Present counterfactuals and the indicative-subjunctive divide[1]

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Abstract. This paper aims to add to the longstanding debate on the relation between subjunctive and indicative mood in conditional sentences. In doing so, the theoretical range is narrowed down to three options, each of which takes at least one of the two moods to be presuppositional. Based on an experiment reported in (Wimmer, 2020), we take a few steps towards a competition-based analysis on which the subjunctive is vacuous (Schlenker, 2005; Leahy, 2011, 2018), contrary to its morphological markedness.

Keywords: mood, conditionals, presuppositions

1. Introduction

A conditional antecedent in the subjunctive mood is often implied to be false when its time of evaluation is the speech time, i.e. the present. Mood and tense conspire to deliver what Iatridou (2000) calls a *present counterfactual*. The following example from English is a case in point; p stands for the antecedent proposition.[2]

(1) If she were sleeping right now, she would be missing the lunar eclipse.
$\rightsquigarrow$ she is not sleeping $\neg p$

By contrast, an indicative counterpart to (1) implies p to be *uncertain*, but by no means false. Put less specifically, p is implied to be *possible*, $\Diamond p$:

(2) If she is sleeping right now, she is missing the lunar eclipse.
$\rightsquigarrow$ she might be sleeping $\Diamond p$

Given these contradictory implications, the two moods can be shown to be in (near-)complementary distribution: For one thing, *disbelief* in p, i.e. the belief in $\neg p$, licenses the subjunctive, but excludes the indicative variant:

(3) She's obviously awake, but if she {were, #is} asleep, she'd be missing the eclipse.

By contrast, contextual *uncertainty* about p licenses the indicative, but does not exclude the

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[2]It is mainly for convenience that we refer to the morphology that comes with counterfactual inferences as 'subjunctive' here. English largely uses past morphology to this end (Iatridou, 2000); von Fintel and Iatridou (2017, 2022) argue for the more neutral term *X-marking*. German, which some of the later discussion in this paper will be based on, happens to be among those languages where X-marking does boil down to subjunctive marking.

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subjunctive as clearly as disbelief excludes the indicative.[3]

(4) I have no idea if she's asleep, but if she {?were, is}, she {?would be, is} missing the eclipse.

This paper aims to add to the vast literature that is available on contrasts such as (1) and (2). We follow Leahy (2018) in concentrating on *antecedent* falsity, even though present counterfactuals typically imply their consequents to be false as well. We also narrow down our explanatory options to the three theories sketched in (5), each of which treats at least one of the two moods as presuppositional. They differ with respect to whether or not both moods presuppose something, and if they do not, with respect to which is the presupposing and which the non-presupposing mood.

Under theory one (T1), each of the two moods presupposes the respective implication witnessed in (1) and (2). The two other theories take only one of the two moods to trigger a presupposition. The respective implication of the non-presupposing counterpart is then seen as an *anti-presupposition* (Chemla, 2008): the pragmatic inference that the presupposing mood's presupposition is not met. These two theories will be referred to as MP1 and MP2, paying debt to the theory *Maximize Presupposition* (MP) originating with Heim (1991).[4]

(5) a. **T1**: both subjunctive and indicative are presuppositional
b. **MP1**: {subj, ind$_{\emptyset}$} vacuous indicative
c. **MP2**: {ind, subj$_{\emptyset}$} vacuous subjunctive

None of these three theories is unprecedented.[5] A version of MP2 in particular has been proposed by Leahy (2011, 2018), in a way also by Schlenker (2005), although Schlenker deals with the French subjunctive, a non-counterfactual mood. Another disclaimer is in place. Unlike many of the inspiring accounts, we limit our empirical range to *present* rather than *past* counterfactuals, where *p* is implied to be false *in the past*:

(6) a. If she had been sleeping at that time, she would have been missing the lunar eclipse.
b. If she was sleeping at that time, she was missing the lunar eclipse.

The term *subjunctive conditional* often appears to be used *pars pro toto* for past counterfactuals like (6a), to the exclusion of present counterfactuals like (1).

This paper is organized as follows. Section 2 provides some theoretical background. Section 3 reports an acceptability rating study on German aimed at a decision between the three theories in (5). The results favor MP2, i.e. a vacuous subjunctive. Section 4 aims to spell out MP2 in

[3]This has also been pointed out to us by Patrick Grosz (pc) with reference to Karawani (2014). In fact, Iatridou (2000) presents sentences like the following as supporting the view that the counterfactuality of subjunctive conditionals is implicated rather than presupposed or asserted:

(i) I don't know if he is rich, but if he were rich, he would be popular with that crowd. (Iatridou 2000: 253)

What is more, our empirical results presented in Section 3 show the subjunctive to do fairly well in uncertainty contexts.

[4]The curly bracket notation grouping lexical items together (here: two different moods) is from Sauerland (2008a). They express that the items in question are assertorically equivalent alternatives ranked differently on a scale of presuppositional strength.

[5]Versions of T1 are held by Schulz (2014) and Portner (1992) as dicussed in von Fintel (1998), a view like MP1 is held by von Fintel (1998), Iatridou (2000) and Grosz (2012).

more detail, taking into account that the German past subjunctive transparently derives from the past tense. Section 5 concludes.

2. Theory

To make especially the second and the third among the three theories under comparison more accessible, Subsection 2.1 provides a minimal background on *Maximize Presupposition*, henceforth MP, to be skipped by the informed reader. With this background in place, we return to the three different theories represented in (5) in Subsection 2.2.

2.1. *Maximize Presupposition*

MP was originally considered by Heim (1991) to capture the difference between definite and indefinite articles. It has since been elaborated on considerably.[6] We start with the original motivation, consisting in contrasts between the definite and indefinite article such as the following:

(7) a. {?A/The} weight of our tent is below 2 kg. ≈ Heim (1991)
b. {?A/The} sun is shining.

The definite implies *uniqueness*: that our tent has a unique weight, and that there is just a single sun. This matches default assumptions about the way things are, so the definite works fine in (7). The indefinite, by contrast, implies *anti-uniqueness* [i.e. additivity] in (7) (Bade and Schwarz, 2019): the rather problematic inference that our tent has more than one weight etc. This obviously violates said default assumptions, hence leads to the infelicities seen in (7).

To entertain MP is to take the definite to *presuppose* uniqueness, and the indefinite to presuppose nothing at all. Given this presuppositional imbalance, the two are taken to *compete* with each other on a scale of presuppositional strength, in close analogy to the so-called *Horn scales* evoked to derive scalar implicatures:

(8) $\{a_{\emptyset}, \text{the}\}$

The indefinite's anti-uniqueness inference (if it arises) then just comes *ex negativo* from the speaker's *not* having used the definite: from not presupposing uniqueness. Given (8), a pragmatic reasoning process involving several steps is triggered, explored in detail by Chemla (2008). Crucially for our purposes though, with the right assumptions in place, the use of the indefinite (the weaker competitor) anti-presupposes the negation of the definite (the stronger competitor). The guiding principle for drawing this anti-presupposition is MP, which is explicitly inspired by the Gricean Maxim of Quantity. An informal version of MP goes roughly like this:[7]

[6] Relevant work on MP includes, but is far from limited to, Chemla (2008) and Sauerland (2008a).

[7] The original German formulation by Heim (1991) goes like this:

> In Äußerungssituationen, wo es bereits bekannt ist, dass die Präsupposition von [[das P] Q] erfüllt ist, ist es verboten, [[ein P] Q] zu äußern. ≈ Heim (1991): 515
> 'In utterance situations in which it is already known that the presupposition of [[the P] Q] is satisfied, it is forbidden to utter [[a P] Q].'

(9) *Maximize Presupposition*
≈ Make your contribution presuppose as much as context allows you to.

This formulation, paired with the scale in (8), gives rise to the following inference pattern. To use the weaker indefinite is to presuppose less than one could have, given the range of expressions available. To use the weaker indefinite while context licenses the stronger definite is to violate MP. The infelicitous uses of the indefinite in (7) can be seen to be just that: default assumptions automatically license the stronger competitor, so not to use it is to violate (9).

Analogous reasoning has been extended to a whole range of other phenomena, including the plural-singular distinction and, crucially for the purposes of the present paper, the distinction between past and present (Sauerland, 2002), subjunctive and indicative (Schlenker, 2005; Leahy, 2011, 2018).

2.2. The three theories, again

We can now take a closer look at the three theories from the introduction, repeated here for convenience:

(10) a. **T1**: both subjunctive and indicative are presuppositional
b. **MP1**: {subj, $\text{ind}_{\emptyset}$}
c. **MP2**: {$\text{subj}_{\emptyset}$, ind}

The type of examples under investigation are present counterfactuals vs. indicatives:

(11) If she {were, is} sleeping right now, she {would be, is} missing the lunar eclipse.
$\rightsquigarrow$ she {is not, might be} asleep $\{\neg, \Diamond\}p$

On a simplistic construal of T1, one may take each type of mood (granted English has mood in the first place) as presupposing exactly what it implies in (11). Under this assumption, subjunctive marking presupposes the antecedent *p*'s falsity, and indicative marking *p*'s possibility. Mainly for consistency with what is to follow, we capture *p*'s falsity as (speaker) *disbelief* in *p*, following Grosz (2012)'s working semantics of subjunctive mood. This is equivalent with *p*'s (doxastic) *impossibility*.[8]

(12) **T1**, simple
subj(p) presupposes *p* to be held impossible
ind(p) presupposes *p* to be held possible

With theories MP1 and MP2 from (10), MP enters the scene. Under MP1, the subjunctive is presuppositional, while the indicative presupposes nothing. This is in line with morphological markedness, cf. Grosz (2012: 181, fn. 4): the subjunctive is morphologically marked with respect to the indicative, so it is straightforward for it to be semantically marked as well.[9]

[8]Theories taking subjunctive marking to strictly presuppose antecedent falsity seem rare to find, given the early disentanglement between subjunctivehood and counterfactuality by Anderson (1951). But Zakkou (2019) provides arguments against the disentanglement.
[9]For work on semantic markedness, cf. Sauerland (2008b).

Keeping the subjunctive presupposition from T1, the subjunctive is still taken to presuppose *p*'s impossibility.

(13) **MP1**, simple
subj(p) presupposes *p* to be held impossible
ind(p) presupposes Ø

The indicative, being the subjunctive's vacuous competitor, is then taken to *anti-presuppose* the subjunctive presupposition's negation: *p*'s possibility.

Under MP2, it is the other way around: the indicative is presuppositional, the subjunctive is not. So morphological and semantic markedness become each other's reversals. The indicative keeps, and the subjunctive loses, the presuppositions it has according to T1.

(14) **MP2**
subj(p) presupposes Ø
ind(p) presupposes *p* to be held possible

The subjunctive, being the one that is seen as vacuous under MP2, anti-presupposes the negation of the indicative presupposition: *p*'s impossibility, i.e. speaker disbelief in *p*. This is close to what Leahy (2011, 2018) proposes. As already anticipated, we will flesh out MP2 some more in Section 4, based on the empirical results reported in the next section. Our anti-presupposition will not deliver, but serve as a basis for, the disbelief inference.

3. Experiment

In order to decide on the three presented accounts of presuppositions and anti-presuppositions in conditionals, T1, MP1 and MP2, we ran an acceptability study. In this study, participants judged the acceptability of a target conditional that was uttered in a particular context. The object language was German, whose subjunctive conditionals are marked with the ***Konjunktiv 2*** (K2), a kind of past subjunctive. We advocate the general hypothesis shared by all three accounts that a K2-conditional (a conditional whose antecedent verb is K2-marked) fits better with a disbelief context than with an uncertainty context, whereas an indicative (IND) conditional (whose antecedent verb is IND-marked) fits better with an uncertainty context than with a disbelief context. We further expect a conditional to be judged more acceptable if presented in a context that it fits better with, compared to one that it fits worse with. We will formulate the specific predictions made by the three accounts in terms of *violation costs*. By violation costs, we mean the drop in acceptability of a conditional presented in a non-fitting context rather than a fitting one. We further assume violation costs to be generally higher when a presupposition is violated than when an anti-presupposition is violated.

3.1. Method

Design. We implemented a 2×2 design by crossing the two two-level factors MOOD (K2 vs. IND) and CONTEXT (UN = uncertainty vs. DB = disbelief), with both factors being within-factors for participants and items.

Participants. 75 native speakers of German were recruited via Prolific for participation in an online study hosted by the platform OnExp. 66 participants made less than 15% errors in responding to control questions and were included in the analysis.

Material. There were 36 experimental items. All of them consisted of a context composed of a couple of sentences followed by the target conditional that was uttered by one of the persons introduced in the context. The two versions of the target conditional, K2 and IND, are illustrated in (15).[10] The consequent's verbal mood was always the same as that of the antecedent.

(15) a. Wenn Heinrich gerade fliegen würde, würde er in Gefahr schweben.
if Henry just fly will.K2 would he in danger hover
b. Wenn Heinrich gerade fliegt, schwebt er in Gefahr.
if Henry just fly.IND hover he in danger

An English translation of the two slightly trimmed context variants is shown in (16). The context preceding the target conditional introduces the speaker uttering the target conditional as well as this utterance's addressee. Moreover, the context induces either the speaker's uncertainty about the truth of the target conditional's antecedent, (16a), or it induces speaker disbelief in the antecedent's truth, i.e. the speaker believes the antecedent to be false, (16b). The addressee shares the belief of the speaker; at least nothing suggests the contrary.

(16) Bettina and Max own a parrot named Henry, whom they let fly around freely. [...] For today, a strong thunderstorm has been forecast.
a. **uncertainty,** UC
B and M wonder where Henry is. Searching the apartment for him, B says to M:
b. **disbelief,** DB
That's why B and M are relieved to find Henry on the sofa. B says to M:

The variants of the experimental items were assigned to nine randomized lists according to a modified Latin Square Design such that each list contained sixteen of the experimental items with four of them in each of the four conditions of the design. In addition, each list contained eight of the experimental items equipped with a belief context on which we do not report in this paper. Finally, 24 fillers were added to the nine lists.

Procedure. The experiment was run online. Sessions began with four practice trials, followed by the 48 items in randomized order. Context and target conditional of an item were presented simultaneously with the target visually highlighted by a light grey background. After carefully reading the item, participants judged how acceptable they felt the target utterance to be in the described context on a visible scale from "7" (*completely acceptable*) to "1" (*not at all acceptable*). At the end of each item, participants responded to a control question about the item's content by pressing a YES or a NO button.

[10]Note that (15a) contains a 'periphrastic' subjunctive of the form 'would + verb', rather than a synthetic one of the form 'verb.K2'. Many of our K2-items are periphrastic in this sense. Thanks to the editors for pointing this out; see Section 4.1 for some discussion.

3.2. Results and Discussion

The statistical analysis is based on 66 participants who responded correctly to the control questions in at least 85 % of the cases. The mean judgments in the four conditions are shown in Figure 1. For each participant we computed the violation costs separately for the two moods, K2 and IND, by subtracting the participant's score for the respective target conditional when presented in the mismatching context from the score when presented in the matching context. As can be seen in Figure 1, the violation costs for the indicative mood (white circles: 2.79) are considerably higher than those for the subjunctive (black circles: 0.54). This difference is significant, as confirmed by t-tests for dependent samples [$t_1(65) = 8.23$, $p < .001$; $t_2(35) = 6.84$, $p < .001$].

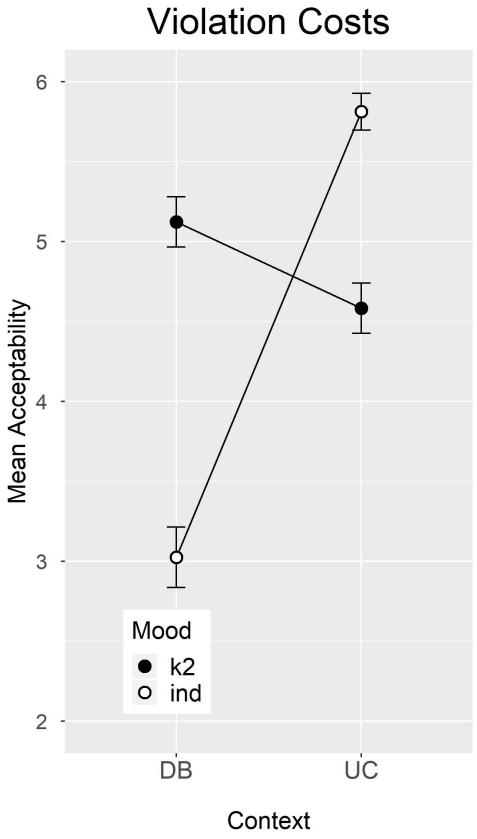


Figure 1: Mean acceptability judgments in the four conditions.

Regarding our central research question, namely, which of the three theories (T1, MP1 or MP2) accounts for the observed violation costs, the outcome is clear. According to our assumptions, the reliably higher violation costs for IND compared to K2 are explained by the indicative being associated with a genuine presupposition, the violation of which leads to a severe drop in acceptability. The subjunctive, by contrast, is not associated with a presupposition but with an anti-presupposition derived from the indicative presupposition. An anti-presuppositional violation is not as severe as a presuppositional one. We hence observe a strong difference in the respective violation costs for IND and K2. In other words, the experimental results corroborate MP2.

4. Theoretical implications

The purpose of this section is to flesh out MP2 a bit, given the evidence in its favor. For English and German, MP2 also has implications for a theory of the past tense. The latter is among the *grammatical ingredients of counterfactuality* (Iatridou, 2000) in both languages. This may be less obvious for German than for English. In English, 'subjunctive' equals past marking, a few exceptions taken aside. While the German past subjunctive (K2) is not always fully identical with the past tense, its morphological pastness is always transparent. This is shown in Subsection 4.1. Based on a review of some previous work on the indicative-subjunctive divide in Section 4.2, Subsection 4.3 discusses an anti-presupposition for the subjunctive. From this anti-presupposition, Subsection 4.4 pragmatically derives antecedent falsity. Subsection 4.5, finally, considers the prospects of treating both the subjunctive and the past tense as vacuous.

4.1. The subjunctive's pastness

The German K2 is called *past subjunctive* for a reason: the past tense shines through any of its forms, at least as long as we limit our attention to *synthetic* marking. The latter directly affects the verbal stem, either via suffigation, or even via modification of the stem itself. More precisely, a given synthetic K2-form of a German verb V at least strongly resembles V's corresponding past form, if it is not even identical with it. As one might expect, this identity is far more pervasive in English than in German, given the lack of dedicated subjunctive mood in English.

We begin with a case of pure identity between past and K2. In (17a), we have the third person singular past tense of *lächeln* 'to smile'. In (17b), the very same form is used in a conditional antecedent. But here, it would be classified as K2, number and person remaining equal.

(17) a. Sie lächelte$_{\text{past}}$.
she smiled.

b. Wenn sie lächelte$_{\text{K2}}$, wäre er froh.
if she smiled were he glad

There are different degrees of morphological resemblance, depending on the verbal stem involved. But no matter how great the deviation, the pastness of K2 remains highly transparent. Table 1 distinguishes three degrees of morphological deviation, increasing from left to right. Again, third person singular forms are compared.

Table 1: Degrees of morphological deviation between past and K2

	K2 **= past**	K2**=(past+*e*)** or	**vowel shift**	**combined**
Past	lächelte	schlief	brachte	fl**o**g
K2	lächelte	schlief**+e**	brächte	fl**ö**g**+e**
	'smiled'	'slept'	'brought'	'flew'

The first column in Table 1 represents the case of full identity seen in (17). The second column distinguishes two single steps from past to K2: suffigation of the verbal stem with the vowel *-e*

and stem-affecting vowel shift (*Umlautung*). The third column shows a case in which the K2 combines both steps from the second column, thus delivering the highest degree of deviation.

Taking the K2's morphological pastness at face value, the presuppositional relationship between subj(unctive) and ind(icative) generalizes to the relationship between past and present:

(18) $\langle \text{subj,ind} \rangle \equiv \langle \text{past,pres} \rangle$

In other words, we will henceforth see the subjunctive as a *modal* past, and the indicative as a *modal* present.

From (18), the assumed vacuity of the subjunctive translates into that of the past, and the presuppositionality of the indicative into that of the present:

(19) $\{\text{past}_{\emptyset}, \text{pres}\}$

Now, this view is the exact opposite of the relation between past and present as conceived by Sauerland (2002) – "the present tense is vacuous"–, but the past presupposes (temporal) precedence.[11]

(20) $\{\text{past,pres}_{\emptyset}\}$ (Sauerland, 2002)

Sauerland's view does preserve the morphological markedness relations between the two tenses, unlike (19).

There is a possible concern about (19): the K2's pastness is less obvious if we move away from *synthetic*, and look at *periphrastic* marking instead. The synthetic K2 attaches to the verbal stem, if it does not even alter it. The periphrastic K2 follows the same pattern as English 'would + infinitive', i.e. the lexical verb is left in its infinitival form, governed by the modal auxiliary *würde* 'would':

(21) periphrastic K2: *würde* + V+inf

The antecedents of the following two conditionals (both present counterfactuals) vary along the {periphrastic, synthetic} dimension:

(22) a. Wenn dieser Vogel schneller {fliegen würde, flöge}, entkäme er jeder Katze.
if this bird faster {fly would, fly.K2} escape.K2 he every cat

b. Wenn sie {schlafen würde, schliefe}, würde sie die Mondfinsternis versäumen.
if she {sleep would, sleep.K2} would she the moon.eclipse miss

In present-day German, there is usually a preference for the periphrastic variant, being conceivably easier to build.[12] The synthetic variant often has something artificial to it. This contrast is

[11] This view is in a way foreshadowed in Iatridou (2000). With a more holistic theory of past and present in mind, she considers the option for the present tense to be semantically vacuous, and purely definable in terms of *not* being the past. The "exclusion relationship" figuring in the following quote is part of her definition of the past:

> The present tense ... would then just indicate the absence of the exclusion relationship we have been talking about. (Iatridou, 2000: 253)

[12] The periphrastic K2 has more syllables, which is a potential disadvantage in terms of communicative efficacy. But it is more economical in other respects. For example, it requires a speaker to keep just a single inflectional paradigm in mind – namely that for *würde*. After all, the verb to be K2-marked remains in the infinitive.

noticeable in (22). In order for this difference in style not to become a confounding factor, the majority of our experiment's K2-marked targets are periphrastic.[13]

At first glance, the periphrastic K2 seems less obviously past-based than the synthetic one. If there should turn out to be no clear connection between the periphrastic K2 and the past tense, this would limit the empirical scope of the following discussion considerably. One may even take the differences noted above as an indication that the two sub-forms are not reducible to the same analysis. However, the pastness of the auxiliary *würde* 'would' is as transparent as that of its English counterpart, sometimes taken to be the past variant (albeit fossilized) of a modal *will* or *woll*: *würde* is clearly recognizable as the past form of *werden* (i.e. *wurde*) plus vowel shift ($u \rightarrow \ddot{u}$). Accordingly, Grønn and von Stechow (2011) endow *würde* with a (morphological) past feature. We conclude it to be safe to see morphological pastness in all kinds of K2-uses, be they periphrastic or synthetic.

In the following three subsections, we are going to put the subjunctive's pastness aside for a moment and tackle the question what the indicative presupposes and what the subjunctive anti-presupposes. It is in Subsection 4.5 that present and past tense will be brought into play again.

4.2. Previous work on the indicative-subjunctive divide

In what follows, we will see conditional constructions in light of what von Fintel and Heim (2011) refer to as the Kratzerian *restrictor view*, sketched in (23): an antecedent *p* restricts a universal quantifier over possible worlds, □, prior to □'s application to the consequent proposition *q*. As a result, *q* is ascribed to a set of worlds restricted to *p*-worlds.

(23) $[\![\text{if p, q}]\!] = \Box\text{p(q)}$
= for all *p*-worlds *w*: *q* is true in *w*

In addition to *p*, there are other, silent restrictions on □. Work in the wake of Stalnaker (1975), such as von Fintel (1998), takes the indicative-subjunctive divide to reflect differences in these restrictions. von Fintel (1998)'s implication for the indicative relates □'s domain of quantification to the Stalnakerian *context set*: that set of worlds in which each proposition from the common ground is true. The common ground consists of all the current presuppositions: those propositions mutually accepted as true by the interlocutors.[14]

(24) Stalnaker's/von Fintel's implication for the indicative (modal present):
The domain of quantification *d* is a subset of the context set *c*, $d \subseteq c$.

[13]This is not to deny that there are exceptions. Synthetic marking may be preferable or even necessary for certain readings to arise. A prominent case is the phenomenon of *weak necessity* modals such as *should* or *ought*, decomposable into a strong necessity modal like *must* + 'subjunctive' marking. Compare, for instance, von Fintel and Iatridou (2008), Matthewson and Truckenbrodt (2018) for relevant discussion.

[14]The term *implication* is used neutrally in (24). At least under von Fintel (1998)'s account, the indicative, unlike the subjunctive, is a vacuous "default". (24) is at least close to entailing Leahy (2011, 2018)'s existential presupposition for the indicative: that an indicative conditional's antecedent *p* is epistemically possible. To intersect *p* with *q* is to say that *p* is possible, according to what is in the common ground. Epistemic possibility does not follow, however, given that interlocutors may have false presuppositions, cf. also Mackay (2019).

The subjunctive, by contrast, is taken to signal, if not presuppose, that *d* is *not* a subset of *c,* or, put more cautiously by Stalnaker, that *d* "*may* [be] outside of the context set" (Stalnaker 1976: 145; own emphasis). In this way, the subjunctive becomes a [presuppositional] device to signal presupposition suspension, taking us to possible worlds in which at least one presupposition currently entertained does not obtain.

In spelling out a modal past analysis, Mackay (2019) builds on these proposals, but modifies them in certain ways. One of his goals is to fix certain issues he took with previous modal past analyses in Mackay (2015), notably Iatridou (2000)'s and Schulz (2014)'s. These analyses rule out the possibility for the actual world to be among the worlds quantified over in subjunctive conditionals.[15] Mackay's own modal past view includes what von Fintel and Iatridou (2022) refer to as *domain widening*: some but not all presuppositions are suspended. *d* becomes a *superset* of *q* in this way. The indicative, by contrast, comes with a (default) presupposition of identity between *d* and *c*.

This was actually a simplifying distortion of Mackay's view. Another ingredient central not only to his, but also to Leahy's analysis is *factivity*. Indicative and subjunctive are not about the common ground simpliciter, but the *factive* common ground: those presuppositions that are also true. So under a Mackay-style analysis, the specific set relation each mood presupposes is between *d* and (what one may call) the factive context set (a superset of *c*, granted that there are false presuppositions). This is to ensure the falsity of a conditional *if p,q* in cases in which speakers wrongly presuppose *p* to make *q* true. It is mainly for simplicity that we will be leaving factivity aside, i.e. that we will take the presupposition in (24) as a starting point to derive an anti-presupposition for the subjunctive (modal past).[16]

4.3. Deriving the anti-presupposition

As the reader may have expected, we now take the implication from (24) to be an actual presupposition, the anti-presupposition for modal past would be *non-subsethood* between *d* and *c.* This is exactly the meaning von Fintel (1998) assigns to the subjunctive – with the difference that he takes it to be presupposed rather than anti-presupposed.

(25) Anti-presupposition for modal past, based on (24):
d is not a subset of *c, d* $\not\subseteq$ *c*.

[15] Mackay (2015) and Leahy (2018) both take issue with Iatridou (2000)'s view that modal past excludes the actual world from those possible worlds the antecedent is ascribed to. Leahy in particular notes this exclusion to come with an invalidation of *modus ponens*.

[16] As far as we can see, a subjectivist conception of truth and falsity may make it unnecessary to bring factivity into play. If A and B wrongly presuppose *p* to verify *q*, and A utters *if p, q*, then what A says is true in a *subjective* sense, relativized to the common ground that holds between A and B at the time of utterance, irrespective of what is in fact the case. If we, knowing that *p* does not in fact make *q* true, judge *if p, q* to be false, we do so given our belief that *p* does not make *q* true. In other words, the seemingly objective evaluation of *if p, q* as false is belief-sensitive as well. It is just that this (shared) belief happens to be correct, which elevates it to knowledge, but *if p, q* is not rendered false until this elevated state of belief is entertained.

This opens up various possibilities, including

1. d being a superset of c
2. d and q having no worlds in common

Option 1 is what von Fintel and Iatridou (2022) refer to as *domain widening*, a version of which is entertained by Mackay (2019). The non-intersective option in 2 is reminiscent of Iatridou (2000)'s analysis, according to which the actual world is excluded from the domain of quantification (the *topic worlds* in her terminology). Opening up this possibility, the analysis reflected by (25) is potentially vulnerable to the same objections as those brought up in response to Iatridou's modal past analysis, compare footnote 15. While we cannot do justice to these objections here, it seems to us that some of them no longer apply to (25). Mackay (2015) makes the point that Iatridou's exclusion analysis incorrectly trivializes certain subjunctive conditionals. But this trivialization no longer arises under (25), where exclusion from the context set, rather than being hardwired in the semantics, is a defeasible pragmatic inference. And even if the inference is drawn, said exclusion is still just a possibility among those opened up by (25).

In any case, (25) entails worlds "outside of the context set" to be brought into play, in line with Stalnaker's original idea. And as such, we see it as boiling down to the following.

(26) Entailment of (25):
Some d-worlds are not in c.

The version in (26) is what we will be working with in deriving an implication that subjunctive conditionals, including present counterfactuals, tend to come with: *antecedent falsity*. We will be using this term in the subjective sense of (shared) *disbelief*, in line with some of the considerations above.

4.4. Antecedent falsity

In tackling antecedent falsity, we start by observing that from (26), it follows that there is some proposition ϕ that is true throughout c, but false in at least some of the worlds in d:

(27) Entailment of (26):
Some ϕ that is true throughout q is false in some d-world.

This entailment lends itself as a basis for counterfactual reasoning, variants of which have been proposed by Iatridou (2000), Leahy (2011, 2018) and von Prince (2019). Each of the disjuncts brings worlds into d that are outside c. Each of these new worlds distinguishes itself from q in that there is at least one proposition ϕ that is true throughout c, but false in at least some of the d-worlds. One single such ϕ can make a difference. When a conditional with a subjunctive-marked antecedent is uttered, *if p-subj, q*, it might be tempting to identify ϕ as $\neg p$, for lack of a better alternative. Take the context to already entail p to be false, i.e. $\neg p$ to obtain throughout c. In uttering *if p-subj*, the speaker evokes, i.e. *anti-presupposes*, a departure from c. The reason for her to do so can be readily identified as p being false in the context: in wanting to talk about p-worlds, worlds outside q must be considered. Put differently, it is easy in this case to identify ϕ as $\neg p$, and, consequently, the $\neg\phi$-worlds brought into play by the subjunctive as

($\neg\neg$)p-worlds.

To be sure, the identification ϕ=$\neg p$ can still be contextually overridden. If context establishes another proposition p′ to be false, the latter becomes a plausible candidate for ϕ to be identified with. This is arguably what is going on in the following sequence of conditionals from von Fintel (1998), treated by Leahy (2011) and Zakkou (2019) as instances of *modal subordination* (Roberts, 1989):

(28) If Polly had come to dinner tonight, we would have had a great time. If Uli had made the same amount of food that he in fact made, she would have eaten most of it.

The antecedent of the second conditional in (28) is subjunctive-marked, but trivially true. In other words, ϕ does not get identified with the negation of [$_p$ Uli made the amount of food that he made], as this proposition must hold throughout c. What ϕ rather seems to get identified with is the negation of the antecedent of the first conditional, [$_{p'}$ that Polly came to dinner]. To be more precise, p' probably restricts the second conditional's silent necessity modal as well, i.e. p is to be read as being silently conjoined with p'. The conjunction [p & p'] *is* false, but this is not because of p.

4.5. Covering temporal uses[17]

A pressing question to ask is to which extent the view outlined above generalizes from *modal* to *temporal* past and present. After all, it would be ideal to have an abstract template that covers both variants. This is what the appeal of previous modal past accounts in the wake of Iatridou (2000) consists in: there is a basic relation between two [deictic] entities, and a mere shift in semantic type is all it takes to get us from one of the two variants to the other. A template for the view considered above looks as follows:

(29) a. present/indicative presupposes $x \subseteq y$
b. past/subjunctive anti-presupposes $x \not\subseteq y$

There is no straightforward way in which (29) applies to temporal past and present, cf. Mackay (2019) for related discussion. If x is the reference time t and y is the speech time t*, we get (non-)subsethood of t with respect to t*. Even if we think of times as intervals, hence as sets, it is not obvious why the present should allow t to be (just) contained in t*. Mackay (2019) presents a solution to a similar transfer issue. Following work by Katrin Schulz, we are going to consider a different option here.

Schulz (2014, 2015) works with an idea that is present also in work by Schlenker (2003, 2005): tense and mood are treated as imposing a presupposition on a variable of a simple type. Tense constrains a time-denoting variable, mood constrains a world-denoting one. Under this analysis, the moods themselves place no constraints on the domain of $\Box$, the conditional's necessity modal. The restriction arises only indirectly via presupposition projection. So what we see in (29) are only indirect reflections of the actual (anti-)presuppositions.

In getting more explicit, we follow Schulz (2015) in having mood or tense combine with a

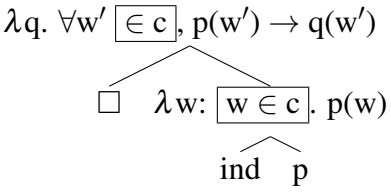
[17]We wish to thank Frank Sode for valuable discussion on this subsection.

proposition *p* and a world *q* or time *t*. In other words, mood is of type *st,st*, and tense of type *it,it*. Mood and tense each place a presupposition on *w/t*. The indicative's world argument is presupposed to be in the context set *c,* (30a). The time argument of the (temporal) present is presupposed to be in the set of those times t' that are no earlier than the speech time t^*, (30b); the set notation is inspired by von Prince (2019).

(30) a. *ind(p)(w)* is true iff *p(w)*, presupposes $q \in c$
b. *pres(p)(t)* is true iff *p(t)*, presupposes $t \in \{t' : t' \geq t^*\}$

The LF-tree below sketches the resulting LF of an indicative antecedent.[18] The indicative scopes between the universal quantifier □ and the antecedent *p*, which serves as the indicative's propositional argument. The presuppositional constraint from (30a) ends up being imposed *on every world in* □*'s domain*. So *d* does end up being contained in *c,* in line with (29a). But this is the result of a compositional interaction between the indicative presupposition and □.

(31)



Based on (30), the anti-presuppositions for subjunctive and (temporal) past come out as in (32): the subjunctive's world argument is anti-presupposed *not* to be in *q*, (32a), and the time argument of temporal present is anti-presupposed *not* to be (later than) the speech time, (32b). In other words, *t* is anti-presupposed to temporally *precede* t^*.

(32) a. *subj(p)(w)* is true iff *p(w)*, presupposes Ø, anti-presupposes $q \notin c$
b. *past(p)(t)* is true iff *p(t)*, presupposes Ø, anti-presupposes $t \notin \{t' : t' \geq t^*\}$

How does (32a), the anti-presupposition for the subjunctive, compositionally interact with □? In other words, what do we predict for an LF like the following, where we have the subjunctive scope directly above the antecedent?

(33) [□ [subj p]] q

If the anti-presupposition projected universally, then each world quantified over by □ would be implied not to be a *c*-world. In other words, □'s domain *d* and *q* would be predicted not to intersect, and we would have the exclusion relationship from Iatridou (2000). This is clearly stronger than what we derived in (26): that *some d*-worlds are not in *c*. However, Sauerland (2008a) shows anti-presuppositions to project *weakly* (existentially) under universal quantifiers. So the projected anti-presupposition we actually derive is just that not all worlds quantified over by □ satisfy the indicative presupposition – in other words, that not all *d*-worlds are also *c*-worlds. And this is exactly what was independently derived in (26).

(34) Weakly projecting anti-presupposition for (33):
For some $q \in d$: $q \notin$ c = (26)

[18] Following Heim and Kratzer (1998), colons introduce presuppositions imposed on preceding arguments.

The unified view of subjunctive and past that we are after encounters another challenge in work by Thomas (2015). Arguing against Sauerland (2002)'s view that the present is vacuous, Thomas shows in passing that the past cannot be vacuous either. The underlying idea is that a vacuous item with a presupposing competitor should be felicitous in a context in which the speaker is uncertain if that competitor's presupposition is met. So if the past presupposes nothing, we should expect a past-tensed sentence *S* to be fine when we do not know for sure if the proposition denoted by *S* holds at a past or at a non-past time. This does not work, as the following examples suggest.

(35) Thomas (2015)-style arguments against a vacuous past
   a. I don't know if John has ever been to Paris, #but he was there today.
   b. John was in Paris this morning *or tonight.

If these are viable objections, they leave us with the rather pessimistic conclusion that a comprehensive theory of a vacuous past, covering modal and temporal uses, is not around the corner. If we wish to keep treating the subjunctive as vacuous, we have to treat it differently from the past tense. Assuming Sauerland (2002)'s view that the present tense is vacuous, we end up with the following asymmetry:

(36) a. $\{\text{subj}_{\emptyset}, \text{ind}\}$
   b. $\{\text{pres}_{\emptyset}, \text{past}\}$

Under (36), past and present, including subjunctive and indicative, compete in presuppositional strength. But while the subjunctive is vacuous under (36a), the past triggers a presupposition under (36b). And even (36) might still constitute an idealization, given Thomas (2015)'s objections to (36b).

To sum up, it seems hard to maintain (36a) and keep a coherent theory of the morphological past. What we are left with at this point is to treat the past as lexically ambiguous between its modal and temporal variants. This certainly cannot be an accidental homophony. But if there is no coherent analysis of the way things are now, a unification of the two forms becomes a task for diachronic semantics. A synchronic ambiguity account seems slightly easier to entertain for German than for English: while the two pasts nearly always share exactly the same form in English, they come apart in German more frequently, as subtle as the deviations were seen to be in Subsection 4.1. Still, one may see these deviations in form as reflecting deviations in meaning.

5. Conclusion

This paper reported empirical evidence in favor of the view that the subjunctive in present counterfactuals is vacuous, a view inspired by Leahy (2011, 2018): the subjunctive was found to incur lower violation costs than the indicative. Based on this finding, we took a few steps towards spelling out the theoretical implications. We ended up with a tension between subjunctive and past, which we hope to be resolved in future, potentially diachronic research.

The starting point for our anti-presuppositional treatment of the subjunctive was to endow the indicative with von Fintel (1998)'s presupposition in (37a): the quantificational domain *d*'s

subsethood with respect to the context set *c*. For the subjunctive, von Fintel (1998)'s presupposition became our anti-presupposition (37b): *d*'s non-subsethood with respect to *c*.

(37) a. the indicative presupposes $d \subseteq c$
b. the subjunctive anti-presupposes $d \not\subseteq c$

The anti-presupposition itself does not deliver antecedent falsity, but merely evokes worlds outside *c,* in line with Stalnaker (1975). We still argued this anti-presupposition to be a fruitful basis for counterfactual reasoning, aimed at identifying a proposition ϕ that is true throughout *c,* but false in relevant *p*-worlds outside it. So on our view, unlike Leahy's, it takes more than one pragmatic step from encountering a subjunctive-marked antecedent *if p-subj* to inferring its falsity.[19] Put schematically:

(38) *if p-subj* $\rightsquigarrow$ anti-presupposition
+ counterfactual reasoning
$\Rightarrow$ antecedent falsity

If this is correct it is even less surprising that subjunctive conditionals do so well under contextual uncertainty, or, put differently, that the subjunctive's violation costs are so low: the antecedent falsity of subjunctive conditionals involves quite a bit of reasoning, contrary to the ease with which this inference is often drawn. This intuitive ease masks an underlying complexity, the further exploration of which we leave to future work.

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[19] This is to ignore for the sake of simplicity that anti-presuppositional reasoning does itself involve several steps, cf. Chemla (2008), Leahy (2011).

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