict partial order  $<_P$ :  
 $\forall w', w'' : w' <_P w''$  iff  $\forall p \in P (w'' \in p \rightarrow w' \in p) \wedge \exists p \in P (w' \in p \wedge w'' \notin p)$

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<sup>31</sup>The modal base is responsible for differentiating between epistemic and non-epistemic modals. We will discuss more details of epistemic modality in Section 5.3 in connection with anaphoric epistemic modals.

$w'$  is better than  $w''$  according to  $P$  iff all propositions in  $P$  that hold in  $w''$  also hold in  $w'$  but some hold in  $w'$  that do not also hold in  $w''$ .

- (121) For a given strict partial order  $<_P$  on worlds, define the selection function  $MAX_{<_P}$  that selects the set of  $<_P$ -best worlds from any set  $X$  of worlds.  
 $\forall X \subseteq W : MAX_{<_P}(X) = \{w \in X : \neg \exists w' \in X : w' <_P w\}$

Depending on the context, a modal can have a number of different modal flavors, the teleological flavor being one of them. A modal with a teleological flavor is used to express what is possible or necessary in order to reach a certain goal. Portner (2007) presents (122-a) as an example of a teleological interpretation of *should*. When the suggested conversational background is made explicit, (122-a) comes out as something like (122-b).

- (122) a. Susan should quit her day job. (It's the only way she'll realize her dream of becoming a successful yoga teacher.)  
 b. In order to reach her goal of becoming a successful yoga teacher, Susan should quit her day job.

As mentioned earlier in Section 1.2.3, Portner (2007) classifies teleological modals together with deontic and buletic modals in the category of priority modals. In Kratzer's modal semantics, these modal flavors have in common that each of them can be analyzed with a circumstantial modal base and a prioritizing ordering source, depending on either the rules (deontic), the wishes (buletic) or the goals (teleological) that are pragmatically salient in the context.<sup>32</sup>

The modal *soIl* receives the following interpretation:

- (123) For any world  $w$ , conversational backgrounds  $f$ ,  $g$ , and proposition  $q$ :  
 $\llbracket \text{soIl} \rrbracket(w)(f)(g)(q) = 1$  iff  $\forall w' \in MAX_{<_{g(w)}}(\cap f(w)) : q(w') = 1$

Since we now have established the necessary theoretical background of the intensional elements involved in our data, we can finally move on to an analysis of this data in order to discover the challenges of our sentences for a conservative restrictive

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<sup>32</sup>Heim (1992) – following observations by Stalnaker (1984) and Asher (1987) – argues that it is necessary to analyze buletic attitudes similarly to priority modals. For *want* she suggests a doxastic modal base and a buletic ordering source. The latter is able to rank the worlds according to the preferences of the attitude holder. However, we will not use this fine-grained analysis of attitude verbs for our purposes.

approach.

## 4.2 A traditional analysis of embedded modality

A traditional analysis of embedded modality is able to account for sentences with an independent modal interpretation like in (55), where it is likely the obligation put on the juvenile offender will be interpreted as coming from a court order. Except for the independent interpretation of the modal, this sentence is parallel to sentences that exhibit the anaphoric reading like (1).

- (55) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit leisten muss.  
 the FAZ seeks a juvenile offender who community service perform must  
*'The FAZ is looking for a juvenile offender who must perform community service.'*
- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
*'The ECB is looking for a lawyer who should be an EU-citizen.'*

When a traditional analysis is applied, both types of data are assumed to have the same structure in an unspecific and restrictive reading: the matrix intensional verb in the sentence is the highest operator and takes scope over the rest of the sentence including other quantifiers and the relative clause. Moreover, I will assume that the existential quantifier of the object argument remains in a position higher than the lower modal operator. The underlying structure is given in (124). The opaque verb is decomposed and represented by the *GOAL*-operator and the *find*-relation in the propositional argument. The restrictive relative clause receives a standard interpretation and denotes a complex property. The goal of the attitude holder  $x$  is determined in the actual world  $w_0$ . Since the modal is embedded inside the intensional context opened up by the matrix attitude, its parameters  $f$  and  $g$  are determined by the possible world  $w'$ .

$$(124) \quad \forall w' \in GOAL_x(w_0) : [\exists y[P(y)(w') \ \& \ find(y)(x)(w') \ \& \ \forall w'' \in MAX_{<g(w')}(\cap f(w')) : [Q(y)(w'')]]]$$

For the independent reading of (55), I will attribute a deontic interpretation for the modal. Hence, the modal base  $f$  is circumstantial and is characterized by the



relevant facts in  $w'$ , and the ordering source  $g$  is deontic and determined by certain obligations in  $w'$ , in our case a court order. The construal in (125) brings out the truth conditions we want to have:

- (125)  $\forall w' \in GOAL_{FAZ}(w_0) : [\exists y[juvenile\ offender(y)(w') \ \& \ find(y)(FAZ)(w') \ \& \ \forall w'' \in MAX_{<court\ order(w')}(\cap f_{circ}(w'')) : [perform\ community\ service(y)(w'')]]]$   
*In all worlds  $w'$  in which the goals of the FAZ in  $w_0$  are reached, there is a juvenile offender that the FAZ finds, and in all worlds  $w''$  that best comply with a court order in  $w'$ , the juvenile offender (found in  $w'$ ) performs community service.*

When adapting this analysis to the teleological example in (1), even considering a teleological interpretation of the modal that is determined by the goals of the ECB, we get the following truth conditions:

- (126)  $\forall w' \in GOAL_{ECB}(w_0) : \exists y[lawyer(y)(w') \ \& \ find(y)(ECB)(w') \ \& \ \forall w'' \in MAX_{<g_{GOAL_{ECB}(w')}}(\cap f_{circ}(w'')) : [EU-citizen(y)(w'')]]]$   
*In all worlds  $w'$  in which the goals of the ECB in  $w_0$  are reached, there is a lawyer that the ECB finds, and in all worlds  $w''$  that best comply with the goals of the ECB in  $w'$ , the lawyer (found in  $w'$ ) is an EU-citizen.*

Although both the attitude and the modal in this construal are teleological and determined by the goals of the ECB, it does not bring out truth conditions that match our intuitions about the prominent anaphoric reading of (1). The interpretation of the modal in (126) is determined by the intensional context it is embedded in, hence it is determined by  $w'$ . This means that the modal is dependent on different goals than the goals which are present in  $w_0$ . These goals can still be goals of the ECB, but they differ from their goals in  $w_0$ , at least with respect to the ECB's search goal in  $w_0$ , which can no longer be an active goal in a world in which the search has successfully ended. Since the accessible worlds  $w'$  represent exactly these successful worlds, the search goal of  $w_0$  is definitely not part of the ECB's goals in  $w'$ . Consequently, the reading portrayed in (126) – although both intensional operators are interpreted with respect to the goals of the ECB – does not capture the anaphoric reading. Instead, it represents an independent modal reading in which the goal that the lawyer is an EU-citizen is an independent goal of the ECB that has nothing to do with the search goals of the ECB.

The structures in (125) and (126) show that a conservative approach to embedded modality can only account for an independent modal reading, but it leads to an undesired result for an anaphoric reading. The problem of an anaphoric reading is based on the discrepancy between our intuitions and the embedded position of the modal, which leads to an embedded interpretation of the modal that brings out the wrong truth conditions.

### **4.3 Summary**

In this section, we presented the theoretical background on how to analyze sentences with attitudes and modals in a traditional way. We also showed why a conservative, restrictive approach to our data results in the wrong truth conditions. Similar problems also occur with other phenomena which arguably also involve some kind of anaphoric modality, and which have already been studied in the literature. In order to find possible solutions to the theoretical challenges of our data, we will discuss these other phenomena in the next section.

## 5 Anaphoric Modality

In this section, we will discuss three different phenomena which I classify as being instances of anaphoric modality. These phenomena are reminiscent of our data, on a semantic and/or a structural level, which makes analyses that have been put forward to deal with their theoretical obstacles highly relevant for our purposes. For the first two phenomena, it may appear more obvious that they might be related to our data, whereas the connection of the third phenomenon may appear too far-fetched. However, I do believe that the third phenomenon is as relevant for understanding anaphoricity in modals as the other two. I hope that I will be able to show that rather than anaphoricity in modals in general, it is the type of modality (and therefore the type of anaphoricity) that is crucial for the semantic peculiarity of our data. Also, the story may go beyond specific constructions and rather concern a particular semantic relation that I loosely subsume under the term *anankasticity*, hence the title of this thesis.

The first phenomenon I want to discuss is known under the term *modal concord*. Examples that go by this term are presented in (127). The second phenomenon concerns epistemic modals in particular; examples are given in (128). Although Portner (2009) categorizes the second phenomenon as part of modal concord – or in a broader sense harmonic modality – I choose to keep the two apart for conceptual reasons that will become clear in the course of this section.

- (127) a. Power carts must mandatorily be used on cart paths where provided.  
(Geurts and Huitink 2006)
- b. The general demands that the troops must leave. (Zeijlstra 2008)
- (128) a. Mary thinks that it may rain. (Portner 2009)
- b. Bill thinks that John must have won. (Hacquard 2010)

The third phenomenon I want to consider concerns anankastic conditionals. A classic example is given in (129).

- (129) If you want to go to Harlem, you must/have to take the A train. (Sæbø 2001)

In the following, we will investigate these three phenomena to examine different approaches that have been proposed to deal with their theoretical problems. We

will work out the similarities and differences on a structural and semantic level and highlight the consequences of adapting such an analysis to our data. In the course of the discussion, we will see that although it seems that we are dealing with similar problems in our data to the other associated phenomena, we cannot simply transfer the strategies that have been put forward to deal with their theoretical obstacles to tackle the ones in our examples. However, we will be able to use some theoretical ideas from the other approaches. Moreover, the discussion about different kinds of modal anaphoricity will broaden our understanding of the semantics and the tricky relationship between the ‘intensional antecedent’ and the anaphoric element in our data.

## 5.1 Modal concord

Modal concord is a term introduced in Geurts and Huitink (2006) to label a phenomenon in sentences with multiple modal elements in which these elements seem to ‘agree’ in their modality, leading to a reading in which the modality of one element seems to be canceled out. Similar to the phenomenon of *negative concord*, where instead of a logical interpretation of a double negative, a double negative means only a single negative, a sentence with multiple modal elements in modal concord is interpreted as having the same interpretation as or a similar interpretation to a sentence with only one modal element. Hence, the two examples in (130), where the a-sentence is the one featuring modal concord, result in the same reading. Despite the fact that two modal elements – the necessity modal *must* and the modal necessity adverbial *mandatorily* – appear in sentence (130-a), only one of them seems to be reflected in the interpretation of the sentence.

- (130) a. Power carts must mandatorily be used on cart paths where provided.  
(Geurts and Huitink 2006)
- b. Power carts must be used on cart paths where provided.

Therefore, rather than the paraphrase in (131-b), in which a stacking of the modal operators occurs, the paraphrase in (131-a) seems to be more adequate for (130-a), and this paraphrase happens to be the one which also paraphrases (130-b).

- (131) a. It is obligatory that power carts be used on cart paths where provided.
- b. It is obligatory that it is obligatory that power carts be used on cart paths where provided.

The phenomenon is usually not associated with anaphoric modality because early approaches are more focused on the semantic redundancy of the second modal element. Sentences like (130-a) have mainly been seen as displaying a concord or matching phenomenon (Grosz 2009) because the involved modal elements have to be similar in meaning in order to be able to yield the concord or matching effect. In this regard, modal concord is very similar to our data, especially to the original example with the apparently empty modal. Later approaches to modal concord moved away from viewing the second modal element as redundant. We will outline the different approaches in the course of this section.

Grosz (2009) identifies out three properties of modal concord. The first one is a similarity of logical strength shown in the two modal elements (meaning that necessity not only matches necessity, but also impossibility, and possibility matches both possibility and non-necessity). Thus, both sentences in (132) equally exhibit concord effects.

- (132) a. Visitors {must / #may} mandatorily sign this form.  
 b. Visitors mandatorily {#may / may not} cross this yellow line.

The second property concerns modal flavor. The modal flavors of both modal expressions have to match and the range of flavors is also restricted.

- (133) a. In view of what the law prescribes, visitors must mandatorily sign this form.  
 b. #In view of what I want, you must mandatorily clean my room once a day.

Thirdly, Grosz (2009), referring to an observation made by Zeijlstra (2008) and Huitink (2008), detects a strengthening effect of modal force whenever modal concord is at play (134).

- (134) In view of what the law prescribes, visitors must mandatorily sign this form.  
 ≈ In view of what the law prescribes, it is necessary to a high degree that visitors sign this form.

The first two properties can be interpreted as licensing constraints for concord phenomena, the third property is rather the consequence for the interpretation.

Geurts and Huitink (2006) as well as Anand and Brasoveanu (2010) and Grosz (2009) focus on examples with modal auxiliaries and adverbials, but they purposely do not make the link from modality to mood which others do when speaking about modal concord. Additionally, they only attempt to give an analysis for cases in which the modal expressions appear as clause mates. In Anand and Brasoveanu (2010), this aspect is crucial for the analysis. Although Geurts and Huitink (2006) cite Fintel and Iatridou (2003) with the example in (135), which contains an attitude verb and an embedded modal, they are not sure whether to categorize this sentence as an instance of modal concord because they cannot discern the difference between a cumulative and a concord reading of the sentence. Also, Huitink (2012) excludes sentences like (136) and (137) from her case study of Dutch as she is skeptical about their having a true concord reading.

(135) John thinks that Sarah must have played on every piano that we had predicted he would.

(136) Alice thought “O Mouse” must be the right way of speaking to a mouse. (Drubig 2001)

(137) Jack wishes that you may be happy. (Portner 1997)

Basically, there are two ways of analyzing the phenomenon of modal concord. The first approach is based on the assumption that one of the modal expressions is redundant. Geurts and Huitink (2006) propose a semantic analysis that tries to achieve this interpretation by an absorption process of the modal adverbial, whereas Zeijlstra (2008) tries to explain it via syntactic agreement parallel to his approach to negative concord. Obviously, such an approach is of no use for an analysis of our data since we have established that our data does not generally contain redundant modal material.

The second approach to modal concord is more interesting for our purposes as it rests on the assumption that each modal expression actually does contribute to the proposition it takes. Anand and Brasoveanu (2010) analyze modal concord as modal modification, allowing both modal operators to work on the same modal base and proposition, and where the agreement in modal force is seen as a result of a pragmatic effect. The modal adverb is analyzed as a modifier next to the modal auxiliary. Their analysis, however, rests on the idea that the two modal elements in concord are clause mates. Hence, this analysis cannot apply to concord phenomena across

clause boundaries. Still, the idea that one modal element functions as a modifier, working on the same modal base as another modal element, seems to be a promising idea for our data as well. Intuitively, the relative clause containing the anaphoric modal actually does seem like a modification of the attitude depicted in the matrix clause. We will discuss an approach close to this idea as well as the consequences of using the strategy of two modal elements working on a single modal base in Section 5.3.4.

Grosz (2009) uses the concept of graded modality and analyzes modal adverbs as degree modifiers. However, his analysis predicts that the element that functions as a degree modifier cannot appear on its own. For modal adverbials or modal particles, which Grosz also discusses, such a claim is defensible, but in our data, modal verbs would represent the degree modifiers, and it is not a desirable outcome to assume that they cannot appear on their own. Hence, so far, an approach inspired by the analysis of Anand and Brasoveanu (2010) seems to be the most promising. However, the fact that they only consider sentences with modal verbs in combination with modal adverbs as concord phenomena limits the applicability of their analysis to our data.

Unlike the other authors, Zeijlstra (2008) and Portner (2009) have no reservations about assuming that modal concord also occurs across clause boundaries. For instance, Zeijlstra categorizes the sentence in (127-b) as an example of modal concord. He argues that *demand* as a modal verb together with the embedded modal auxiliary *must* produces a concord reading.

(127-b) The general demands that the troops must leave.

In his 1997 paper, Portner does not yet speak of modal concord – the term was introduced in Geurts and Huitink (2006) – but discusses mood-indicating modals such as *may* in contexts where there is either an embedding operator that expresses desire, like the attitude verbs *hope* or *wish*, or an embedding epistemic operator, like *possible* or *likely*. (137) and (138) below are two of his examples. Portner describes *may* in these sentences as a dependent modal that has no modal force on its own. Thus, in (138), “the sentence does not mean that it’s possible that it’s possible that Sue wins the race. Indeed, the embedded *may* seems redundant” (Portner 1997:190).

(137) Jack wishes that you may be happy.

(138) It is possible that Sue may win the race.

Portner (2009) views modal concord as a special case of harmonic modality, a term that describes sentences in which two or more modals express similar meanings. He cites a sentence from Westmoreland (1998) as an example of harmonic modality that is not an instance of modal concord (139-a), though he agrees with Westmoreland's assumption that the sentence in (139-b) reflects the meaning of (139-a).<sup>33</sup>

- (139) a. We know a large amount of “dark matter” must be there.  
b. We know a large amount of “dark matter” is there.

Since there is more to say about epistemic modals embedded under attitude contexts, I will discuss these examples in greater detail in the next section.

## 5.2 Epistemics under attitudes

In this section, we will focus on sentences that involve epistemic modal auxiliaries that are embedded under attitude verbs. As shown in the previous section, Portner (2009) categorizes these examples as instances of modal concord, but others do not.

- (128) a. Mary thinks that it may rain.  
b. Bill thinks that John must have won.

Unlike priority modals – which are subject-oriented – epistemic modals are said to be speaker-oriented (cf. Hacquard 2007). However, referring to Speas (2004) and Stephenson (2007), Hacquard (2006, 2010) points out that for epistemic modals embedded under attitude contexts, this cannot be the case. Thus, when I utter the sentence in (128-b), it will never be understood as (140-a), but rather as (140-b).<sup>34</sup>

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<sup>33</sup>I personally do not see the difference between Portner's view of (139-a), which he says only features general harmonic modality, and sentences that in his opinion specifically feature modal concord, like (128-a) and (i). I am not sure whether the important difference between the examples is the quantificational force of the embedded modal or the type of attitude verb that appears in the matrix clause.

(128-a) Mary thinks that it may rain.

- (i) I pray that God may bless you. (Palmer, F. R. 1990. *Modality and the English Modals*. New York: Longman.)

<sup>34</sup>Ede Zimmermann (p.c.) has pointed out to me that (i) would be more adequate as a paraphrase for (128-b).



Consider (141) for comparison.

- (140) a. Bill thinks that according to my knowledge, John must have won.  
b. Bill thinks that according to his knowledge, John must have won.
- (141) a. John must have won.  
b. According to my knowledge, John must have won.

Additionally, the time reference in epistemics embedded under attitude verbs is different from that in epistemics in matrix sentences. Hacquard argues that the time of the knowledge status of the embedded epistemic is linked to the time of the attitude verb. Hence, when the attitude verb is in the past tense, the knowledge status is adapted accordingly. Her example is given in (142).

- (142) a. John thought that Mary might be home.  
b. ‘Given what John knew at his thinking time, it was possible Mary was home.’  
c. \*‘Given what John knows now, it was possible Mary was home.’

Contrary to this, Hacquard argues, epistemic modals in matrix sentences cannot be shifted backwards in time since they always refer to the speech time (143). The alleged impossibility of epistemics being interpreted in the past is crucial for Hacquard’s analysis and goes hand in hand with the standard assumption about epistemic modality. However, some linguists are skeptical about this. We will return to this issue in greater detail in Section 5.3.

- (143) a. Mary had to be home.  
b. ‘Given what I know now, it must be the case that Mary was home then.’  
c. \*‘Given what I knew then Mary had to be home.’

Similar to Westmoreland (1998) and Drubig (2001), who come to the conclusion that epistemic modals are actually evidential markers, Hacquard (2006) and Yalcin (2007, 2011) claim that instead of referring to knowledge, an embedded epistemic refers to certain beliefs. According to this line of thought, rather than (144-b), (144-a) would be a more adequate paraphrase for sentence (128-b).

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(i) According to Bill’s knowledge, John must have won.

- (144) a. ‘In all of Bill’s doxastic alternatives, there are worlds compatible with what Bill believes in those doxastic alternatives in which John has won.’
- b. ‘In all of Bill’s doxastic alternatives, there are worlds compatible with what Bill knows in those doxastic alternatives in which John has won.’

In sentences with epistemic modals expressing possibility, this comes out even more clearly. For a sentence like (128-a), Hacquard argues that the paraphrase in (145-a) is more adequate than that in (145-b).

- (145) a. ‘In all of Mary’s doxastic alternatives, there is a world compatible with what Mary believes in those doxastic alternatives in which it is raining.’
- b. ‘In all of Mary’s doxastic alternatives, there is a world compatible with what Mary knows in those doxastic alternatives in which it is raining.’

Finally, Fintel and Iatridou (2003) argue that the problem with embedded epistemics can in principle be solved by modal logic as long as epistemic accessibility is transitive and Euclidean. Then, it not only holds that  $\Box\Box p = \Box p$ , but also that  $\Box\Diamond p = \Diamond p$ . An explanation of this kind, however, does not apply to all types of (non-epistemic) modality, especially not the type we are interested in. Therefore, we will not pursue this idea any further.

The distribution of embedded epistemic modals under attitude verbs is restricted. Since epistemics quantify over an information state, Hacquard (2006) proposes that in order to appear in an embedded position, they need an attitude that can offer such an information state. Anand and Hacquard (2009, 2013) investigate this issue in greater detail. In Anand and Hacquard (2013), following the terminology of Bolinger (1968), they claim that only representational attitudes are compatible with the use of epistemic modals in their scope and that these attitudes “quantify over an information state (e.g., a set of *beliefs* for *believe*), which [...] epistemic modals can be anaphoric to” (Anand and Hacquard 2013:1). This difference is responsible for the differing availability of epistemic readings in the examples below, which are all taken from Anand and Hacquard (2009, 2013). Basically, doxastic attitudes license epistemic modals but directives and buletic attitudes with a preference semantics do not. Emotive attitudes represent a mixed status in having both a representational and a preference feature. They license the epistemic modal of possibility, but not

the epistemic modal of necessity (147).

- (146) a. John thinks that Mary had to be the murderer. (*epistemic*)  
b. John discovered that Mary had to be the murderer. (*epistemic*)  
c. John wishes that Paul had to be innocent. (*\*epistemic*)  
d. John demanded that Paul had to be the murderer. (*\*epistemic*)
- (147) a. John is afraid/is happy that the Earth might be flat.  
b. John #is afraid/#is happy that the Earth must be flat.

Crnič (2014) has concerns about the generality of taking the availability of an information state as the basis for licensing embedded epistemic modals. Quoting Heim’s work on presupposition projection (Heim 1992), he argues that verbs of desire have to express some kind of information state too. He argues that, rather than implying an information state, the presupposition of anti-opinionatedness of buletic attitude verbs (cf. Heim 1992, Fintel 1999) is responsible for the infelicity of embedding epistemic modals, that is, “that it is not the case that she believes the complement of the attitude predicate nor is it the case that she believes its negation” (Crnič 2014:4f).

We conclude from this discussion that similar restrictions concerning the compatibility of attitude and modal hold in the epistemic cases as hold in our data with anaphoric modality. The attitude has to match the interpretation of the modal in order to license a concord-reading. It seems that the epistemic data is parallel to ours. Therefore, we will discuss differences between epistemic modals and priority modals in more detail, and come back to Hacquard’s analysis of embedded epistemics in Section 5.3.2 in order to find out whether we can transfer her approach to our sentences.

### 5.3 Adapting an epistemic approach to non-epistemic data

We saw in Section 5.2 that embedded epistemics display a similar behavior to the German examples of interest to us in terms of modal anaphoricity. Consequently, Hacquard’s analysis of the epistemic cases is highly relevant for our data. However, her analysis rests on the difference between epistemic and non-epistemic modals concerning their behavior with tense. The question that arises now is whether anaphoric priority modals behave similarly to embedded epistemics in this respect or not. This issue will be crucial for an adaption of Hacquard’s analysis to our data.

Hence, in this section, I will discuss various aspects of the interaction between tense and modals which will become relevant in a treatment of anaphoric priority modals that aims at analyzing them on a par with embedded epistemics. I will outline several features of modals in connection with tense that have been an issue in the literature of temporal semantics. A discussion on the behavior of our German examples is also included.

### 5.3.1 Differences between epistemic and non-epistemic modals

Modals interact with tense in a very specific way that is tightly connected with aspect. Stowell (2004) notes, quoting Zagana (1990), that this observation mainly applies to the epistemic use of modals: When the complement of an epistemic modal is stative, the sentence most likely yields a simultaneous reading, although it can also in some cases be understood in a future-shifted manner. In contrast, when the complement of the modal describes an event, only the future-shifted reading is available. Examples from Stowell (2004) are given below.

- (148) a. John must/should be in class today. (simultaneous or future-shifted)  
b. John must/should leave today. (only future-shifted)

However, Stowell argues, aspectual considerations play a subordinate role when it comes to non-epistemic modals. Besides *can* and *could*, for which a simultaneous interpretation in ability readings is natural, non-epistemic modals tend to prefer future-shifted readings regardless of the type of complement.

Another important difference between epistemic and non-epistemic modals is that the former seem to not fall under the scope of tense, whereas the latter do. This is exemplified in (149) and (150) for deontic modals and in (151) and (152) for epistemic modals (Stowell 2004:625). We can see that the past tense on the modal in (152) does not manifest the past tense of epistemic possibility (152-b).<sup>35</sup>

- (149) Max can't go out after dark.  
*'According to the permissions at utterance time, it is not possible that Max goes out after dark.'*
- (150) Max couldn't go out after dark.

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<sup>35</sup>I will ignore questions concerning the semantic difference between epistemic *can* and *could*.

*‘According to the permissions prior to utterance time, it was not possible that Max went out after dark.’*

(151) Jack’s wife can’t be very rich.

*‘According to the speaker knowledge at utterance time, it is not possible that Jack’s wife is very rich.’*

(152) Jack’s wife couldn’t be very rich.

a. *‘According to the speaker knowledge at utterance time, it is not possible that Jack’s wife is very rich.’*

b. \**‘According to the speaker knowledge at utterance time, it was not possible that Jack’s wife is very rich.’*

However, Fintel and Gillies (2008) among others argue against the view that morphological past tense in epistemic modals is neglected in the interpretation. For instance, Fintel and Gillies (2008:87) say that for the example in (153) “it is possible for [the speaker] to have said something true, even though at the time of the utterance she knows ... there is no ice cream in the freezer.” Hence, both the simultaneous possibility reading and the past possibility reading are available in this example.

(153) There might have been ice cream in the freezer.

a. *‘According to the speaker knowledge at utterance time, it is possible that there was ice cream in the freezer.’*

b. *‘According to the speaker knowledge at utterance time, it was possible that there was ice cream in the freezer.’*

For Hacquard (2006, 2010), whose analysis of embedded epistemics rests on the scope difference between epistemic and non-epistemic modals, backward-shifted interpretations of epistemics are a problem. Although she acknowledges this possibility, she suggests that it is the result of a sequence-of-tense phenomenon.<sup>36</sup>

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<sup>36</sup>The most influential semantic analysis of *sequence of tense* can be found in Abusch (1994, 1997), where a tense semantics is introduced that is specifically designed for tenses embedded under intensional operators. Abusch’s theory suggests that tense markers of embedded verbs are dependent on temporal parameters connected to the embedding intensional verb instead of being interpreted *De Re*. With this theory, Abusch is able to account for sentences like (i), where the embedded *would* has morphological past tense, but does not have to be interpreted prior to the utterance time. Abusch argues that embedded tense is dependent on the past tense of the intensional matrix verb, and hence can stay indeterminate relative to the utterance time.

(i) Sue believed that she would marry a man who loved her.

### 5.3.2 An event-relative analysis of embedded epistemics (Hacquard 2006, 2010)

As already mentioned in Section 5.2, Hacquard (2006) uses the observation that epistemic modals interact differently with tense than non-epistemic modals as the basis for her analysis of epistemics embedded under attitude verbs. She uses this observation to motivate different positions in the syntax for epistemic and non-epistemic modals, either above or below tense. In this subsection, I will briefly outline her analysis since the phenomenon is so similar to the German data discussed in this thesis, and her analysis gives us interesting insights into the similarities and differences between the two phenomena.

Instead of evaluating modals relative to a world, as in a traditional account of modal verbs, Hacquard proposes evaluating them relative to an event. In her account, modals have an event variable that needs to be bound locally. Following Cinque (1999), she argues for two positions for modals in syntax – one higher up above the tense phrase for epistemic modals, and one below tense for non-epistemic modals. This strategy is supposed to account for the differences in the scope interaction of epistemic and non-epistemic modals with tense. Based on English data, she observes that there are three kinds of events modals can be sensitive to: The speech event,

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According to Abusch the evaluation time of modals like *might* and *ought* when embedded under an attitude verb is also dependent on the time parameter of the embedding intensional verb, whereas otherwise, the evaluation time of modals is always the utterance time. This actually applies to both epistemic and non-epistemic interpretations of the modal (cf. Stowell 2004). If the matrix verb is intensional and in the past, then the modal receives an interpretation that is set prior to the utterance time (ii) (examples from Stowell 2004:627). Otherwise – in extensional contexts – the modal takes the utterance time as its evaluation time, as shown by (iii) (example from Abusch 1997:23).

- (ii) a. Caesar knew that his wife might be in Rome. (epistemic)
- b. Susan told me that she ought to stay home. (deontic)
  
- (iii) John married a woman who might become rich.

Hacquard (2006, 2010) suspects that something similar is happening in sentences with backward-shifted epistemics. She assumes that the matrix clause contains a past tense attitude description which gets elided at some point. Consider her example in (iv), where the answer in B' shows the elided material.

- (iv) A: Why did you look in the drawer?
- B: My keys might have been in there.
- B': =~~I thought that~~ my keys might have been in there.

the attitude event and the main verb event. Examples are given below. Hacquard argues that the modal is sensitive to the speech event in (154), to the attitude event in (155) and to the main verb event in (156) (the speech event is ruled out here because of the use of the past tense in this example). In the first two examples, the modal is epistemic, whereas in the third, it is not.

- (154) It might be raining.  
*‘According to the speaker knowledge at utterance time, it is possible that it is raining.’*
- (155) John believes it might be raining.  
*‘According to John’s beliefs at utterance time, it is possible that it is raining.’*
- (156) Last night Mary had to take the train to go to Paris.  
*‘According to the circumstances of last night, it was necessary that Mary took the train to go to Paris.’*

Pairing modals with an event simultaneously takes care of the time parameter. The modal is either anchored to the speech time, the attitude time or the time displayed in the main verb. The local event binder is dependent on the position of the modal in the syntax tree: If it is a ‘high’ modal, the event variable is either bound by the speech event or, in embedded contexts, by the attitude event (157-b). If it is a ‘low’ modal, its event variable is bound by the aspect phrase of the main verb (157-c).

- (157) a.  $[_{CP} \lambda e_0 \text{ Mod } e_0 [_{TP} T \text{ Asp}_1 [_{VP} V e_1]]]$   
 b.  $[_{CP} \lambda e_0 T \text{ Asp}_2 \text{ Att } e_2 [_{CP} \text{ Mod } e_2 [_{TP} T \text{ Asp}_1 [_{VP} V e_1]]]]]$   
 c.  $[_{CP} \lambda e_0 [_{TP} T \text{ Asp}_1 \text{ Mod } e_1 [_{VP} V e_1]]]$

Hacquard suggests that epistemic modals are ‘high’ modals, whereas non-epistemic modals are ‘low’ modals. With the proposal of ‘high’ and ‘low’ modals in syntax, she wants to explain the different distributions of epistemic and non-epistemic modals in the data and their different interactions with tense. She argues that propositional content licenses epistemic modals. Hence, an epistemic interpretation is dependent on the modal’s event-relativity to an event with propositional content, which is a speech event or an attitude event with a certain type of attitude (a representational attitude).

An analysis of the embedded epistemic modal in terms of Hacquard (2006, 2010) is presented below, using the formalization given in Anand and Hacquard (2009). For the semantics of the attitude verb, Hacquard combines a classic Hintikka-analysis in terms of quantification over doxastic alternatives with the Davidsonian twist that attitude verbs have an event argument (cf. Moltmann 1994, Kratzer 2006). The lexical entry is given in (158-b). The content of the *believe*-event is the doxastic alternatives of the event’s experiencer, which is the attitude holder. (158-c) specifies the accessibility relation of the epistemic modal – a function that generates the set of propositions regarding the event *e*. The semantic construal in (158-d) combines the universal quantification that comes from the attitude verb with the existential quantification from the meaning of *might*. Due to the event-relativity of the modal and the licensing by the contentful event of the *believe*-predicate, the modal’s event variable is bound by the *believe*-event. This leads to a structure in which both quantifiers quantify over the same worlds, which are the worlds compatible with the content of *believe*. Since this analysis amounts to vacuous quantification, the construal in (158-d) is actually equivalent to the one in (158-e), where the universal quantification is omitted. The interpretation of the sentence should come out as in (158-f).

- (158)
- a. John believes it might be raining.
  - b.  $\llbracket \text{believe} \rrbracket = \lambda e. \lambda p. \lambda x. \lambda w. \text{HOLDER}(x, e) \ \& \ \text{belief}'(e, w) \ \& \ \forall w' \in \cap \text{CON}(e):$   
 $[\text{p}(w')=1], \text{ where } \cap \text{CON}(e) = \text{DOX}(\text{tx Exp}(e, x), w)$
  - c.  $f_{\text{epistemic}}(e) = \lambda w'. w'$  is compatible with  $\text{CONTENT}(e)$
  - d.  $\exists e_1 [e_1 \text{ in } w \ \& \ \text{HOLDER}(\text{John}, e_1) \ \& \ \text{belief}'(e_1, w) \ \& \ \forall w' \in \cap \text{CON}(e_1):$   
 $\exists w'' \in \cap \text{CON}(e_1): [\text{it is raining in } w'']]$
  - e.  $\exists e_1 [e_1 \text{ in } w \ \& \ \text{HOLDER}(\text{John}, e_1) \ \& \ \text{belief}'(e_1, w) \ \& \ \exists w' \in \cap \text{CON}(e_1):$   
 $[\text{it is raining in } w']]$
  - f. *In some world of John’s doxastic alternatives it is raining.*

### 5.3.3 Anaphoric priority modals and tense

As we have discussed in Section 5.3.1, the standard assumption is that epistemics take scope over tense, whereas non-epistemic modals can be interpreted below tense. Additionally, it is crucial for Hacquard’s (2006) analysis that epistemic modals cannot be shifted backwards. In this section, we will have a look at how anaphoric German priority modals behave, and we will focus on the modal *soll*. Since priority modals are non-epistemic, it is expected that tense takes wide scope over them. In



(159), we have an embedding attitude in the present tense and an embedded modal with past tense morphology.<sup>37</sup>

- (159) Otto sucht einen Zauberer, der bei seiner Geburtstagsfeier auftreten  
Otto seeks a magician who at his birthday party perform  
sollte.  
should (*past*)

Strikingly, the anaphoric reading is not available in (159). Instead, we get a reading in which the modal is interpreted independently, referring to an obligation that was put on a magician in the past.<sup>38</sup> However, the anaphoric interpretation of the modal is not generally excluded with past tense morphology on the modal. If the embedding attitude has past tense, the anaphoric modal can appear with both past and present morphology. Below are some examples. I have chosen to present sentences with the German tense *Perfekt* in the matrix clause since it is more common in spoken German. In (160-a), I use the modal with present tense morphology inside the relative clause, and in (160-b), the modal has past tense morphology. The anaphoric reading seems to be available in both cases. (160-a) is compatible with a scenario in which Otto was looking for a magician for his birthday party, which will take place after the utterance time. For (160-b), the party has already taken place prior to the utterance time. However, this behavior is predicted by Abusch's theory of sequence of tense.<sup>39</sup>

- (160) a. Otto hat einen Zauberer gesucht, der bei seiner Geburtstagsfeier  
Otto has a magician sought who at his birthday party  
auftreten soll.  
perform should (*present*)  
'Otto was looking for a magician who should perform at his birthday party.'
- b. Otto hat einen Zauberer gesucht, der bei seiner Geburtstagsfeier  
Otto has a magician sought who at his birthday party  
auftreten sollte.  
perform should (*past*)  
'Otto was looking for a magician who should perform at his birthday party.'

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<sup>37</sup>There is a syncretism between the conjunctive form and the past tense of *soll*. The result in both cases is *sollte*. We discussed the conjunctive form in Section 2.1.3 in connection with modals of different strengths.

<sup>38</sup>The anaphoric reading is only available in this sentence if we interpret the modal as the weak necessity modal with a conjunctive morphology.

<sup>39</sup>See footnote 36 for more details.

Since sequence of tense is expected to appear with both epistemic and non-epistemic modals, the data in (160) cannot be used to decide whether the anaphoric modal is a ‘high’ or a ‘low’ modal in the sense of Hacquard (2006). Additionally, the sentence in (159) does not allow an anaphoric reading at all. The tense ‘mismatch’ between attitude and modal seems to block the appearance of an anaphoric relation between the two intensional elements. Hence, based on this sentence, we do not have positive evidence that the anaphoric priority modal behaves like a ‘high’ or a ‘low’ modal. However, the unavailability of the anaphoric reading in (159) can be seen as an argument in support of the view that the anaphoric priority modal does not rank as a ‘high’ modal. Otherwise, it should be able to receive an anaphoric interpretation, despite the tense ‘mismatch.’

#### **5.3.4 Event-relative semantics for anaphoric priority modals?**

In this section, we will try to formulate an analysis that is similar to Hacquard’s (2006, 2010) analysis of sentences with embedded epistemics. Hacquard argues that the events introduced by the attitude verb in the matrix sentence can license the appearance of epistemic modals as long as the attitude verb exhibits the right kind of event (in her case something contentful). Similarly, for our non-epistemic cases, we have observed that only few attitudes license an anaphoric reading of the embedded modal: thus, for our data, the attitude verb must contain a teleological, buletic or deontic perspective in order to license an anaphorically interpreted teleological, buletic or deontic modal, respectively.

When using Hacquard’s approach to event-relative modality for our purposes, we are hesitant to exploit her assumptions about the height of the modals in the tree structure since we have counterarguments that refute the idea that anaphoric priority modals appear in the same high position in the tree as epistemic modals. Still, we can adopt her idea that modals in general are event-relative, interpreted with respect to events either introduced in the sentence or salient in the context. In this case, the sentence in (1) receives a structure that looks like (161). Here, both the attitude verb and the modal are evaluated according to an event instead of a world. In an anaphoric interpretation, the evaluation event of the modal base and the ordering source of the modal is the same event that also determines the attitude operator in the matrix clause.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
 ‘The ECB is looking for a lawyer who should be an EU-citizen.’

$$(161) \quad \forall w' \in ATT(e_{search}) : \exists y[P(y)(w')... \& \forall w'' \in MAX_{<g(e_{search})}(\cap f(e_{search})) : [Q(y)(w'')]]$$

In a sentence like (55) with an independent, non-anaphoric interpretation of the modal, the embedded modal gets evaluated by an event that can be reconstructed from the context using world knowledge. For (55), this might be the preceding event of a verdict by a judge.

- (55) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit leisten muss.  
 the FAZ seeks a juvenile offender who community service perform must  
 ‘The FAZ is looking for a juvenile offender who must perform community service.’

$$(162) \quad \forall w' \in ATT(e_{search}) : \exists y[P(y)(w')... \& \forall w'' \in MAX_{<g(e_{verdict})}(\cap f(e_{verdict})) : [Q(y)(w'')]]$$

With this event-based account we are able to evaluate the anaphoric modal by the use of the same parameter that is associated with the attitude operator in matrix position, which in (1) is the search-event. Although we cannot use Hacquard’s closest-binder strategy to account for the adequate event the modal gets evaluated with, it is in principle possible to find another mechanism to capture the different event-relativity of independent and anaphoric modals. In this approach, both intensional operators basically operate on the same modal base. In this respect, such an analysis is similar to the idea Anand and Brasoveanu (2010) pursue in their analysis of modal concord (although they do not use events). The consequences of such an approach, however, lead to the conclusion that the idea of ‘matching’ intensional operators working on the same base does not help in the case of the German data: the truth conditions of an approach like this simply do not match our intuitions about the meaning of the sentences.

The evaluation of the modal with an anaphoric modal flavor by the same parameter that is responsible for the accessibility relation of the antecedent attitude verb makes the same set of worlds accessible for both the modal and the attitude verb.

A sentence with the structure in (161) would mean that in all worlds in which the search aims are reached there is a  $y$  with the property  $P$  such that in all worlds in which the search aims are reached  $Q(y)$ . This is too strong for our data. We do not want any  $y$  in the accessible worlds to have to have the feature  $Q$  across all accessible worlds. We only want any  $y$  in the accessible worlds to have the feature  $Q$  in the respective accessible world. By establishing the same accessibility relation with the attitude operator and the modal, we cannot achieve this. In example (1), the property  $P$  would be *lawyer* and the property  $Q$  would be *be an EU-citizen*. For this example, a structure like (161) would basically mean that if the ECB finds the lawyers Mary, Bob and Alex in different worlds in the set of  $w'$ , then in each world in the set of  $w'$  all these three lawyers are also EU-citizens.<sup>40</sup>

In an example with a dependent interpretation of the modal, truth conditions of this kind would be even more bizarre. In a sentence like (9), in each success-world, every hotel Anna finds (viz. in that world) has to be a hotel in which the invited speakers are staying in each success-world.

- (9) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
 Anna seeks a hotel in which the invited speakers be accommodated  
 sollen.  
 should  
 ‘*Anna is looking for a hotel in which the invited speakers should be accommodated.*’

Why is this a problem for our cases of anaphoric modality, but not for the cases Hacquard is interested in? The answer is simple: because we are not only dealing with quantifiers quantifying over worlds, but also with an (existential) quantifier quantifying over individuals, and crucially, the latter is nested in-between the two intensional operators in concord. The relative clause actually makes the decisive difference between Hacquard’s data and ours. However, there is a way to fix this problem.

When we integrate events into the analysis, our operator structure actually becomes richer than before. Not only do we need to existentially quantify over the search-event, we also have to consider other events that play a role in the meaning of the

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<sup>40</sup>This problem was pointed out to me by Maribel Romero (p.c.) in the context of a different approach to anaphoric modals which had similar consequences for the accessibility relation of the modal.

sentence. Having established that opaque verbs like *search* have complex lexical semantics, we come to the conclusion that an adequate structure for a sentence like (1) might actually look like (163), assuming that the modal can be evaluated by any salient or contextually plausible event.

$$(163) \quad \exists e_{try} \dots \forall w' \in ATT(e_{try}) : \exists y [P(y)(w') \ \& \ \exists e_{find} \dots \ \& \\ \forall w'' \in MAX_{<g(e_{find})}(\cap f(e_{find})) : [Q(y)(w'')]]$$

At first glance, this attempt does not look too bad. As long as we are able to locate the events in the respective world, we can argue that the accessibility relation of the intensional operator gives us the right set of worlds. However, it is not clear what it means for a modal to get evaluated by a non-intensional event like  $e_{find}$  in (163). In the case of the opaque verb *search*, we might be able to say that the paraphrase *trying to find* presents a unit and that the *find*-event is a cumulative event of a preceding search; therefore, features of the intensional attitude can transcend to the embedded event. This argumentation would result in the view that the event  $e_{find}$  establishes an indirect link to the teleological features of the attitude displayed in the matrix sentence, without losing its anchor in the world  $w'$ .

For the opaque verb *search*, this strategy may sound promising. However, we have seen that our phenomenon not only appears with verbs that have complex lexical semantics, but also with propositional attitudes like *want* and *wish*. It is highly questionable whether we can support a similar argument for these kinds of verbs. As a case in point, it is unclear why, in (164), *wanting to watch* should form a unit.

$$(164) \quad \text{Anna will \quad einen Film \quad sehen, in dem \quad Drachen vorkommen sollen.} \\ \text{Anna wants a \quad movie watch in which dragons \quad appear \quad should} \\ \text{'Anna wants to watch a movie which should feature dragons.'}$$

$$(165) \quad \exists e_{want} \dots \forall w' \in ATT(e_{want}) : \exists y [P(y)(w') \ \& \ \exists e_{watch} \dots \ \& \\ \forall w'' \in MAX_{<g(e_{watch})}(\cap f(e_{watch})) : [Q(y)(w'')]]$$

As it turns out, when trying to get the event-account working, there are a number of obstacles one has to overcome, not to mention the complexity that arises due to the introduction of event variables and ensuing quantifiers. I believe that the event-account has potential, but one needs to very carefully examine the relation of events and modals, or even intensionality and events in general, in order to be able to say something meaningful within such an account. It surely is not an easy

and elegant solution to our problem. I believe that more fundamentals have to be worked out and motivated independently of our data before we can try to develop an event-based account that is more than just the result of various stipulations. Additionally, the discussion has shown that despite the similarities in the data, the embedded epistemics from Hacquard's dissertation differ in a crucial respect from our sentences. Therefore, her account is not directly applicable to our data; an event-based analysis for anaphoric priority modals has to be motivated and executed in a totally different way.

### 5.3.5 Conclusions

In this section, we have discussed the impact of tense on the data with anaphoric priority modals in order to determine whether Hacquard's (2006, 2010) analysis of embedded epistemics – which is based on the specific behavior of epistemics with tense – can be transferred for our non-epistemic data. Unfortunately, we were not able to find examples that support a similar treatment of both phenomena. Consequently, we did not adopt Hacquard's approach to epistemic sentences to our data. However, we borrowed her idea of using an event-relative semantics for the interpretation of modals. This approach yielded some promising results. Yet, although an event-based approach offers an interesting strategy to account for the anaphoricity of the modal, the relative clause in our data is still a serious technical obstacle that cannot easily be dealt with within an event approach. Therefore, I will not pursue this path any further.

## 5.4 Anankastic conditionals

In this section, we will have a closer look at the phenomenon of anankastic conditionals. Structurally these conditionals differ a great deal from our data. However, they involve a similar kind of attitude and modality, and semantically, they express a specific condition- or requirement-relation which to me is reminiscent of the anaphoric relation between the two intensional elements in our data with relative clauses. In the linguistic literature, the relation in the conditional cases has been described by the word *anankastic*.<sup>41</sup>

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<sup>41</sup>The term *anankastic* goes back to work from G. H. von Wright (1963, Norm and Action: A Logical Enquiry), who used the Greek word for necessity (*ananké*) in connection with these conditionals (Huitink 2008:112).

Prototypical cases of anankastic conditionals express a necessary-means-of relation between the antecedent and the consequent of the conditional (Fintel and Iatridou 2005, Condoravdi and Lauer 2016). These sentences also go by the name *instrumental conditionals* (cf. Finlay 2016) or in the field of philosophy by the name *hypothetical imperatives*, a term coined by Immanuel Kant. Although – for different reasons which will become apparent in the course of this section – none of these terms can accurately capture the true nature of this phenomenon, they do describe the most prototypical and most discussed case, which is a conditional containing a teleological necessity modal in the consequent, like in (129). We will use the word *anankastic* in this thesis because it is the term under which these sentences have been discussed and analyzed in the linguistic literature.

(129) If you want to go to Harlem, you must/have to take the A train.

The sentence in (129) roughly means that in order that you get to Harlem, it is a necessary condition to take the A train.

The characteristic feature of anankastic conditionals is summarized in a question addressed by Sæbø (2001): “How can a sentence *if ... want to  $\phi$ , must  $\psi$*  express a relation between the proposition expressed in  $\phi$  and the proposition expressed in  $\psi$ ?” (Sæbø 2001:438). Establishing the relation between  $\phi$  and  $\psi$  is the main goal of the various approaches to these sentences.

Although conditionals differ a great deal structurally from our sentences with relative clauses, we are interested in examining the relation Sæbø is talking about because it reminds us of something that is going on in our data. This is why we will go into greater detail in our discussion of the theoretical problems of these conditionals and the attempts to solve these problems. A comparison of anankastic conditionals with our data will follow in Section 5.5.

#### 5.4.1 Features of anankastic conditionals

Anankastic conditionals are compatible with the appearance of modals of different strengths (166) (cf. Sæbø 2001, Nissenbaum 2005), as like other attitude verbs they depict some kind of intent or goal-orientedness (167) (examples from Condoravdi and Lauer 2016). It seems to also be possible to have anankastic conditionals with

teleological opaque verbs like search-verbs (168-a) or with creation verbs (168-b).<sup>42</sup>

- (166) a. If you want to go to Harlem, you should/ought to take the A train.  
b. If you want to go to Harlem, you can take the A train.
- (167) a. If you intend to go to Harlem, you should take the A train.  
b. If you are planning to go to Harlem, you should take the A train.  
c. If your goal is to go to Harlem, you should take the A train.
- (168) a. If you are looking for your keys, you should look over there. (*?anankastic conditional*)  
b. If you are making a dough for gingerbread, you should use potassium carbonate. (*?anankastic conditional*)

Although the literature has focused on examples involving the second person, these conditionals are not limited to such cases. However, Sæbø (2001) makes the observation that there has to be a coreference between the subjects in the antecedent and the consequent, except for in the cases where the predicate *to be* is used in the antecedent. In his examples below, only the first and the third sentence exhibit the anankastic reading, whereas the second example is an ordinary conditional.

- (169) a. If David is to recover, we must find him a maid.  
b. If David wants to recover, we must find him a maid.  
c. If we want David to recover, we must find him a maid.

Although on the surface, anankastic conditionals look the same as regular conditionals, they differ crucially in their semantics. A classic minimal pair that displays the difference goes back to Hare (1968):

- (170) If you want sugar in your soup, you should ask the waiter.  
(171) If you want sugar in your soup, you should get tested for diabetes.

(170) is an example of an anankastic conditional. It says that in order to reach the goal of having sugar in the soup, one has to ask the waiter. In contrast, (171) is a normal conditional. Here, the desire to have sugar in the soup is not satisfied by getting tested for diabetes, but the desire is a reason that the addressee should get tested.

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<sup>42</sup>Sven Lauer (p.c.) pointed out to me that he would classify them as *near anankastics*. More about this type of sentence in Section 5.4.5.



### 5.4.2 Problems for an analysis

Anankastic conditionals became a topic for semantics because the traditional approach to analyzing conditionals did not result in the correct truth conditions: In a Lewis-Kratzer-style framework of conditionals (cf. Lewis 1973, Kratzer 1981, 1986, 1991) the antecedent of the conditional functions as a restrictor to domains of other operators, like, for instance, a modal in the consequent. This works for prototypical conditionals, but not for anankastic ones. In the Harlem-sentence, the proposition *you want to go to Harlem* from the antecedent would be added to the circumstantial modal base of the modal, which ensures that only those worlds are considered in which the addressee wants to go to Harlem. Worlds in which the addressee does not want to go to Harlem are not accessible with this modal base. However, the ordering source of the modal would still be totally realistic, ranking the worlds according to the addressee's wishes in the evaluation world – irrespectively of the restrictions caused by the antecedent – and those wishes may not contain the wish to go to Harlem. This is because in an analysis like this, the antecedent only restricts the modal base but does not affect the ordering source. Hence, the set of accessible worlds may be ranked according to the wrong goals, which are the goals of the evaluation world and not the hypothetical goal that is established in the *if*-clause.

This problem actually not only arises with anankastic conditionals but in any conditional containing a deontic modal in the consequent. As a solution, Frank (1997) suggests that this type of conditional has a double-modal structure, leading to a nested position of the modal in the consequent. The embedding, covert modal has wide scope and gets restricted by the antecedent of the conditional. Hence, the modal in the consequent, being embedded under the covert modal, is no longer determined by the actual world. This approach is not without problems (cf. Fintel and Iatridou 2005), but it seems to be a valid alternative to the traditional approach. Some analyses of anankastic conditionals are based on the nested structure, but some can also do without it.

However, even if an analysis rests on the nested structure of conditionals, there is still a remaining problem with the second modal's ordering source. Intuitively, the hypothetical goal introduced in the antecedent clause seems to play a role not only in restricting the domain of the covert modal, but also regarding the ordering source of the modal in the consequent. In the following sections we will discuss three ideas

on how to ‘manipulate’ the structure in such a way that the hypothetical goal can be relevant for the ordering source.

### 5.4.3 The purpose-clause analysis (Fintel and Iatridou 2005)

Fintel and Iatridou (2005) use the parallelism of anankastic conditionals (129) and purpose-clause constructions (172) (cf. Sæbø 2001) as the basis of their analysis of teleological modals and anankastic conditionals.

(129) If you want to go to Harlem, you have to take the A train.

(172) To go to Harlem, you have to take the A train.

Their main aim is to get rid of conflicting goals the addressee might have which are expected to be targeted by the ordering source, but interfere with an analysis that gives us the correct results. Since people can have contradicting and inconsistent desires, the ordering source of a priority modal in an anankastic conditional might not be able to order the accessible worlds according to the goal expressed in the antecedent. Therefore, Fintel and Iatridou (2005) try to strengthen the hypothetical goal in the antecedent by classifying it as a *designated goal*. They argue that teleological modals take a purpose *to*-clause as an argument that is either explicitly given in the sentence or filled by a purpose which is salient in the context. When it comes to anankastic conditionals, they claim that the hypothetical goal introduced in the antecedent fills the argument position of the modal in the consequent.

The analysis for the anankastic conditional in (129) would come out as something like (173). Fintel and Iatridou (2005) assume that the hypothetical goal is made contextually salient by the *if*-clause. The implicit purpose clause in the consequent can pick up this goal, providing the designated goal for the ordering source that is relevant for the interpretation of the teleological modal. The resulting anankastic conditional is elliptical because the purpose clause in the consequent stays covert. This strategy ensures that the ordering source of the modal does not contain conflicting goals because all possibly conflicting goals the addressee might have are overridden by the designated goal, which is salient in the context.

(173) If you want to go to Harlem, you have to take the A train (to go to Harlem).

Huitink (2005b) introduces a scenario with consistent goals that also has to be con-

sidered in the discussion of the Harlem-sentence. In this scenario, the addressee wants to go to Harlem and in addition he/she wants to meet Ruud van Nistelrooy, a Dutch soccer player, who happens to be on the A train. However, not only the A train, but also the B train has a stop in Harlem.<sup>43</sup> Intuitively, sentence (129) is odd in this scenario, but should come out as true in analyses that involve ordering sources with multiple consistent goals. This is because such an ordering source renders the A train-worlds as preferable compared to the B train-worlds. On the other hand, there are also scenarios in which the modal seems to be sensitive to other, consistent goals in the context. Therefore, ruling out that other goals play a role in the interpretation of the modal seems to be problematic too. The answer Fintel and Iatridou (2005) present to this problem is that it all depends on what the content of the designated goal is. It is possible that the designated goal indeed only contains the hypothetical goal of the antecedent (overriding both other consistent and inconsistent goals) and also that it contains not only the hypothetical goal but also other consistent goals. Moreover, the content of the designated goal may vary from speaker to speaker, allowing different intuitions on certain data (cf. Fintel and Iatridou 2005:16).

The purpose-clause analysis has been criticized for several reasons. One prominent objection to it is raised by Condoravdi and Lauer (2016). They argue that the purpose-clause analysis only fits one specific type of data featuring the anankastic reading. However, the challenges of anankastic conditionals are relevant for other types of conditionals too that cannot be explained by stipulating an implicit purpose-clause. They list a number of cases where the “means of”-relation, which is crucial for assuming a purpose-clause construction, is not available. These cases include anankastic conditionals like (174), where the consequent expresses a necessary precondition but not the necessary means to achieve the addressee’s goal, and also sentences they call *near-anankastics*. An example is given in (175).

- (174) If you want to invite everyone to the dinner, your table has to seat at least 20 people.
- (175) If you want to go to Disneyworld, you must/should spend at least five days there.

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<sup>43</sup>The original scenario in Huitink (2005b) is a little bit different. This version is from Huitink (2008).

Although (175) is about the consequences of an achieved goal – which is to get to Disneyworld – this sentence raises the same questions as the Harlem-sentence in (129). The purpose-clause construction, however, cannot capture the meaning of this sentence:

- (176) a. #To go to Disneyworld, you have to spend at least five days there.  
b. #If you want to go to Disneyworld, to go to Disneyworld, you have to spend at least five days there.

#### 5.4.4 The salient-goal analysis (Huitink 2005a, 2005b, 2008)

Huitink (2005a, 2005b, 2008) suggests an analysis that is very similar to the purpose-clause analysis in terms of the idea of strengthening the hypothetical goal as the prominent goal for interpreting the modal in the consequent. However, she does not support the elliptical approach of Fintel and Iatridou (2005) as she finds it poorly motivated. Huitink suggests two strategies for strengthening the hypothetical goal for the interpretation of the modal. In the 2005-version, she proposes that the modal itself is only concerned with one goal, which is the hypothetical goal since this is the only goal that is salient in the context.

Huitink admits that this analysis requires a different approach to ordering sources than is suggested by Kratzer (1981). Instead of viewing the ordering source as “independent of the linguistic context,” Huitink prefers a dynamic perspective on ordering sources – however, without adopting a dynamic framework – where the ordering source consists of a contextually salient set of propositions (Huitink 2005b:147). In the Ruud-van-Nistelrooy scenario, then, the goal of meeting Ruud van Nistelrooy is not targeted by the ordering source because it is not salient (despite being an actual and consistent goal). The hypothetical goal of going to Harlem *is* salient since it is made explicit in the antecedent clause. As Huitink puts it:

The anankastic reading results from binding the ordering source parameter to the proposition in the antecedent that describes the goal. Introducing a goal in the antecedent of a conditional is a way of making that goal highly salient. It is therefore not surprising that the ordering source would link up to that goal. (Huitink 2005b:148)

In the 2005-version, Huitink does not suggest a nested structure for anankastic conditionals. She only suggests that the modal’s ordering source targets one single

goal, which is the hypothetical goal introduced in the *if*-clause. The truth conditions of an anankastic conditional are given below:

- (177) Anankastic Conditionals  
*if want p, then must q* is true in  $w$  iff  
 for all  $w' \in \cap f(w)$  s.t.  $\neg \exists w''$  s.t.  $w'' \leq_{g(w)} w'$ :  $q$  is true in  $w'$   
 where  $g(w) = p$

One objection put forward by Stechow et al. (2005) to this analysis is that it allows the ordering source to be inconsistent with the modal base. This itself does not pose a problem. However, following Kratzer's definition of the ordering source, in such a case the modal base would get priority over the ordering source. Hence, the ordering source would no longer be able to rank the worlds according to the salient goal. We would get the wrong predictions for Huitink's analysis because without a ranking, all worlds made accessible by the modal base would come out as equally good. Consider the example from Stechow et al. (2005) below:

- (178) If this water is to boil, its temperature ought to be 100° Celsius.

The argumentation in Stechow et al. (2005) goes like this: Assuming that the water is not boiling in the actual world, this fact seems to be a relevant fact that has to be added to the modal base. Therefore, all accessible worlds are worlds in which the water is not boiling. In such a scenario, the ordering source consisting of the proposition that the water boils cannot be applied to establish an ordering, hence the worlds that have to be considered are all accessible worlds. But as mentioned before, these worlds are worlds in which the water is not boiling. This leads to the wrong prediction that in all of these worlds the water temperature is 100° Celsius, which, obviously, cannot be right. Huitink's answer to this criticism is that in such a scenario, she does not consider it to be evident that water not boiling in the actual world is a relevant fact that has to be added to the modal base. Instead she would suggest facts for the modal base that are relevant for the boiling temperature of water, like for instance the Earth's atmospheric pressure.

Huitink's second approach, from her dissertation (Huitink 2008), revolves around the same idea as her first approach, but follows the opposite strategy: instead of making the modal responsible for the specific interpretation of anankastic conditionals, Huitink suggests that a 'strong' reading of the *if*-clause leads to this in-

terpretation.<sup>44</sup> Additionally, she assumes a double-modal structure for anankastic conditionals. With this approach, the sentence in (129) would receive the interpretation in (179), making the goal of going to Harlem the only goal that is available for the interpretation of the modal.

(129) If you want to go to Harlem, you have to take the A train.

(179) If the only thing you want is to go to Harlem, you have to take the A train.

Condoravdi and Lauer (2016) voice a concern about the basic idea of Huitink's analyses, which is that only one goal determines the interpretation of the modal. They argue that the teleological modal in anankastic conditionals can be influenced by additional desires besides the hypothetical goal introduced in the antecedent. They discuss the sentence in (180) to make their argument. Here, getting vaccinated is not a necessary condition for traveling to a certain place, but it is necessary to stay healthy during the trip. Since staying healthy can be seen as desirable, it is surely relevant for the ordering source of the teleological modal.

(180) If you want to travel to that place, you should/must get a vaccine.

#### 5.4.5 The preference-structure analysis (Condoravdi and Lauer 2016)

As already discussed, Condoravdi and Lauer have argued that the challenges of anankastic conditionals are more general and are also relevant for other conditionals, which usually are not the focus of the literature on anankastic conditionals. They call the other sentences 'near-anankastics' due to the similar structure and meaning they have as compared to the canonical cases. As a case in point, they observe that all these sentences have in common the apparent vacuity of the attitude verb *want* in the antecedent clause, which has been discussed as a distinctive feature of anankastic conditionals. This is shown by a comparison of the anankastic or near-anankastic conditional with a conditional lacking the attitude verb. The Harlem-sentence in (129) is intuitively equivalent to the sentence in (181) and the teleological near-anankastic in (175) to (182).

(129) If you want to go to Harlem, you have to take the A train.

(181)  $\approx$ If you go to Harlem, you have to take the A train.

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<sup>44</sup>Huitink (2008) follows an idea sketched in a footnote in Nissenbaum (2005) for this approach, referring back to Huitink's 2005-approach.

(175) If you want to go to Disneyworld, you must/should spend at least five days there.

(182)  $\approx$ If you go to Disneyworld, you must/should spend at least five days there.

This apparent vacuity is also available in (near-)anankastics with other desire predicates like *plan* or *intend*. The assumption of a semantically vacuous desire predicate is one way of dealing with these conditionals,<sup>45</sup> but it remains to be seen how such an analysis can still be compositional. Besides, Condoravdi and Lauer themselves have general objections to the view that the desire predicate is semantically vacuous. Not only would such behavior be a “quite curious lexical accident” (cf. Condoravdi and Lauer 2016:20), but they also present an example due to Doris Penka (p.c.) showing that the desire predicate interacts in an expected way with other operators, like for instance negation (183).

(183) If you don’t want to get a letter grade for the course, you don’t have to sit the exam.

Additionally, the omission of the desire predicate does not always work. For instance, in Condoravdi and Lauer’s version of example (170) – here in (184-a) – the omission of *want* does not result in a good paraphrase. The sentence in (184-b) means something completely different than (184-a).

(184) a. If you want to eat chocolate, you should try thinking about something else.

b. If you eat chocolate, you should try thinking about something else.

Condoravdi and Lauer do not touch on this subject, but they still conclude that the desire predicate cannot be viewed as semantically empty. In fact, they argue that instead of neglecting the semantic contribution of the desire predicate, it is crucial to scrutinize it in order to better understand the behavior of the sentences.

Condoravdi and Lauer (2016) present an analysis that is based on the double-modal structure of conditionals proposed by Frank (1997). To avoid the problem of conflicting goals and desires in anankastic conditionals, Condoravdi and Lauer argue that the verb *want* comes in two versions, only one of which appears in (near-)anankastic

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<sup>45</sup>The account by Stechow et al. (2005) rests on the idea of a vacuous desire predicate. In Stechow et al. (2005), *want* introduces a felicity condition that licenses the use of the conditional, but it makes no contribution to the truth conditions of the sentence.

conditionals. This version of *want* describes not only a mere desire of someone, but something more direct and potentially action-driving; it refers to “a preference that the agent assigns a special status to: an action-relevant preference” (Condoravdi and Lauer 2016:22).<sup>46</sup> <sup>47</sup> They introduce the term *effective preferences* in order to account for the action-relevant preferences of desire predicates.<sup>48</sup>

Condoravdi and Lauer do not identify effective preferences with intentions, but they establish a close relation between the two concepts. They consider that intentions might be a specific kind of effective preferences, one that the agent decides to maintain “indefinitely into the future, until they are either realized or consciously reconsidered” (2016:23), a point of view that goes hand in hand with the definition of intentions in the philosophical work of Michael Bratman (1987).

One key reason why Condoravdi and Lauer (2016) argue for the presence of effective preferences in anankastic conditionals is that they are defined as not being inconsistent. The assumption that mere desires are and should be inconsistent is one of the core problems when analyzing anankastic conditionals because inconsistency results in the possibility of having conflicting goals or desires. With the introduction of effective preferences and the consistency requirement, Condoravdi and Lauer can circumvent this issue.

The analysis Condoravdi and Lauer propose goes as follows: The first, covert modal *NEC* has universal force and is interpreted with an epistemic modal base  $f_{belS}$ . It concerns the speaker’s beliefs in the actual world but is restricted by the *if*-clause; the ordering source  $g_{norm}$  is stereotypical, meaning that it is a set of propositions representing the normal course of events in  $w$ . The desire predicate *want* targets the

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<sup>46</sup>In the context of the interdisciplinary field of action theory, this argument is far from being implausible: the close connection between desire and intention is very well studied and broadly accepted. For instance, in the BDI-model (short for *Belief-Desire-Intention-model*), desire represents the psychological state that is responsible for the commitment to a certain intention, which eventually will lead to an action (see Bratman 1987, Georgeff and Ingrand 1989, Cohen and Levesque 1990). Therefore, Condoravdi and Lauer’s hypothesis about the action-relevant preference expressed with the desire predicate makes a lot of sense, independently of the issue of analyzing anankastic conditionals.

<sup>47</sup>In a similar spirit, Rooij suggests viewing the relation between desire and intention similarly to the relation between belief and knowledge: the latter can be seen as a robust version of the former (Rooij 2006).

<sup>48</sup>Condoravdi and Lauer also use the concept of effective preferences to account for other linguistic phenomena like imperatives and performance verbs (cf. Condoravdi and Lauer 2011, Condoravdi and Lauer 2012, Lauer and Condoravdi 2014).



(hypothetical) effective preference structure  $EP$  of the attitude holder in  $w'$ , which is the addressee  $Ad$ . The effective preferences in  $w'$  consist of the addressee's desire to go to Harlem. The second modal, which is in the consequent, also has universal force. Condoravdi and Lauer follow Kaufmann and Schwager (2009)<sup>49</sup> in the decision that the modal base of a teleological modal is historical. For the anankastic conditional, this means that the historically accessible worlds would be the future continuations of worlds in which the attitude holder has effective preferences to go to Harlem. Condoravdi and Lauer use the index  $t$  in  $f_{hist}^t$  to determine the temporal anchor, which is the time when the goal described in the antecedent is achieved. As for the ordering source of the teleological modal, they say that the modal is able to pick up the effective preference structure  $EP$  of the desire predicate to rank the accessible worlds. Then, in the set of accessible historical alternatives, the worlds are ranked by the effective preference structure of the attitude holder, which is the addressee.

- (185)  $NEC_{f_{belS}, g_{norm}}[want_{EP}(Ad, Harlem)][MUST_{f_{hist}, g_{EP, Ad}}[A Train]]$   
*All the most typical worlds consistent with what the speaker knows in which the addressee has the goal of going to Harlem are such that all their possible future continuations in which the addressee's goals are eventually realized in an optimal way are such that the addressee takes the A train.*

In conclusion, Condoravdi and Lauer argue that anankastic conditionals can be analyzed in a rather conservative way as long as one takes the time to understand the elements an anankastic conditional consists of. Since there are independent motivations for the nested structure of anankastic conditionals and for the effective preference structure of desire predicates, and since the phenomenon of anankastic readings not only concerns anankastic conditionals with a “means of”-interpretation, the analysis Condoravdi and Lauer propose does not need any ingredients that are specific to anankastic conditionals. Rather, this type of construction is a result of the interaction among several other elements.

## 5.5 Anankasticity in conditionals and relative clauses

In this section, we will discuss the general concept of anankasticity and the significance of anankastic conditionals for the topic of this thesis: relative clauses containing an anaphoric modal, which I from now on will call anankastic relatives. I am going to work out important similarities of both phenomena, focusing on the chal-

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<sup>49</sup>Although an earlier approach can be found in Kaufmann (2005).

lenges they both pose for an analysis. In the last subsection, I will also try to adapt an approach to anankastic conditionals to our data. This discussion should answer the question whether strategies to overcome obstacles in the conditional cases can also be applied to challenges of sentences with anankastic relatives. It should also become clear in the course of this section why I have chosen to label the relative clauses of interest to us as being anankastic.

### 5.5.1 Features of anankasticity

There are certain similarities between anankastic conditionals and our data with relative clauses, which is what motivated my decision to name the latter *anankastic relatives*. Although I am not trying to argue for a deep relationship between the two phenomena, it is still worth looking into the features the two constructions have in common. In the following, I will list the similarities on a descriptive and a theoretical level.

*Descriptive aspects:*

- Structurally, anankasticity involves at least two prepositional parts.
- It concerns the expression of a goal or desired outcome as well as a circumstance that is somehow connected to the fulfillment of the goal or the achievement of the desired outcome.
- The goal is linguistically represented as the complement of an attitude; the circumstance is represented as the complement of a modal.
- The circumstance may either help in reaching the outcome or it is necessarily and/or intentionally tied to it.

*Theoretical aspects:*

- There seems to be an anaphoric relation between the two intensional elements involved which mainly concerns the ordering semantics.
- An evaluation world conflict appears that cannot be accounted for with a conservative approach.
- In some cases, anankasticity leads to a very prominent, but deceptive notion of a semantically empty intensional element.

Of course, these generalizations ignore the major differences between the conditional cases and the relative clauses on a structural and semantic level. In addition, the features I have listed above may not be conclusive and are not meant to convince the reader that anankastic conditionals and anankastic relatives are related or should be treated uniformly. They are only observations I have made based on our discussion of both phenomena. Finally, these observations should explain why I choose to borrow the term ‘anankastic’ from the conditional cases to label our data with relative clauses. Generally speaking, an anankastic interpretation seems to be the result of a specific type of anaphoric relation which exclusively appears between priority modals and a matching attitude.

### 5.5.2 Evaluation world conflict

In this subsection, we will discuss the theoretical problem of the evaluation world conflict in anankastic sentences in greater detail, and compare its occurrence in conditionals and in relatives. As we have already seen, the basic scope structures of anankastic conditionals and anankastic relatives are completely different: whereas in the conditional, the attitude verb appears inside the subordinate clause, and the modal in the main clause – leading to a narrow scope of the attitude verb – in the data with relative clauses, the attitude verb in matrix position has scope over the modal, which appears inside the subordinate relative clause. Despite this difference, the obstacle both constructions face in an analysis is that the teleological modal targets the intuitively wrong goals.<sup>50</sup> In the case of the conditional, it targets actual goals instead of the hypothetical goal, and in the case of the relative, it targets counterfactual goals instead of the actual goal.

One approach to dealing with this problem in the case of anankastic conditionals is to assume a double-modal structure for these sentences which results in an embedded position of the modal in the consequent. A strategy like this is not applicable to our relative clause data since we do not need the modal to be embedded even further. The other approach to this problem is to make the hypothetical goal available for the modal in the consequent. We have discussed two of these approaches in this chapter: the purpose-clause analysis by Fintel and Iatridou (2005) and the earlier version of Huitink’s proposal (Huitink 2005a, 2005b). Neither of these requires a

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<sup>50</sup>The same holds for buletic modals and desires they target, and deontic modals and obligations or permissions they target. In the presentation of the problem, I will focus only on teleological cases since the other cases work in an analogous manner.

nested modal structure. Instead, they work on the basis of changing the semantics of the teleological modal to make it prone to targeting (only) one goal, which also is the most salient or ‘designated’ goal in the context. Hence, these analyses do not particularly concern conditionals, but rather the semantics of (teleological) modals in general. Among other reasons, Fintel and Iatridou’s (2005) analysis is criticized by Condoravdi and Lauer (2016) for only being applicable to anankastics with a “means of”-relation. This feature is also a problem for an application of this analysis to anankastic relatives. A purpose clause simply does not fit the meaning these sentences have.

- (186) a. Anna will eine Katze haben, die schwarz sein soll.  
 Anna wants a cat have which black be should  
*‘Anna wants to have a cat which should be black.’*
- b. #Anna will eine Katze haben, die schwarz sein soll um sie zu  
 Anna wants a cat have which black be should for it to  
 haben.  
 have  
*‘Anna wants to have a cat which should be black for her to have it.’*

The salient-goal analysis in Huitink (2005a, 2005b) requires a different, ‘dynamic’ view on modals. Similar to the purpose-clause analysis, Huitink suggests that the modal is interpreted only by one specific goal. This analysis was criticized for neglecting possibly conflicting facts in the modal base as well as additional and relevant consistent goals in the ordering source. We will discuss an adaption of Huitink’s approach to our data in Section 5.5.4, and we will see that the criticism put forward in the case of anankastic conditionals does not concern the issues relevant to anankastic relative clauses. However, there are other obstacles which render such an approach unlikely.

Condoravdi and Lauer (2016) argue against approaches where the modal’s interpretation is dependent on only one goal. Instead, they propose that desire predicates, which appear in the classic cases of anankastic conditionals, involve a preference structure that can be targeted by the modal. With this preference structure, the modal can also be sensitive to consistent and connected desires. Their analysis rests on the double-modal structure of conditionals and cannot be adapted to relatives.

One of the main goals in the literature on anankastic conditionals is to get rid of conflicting, inconsistent or other additional goals and desires that may play a part

in the analysis of the modal. Interestingly, this topic did not play a big role in our discussion of anankastic relatives. The reason for this is that (i) the prototypical attitude of our sentences is teleological (instead of buletic), and teleological attitudes are defined as being consistent,<sup>51</sup> (ii) most sentences involve an action-based or event-related attitude, which limits the possibility of there being conflicting or intervening goals,<sup>52</sup> and (iii) different than in the conditional cases, one key element in the interpretation of anankastic relatives is that the modal's complement in the relative clause is part of the attitude holder's intentions that are connected to the goal introduced in the matrix clause. This leads to the intuition that there always is only one goal (or desire or obligation) relevant for the interpretation of the modal. Different from anankastic conditionals, we do not have to decide how many or which goals (or desires or obligations) the modal is sensitive to. It seems that it is only sensitive to one goal, which is the actual goal expressed in the matrix clause.

Consequently, in anankastic relatives, we only have to deal with the question of how the embedded modal can target the actual goal instead of counterfactual goals (or desires or obligations). The challenge is therefore simpler than in the case of anankastic conditionals. There are basically two different strategies to deal with this issue: either the goal is somehow transferred to accessible successful search-worlds so that the modal can pick it up regularly – this idea is reminiscent of the event-relative approach that we sketched in Section 5.3.4 – or the modal is more flexible in the way it targets its ordering source. The first option would lead to several problems. Apart from the question of how such a transferral should be motivated and executed on a technical level, making the actual goal present in the successful world would conflict with the notion that goals (which are closely connected to intentions) dissolve at the moment of fulfillment (Bratman 1987). Additionally, the assumption that the goal is present in the successful worlds means that the modal can then target both the transferred actual goal and counterfactual goals, which then leads to incorrect results. We would need an additional strategy to filter out counterfactual and possibly conflicting goals. The second option seems to be more promising, and in the following, we will discuss two approaches, including our final one, that rest on this idea. The first approach, discussed in 5.5.4, is an adaption of Huitink (2005a), which, however, does not work for our data. In Section 6.1, we will

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<sup>51</sup>However, since anankastic relatives are in fact also compatible with buletic attitudes, in the end we will have to deal with the issue of inconsistent desires.

<sup>52</sup>Zimmermann (2006) includes events in his analysis of search-verbs exactly for this reason. If you have more than one search objective, you have different search-events for each objective.

discuss our final approach to the anaphoric data, which also involves a more flexible ordering source.

### 5.5.3 Other anankastic sentences

Stechow et al. (2005) discuss anankasticity in sentences which do not involve conditionals at all but in fact relative clauses. Consider their examples below:

- (187) Wer schön sein will, muss leiden.  
who beautiful be want must suffer  
'Whoever wants to be beautiful has to suffer.'
- (188) Die Bücher, die du ausleihen willst, musst du dem Bibliothekar  
the books which you borrow want must you the librarian  
geben.  
give  
'You have to give the books you want to borrow to the librarian.'

Semantically these examples have a lot in common with conditionals. However, (188) is structurally reminiscent of a sentence that serves as a variant of our anankastic relatives. An example is given in (190), which is the modified version of (189).

- (189) Die EZB sucht einen neuen Angestellten, der EU-Bürger sein soll.  
the ECB seeks a new employee who EU-citizen be should  
'The ECB is looking for a new employee who should be an EU-citizen.'
- (190) Der neue Angestellte, den die EZB sucht, soll EU-Bürger sein.  
the new employee who the ECB seeks should EU-citizen be  
'The new employee the ECB is looking for should be an EU-citizen.'

Assuming an unspecific interpretation of the definite NP *der neue Angestellte*, (190) presents quite a few theoretical challenges. However, we do not want to focus on that issue here, but instead are interested in the relationship between this sentence and (189) regarding the interpretation of the modal and its potential anaphoricity to the attitude. Moreover, it has to be discussed whether (188) and (190) share similar semantics and can both be categorized as anankastic sentences. Although the two sentences look very similar structurally, they differ on a semantic level. (188) is compatible with a purpose-clause analysis that disregards the desire predicate ('*You have to give the books you want to borrow to the librarian to borrow them.*'), while for (190), this is questionable ('*The new employee that the ECB is searching for has to be an EU-citizen in order for the ECB to find him.*'). However, since Condoravdi

and Lauer (2016) refuted both the necessity of having a “means of”-relation and the vacuity of the desire predicate in anankastic conditionals, this difference may not be crucial. It would be interesting to discuss the relationship between these sentences in greater detail in order to be able to determine whether we can establish or dismiss a deeper relationship between anankastic conditionals and anankastic relatives. I will not touch on this subject here, but leave it to future research.

#### 5.5.4 An adaption of Huitink (2005a)

As we have seen in the previous subsections, Huitink’s (2005a) approach seems to be the most promising for an application to our data with relative clauses. This is because it focuses more on the role of the modal than on the structural features of conditional sentences. However, her approach also strongly depends on an argument, which is also supported by Bittner (2001), saying that the antecedent of *if*-clauses are topical, meaning that they can provide highly salient information, like for instance a salient goal that the modal in the consequent can then pick up. In this respect, her approach is also linked to the conditional structure of anankastic conditionals.

However, Huitink herself (p.c.) does not shy away from trying to adapt her analysis to the data discussed in this thesis. An adaption of her analysis would mean that something other than the *if*-clause has to provide the salient goal, and the biggest parallel that one can find would be the subordinate clause in our data, hence the modalized relative clause. This means that the roles of the intensional operators are somehow reversed: in our data, the modal in the relative clause introduces the goal, which, for some reason appears to be highly salient, and the matrix attitude has to be analyzed as having an ordering source that can target the salient goal introduced by the modal.

For our original sentence in (1), this means that the relative clause provides the salient goal *x/some lawyer is an EU-citizen*, which can be picked up by the search-verb, determining the lawyers they eventually find. Following Huitink’s original analysis, this goal then would be the only goal of the attitude verb’s ordering source. However, this does not match the intuition about the meaning of the sentence. A search-verb is connected to the goal of finding the searched-for object. Hence, such an approach would only be consistent with our intuitions if the salient goal provided

by the modalized relative clause is added to the ordering source of the attitude verb instead of overriding every other existing goal.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*

When applying Huitink’s analysis to the German data, the example in (190) presents a particularly interesting case. Here, the role-reversal of the intensional operators that happens when applying Huitink’s analysis to the classic examples like (1) does not occur: in (190), the attitude verb is inside the relative clause and the modal in the main clause. Huitink would argue that the relative clause still provides the salient argument, which in this case is then introduced by the attitude verb, and the modal’s ordering source picks up this goal. We can see that sentence (190) shows more parallelism to anankastic conditionals.

- (190) Der neue Angestellte, den die EZB sucht, soll EU-Bürger sein.  
the new employee who the ECB seeks should EU-citizen be  
*‘The new employee the ECB is looking for should be an EU-citizen.’*

However, also in the case of (190), we have to be careful in figuring out what the salient goal actually is. It cannot be *seeking a new employee* since this does not match the intuition about the meaning of the sentence. A promising alternative would be to assume that the search-verb implicitly introduces the finding-goal that is connected to the specific search, and that the ordering source of the modal picks up exactly this goal.

Assuming that all the details of such an analysis could be worked out properly, this approach would mean that the modals in (1) and (190) are completely different on a basic level. It particularly means that the modal in (1) is not anaphoric at all. Although this may indeed have been a wrong assumption from the very beginning of this thesis, the idea that the modal is not anaphoric in the original sentences that are all constructed like (1) goes against my theoretical intuitions about the data. This is because I do not consider the modalized relative clause in sentences like (1) to necessarily express a goal, but rather to be connected to a goal. This is why I am hesitant to pursue the adaption of Huitink’s approach to anankastic conditionals to our data.



### 5.5.5 Conclusions

This chapter has focused on the comparison of anankastic conditionals and our data with relative clauses, especially concerning the shared characteristics concerning the reading I associate with anankasticity in both cases. In reviewing the literature concerning anankastic conditionals, we hoped to find links and ideas for an analysis of our problematic relative clauses. However, we had to realize that most analyses of anankastic conditionals cannot be applied to our examples because they are specifically designed for the structural and semantic features of conditionals. We conclude that although there are interesting similarities between both phenomena on an abstract level, due to the structural differences, analyses that are specifically designed for conditionals cannot be adapted to our data with relative clauses. Analyses like those of Fintel and Iatridou (2005) and Huitink (2005a, 2005b), which focus on the role of the modal instead of the conditional, are more promising. Fintel and Iatridou's approach, however, is not applicable to our relative clauses, for reasons similar to those for which it was criticized in connection with anankastic conditionals. Although Huitink's analysis was also criticized for various reasons, the criticism that was put forward is not relevant to our data with relative clauses. In the last part of this section, we tried to adapt Huitink's analysis to our data, which was partly successful. Although this approach seems to be promising on a rudimentary basis for an application to our data, in the end, we were not convinced that it suited our purposes.

Independently of the discussion on whether analyses of anankastic conditionals can be adapted to anankastic relatives, we did not try to argue in favor of or against a parallelism between both phenomena. In order to be able to do this, one has to look deeper into other sentences involving anankastic readings, like for instance those presented in Stechow et al. (2005). An investigation like that, however, goes beyond the scope of this thesis.

Although the investigation of anankastic conditionals did not directly contribute to finding an analysis of our data, it still addressed interesting parallels and ideas for dealing with certain theoretical issues as well as helped in gaining a better understanding of the special relation between attitude and modal in what I categorize as anankastic data.

## 5.6 Summary

In this section, we discussed the issue of anaphoric modality in greater detail by investigating three related phenomena that have been discussed in the literature. Firstly, we presented the phenomenon of *modal concord* and *harmonic modality*, which showed conceptual similarities to our data, especially concerning the stacking problem of the operators in an analysis. However, since the analyses of modal concord either deal with the problem by somehow eliminating the second modal element or are designed specifically for data involving modal verbs in combination with modal adverbials, we cannot profit from the analyses that have been proposed in the literature. Apart from modal concord, we also discussed *epistemics under attitudes*, which also appear to be in concord or anaphoric. Since these examples involve attitudes, modals and an anaphoric relation between these intensional elements, a semantic analysis of them is highly relevant for our purposes. Consequently, we discussed Hacquard's (2006, 2010) event-relative approach to modals, which can take care of anaphoric embedded epistemics, and tried to adapt it to our non-epistemic data. Unfortunately, this attempt was not successful. Although we formulated an alternative way to salvage an event-relative approach to modals, it did not lead to the desired outcome.

Finally we also looked into the phenomenon of anankastic conditionals, which arguably also involve some kind of modal anaphoricity. Anankastic conditionals turned out to be very interesting for our purposes because they involve the exact same kind of modality that is crucial for our data. We discussed various analyses that have been put forward to deal with the theoretical challenges of anankastic conditionals. However, they were mostly specifically developed for conditionals and could not easily be adapted to our data. Still, the discussion inspired us to view anankasticity independently from conditionals as a specific kind of anaphoric relation between goal-oriented or prioritizing intensional elements. This is why we ultimately chose to categorize our relative clauses as being anankastic.

## 6 Towards an approach to anankastic relatives

In this chapter, we are going to present our final analysis of anankastic relatives, which is based on the observations we have made and conclusions we have drawn from the previous sections. The goal of this chapter is to develop an analysis that is able to account for the whole range of data with the anaphoric modal inside the relative clause. Based on our observations, I will continue to argue that the anaphoric reading is in principle independent of the structural feature of (non-)restrictivity. Hence, the intended reading is compatible with both an underlying restrictive and an appositive structure.

This chapter is structured as follows: I will first develop a restrictive account of relative clauses and discuss its application to the whole range of crucial data. Subsequently, I will turn to appositive relative clauses featuring the anaphoric reading, and propose a strategy for analyzing them. Based on the parallels between discourse phenomena and anankastic relative clauses, I will propose analyzing the appositive version of our data as an instance of *modal subordination*.

In the following, I will distinguish between the terms *anankastic restrictive relative clause (aRRC)* and *anankastic appositive relative clause (aARC)*.

### 6.1 A restrictive account

In this section, I will discuss the underlying logical form of the operators involved in aRRCs. The focus will be on the scope-taking issues and flexibility of parameters that are relevant for a restrictive interpretation of the relative clause.

#### 6.1.1 Quantifier scope

After multiple failed attempts to solve the compositionality problem of anankastic relatives by changing the position of the scope-taking elements, I came to the conclusion that playing around with the double embedding of the modal leads to too many unwanted consequences for which we would have to account. Moreover, when changing something so crucial in the structure, it becomes difficult to argue for the parallelism between anankastic relatives and canonical relatives. Hence, my strategy is to be conservative when it comes to the scope issues of the involved operators. We will see in the following that we can actually account for the peculiarities of the

data while maintaining a quite traditional approach.

For the aRRCs, I will assume that the matrix attitude verb in the sentence is actually the highest operator and takes scope over the rest of the sentence including other quantifiers. Additionally, I will assume that the existential quantifier of the object argument remains in a position higher than the lower modal operator. In fact, the constellation of the operators I am suggesting does not distinguish in any way between sentences with prototypical relative clauses and sentences with anankastic ones. Therefore, (1) and (55), where the first sentence suggests the anankastic reading and the second one represents a canonical relative clause, share the same underlying operator structure, which is the one in (191).<sup>53</sup>

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
*'The ECB is looking for a lawyer who should be an EU-citizen.'*
- (55) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit  
the FAZ seeks a juvenile offender who community service  
leisten muss.  
perform must  
*'The FAZ is looking for a juvenile offender who must perform community service.'*
- (191)  $\forall w' \in ATT(w_0) : [\exists y[P(y)(w') \dots \forall w'' \in MAX_{<g(w')}(\cap f(w')) : [Q(y)(w'')]]]$

The major advantage of such an approach is that we can account for the canonical behavior of aRRCs in terms of restrictivity and the interaction with other operators. In the following section, we will discuss how we can manipulate the elements in the structure to differentiate between an independent and an anaphoric reading in order to capture the semantic differences in the prominent readings of (1) and (55).

### 6.1.2 World parameters

When choosing a conservative basic structure, we have to find a way to account for the difference in interpretation between the anaphoric reading and the stacked reading of the embedded modal in the relative clause. One way to do this is to change the evaluation world of the anaphoric modal so that it can pick up the content of its antecedent, which is the attitude verb.

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<sup>53</sup>I introduced the semantics I am using here in Section 4.

In a traditional approach, the stacking of the two intensional operators leads to a shift of the evaluation world for the embedded operator, which, in our case, is the modal. This means that in a conservative semantic construal, the intensional operator of the attitude is evaluated by the world  $w_0$  and the embedded modal by the world  $w'$ , as presented in (191). When the evaluation world of the modal is  $w'$ , the ordering source of the modal cannot contain the goals that determine the matrix attitude. This would be counterintuitive since the set of worlds  $w'$  consists of successful worlds where the goals of  $w$  are met. When goals are met, they are not available anymore.

$$(191) \quad \forall w' \in ATT(w_0) : [\exists y[P(y)(w') \dots \forall w'' \in MAX_{<g(w')}(\cap f(w')) : [Q(y)(w'')]]]$$

However, because of the modal's anaphoricity to the matrix attitude, the intuition about the meaning of the sentence suggests that the modal's interpretation is determined by the same goals as the matrix attitude. One way to translate this intuition into the semantic construal is to change the evaluation world of the modal so that it is able to pick up the same goals as the attitude, hence by giving the modal the same evaluation world as the attitude, which is  $w_0$ :

$$(192) \quad \forall w' \in ATT(w_0) : [\exists y[P(y)(w') \dots \forall w'' \in MAX_{<g(w_0)}(\cap f(w_0)) : [Q(y)(w'')]]]$$

The truth conditions of sentence (1) with an underlying structure like (192) would be the following: *In each world  $w'$  in which the goals of the ECB in  $w_0$  are reached, there is a lawyer in  $w'$  that the ECB finds in  $w'$  such that in all worlds  $w''$  in which the ECB's goals in  $w_0$  are met, the lawyer is an EU-citizen in  $w''$ .* Unfortunately, these truth conditions are too strong for our sentence.<sup>54</sup> Due to the wide scope of the existential quantifier over the embedded modal operator, we have to make sure that some lawyer that the ECB finds in  $w'$  is an EU-citizen in each of the worlds  $w''$ . This means that if the bank finds (only) Mary in  $w_1$ , (only) Bob in  $w_2$  and (only) Alex in  $w_3$ , all of them have to be EU-citizens in  $w_1$ ,  $w_2$  and  $w_3$  all together. So, Mary has to be an EU-citizen in  $w_2$  and  $w_3$  too, although she is not the lawyer the ECB finds there. For the matter of lawyers being EU-citizens, this structure is merely too strong, but for other sentences, these truth conditions would be completely wrong. This is exemplified in a sentence like (9): we surely do not want to say that in each hotel that Anna finds in the set of  $w'$ , it has to accommodate the invited speakers in

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<sup>54</sup>We had a similar problem when we discussed the approach involving events in Section 5.3.4. There, we encountered the problems not with worlds as evaluation parameters but with events.

every world that is in the set of successful worlds, independently of whether Anna finds the hotel in the particular world or not. We need a structure that offers the truth conditions that the guests are only accommodated in the hotel that has been found in its respective world. Hence, the finding of the hotel becomes a crucial condition for the place of accommodation.

- (9) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
 Anna seeks a hotel in which the invited speakers be accommodated  
 sollen.  
 should  
 ‘Anna is looking for a hotel in which the invited speakers should be accom-  
 modated.’

The structure in (192) clearly does not work, mainly because of the changed world parameter of the modal base  $f$ . A modal base  $f$  that is determined by  $w$  simply does not contain the successful completion of the search, which is what we need, especially in the case of attitude-dependent examples like (9). However, there actually is no need to change the world parameters of the modal base  $f$  from  $w'$  to  $w_0$ . When we say that the modal is anaphoric concerning its modal flavor, we are talking about the teleological, buletic or deontic flavor, which is reflected in the ordering source  $g$ . Hence, having a more finely grained modal semantics, it seems to be more accurate to say that the anaphoricity of the modal only concerns the ordering source.

The inclusion of multiple conversational backgrounds gives us the possibility to treat the modal’s accessibility relation separately from its modal flavor, which comes in handy for an analysis of our data. We need a modal base that is determined by facts that are valid in  $w'$  (like facts concerning goals that are met), but we also need an ordering source that is determined by goals from  $w_0$ . Therefore, why shouldn’t we treat the embedded modal as a truly embedded modal with an accessibility relation that is evaluated by  $w'$ , but then order the accessible worlds  $w''$  by the goals of  $w_0$  instead of  $w'$ ? With this minimal change we can account for the anaphoricity of the ordering source while maintaining a rather conservative approach to the modal in an embedded position.

$$(193) \quad \forall w' \in ATT(w_0) : [\exists y[P(y)(w') \dots \forall w'' \in MAX_{<g(w_0)}(\cap f(w')) : [Q(y)(w'')]]]$$

Following Condoravdi and Lauer (2016), I will argue that the modal base in our construal has to be historical, however, not only for anaphoric teleological modals,

but for all anaphoric priority modals. With this modal base, we can establish an accessibility relation between  $w'$  and  $w''$  where the set of accessible worlds  $w''$  consists of the future continuations of  $w'$ , where  $w'$  itself has been sorted out by the attitude perspective. The temporal anchor of the future continuations  $w''$  is determined by the parameter  $t$ , which is connected to  $w'$ , the evaluation world of the modal base. Since  $w'$  also represents the successful worlds of the matrix attitude, the temporal parameter automatically refers to the time when the matrix goal, matrix desire, etc. has been fulfilled. For a sentence like (1), the goal that has been reached in  $w'$  is that a certain lawyer has been found as the result of a search. By using a historical modal base which is connected to the successful search-worlds and temporally anchored to the moment when the goal is reached, we can make sure that the lawyer in  $w''$  we are talking about is actually the one who has been found in the corresponding world  $w'$  as the result of the search.

Furthermore, since the historical modal base establishes an accessibility relation that gives us future continuations from the successful moment onwards, we can account for both attitude-independent and attitude-dependent properties of the relative clause.

$$(194) \quad \forall w' \in ATT(w_0) : [\exists y[P(y)(w') \dots \forall w'' \in MAX_{<g(w_0)}(\cap f_{hist}^t(w')) : [Q(y)(w'')]]]$$

A construal on the basis of (194) seems to be promising since we can maintain a conservative analysis and only have to explain why the ordering source of the embedded modal can target goals in  $w_0$ , which we could do by postulating saliency.<sup>55</sup> In this respect, the approach is similar to the one from Huitink (2005a), however, our analysis is somehow inverse to an adaptation of hers to anankastic relatives, which we presented in Section 5.5.4.

There were two points of criticism regarding Huitink's approach, which we also want to discuss in regard to our proposal. Firstly, Stechow et al. (2005) argue that the ordering source might target a goal that contradicts the modal base, leading to a

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<sup>55</sup>Another strategy to solve the compositionality problem would be to transfer the goal in  $w_0$  to  $w'$  or to argue that in  $w'$ , the same goal is present as in  $w_0$ . However, I don't see how such a strategy would work without stipulating additional criteria since, as already mentioned earlier, it is unreasonable to assume that goals are still present in the worlds in which they have already been reached. One way to circumvent this issue is to work with events. This idea was explored in Section 5.3.4, where we evaluated the modals in dependency on events instead of worlds. Due to the simplicity of the account featuring an anaphoric ordering source, I favor this approach to aRRCs.

quantification over the whole set of worlds (because the modal base has priority over the ordering source). This criticism does not concern our sentences because the modal base in our sentences is determined by the output-worlds of the attitude which per se are consistent with the goals that determine them. Hence, in our sentences, it will not be the case that the anaphoric ordering source contains propositions that are inconsistent with the modal base. Secondly, in the case of anankastic conditionals, Condoravdi and Lauer (2016) criticize Huitink’s approach because only one (strengthened) goal determines the modal’s interpretation, and any other (consistent or non-consistent) goal is neglected. Since in our case we do not deal with strengthened goals, but anaphorically refer to the exact same goals that also determine the matrix attitude, I do not think that a similar criticism would be valid. I will argue that the modal’s ordering source captures exactly the same (implicit or explicit) goals, wishes, etc. that also determine the attitude. Because of the embedding of the modal verb inside the intensional context of the attitude verb, exactly the right set of worlds are considered as evaluation worlds for the modal.

### 6.1.3 Analysis of different data

In this section, we will come back to the whole range of data that we investigated in the beginning of this thesis in order to show that our analysis with an anaphoric ordering source can capture the intended reading in all of these cases. In the descriptive part of this thesis, we have discussed multiple different cases featuring the anankastic reading, which are all listed below.

#### 6.1.3.1 Search-verbs with direct object arguments

The first sentence we are going to analyze is the original sentence from Zimmermann’s puzzle in (1). This sentence features a teleological opaque verb and the modal *soll* inside the relative clause.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
*‘The ECB is looking for a lawyer who should be an EU-citizen.’*

As discussed in Section 4.1, we will use a Quine-Hintikka-Zimmermann-style analysis for the opaque verb, meaning that we will combine Quine’s lexical decomposition of the search-verb with Hintikka’s treatment of attitudes as universal quantifiers over possibilities and Zimmermann’s (1993) analysis of opaque verbs taking properties as arguments. The *GOAL*-operator captures the teleological perspective of



the verb and refers to the one specific search goal of the attitude holder in  $w_0$ : it makes the worlds  $w'$  accessible where this exact search goal is fulfilled. We do not have to deal with contradicting or multiple goals.<sup>56</sup> The relative clause receives a standard interpretation and denotes a complex property.<sup>57</sup> This construal is essentially conservative, except for the modal's ordering source, which is anaphoric to the contextually most salient goal: the ECB's search goal in  $w_0$ .

- (195)  $\forall w' \in GOAL_{ECB}(w_0) : \exists y[lawyer(y)(w') \ \& \ find(y)(ECB)(w') \ \& \ \forall w'' \in MAX_{<g_{GOAL_{ECB}(w_0)}}(\cap f_{hist}^t(w')) : [be \ an \ EU-citizen(y)(w'')]$   
*In all worlds  $w'$  in which the ECB's goals in  $w_0$  are reached, there is a lawyer that the ECB finds, and in all of the future continuations  $w''$  that best comply with the ECB's goals in  $w_0$ , the lawyer (found in  $w'$ ) is an EU-citizen.*

Since the modal base of the modal operator in (195) is determined by  $w'$ , we do not have to deal with the problem that appeared in (192). Due to the historical modal base, we are considering future continuations of the successful search-worlds where different lawyers that fit the search profile have been found. This mechanism guarantees that if Hannah has been found in  $w_2$  and Steven in  $w_3$  that in the future continuations of  $w_2$ , Hannah is the lawyer that is found, hence, she is the one having a passport from an EU-country, and in the future continuations of  $w_3$ , it is Steven who has an EU-citizenship because he is the lawyer that has been found in  $w_3$ . The historical modal base prevents the appearance of the problem that both Steven and Hannah are EU-citizens in the future continuations of both  $w_2$  and  $w_3$ .

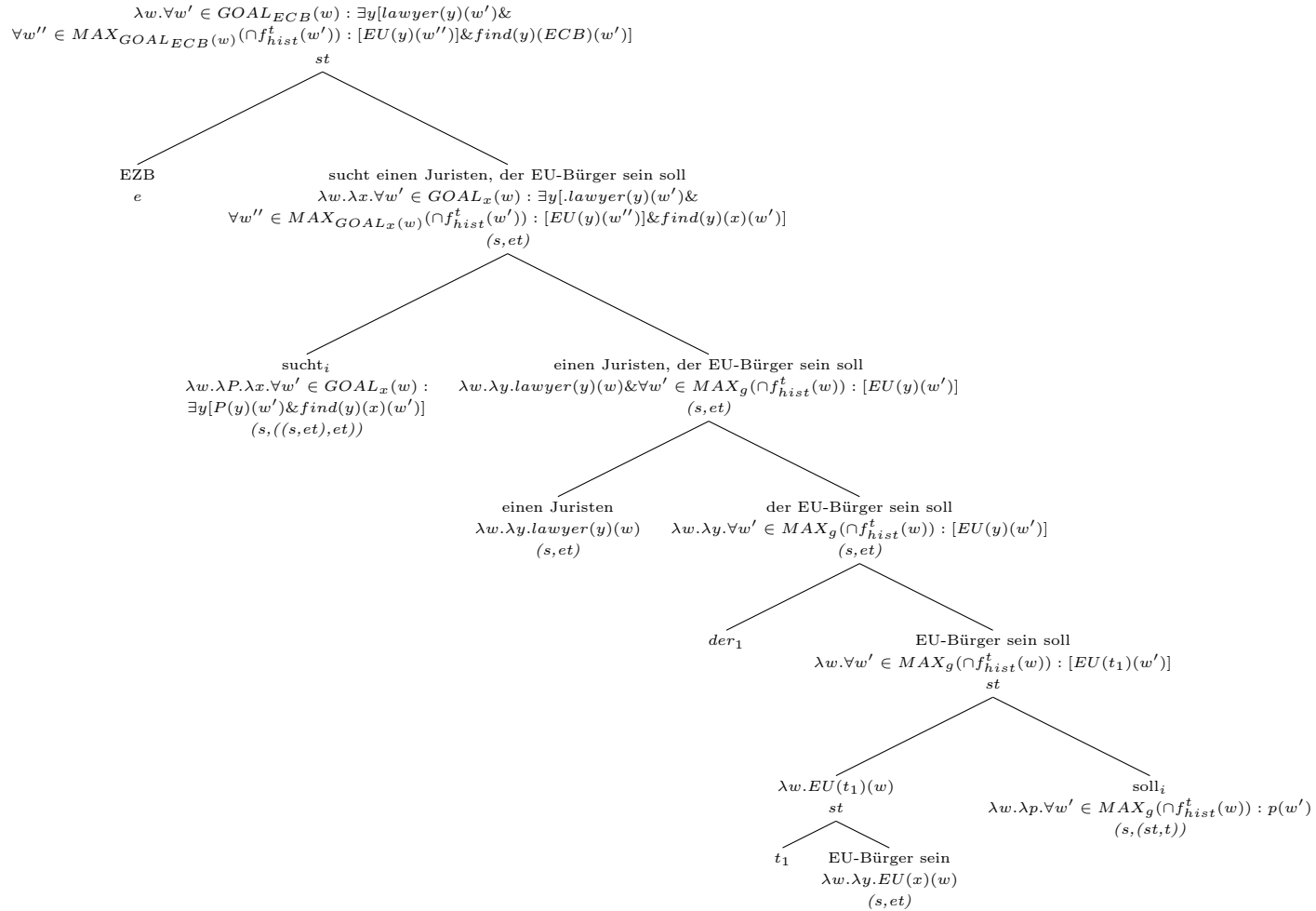
The compositional analysis for this example is presented in (196). However, the anaphoricity of the ordering source is not accounted for in the syntax. I choose to represent the anaphoric relation between the attitude verb and the modal by using the same index  $i$  on both elements. It should be noted that the anaphoric relation only concerns the modal's ordering source and the attitude perspective, but, crucially, not the modal base.

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<sup>56</sup>As mentioned in footnote 52, Zimmermann (2006) proposes that search-verbs in fact come with an event variable that determines the respective search goal in the context. Although I agree, I am not going to include events in my approach here.

<sup>57</sup>To make it easier, I will treat *being an EU-citizen* here as a lexical property.

(196) Die EZB sucht einen Juristen, der EU-Bürger sein soll.



### 6.1.3.2 Sentences with embedded possibility modals

The availability of the anaphoric reading in sentences with embedded possibility modals poses a challenge for a modal concord analysis. However, with an account building on an anaphoric ordering source, these examples are no longer an issue. A sentence like (12) can be analyzed the same way as (1):

- (12) Die EZB sucht einen Juristen, der EU-Bürger sein darf.  
 the ECB seeks a lawyer who EU-citizen be may  
 ‘The ECB is looking for a lawyer who may be an EU-citizen.’
- (197)  $\forall w' \in GOAL_{ECB}(w_0) : \exists y[\text{lawyer}(y)(w') \ \& \ \text{find}(y)(ECB)(w') \ \& \ \exists w'' \in MAX_{<GOAL_{ECB}(w_0)}(\cap f_{hist}^t(w')) : [\text{be an EU-citizen}(y)(w'')]]$   
*In all worlds  $w'$  in which the ECB’s goals in  $w_0$  are reached, there is a lawyer that the ECB finds and in some of the future continuations of  $w'$  that best comply with the ECB’s goals in  $w_0$ , the lawyer (found in  $w'$ ) is an EU-citizen.*

Since the ordering source of the modal targets the ECB’s search aim in this case too, the future continuations are ranked by this goal. The sentence suggests that being an EU-citizen is not a requirement but also not a knock-out criterion for the ECB. Therefore, in the best worlds according to the ECB’s search goal there are both lawyers from EU-countries and lawyers from other countries.

### 6.1.3.3 Sentences featuring attitude-dependency

As further evidence that the embedded modal cannot be semantically empty, we discussed data where the necessity modal explicitly contributes to the meaning of the sentence. These data feature an attitude-dependent property inside the relative clause that is part of the attitude holder’s intentions. (9) is a case in point. With the present analysis, it receives the structure in (198). Because of the historical modal base, we are able to account for the forward-shifted reading of the content of the relative clause. The temporal anchor that refers to the time the matrix goal has been achieved guarantees an appropriate interpretation of the attitude-dependent content of the relative clause. As in the other cases, the anaphoric ordering source of the modal makes sure that the future continuations are ranked according to the attitude holder’s search aim introduced in the matrix clause.

- (9) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
 Anna seeks a hotel in which the invited speakers be accommodated  
 sollen.  
 should  
 ‘Anna is looking for a hotel in which the invited speakers should be accom-  
 modated.’
- (198)  $\forall w' \in GOAL_{Anna}(w_0) : \exists y[hotel(y)(w') \ \& \ find(y)(Anna)(w') \ \& \\ \forall w'' \in MAX_{<g_{GOAL_{Anna}(w_0)}}(\cap f_{hist}^t(w')) : [accommodate \ invited \ speakers(y) \\ (w'')]]$

As discussed in Section 2.1.1, the forward-shifted reading is not a distinctive feature of an attitude-dependent example. The modal in (9) could also receive a non-anaphoric reading while being interpreted as forward-shifted. A scenario for this reading would be that there are rooms booked for the invited speakers in several hotels, and for some reason Anna is looking for one of these hotels. In this case, the accommodation of the invited speakers is not part of her intention but just the description of the (unspecific) hotel she is looking for. In this reading, however, since the content of the relative clause is not attitude-dependent, the temporal parameter of the modal should not be anchored to the time when Anna successfully ends her search. This is because the guests will be accommodated in the hotels regardless of Anna’s ability to reach her search goal. It is therefore not accurate to consider only future continuations of worlds in which she finds one of the hotels. In this non-anaphoric case, we prefer a circumstantial modal base instead of a historical one.

- (199)  $\forall w' \in GOAL_{Anna}(w_0) : \exists y[hotel(y)(w') \ \& \ find(y)(Anna)(w') \ \& \\ \forall w'' \in MAX_{<g_{deo}(w')}(\cap f_{circ}(w')) : [accommodate \ invited \ speakers(y) \\ (w'')]]$

To capture the forward-shifted interpretation of the modal, one has to include additional temporal parameters in the construal that are capable of establishing a temporal relation between the forward-shifted event expressed in the relative clause and the utterance time or the time the search-event takes place.

#### 6.1.3.4 Sentences with other attitude verbs

We have observed that the anaphoric reading of the embedded modal appears with all kinds of attitudes that are somehow compatible with a priority modal, hence

not only teleological attitudes, but also buletic and deontic ones. Due to the periphrastic treatment of the search-verb, the semantic construals of the sentences we have discussed so far already show how attitude verbs, including propositional attitude verbs, are treated within this analysis. Hence, when turning to sentences with buletic attitudes and clausal arguments, we have nothing new to add. In (164), the verb expresses a buletic attitude, and the embedded modal is anaphoric to exactly the same desire that is connected to the matrix attitude. The semantic construal for this case in (200) is basically the same as the one in (195), apart from the choice of the attitude.

(164) Anna will einen Film sehen, in dem Drachen vorkommen sollen.  
 Anna wants a movie watch in which dragons appear should  
 ‘*Anna wants to watch a movie which should feature dragons.*’

(200)  $\forall w' \in DESIRE_{Anna}(w_0) : \exists y[movie(y)(w') \ \& \ watch(y)(Anna)(w') \ \& \\ \forall w'' \in MAX_{<g_{DESIRE_{Anna}(w_0)}}(\cap f_{hist}^t(w')) : [feature\ dragons(y)(w'')]]$

In order to avoid the problem of conflicting desires, one might choose to follow Condoravdi and Lauer (2016) in assuming that in these cases the buletic attitude also expresses an effective preference. An analysis which includes effective preferences can prevent the ordering source of the anaphoric modal from targeting contradictory sets of propositions. However, there are also objections to such an approach since not only sentences like (164) – where Anna arguably can act on her desires in the choice of the movie she is going to watch – exhibit the anankastic reading, but also sentences with attitudes like *wish* or *hope*, like in the examples (69) and (201), respectively. For these cases, it is unlikely that the attitude contains an action-driving component because these attitudes do not grant the attitude holder a lot of leverage in implementing her desires. Therefore, we will not include the concept of effective preferences in our analysis.

(69) Anna wünscht sich eine Katze, die schwarz sein soll.  
 Anna wishes a cat which black be should  
 ‘*Anna wants a cat which should be black.*’

(201) Anna hofft, dass sie einen Pokal gewinnt, der besonders groß sein  
 Anna hopes that she a cup wins which exceptionally big be  
 soll.  
 should  
 ‘*Anna hopes to win a cup which should be exceptionally big.*’

However, since the ordering source of the modal not only picks up the desires determining the matrix attitude, but also those producing an ordering of the accessible worlds, it should be possible to rank the worlds according to best to worst, taking inconsistent desires into account. One might as well consider using an ordering-semantic for buletic attitudes in general to capture exactly these issues, which of course also play a role in the accessibility relation of the desire predicate (cf. Heim 1992).

Apart from teleological and buletic verbs in matrix position, we discovered that deontic verbs are also compatible with the anaphoric reading of embedded modals. I will treat deontic verbs similarly to other propositional attitudes, as universally quantifying over possible worlds. Therefore, the sentence in (73) will be analyzed in the same way as the other examples we have discussed so far:

(73) Herr Schmidt verlangt eine Rückerstattung, die mindestens fünfzig  
 Mr. Schmidt demands a refund which at least fifty  
 Euro betragen muss.  
 euros amount must  
 ‘*Mr. Schmidt demands a refund which must amount to at least fifty euros.*’

(202)  $\forall w' \in DEO_{Schmidt}(w_0) : \exists y[refund(y)(w') \ \& \ receive(y)(Schmidt)(w') \ \& \ \forall w'' \in MAX_{<g_{DEO_{Schmidt}(w_0)}}(\cap f_{hist}^t(w')) : [amount\ to\ at\ least\ 50\ euros(y)(w'')]]$

### 6.1.3.5 Sentences with verbs of creation

Since I do not want to go into the specifics concerning the treatment of verbs of creation, I will use a similar treatment for them as for attitude verbs. Events and tense parameters are usually essential for the discussion of creation verbs, but I do not want to go into this issue here. A highly tentative construal for (21) is given below in (203). I am going to argue that verbs of creation, just like teleological attitudes, are goal-oriented and connected to some kind of intention that can be captured by a teleological operator. Although this operator is not necessarily the determining factor in the analysis of these verbs, an explicit mentioning of it in the semantic account helps in creating a construal where the embedded modal can anaphorically refer to the intentions and goals connected to this verb. If we refrain from incorporating this intensional operator into the construal, we cannot argue that the modal is anaphoric anymore, as we lose the analogy to the other examples.

- (21) Anna baut ihrer Familie ein Haus, das zwei Stockwerke haben soll.  
 Anna builds her family a house which two floors have should  
 ‘*Anna is building a house for her family which should have two floors.*’
- (203)  $\forall w' \in GOAL_{Anna}(w_0) : \exists y[house(y)(w') \& built(y)(Anna)(w') \&$   
 $\forall w'' \in MAX_{<gGOAL_{Anna}(w_0)}(\cap f_{hist}^t(w')) : [two\ floors(y)(w'')]$

Because the anaphoric modal picks up the goals that are connected to the creation verb, in this approach, the anaphoricity comes out parallel to the cases with attitude verbs. This is nice because it fits with the intuition that the phenomenon in sentences with verbs of creation is the same as in sentences with attitude verbs. If one uses a different approach to verbs of creation, one has to develop an alternative strategy to establish the link between the anaphoric ordering source of the embedded modal and the goal of the subject that is intuitively available in these sentences.<sup>58</sup>

### 6.1.3.6 Modals that are anaphoric to modals

There are also sentences where the embedded modal is not anaphoric to an attitude verb but to another modal in the matrix clause (23). In an analysis of these sentences, the ordering source of the anaphoric modal picks up the ordering source of the matrix modal. For the sentence in (23) I will assume that both modals are interpreted deontically. Regular deontic modals, like the modal in the matrix clause in (23), receive a circumstantial modal base and a deontic ordering source. Because the second modal in this sentence is anaphoric, in my analysis, its modal base has to be historical.

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<sup>58</sup>Although I am not aware of any literature that touches on the topic of intention and goal-orientedness within the context of verbs of creation, I firmly believe that this aspect is relevant for their interpretation. Parallel to attitude verbs, it is also possible for verbs of creation to integrate *de re*-object arguments, like in (i) (Ede Zimmermann, p.c.). Assuming that Anna does not know that belladonna is highly poisonous, it is possible to utter this sentence in a context where she mixes a smoothie with this ingredient, trying to make a very healthy one. The anaphoric interpretation of the modal is available here, but the noun “Giftcocktail” has to be interpreted *de re* (or, rather, *de qualitate*). Still, the relative clause modifies what Anna tries to mix, without herself knowing that it is poisonous. The sentence makes perfect sense and her intention to make something which is very healthy can be expressed with the help of the anaphoric modal.

- (i) Anna mixt einen Giftcocktail, der gesund sein soll.  
 Anna mixes a toxic cocktail which healthy be should  
 ‘*Anna mixes a toxic cocktail which should be healthy.*’

- (23) Anna soll einen Kuchen zur Party mitbringen, der gluten- und  
 Anna should a cake to the party bring which gluten- and  
 laktosefrei sein soll.  
 lactose-free be should  
 ‘Anna should bring a cake to the party which should be gluten- and lactose-  
 free.’
- (204)  $\forall w'' \in MAX_{<g_{ORDER_{Host}(w_0)}}(\cap f_{circ}(w_0)) : \exists y[cake(y)(w') \ \& \\
 bring\ to\ party(y)(Anna)(w') \ \& \ \forall w'' \in MAX_{<g_{ORDER_{Host}(w_0)}}(\cap f_{hist}^t(w')) : \\
 [gluten-/lactose-free(y)(w'')]$

#### 6.1.4 Summary

In this section, we presented an approach to examples featuring the anankastic reading that is based on a restrictive structure of the relative clause. We were able to capture most of the distinctive features of the examples as well as the canonical features of a normal restrictive relative clause. We could analyze all of the data we examined in the descriptive part of this thesis in the same way, including sentences featuring different types of attitudes, different argument structures (NP-arguments and clausal arguments), modals with different strengths and sentences with an attitude-dependent interpretation. We managed to do so in an almost conservative manner by maintaining the stacked structure of the quantifiers involved. Basically, we made use of the finely grained modal semantics proposed by Kratzer, but with some flexibility in the choice of the ordering source which – in the case of a matching modality – can pick up a target that has been introduced and made salient earlier in the sentence, namely by the intensional verb in the matrix sentence. In addition to the stacked structure of the quantifiers, we argued for a historical modal base for the anaphoric modal. Both of these features are important to prevent problems concerning cross-identification. The matching modal flavor is taken care of by the parameter of the ordering source, which is not responsible for the modal’s accessibility relation, but only for ordering the set of accessible worlds.

## 6.2 An appositive account

In Section 3 we discovered that there is a true appositive anaphoric reading of our data. Hence, we also need an appositive proposal for the data, which is what we will cover in this section. The restrictive analysis of the anankastic relative clause that we developed in Section 6.1 cannot be directly adapted to appositive cases. This is



because the relative pronoun of appositives lies outside the scope of the antecedent and is not referential in our examples. In these cases, the pronoun functions as an unbound variable. These technical challenges are independent of the anaphoricity issues but are a general problem of appositives in such an environment. The same problems also arise in the extensional data from Sells (1985), where appositive relative clauses attach to unspecific indefinite heads (86). We discussed these examples in Section 3.1.2.

- (86) Every chess set comes with a spare pawn, which you will find taped to the top of the box.

Considering that both the features of appositive relative pronouns and the challenges of an appositive account are very similar to the characteristics of E-type pronouns and an analysis of them, it is reasonable to assume that there is a certain parallelism between these two phenomena. In Section 3.1.2 we discussed the relation between appositive relative clauses and discourse structures in connection with the extensional data from Sells (1985), and we will follow his strategy of using an approach to overcome the problems of E-type pronouns as discourse anaphors to solve the same problems in our intensional data.

This basically means that we will argue for a parallel treatment of anankastic appositive relative clauses and modal subordination, which is the intensional equivalent of quantificational subordination, which Sells uses for the the extensional data. A classic example of modal subordination is given in (205).

- (205) A thief might break into the house. He would take the silver. (Roberts (1989), attributed to Fred Landman, p.c.)

The appositive reading of (108) will be analyzed the same way the discourse in (206) is analyzed in a modal subordination account. The same holds for the appositive relative clause in (12) and the discourse (13).

- (108) Google sucht die meisten Praktikanten, die (alle) unter zwanzig sein  
 Google seeks the most interns who (all) under twenty be  
 sollen.  
 should  
 ‘Google is looking for the most interns who all should be below the age of  
 twenty.’

- (206) Google sucht die meisten Praktikanten. Sie sollen (alle) unter zwanzig  
 Google seeks the most interns they should (all) under twenty  
 sein.  
 be  
 ‘*Google is looking for the most interns. They all should be below the age of  
 twenty.*’
- (12) Die EZB sucht einen Juristen, der EU-Bürger sein darf.  
 the ECB seeks a lawyer who EU-citizen be may  
 ‘*The ECB is looking for a lawyer who may be an EU-citizen.*’
- (13) Die EZB sucht einen Juristen. Er darf EU-Bürger sein.  
 the ECB seeks a lawyer he may EU-citizen be  
 ‘*The ECB is looking for a lawyer. He may be an EU-citizen.*’

The framework of *Discourse Representation Theory* (DRT) has been specifically developed to cope with the challenges of unbound pronouns in discourse contexts. Because in the original DRT-version, a fine-grained modality – which is essential for our examples – is not defined and represented in the discourse representation structures (DRSs), I will use Anette Frank’s DRT variant with ADRSs (Frank (1997), *Annotated Discourse Representation Structures*) in order to capture the modal’s anaphoric relation, which is most interesting to us.

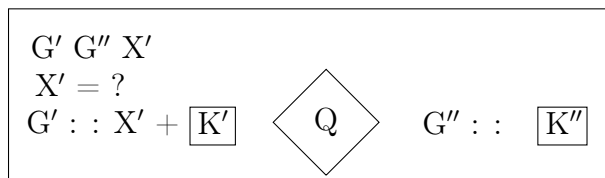
Frank develops a unified analysis for both conditional sentences and modal subordination, as well as a unified analysis for modal subordination and relative modality since she treats the discourse phenomenon as a special subtype of relative modality. For her, modal subordination just makes the conversational background linguistically explicit that in regular cases of relative modality has to be accommodated. Her account does not use Kratzer’s idea of ordering sources but tries to capture relative and graded modality solely by a (possibly complex) modal base.<sup>59</sup> A logical form of a modal operator in her system is given in (207). Her DRSs include context referents  $G, H$  denoting sets of world function pairs. With the help of context referents, Frank can introduce update conditions  $G' :: X' + K''$  to her DRSs. To account for relative modality, Frank uses an anaphoric context referent  $X'$ , which functions as the domain argument for the modal quantifier. By anaphoric binding of  $X'$  to an appropriate antecedent, the characteristic anaphoric relation of modal subordination can be captured. The antecedent either has been introduced in the

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<sup>59</sup>Before Kratzer introduced ordering sources to her framework, she also used complex modal bases to account for modals (cf. Kratzer 1977).

previous discourse or is accommodated.

(207) (Frank 1997:100, example (38))



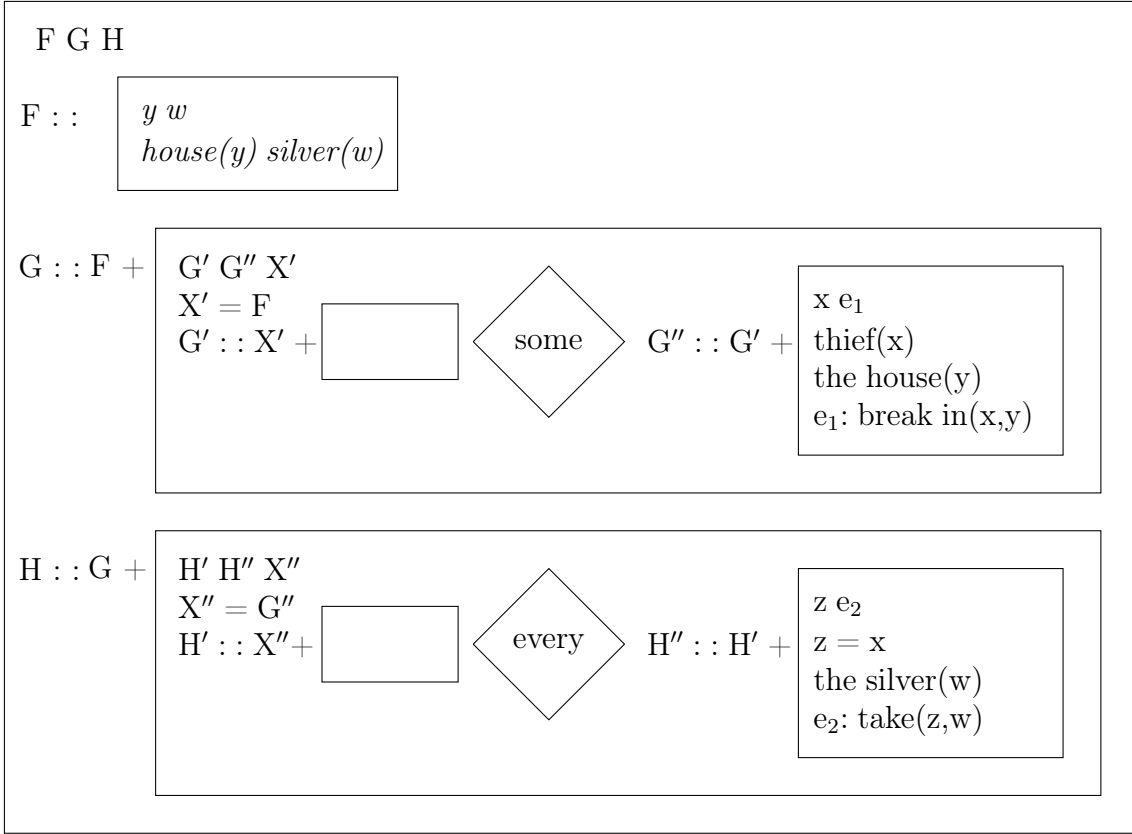
The anaphoric context referent can take care of both relative modality and modal subordination. The classic example of modal subordination in (205) displays both kinds of modality. In Frank’s theory, it is represented by the structure in (208). The weak modal *might* is interpreted relative to the epistemic context  $F$ , hence the modal’s context referent  $X'$  is bound by  $F$ .<sup>60</sup> The modal *would* in the second clause, which indicates modal subordination, is anaphorically dependent on the context that is introduced as the scope argument of the preceding modal, therefore, the context referent  $X''$  is anaphorically bound by  $G''$ .<sup>61</sup> Basically, the “input” of the modally subordinated content is anaphorically bound to the “output” of the previously established modal context. The accessibility conditions in Frank’s framework differ from the standard assumptions about accessibility in DRT. In order to allow binding of the variables  $x$  and  $z$  in (208), Frank needs to redefine accessibility and the syntactic definition of subordination that holds between the DRSs  $K'$  and  $K''$ .<sup>62</sup> Further details can be found in Section 3.3 of Frank (1997).

(208) (Frank 1997:103, example (44))

<sup>60</sup>Because (205) displays epistemic modality, there should be epistemic markers associated with the sub-DRSs. We have left them out in order to focus purely on the subordination pattern and anaphoric binding.

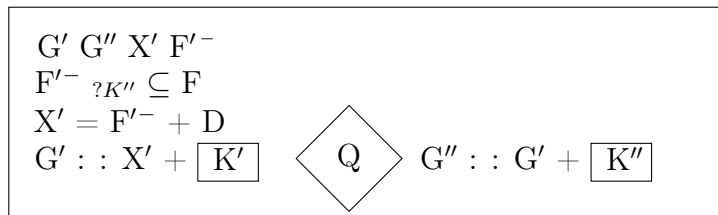
<sup>61</sup>Since this example features non-restricted modality, the DRS  $K'$  stays empty. In the case of conditionals, it would be filled by the antecedent of the conditional, which functions as a domain restrictor.

<sup>62</sup>More specifically, Frank revises the definition of accessibility both on the semantic and on the syntactic level. Basically, she is able to make any referent appearing in the antecedent of  $X'$  accessible to both DRSs  $K'$  and  $K''$ , as long as they are in a binding relation. Additionally, she establishes rules for syntactic restrictions. Since we are not going to challenge the rules of accessibility with our data, we will not be concerned with the details here.



For deontic modality, Frank captures Kratzer’s account of doubly relative modals with a complex modal base. She introduces a discourse referent  $D$ , which represents the deontic circumstances in the context or the deontic context, and which has to be either accommodated or explicitly expressed in the discourse. Frank additionally introduces a reduction condition  $?_{K''} \subseteq$  to take care of unwanted presupposition projection and guarantee that the antecedent discourse referent for the modal contains only material that we need. The deontic modal quantifier receives a structure like in (209). The reduction condition makes sure that in the context referent  $F'^-$ , which serves as an antecedent for the complex modal base  $X'$ , the truth of the scope DRS  $K''$  is not determined.

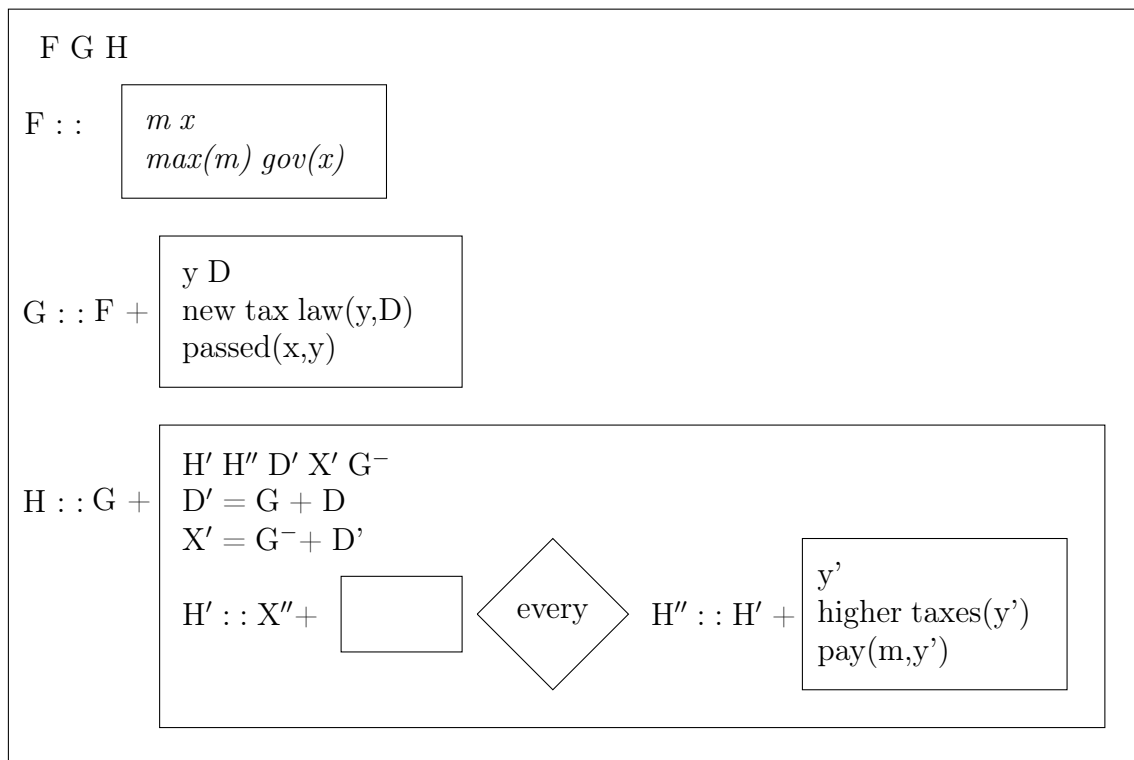
(209) (Frank 1997:187, example (31))



An example of deontic modality in Frank's framework is given in (210). The modal is dependent on both the context referent  $D$ , which is an argument of the predicate *new tax law*, and on the context referent  $G$ , which provides the factual antecedent context. This is represented by the condition  $X' = G^+D'$ .<sup>63</sup> The contracted discourse referent  $G^-$  makes sure that the truth of Max paying higher taxes is undetermined as input for the modal base. For non-restricted deontic modals, the DRS  $K'$  always stays empty.

(210) (Frank 1997:178, example (11), adapted)

The government has passed a new tax law. Max must pay higher taxes now.

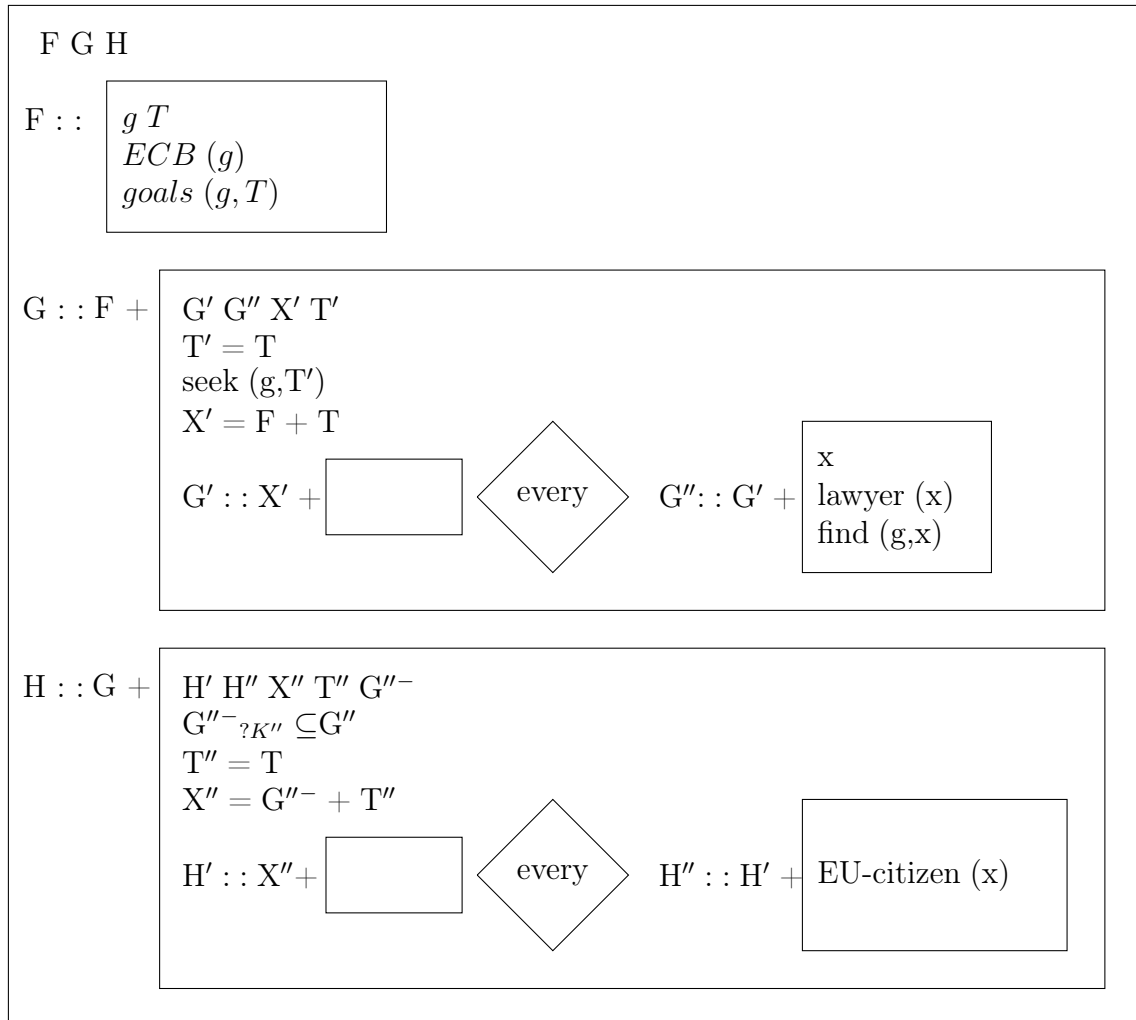


We can now put together a DRS for our cases of modal subordination. The original sentence (1) receives the structure in (211). To indicate anaphoricity to the same teleological context, both teleological context referents  $T'$  and  $T''$  are bound by  $T$ . Together with the factual context referents  $F$  and  $G''^-$ , respectively, they yield the domain argument for the intensional operators. Because the domain argument, which constitutes the modal base, consists of both factual context and teleological

<sup>63</sup>For sentences with inconsistent factual and deontic contexts it is important to have the complex modal base consisting of both the factual and the deontic context.

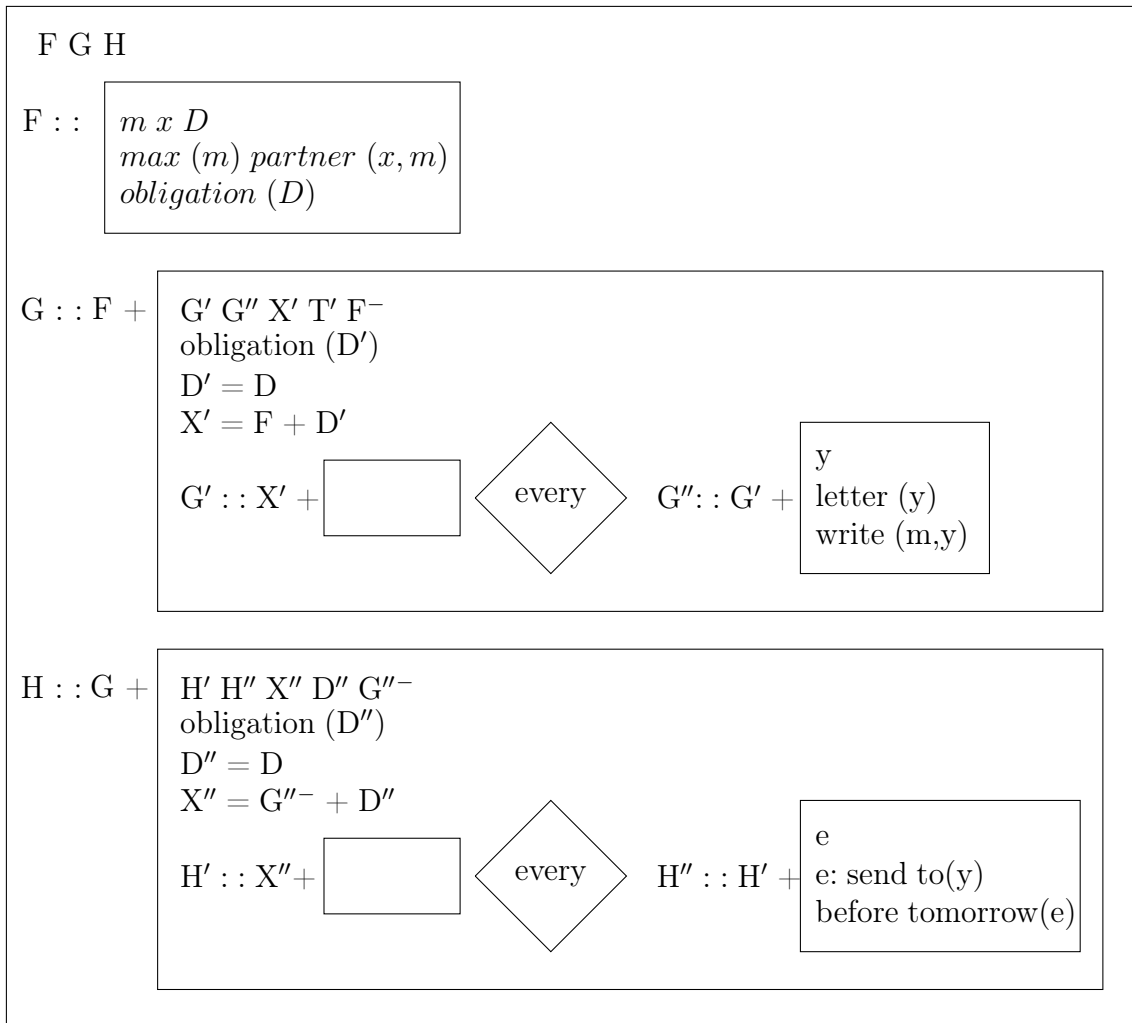
context, we do not need an ordering source to analyze these sentences.

- (211) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
 the ECB seeks a lawyer who EU-citizen be should  
 ‘The ECB is looking for a lawyer who should be an EU-citizen.’



Having the same antecedent for both teleological context referents  $T'$  and  $T''$  is not specific to the examples of interest to us. Frank herself discusses discourses like (212), where the modal bases of both modals refer to the same deontic context. This is made explicit in her DRSs by binding both deontic context anaphors  $D'$  and  $D''$  to  $D$ .

- (212) (Frank 1997:205, example (64-a))  
 Max must write a letter. He must send it to his partner before tomorrow.



There are also classic cases of modal subordination like (213), where the modal part of both intensional operators seems to be anaphoric to the same modal content (which more generally can be categorized as *intentions* in this case). We can imagine that John's plans to eat a fish that he will have caught himself for supper is something that is the very reason why John wants to catch a fish to begin with. For this example, an analysis where the interpretation of the second attitude verb is dependent on a different modal context than that of the first attitude verb seems unreasonable.

- (213) John wants to catch a fish. He plans to eat it for supper. (Roberts 1996, citing an example from Partee 1970)

These examples show that the binding behavior of the teleological context referents

in (211) is not specific to our data, but happens all the time in discourse examples. Since neither of the examples in (212) and (213) contain the anaphoric reading we are interested in (which is an anankastic reading), we conclude that the anaphoric behavior of the modal in our examples alone does not constitute the peculiarity of the anankastic reading.

In Section 2.2.2, we discussed the continuative relative clause and the issue of temporal continuation in discourse paraphrases. An example of a continuative relative clause is given below:

- (68) Die EZB sucht einen neuen Juristen, der dann mit dir das Büro teilen  
 the ECB seeks a new lawyer who then with you the office share  
 soll.  
 should  
*‘The ECB is looking for a new lawyer who then should share the office with you.’*

When we discussed temporal continuity in relative clauses and discourses, we were not sure whether the continuative reading can actually involve anaphoricity. The sentence in (213), however, might offer an answer to this question. When translating this discourse to German and then turning it into a sentence with an appositive relative clause, we actually get a sentence with a continuative relative clause. This sentence also seems to be suitable as a paraphrase for the discourse.

- (214) Hans möchte einen Fisch fangen, den er (später) zum Abendessen  
 Hans wants a fish catch which he later for supper  
 verspeisen will.  
 eat wants  
*‘Hans wants to catch a fish which he later wants to eat for supper.’*

Following Frank’s proposal, the discourse in (213) would be analyzed in the same way as (212), hence the deontic context anaphors of the two involved attitudes would be bound by the same antecedent. When transferring this account to appositive relative clauses, we would analyze continuative readings as involving anaphoricity with the conclusion that the continuative relative clause is in fact compatible with an anaphoric reading. However, this anaphoric reading is crucially different from an anaphoric anankastic reading.

Therefore, the crucial feature of the reading in our anankastic data is not the



anaphoric behavior of the modal's ordering semantics but the special relationship or connection between the goal and the complement of the embedded modal, hence what I have actually categorized under the term anankasticity in this thesis (see Section 5.5.1). This special relationship is responsible for an interpretation of the appositive relative clause which appears to be restrictive although it is not.

In the restrictive analysis of our data, the anankasticity was captured by the interaction of the anaphoric ordering source of the modal and the restrictive nature of the syntax. In the appositive case – since anaphoricity seems to be available in these contexts anyway – the tools of Frank's fine-grained framework can only capture anaphoricity in general but not the specific case of anankastic anaphoricity. However, I do not know how anankasticity could be accounted for in the structure. We might have to consider that this particular interpretation in appositives is a lexical-pragmatic effect that cannot (or perhaps need not) be captured in a semantic framework.

For sentences like (1), the question arises whether the crucial problem of analyzing the anankastic reading is connected to the contracted factual context, which in combination with the deontic context yields the complex modal base. This is because in this example we are dealing with an independent property in the relative clause. Here, the anankastic reading expresses that being an EU-citizen is something that is actually the case in  $G''$ , instead of making clear that this information is not settled there. However, as we discussed at length in Section 2.1.1, there are many examples featuring attitude-dependent content in the relative clause.

- (9) Anna sucht ein Hotel, in dem die Gastsprecher unterkommen  
Anna seeks a hotel in which the invited speakers be accommodated  
sollen.  
should  
'Anna is looking for a hotel in which the invited speakers should be accommodated.'

In (9) for instance, the complement of the modal inside the relative clause can only be realized after a successful search. Therefore, as a generalization, Frank's suggestion of the contracted factual context as part of the modal base has to apply to all of our data.

A more general question concerning modal subordination is how we know to interpret discourses as instances of modal subordination (or, in technical terms: how context referents choose their antecedents). I will say that both for modal subordination cases in general and for anankastic readings in particular, this has to do with context, world knowledge and plausibility. At the beginning of this thesis, we discussed sentences that superficially looked very much like our anankastic ones, but still suggested a canonical interpretation of the modal (55). Although it is possible to have an anankastic reading here, for various reasons discussed in Section 2.1.3, the canonical interpretation is much more prominent. Crucially, when considering the discourse version of this example, we can see that an interpretation with modal subordination is equally degraded: in (215), the pronoun is much more likely to be interpreted as referring to a specific juvenile offender than to be interpreted as an E-type pronoun.

- (55) Die FAZ sucht eine jugendliche Straftäterin, die gemeinnützige Arbeit leisten muss.  
 the FAZ seeks a juvenile offender who community service perform must  
*‘The FAZ is looking for a juvenile offender who must perform community service.’*
- (215) Die FAZ sucht eine jugendliche Straftäterin. Sie muss gemeinnützige Arbeit leisten.  
 the FAZ seeks a juvenile offender she must community service perform  
*‘The FAZ is looking for a juvenile offender who must perform community service.’*

By treating appositives with intensional anchors as an instance of modal subordination, we can account for the parallels between appositive relative pronouns and discourse anaphors and the theoretical challenges they both pose. However, the framework we use to analyze the data is not able to capture the specific features that are distinctive for the anankastic reading in appositive relative clauses.

### 6.3 Conclusion

In this section, I have focused on developing an analysis for the whole spectrum of data that we discussed in the descriptive part at the beginning of this thesis. The analysis includes a variety of examples with different modals and attitudes as well as

two independent accounts, one for the restrictive and one for the appositive version of the anankastic reading, since we argued that both of them are available. My restrictive approach to the anankastic data is very close to a conservative analysis. The final restrictive analysis features a stacked operator structure and a fine-grained Kratzer-style modal semantics; the anaphoric interpretation of the modal is represented by an anaphoric ordering source that is able to pick up the goals, desires, etc. that also determine the matrix attitude. In this respect, our analysis deviates from a conservative approach. Additionally, I argued for a historical modal base in order to avoid problems of cross-identification and to account for attitude-dependent content in the relative clause.

For the appositive version, I followed an idea proposed in Sells (1985) concerning similar but extensional data, which is based on the observation that discourse anaphors have similar features to relative pronouns in appositive relative clauses (see Section 3.1.2 and Sells (1985), Busch and Schumann (2016)). Because of the parallelism between our data and Sells' data, and the parallelism between our data and the discourse phenomenon of modal subordination, we decided to treat the appositive version of our data as an instance of modal subordination. Hence, an analysis of modal subordination should be transferable to our relative clauses in their appositive variant. For our final analysis, we chose Frank's (1997) ADRT-approach to modal subordination, which allows us to capture the anaphoric behavior of the embedded modal. However, as it turns out, anaphoricity in appositive or discourse data is nothing unusual, and it is not the key ingredient that makes the reading of interest to us special. The fact that Frank's framework is able to capture anaphoricity in general, but not anankasticity in particular, proved that we are indeed dealing with a specific kind of anaphoricity in our anankastic data.

However, we were left undecided as to whether anankasticity in appositives necessarily has to be captured in an appositive analysis since we are not sure if its peculiar feature (which is a certain form of restrictiveness) is actually truth-conditionally relevant.

## Epilogue

In this thesis, I discussed an unusual reading that appears in attitude sentences containing an object-modifying modalized relative clause. This reading is characterized by an anaphoric link between the matrix attitude and the modal inside the relative clause which results in a reading we described with the term *anankastic*. The starting point of the discussion was an observation concerning the paraphrasability of the main data with two unexpected paraphrases. I introduced this enigma as *Zimmermann's puzzle*.

- (1) Die EZB sucht einen Juristen, der EU-Bürger sein soll.  
the ECB seeks a lawyer who EU-citizen be should  
'The ECB is looking for a lawyer who should be an EU-citizen.'
- (2) Die EZB sucht einen Juristen, der EU-Bürger ist.  
the ECB seeks a lawyer who EU-citizen is  
'The ECB is looking for a lawyer who is an EU-citizen.'
- (3) Die EZB sucht einen Juristen. Er soll EU-Bürger sein.  
the ECB seeks a lawyer he should EU-citizen be  
'The ECB is looking for a lawyer. He should be an EU-citizen.'

The paraphrases in (2) and (3) raise two main questions which were then investigated in a thorough data discussion. The questions concerned first the semantic contribution of the embedded modal, and second, the ambiguous status of the relative clause, which shows restrictive and appositive features while appearing to display the same reading.

In the course of the discussion, I examined a whole range of German data, discussed the distribution of the phenomenon, and was able to answer both main questions raised by Zimmermann's puzzle. As the conclusion to this thesis, I will illustrate all the relevant findings of our discussion of this phenomenon on the basis of the three examples, and show why the different constructions in these cases result in the same or at least a very similar interpretation.

In Section 2.1, we identified several features that set the sentences with the modal apart from their modal-free counterparts. These features are repeated below:

- The modal is necessary in relative clauses with an attitude-dependent interpretation (see Section 2.1.1).

- The modal is necessary to avoid specific types of third readings and to express intent (see Section 2.1.2).
- The modal is relevant to affect the quantification over possible worlds in cases in which the modal strength does not match the universal quantification expressing the attitude (see Section 2.1.3).

The first feature of the list cannot be detected in (1). This is because world knowledge rules out that the complement of the modal inside the relative clause is attitude-dependent: the characteristic of a lawyer as being an EU-citizen is not dependent or affected by someone's search. The second feature in the list could make a difference between the reading of (1) and its modal-free counterpart in (2). However, the suggested context that fits both sentences makes it unlikely for the relative clause in (2) to be interpreted with a third reading. Clearly, the last feature does not play a role in the sentence in (1) since this example contains a necessity modal, which translates to a universal quantifier, the same as the attitude. Because none of these three features that are distinctive for the semantic contribution of the modal play a role in the original examples, as a result, both sentences come out with the same reading.

A similar observation can be made when addressing the second main question, the ambiguity of the relative clause. In Section 3.3, we discussed a distinctive feature of appositivity that differentiates the appositive interpretation from the restrictive one: the maximizing effect of the appositive relative pronoun, which in the case of a singular head noun leads to a uniqueness condition. This feature makes it possible to distinguish the appositive reading from the restrictive one. In the case of (1), it comes out in a context where it is established that the ECB is looking for more than just one lawyer. In such a scenario, the appositive interpretation and the discourse alternative are no longer available. However, if it is not established that the ECB is looking for several lawyers, both the restrictive and the appositive interpretation are available.

There is also another important difference between restrictive and appositive relative clauses in intensional contexts which we discussed in Section 3.4. Taking a sentence with a search-verb in matrix position as an example, the object-modifying restrictive relative clause makes a statement about the searched-for object, whereas the object-modifying appositive relative clause makes a statement about the found object. However, in an anankastic reading, this difference might not be truth-conditionally

significant.

In Section 5, we tried to put the phenomenon in a broader semantic context by comparing it to other phenomena involving anaphoric modality. This investigation showed us that anaphoric modality comes in several varieties, which function very differently. Although in the beginning, our data showed more similarity to data featuring modal concord or embedded epistemics, in the end, we believed that there is a greater semantic relatedness between our data and anankastic conditionals. We identified the reading in question in our data as a reading featuring anaphoric modality which results in an anankastic interpretation of the sentence, and we tried to identify the characteristics of an anankastic interpretation by comparing anankastic conditionals to our sentences with anankastic relatives. We concluded that anankasticity specifically concerns anaphoricity of prioritizing modals. However, we also saw in Section 6.2 that anaphoricity of prioritizing modals in discourse data or appositive data does not necessarily lead to an anankastic interpretation.

I've shown in this thesis that the peculiar observation that three sentence constructions all lead to the same reading turns out to be the result of a number of independent features which can be explained and analyzed in an almost conservative manner. I have proposed both a restrictive and an appositive analysis for the data, which both more or less follow conservative, uncontroversial paths. The analyses I have suggested are able to account for many different examples we discussed in this thesis. The main result of our enterprise is that – although *Zimmermann's puzzle* displays very unexpected language behavior – the anaphoricity in our data is not so peculiar and can be captured in a quite conservative way. The biggest achievement of this thesis, however, is that we managed to show that a careful semantic investigation of a wide range of data is able to explain away the confusing problems and questions raised by *Zimmermann's puzzle*.

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