Competition between the German root modal *sollen* and the imperative[1]

Stefan HINTERWIMMER — *University of Wuppertal*
Lisa MATTHEWSON — *University of British Columbia*
Hubert TRUCKENBRODT — *Leibniz-Zentrum Allgemeine Sprachwissenschaft, Berlin*

Abstract. In this paper we analyse the complementary distribution in German between the imperative–which is performative–and the root modal *sollen* 'be supposed to'–which appears to be anti-performative (Glas, 1984; Diewald, 1999; Hinterwimmer, 2013; Bochnak and Csipak, 2018). We argue that the imperative and root *sollen* share a bouletic meaning (broadly "x wants at t in w for y to do P") but carry opposite requirements on the parameters of this bouletic attitude. The imperative requires $\langle x,y,t,w\rangle = \langle c_{Sp}, c_{Ad}, c_T, c_W\rangle$, i.e. the parameters are identified with the utterance context (Kaplan, 1989). The imperative must express an actual-world speaker request of the addressee. The root modal *sollen* inversely requires $\langle x,y,t,w\rangle \neq \langle c_{Sp}, c_{Ad}, c_T, c_W\rangle$ and is thus prohibited from expressing an actual speaker request of the addressee. We argue that this account is a step ahead relative to earlier accounts of the non-performativity of root *sollen* (Hinterwimmer, 2013; Bochnak and Csipak, 2018). We also compare root *sollen* to the English modal *be supposed to*. We argue that *be supposed to* carries the stronger requirement $\langle x,t,w\rangle \neq \langle c_{Sp}, c_T, c_W\rangle$ that excludes the expression of all actual speaker preferences, whether or not they concern an action by the addressee. We argue against an account in terms of formal competition between the imperative and the modal *sollen*, though we cannot fully exclude such an account.

Keywords: imperatives, root modals, bouletic modality, Maximize Presupposition, speech acts.

1. Introduction

It has been observed by various researchers that the German root modal *sollen* seems to be in complementary distribution with the imperative (Glas, 1984; Diewald, 1999; Hinterwimmer, 2013). To see this, consider the contrast between (1a) and (1b):

(1) [Maria, a doctor who works in a hospital, is drinking coffee with Lisa. Maria gets a text message from her daughter. Surprisingly, the text says:]
   a. # Du **sollst** mir Morphium besorgen.
      you soll me morphine get
      'You are supposed to get me morphine.'
      ≈ 'I want you to get me morphine.'
   b. Besorge mir (bitte) Morphium.
      get me please morphine
      'Please get me morphine.'

[1] We would like to thank the audiences at *SuB* 23 and at the *Non-canonical Imperatives* workshop at ZAS in June 2018 for questions and comments. The contribution of the first author was supported by the Deutsche Forschungsgemeinschaft (DFG) as part of the Collaborative Research Center 1252 *Prominence in Language* at the University of Cologne. The contribution of the second author was supported by the Social Sciences and Humanities Research Council of Canada (grant #435-2016-0381). The contribution of the third author was supported by the German Federal Ministry of Education and Research (BMBF, grant #01UG1411).

Proceedings of Sinn und Bedeutung 23, vol. 1, pp. 507–524. Universitat Autònoma de Barcelona, Bellaterra (Cerdanyola del Vallès).

In the context provided in (1), it would be most awkward for Maria's daughter to send her the message in (1a) with *sollen*. Sending the imperative message in (1b), in contrast, is fine. At the same time, it is entirely natural for Maria to utter a sentence with *sollen* in the context in (2):

(2) [Maria, a doctor in a hospital, gets a surprising text message from her daughter. Maria shows Lisa the text: Look, …]
Ich **soll** ihr Morphium besorgen.
I soll her morphine get
'I'm supposed to get her morphine.'
≈ 'She wants me to get her morphine.'

Crucially, in the case of (2), in contrast to the one in (1), uttering an imperative instead of the sentence with *sollen* would not have been an option – the imperative that comes closest is the one in (3), which has a different meaning than the sentence with *sollen* in (2). While (2) reports a request of Maria's daughter directed at Maria, the imperative in (3) can only be interpreted as a request of Maria directed at her addressee, Lisa.

(3) Besorge ihr (bitte) Morphium.
get her please morphine
'Please get her morphine.'

Similar observations have lead Glas (1984), Diewald (1999) and Hinterwimmer (2013) to propose that *sollen* is anti-performative, while the imperative is performative. In the present paper, we argue for an account along the following lines. While the imperative and *sollen* share the same basic meaning, they are subject to different constraints: The imperative is subject to an origo restriction requiring the speaker to express their preference at the utterance time for the addressee to bring about some state of affairs, and the root modal *sollen* is subject to an anti-origo restriction requiring at least one of the relevant parameters to be distinct from those of the context of utterance. Finally, we compare *sollen* and be *supposed to*, showing that they have similar, but non-identical meanings, with *be supposed to* being subject to a slightly stricter constraint than *sollen*.

The paper is structured as follows. Section 2 provides background concerning the imperative and *sollen*. Section 3 introduces the full range of data to be accounted for and presents our analysis informally. In Section 4, previous analyses are discussed and compared with our proposal. Section 5 provides the formal details of our analysis and introduces a potential alternative account. In Section 6 *sollen* is compared with *be supposed to*, and Section 7 concludes with questions for further research.

2. Background on the imperative and *sollen*

Canonical imperatives are performative: They commit speech acts like commands (as in (4a)), permissions (as in (4b)), requests (as in (4c)) and advice (as in (4d)) (Sadock, 1974; Wilson and Sperber, 1988; Schwager, 2006; Portner, 2007, 2016; Kaufmann, 2012, 2016; Condoravdi and Lauer, 2012; Oikonomou, 2016, a.o.).

(4) a. Turn down the volume!
b. Take some cookies.
c. Bring me tea, please.
d. (A: How do I get to Saarbrücken?) B: Take a regional train.

We follow Han (2000), Schwager (2006), Grosz (2009), Kaufmann (2012), Condoravdi and Lauer (2012) and Oikonomou (2016) in adopting a unified modal analysis of all uses of imperatives. For concreteness, we assume a bouletic analysis along the lines of Condoravdi and Lauer (2012) and Oikonomou (2016), according to which an imperative conveys the speaker's preference for the addressee to bring about some state of affairs. Such an analysis is at first sight in conflict with cases of disinterested advice such as B's answer in (4d): Intuitively, B does not really seem to care whether A takes the regional train to Saarbrücken. Since it is not relevant for current purposes, we will set that issue aside and tentatively follow Condoravdi and Lauer (2012) and Oikonomou (2016) in assuming that a bouletic/preference-based analysis can account for cases of disinterested advice as well.

As a starting point, we assume the strongly simplified denotation in (5) for the imperative, building on Kaufmann (2012), who assumes conditions on the interpretation of the imperative that make reference to Kaplanian contexts of utterance *c*. Its parameters relevant here are the speaker c_{Sp}, the addressee c_{Ad}, the utterance time c_T and the world where the utterance takes place c_W (Kaplan, 1989).

(5) $[\![\text{IMP}]\!]^{c,g} = \lambda P\ [c_{Sp}$ wants $P(c_{Ad})$ at c_T in $c_W]$

According to (5), an imperative can only express a speaker preference directed at the addressee at the utterance time in the utterance world. We assume this to be the basis for the performativity of imperatives.

Let us now turn to the modal verb *sollen*, which does not have a direct counterpart in English (its closest equivalent, *be supposed to,* will be shown to have a slightly different meaning in Section 6). *Sollen* has both root and epistemic uses. On its epistemic uses, *sollen* conveys reportative evidentiality and cannot be used in inferential contexts, as shown by the contrast between (6) and (7).

(6) [Maria tells me that when Paul proposed to her, he even went down on his knees. Later, I tell Karin:]
(Matthewson and Truckenbrodt, 2018:277)
Paul **soll** sogar vor ihr auf die Knie gegangen sein.
Paul soll even before her on the knees gone be
'Paul is supposed to have even gone down on his knees in front of her.'

(7) [I saw Maria going into the kitchen. The back door of the kitchen is rarely used. Nobody has said anything about Maria. I say:]
(Matthewson and Truckenbrodt, 2018: 277)
Maria muss/# **soll** in der Küche sein.
Maria must/soll in the kitchen be
'Maria must be in the kitchen.'

Turning to root *sollen,* we see that it can clearly be bouletic, as evidenced by (2) above, where Maria reports her daughter's preference that Maria bring the daughter morphine. In purely deontic contexts such as (8), where there is no identifiable bouletic preference-holder, in contrast, *sollen* is infelicitous. If the deontic reading comes about via an inference from the bouletic reading (cf. Glas, 1984; Condoravdi and Lauer, 2012; Lauer, 2013; Matthewson and Truckenbrodt, 2018), as in (9), *sollen* is fine, however.

(8) [Maria and Lisa are playing chess. Maria sometimes makes moves that don't follow the rules. Lisa explains each rule when this happens. Now Maria is castling and places the pieces in the wrong way. Lisa says:]

(Matthewson and Truckenbrodt, 2018: 270)

\# Du **sollst** den König neben den Turm stellen.
you soll the king next.to the rook put
'You're supposed to put the king next to the rook.'
≈ 'Someone wants you to put the king next to the rook.'

(9) [A is the boss of B at a company. A sends C to tell B on behalf of A:]

(Matthewson and Truckenbrodt, 2018: 269)

Du **sollst** diesen Bericht bis morgen um 12 Uhr schreiben.
you soll this report by tomorrow at 12 o'clock write
'You're supposed to write this report by tomorrow at noon.'
≈ 'A wants you to write this report by tomorrow at noon.'

In purely teleological contexts, *sollen* is infelicitous, as shown by (10). In disinterested advice contexts such as in (11), however, *sollen* is fine. As with the imperative, we assume that a bouletic/preference-based account works for such cases as well, following Condoravdi and Lauer's (2012) and Oikonomou's (2016) analysis of disinterested advice with the imperative.

(10) [Maria just received two important emails. She has the goal of answering important emails right away. Nobody asked her to answer her emails right away. Maria calls Peter and says:]

(Matthewson and Truckenbrodt, 2018: 273)

\# Ich **soll** noch zwei E-Mails beantworten, bevor ich nach Hause komme.
I soll still two emails answer before I to home come
'I'm supposed to still answer two emails before I come home.'
≈ 'Someone wants me to still answer two emails before I come home.'

(11) [At the train information center, L asks: How does my grandmother get to Saarbrücken by train? The official answers:]
Sie **soll** einen Regionalzug nehmen.
she soll a regonial.train take
'She is supposed to take a regional train.'
≈ 'I want her to take a regional train.'

3. Evidence for the anti-performative restriction on root *sollen*

As already said in Section 1, root *sollen* cannot be used in cases where the imperative would be appropriate. As we have seen in Section 2, the imperative necessarily expresses an utterance-time desire of the speaker that the addressee brings about some state of affairs.

Consequently, *sollen* is infelicitous whenever such a desire is to be expressed. To see this, consider again the contrast between (1a) and (1b), repeated here as (12a) and (12b).

(12) [Maria, a doctor who works in a hospital, is drinking coffee with Lisa. Maria gets a text message from her daughter. Surprisingly, the text says:
a. # Du **sollst** mir Morphium besorgen.
you soll me morphine get
'You are supposed to get me morphine.'
≈ 'I want you to get me morphine.'
b. Besorge mir (bitte) Morphium.
get me please morphine
'Please get me morphine.'

In the context of (12), the imperative in (12b) expresses the speaker's (i.e. Maria's daughter's) current desire for Maria to get her morphine. As shown by the infelicity of (12a), the same desire cannot be expressed by a sentence with root *sollen*. The sentence with *sollen* in (2), in contrast, repeated here as (13), is fine, since Maria's daughter, whose desire for Maria to get her morphine it reports, is not the speaker anymore.

(13) [Maria, a doctor in a hospital, gets a surprising text message from her daughter. Maria shows Lisa the text: Look, …]
Ich **soll** ihr Morphium besorgen.
I soll her morphine get
'I'm supposed to get her morphine.'
≈ 'She wants me to get her morphine.'

To capture this difference between the imperative and root *sollen*, which otherwise, as we have seen in Section 2, have very similar bouletic meanings, we propose the denotations in (14) and (15), respectively, to be refined in Section 5. The denotation of epistemic *sollen* is provided for comparison in (16). We draw on Sode and Truckenbrodt (2018), who analyze V-to-C movement and verbal mood using an index for contexts <x,t,w> in C, a feature [±origo] on the index, where [+origo] requires identity to Kaplan's context and [-origo] requires difference from it, and two modalities (doxastic and bouletic) that relate the prejacent to the indexed context. The imperative is bouletic and [+origo]. We extend the context to a quadruple to include the addressee, and analyze root *sollen* using the same devices: it is bouletic and [-origo].

Note that we allow *sollen* to take the (overt) subject argument separately and we index its silent argument, i.e. the argument for the preference-holder. If we write the imperative in the same way (with a subject argument and an indexed attitude holder), the only difference between root *sollen* and the imperative is the presupposed origo/non-origo requirement.

(14) $[\![\text{IMP}_j]\!]^{c,g,t,w} = \lambda P \lambda y : \underline{\leq g(j),y,t,w> = c} \; . \; [g(j) \text{ wants } P(y) \text{ at t in w}]$
↑
origo-requirement

(15) $[\![\text{root-}sollen_j]\!]^{c,g,t,w} = \lambda P \lambda y$: $\underline{<g(j),y,t,w> \neq c}$. [g(j) wants P(y) at t in w]
↑
non-origo-requirement

(16) $[\![\text{epist-}sollen_j]\!]^{c,g,t,w} = \lambda P \lambda y$: $g(j) \underline{\neq c_{Sp}}$. [g(j) said that P(y) before t in w]

where c is the context of utterance consisting of the parameters $<c_{Sp}, c_{Ad}, c_T, c_W>$, g is the assignment function, t is the time of evaluation and w is the world of evaluation.

Our account now makes the following predictions: First, sentences with root *sollen* should be able to express any utterance-time preferences except ones of the speaker directed at the addressee ([1→2]). Second, even speaker preferences directed at the addressee should be fine when they are not tied to the utterance time. Third, utterance-time preferences of the speaker directed at the addressee should be fine if they are not tied to the utterance world.

Let us have a detailed look at these predictions. Consider the contrasts between the infelicity of the sentence with root *sollen* and the imperative in (17) and (18): In each case, the preference to be expressed is an utterance-time preference of the speaker directed at the addressee in the utterance world, thus satisfying the presupposition of the imperative and violating the presupposition of root *sollen*.

(17) a. [Do you need anything while I'm out? Yes, …]
Du **sollst** Brötchen mitbringen.
you soll bread.rolls bring.with
'You're supposed to bring bread rolls.'
≈ 'I want you to bring bread rolls.'
b. Bring Brötchen mit.
bring bread.rolls with
'Bring bread rolls.'

(18) a. [Driving; I am giving directions.]
Du **sollst** die nächste Ausfahrt nehmen.
you soll the next exit take
'You're supposed to take the next exit.'
≈ 'I want you to take the next exit.'
b. Nimm die nächste Ausfahrt.
take the next exit
'Take the next exit.' (Hinterwimmer, 2013)

Consider next the sentences with *sollen* in (19)–(21), which are all felicitous: (19), the sentence reports an utterance-time preference of Maria, who is not the speaker, directed at the addressee ([3→2 present]), (20) expresses an utterance-time preference of the speaker directed at Peter, who is not the addressee ([1→3 present]), and (21) asks for the existence of an utterance time-preference of the addressee directed at the speaker ([2→1 present]). Consequently, the non-origo requirement (which, recall, disallows utterance-time preferences of the speaker directed at the addressee) is satisfied in all three cases.

(19) [Does anyone want me to bring them anything? Yes, Maria does.]
Du **sollst** ihr Brötchen mitbringen.
you soll her bread.rolls bring.with
'You're supposed to bring her bread rolls.'
≈ 'Maria wants you to bring her bread rolls.' [3→2 present]

(20) [What should everyone bring to the party?]
Peter **soll** Brötchen mitbringen.
Peter soll bread.rolls bring.with
'Peter is supposed to bring bread rolls.'
≈ 'I want Peter to bring bread rolls.' [1→3 present]

(21) [I'm at the bakery, calling you on the phone.]
Soll ich Brötchen mitbringen?
soll I bread.rolls bring.with
'Am I supposed to bring bread rolls?'
≈ 'Do you want me to bring bread rolls?' [2→1 present]

The sentences with root *sollen* in (22)–(24) show the felicity of three other person combinations in utterance-time preferences (holding at the world of utterance): In (22), a preference of Maria directed at the speaker ([3→1 present]), in (23) a preference of Maria (who is not the speaker) directed at Peter ([3→3 present]), and in (24) a preference of the addressee directed at Peter ([2→3 present]).

(22) [Why are you in the bakery now?]
Ich **soll** Maria Brötchen mitbringen.
I soll Maria bread.rolls bring.with
'I'm supposed to bring Maria bread rolls.'
≈ 'Maria wants me to bring her bread rolls.' [3→1 present]

(23) [Peter is going to the bakery. I give you a message for him:]
Er **soll** Maria Brötchen mitbringen.
he soll Maria bread.rolls bring.with
'He is supposed to bring Maria bread rolls.'
≈ 'Maria wants him to bring her bread rolls.' [3→3 present]

(24) [Peter is going to the bakery. I call you to ask:]
Soll Peter Brötchen mitbringen?
soll Peter bread.rolls bring.with
'Is Peter supposed to bring bread rolls?'
≈ 'Do you want Peter to bring bread rolls?' [2→3 present]

Our first prediction is upheld: Root *sollen* allows all person combinations except speaker-addressee with utterance-time preferences (holding at the utterance world).

Let us next turn to our second prediction, which is that speaker preferences directed at the addressee (in the utterance world) should be fine when they are not tied to the utterance time. As already observed by Hinterwimmer (2013), sentences with root *sollen* may report past bouletic preferences of the speaker directed at the addressee. Consequently, while the

sentences in (25) (repeated from (18a)) and (26) are infelicitous because they violate the non-origo requirement, they are fine when uttered in the contexts provided in (27) and (28), respectively.

(25) [Driving; I am giving directions.]
Du **sollst** die nächste Ausfahrt nehmen.
you soll the next exit take
'You're supposed to take the next exit.'
≈ 'I want you to take the next exit.'

(26) [Peter is whistling. After a while, I say to him:]
Du **sollst** aufhören zu pfeifen.
you soll stop to whitle
'You're supposed to stop whistling.'
≈ 'I want you to stop whistling.'

(27) Nimm die nächste Ausfahrt! [no reaction…]
take the next exit

Du **sollst** die nächste Ausfahrt nehmen.
you soll the next exit take

'Take the next exit … You're supposed to take the next exit.'
≈ 'Take the next exit! ... I want(ed) you to take the next exit.' (Hinterwimmer, 2013)

(28) Hör auf zu pfeifen! [no reaction…]
stop to whistle

Du **sollst** aufhören zu pfeifen.
you soll stop to whitle

'Stop whistling! … You're supposed to stop whistling.'
≈ 'Stop whistling! … I want(ed) you to stop whistling.' (Hinterwimmer, 2013)

What is crucial is that in (27) and (28) the speaker is reminding the addressee of a preference already established in the immediate past with the preceding utterance. This allows the satisfaction of the non-origo requirement. We must also take into account that (27) and (28) employ the present tense. We follow Sauerland (2002, 2008) in the analysis of a semantically vacuous present tense that is in competition with a semantically contentful past tense. This analysis is based on a pronominal interpretation of tense. In the interpretation of the second utterance in (28), the temporal pronoun denoted by the finite tense will refer to a relevant temporal interval that includes the time of the preceding utterance and the present. Past tense can then not be used because this interval does not lie in the past, and therefore present tense is used. We assume that this is also the temporal interval t in the attitudinal anchor <x,y,t,w> of *sollen* in (28). We are thus led to the following conclusion. Where t in <x,y,t,w> stretches across a relevant point in the past and the time at which the utterance is made, it counts as different from c_T for the purpose of the non-origo requirement on <x,y,t,w>.

As a side effect, our analysis can also account for the observation that the combination of an imperative and an immediately following sentence with *sollen* signals a level of annoyance that could not have been expressed by a simple repetition of the imperative. The reason is that while the imperative just states the existence of a current preference twice, by uttering the

sentence with *sollen*, the speaker also expresses that she had already articulated that preference in the past. The effect is thus similar to the one obtained by uttering the sequence in (29), which likewise sounds more annoyed than a simple repetition of the imperative:

(29) Nimm die nächste Ausfahrt! [no reaction…] Ich habe dich gebeten,
take the next exit I have you asked
die nächste Ausfahrt zu nehmen.
the next exit to take
'Take the next exit! ... I asked you to take the next exit.'

Let us now turn to the final prediction–that utterance-time preferences of the speaker directed at the addressee are fine if they are not tied to the utterance world. Unfortunately, the results are less clear. Consider the contrast between the felicitous combination of a conditional antecedent and an imperative in (30a), and the infelicitous combination of a conditional antecedent and a sentence with root *sollen* in (30b). In both cases, the sentences are to be interpreted as text messages sent by someone who considers it likely that the receiver is at the train station, but is not sure. Keep in mind that (30b) is of course felicitous if it is understood in such a way that the speaker reports someone else's desire for the addressee to bring bread rolls if she is at the train station.

(30) a. Wenn du gerade am Bahnhof bist, bring bitte Brötchen mit.
if you just at.the station are bring please bread.rolls with
'If you're at the train station right now, please bring bread rolls.'

b. # Wenn du gerade am Bahnhof bist, **sollst** du bitte Brötchen
if you just at.the station are soll you please bread.rolls
mitbringen.
bring.with
'If you're at the train station right now, you're supposed to bring bread rolls.'
≈ 'If you're at the train station right now, I want you to bring bread rolls.'

On our account, the judgments make sense if the conditional operator and the antecedent clause scope below the imperative and below *sollen*, i.e. if both sentences are understood as preferences that the speaker has in the utterance world at the utterance time, where those preferences do not directly concern the utterance world, but rather the set of worlds maximally close to the utterance world where the speaker is at the train station. It is unclear, however, why the conditional operator and the antecedent should not be able to scope above the imperative (cf. Kaufman and Schwager, 2009 and references therein) and above *sollen*, i.e. why the sentences should not be able to express utterance-time preferences that the speaker does not have in the utterance world, but rather in each member of the set of worlds maximally close to the antecedent world where the receiver of the text message is at the train station (Stalnaker, 1975; Kratzer, 1991a). We thus have to leave the behaviour of root *sollen* in conditionals open as a topic for further research and conclude that for the time being we do not have conclusive evidence for or against the third prediction of our analysis.

Our analysis also accounts for cases like (31), where the preference does not concern another individual, but rather an event.

(31) [Paul is singing *Yesterday* for his baby daughter. I ask him: Why are you doing that? He answers:]
Das **soll** das Baby beruhigen.
that soll the baby calm.down
'It's supposed to calm the baby down.'
≈ 'I want it to calm the baby down.' (Hinterwimmer, 2013)

In such cases the speaker does not want an individual, but rather an event–namely the event of him singing for his baby daughter–to have a certain property: the property of calming down his baby daughter. The external argument of root *sollen* is thus not restricted to (ordinary) individuals, but can be of the type of events as well.

Our analysis can also potentially be extended in such a way that it accounts for cases like the one in (32).

(32) [Two children are playing and pretending to be Jedi knights. Holding a broomstick painted green, one of them says to her mother]:
Das **soll** ein Lichtschwert sein.
that soll a lightsaber be
'This is supposed to be a lightsaber.'

Since the child is well aware that the broomstick can never become a lightsaber, it is intuitively not correct to say that she wants the broomstick to have the property of being a lightsaber. Rather, she wants the broomstick to be seen as if it was a lightsaber for the purposes of the game she is playing with her friend, i.e. she wants the broomstick to be a lightsaber in the fictional worlds she is 'inventing' together with her friend while they are playing together. In contrast to the cases so far, the modal base for root *sollen* is thus not identical to the doxastic modal base of root *wollen* ('want'). The latter always takes a doxastic modal base: One cannot want something which one believes to be impossible (Heim, 1992). The variant of (32) in (33) is therefore not equivalent to the original version:

(33) [Two children are playing and pretending to be Jedi knights. Holding a broomstick painted in green, one of them says to her mother]:
Ich **will**, dass das ein Lichtschwert ist.
I want that that a lightsaber is
'I want this to be a lightsaber.'

We leave a further investigation of this contrast between *wollen* and *sollen* for another occasion. For now it is sufficient that our [-origo] requirement on *sollen* is satisfied by the data in (32), both because t in <x,y,t,w> can refer to a past preference and because it is not a preference for an action by the addressee.

4. Two previous accounts of the anti-performative restriction on root *sollen*

In this section, we discuss the analyses of *sollen* proposed by Hinterwimmer (2013) and Bochnak and Csipak (2018). They both unify the anti-performativity restriction on root *sollen* with the reportative restriction on epistemic *sollen*, which is in principle a desirable result. We will show both accounts to be empirically inadequate, however.

Hinterwimmer (2013) assumes that for both epistemic and root uses of *sollen* there is a prior intentional act α whose agent *x* is distinct from the individual denoted by the subject of the clause. In all worlds where the intended result of α obtains, the prejacent proposition is true. In the case of epistemic *sollen*, the prior intentional act is an assertion, while in the case of root *sollen* the prior intentional act is a command/advice/request etc.

(34) $[\![soll]\!] = \lambda P \lambda x \lambda w.\ [\exists e \leq_{part} w\ \exists y[Agent(y)(e) \wedge y \neq x \wedge \forall w'\ [w' \in \cap\ GOAL(y)(e) \rightarrow \exists e'\ [\neg\tau(e') < NOW \wedge P(x)(e')]]]]$,
where $\tau(e')$ is the temporal trace of e' and $\cap\ GOAL(y)(e)$ is the set of worlds where all the goals that y intends to achieve with e obtain.

According to Bochnak and Csipak (2018), who propose the denotation in (35), *sollen* is reportative in both epistemic and root uses. In both uses, *sollen* relies on a prior utterance. If the existence of such a prior act is not entailed by the common ground at the utterance time, it must be accommodated.

(35) $[\![sollen]\!]^{c,w,t} = \lambda P \lambda x[\forall m \in t[\forall w' \in max_{gm(w)}(\cap f_m(w)) : P(x)(w') = 1]]$
defined only if the context c provides a circumstantial modal base f_m and reportative informational ordering source $g_{\alpha,m}$.

Both accounts capture the anti-performativity effects of root *sollen* quite well. We also agree that there is a partially unified restriction across both epistemic and root *sollen*: Both uses of *sollen* have closely related anti-origo restrictions (see (15) and (16)). We think that fully unifying the epistemic and root uses of *sollen* fails to capture the fact that these are distinct readings, however; that is, we think that there is a true ambiguity. To see this, consider the two sentences with *sollen* in (36) and (37). The one in (36) only has a reportative reading, and a bouletic interpretation of *sollen* would lead to a clear contradiction. In the case of (37), it is the other way round: The sentence only has a bouletic reading, and a reportative interpretation of *sollen* would be a real misinterpretation of what the speaker is saying.

(36) [The man from customer service says that our telephone is broken. I say:]
Unser Telefon **soll** kaputt sein, was ich ärgerlich finde.
our telephone soll broken be what I annoying find.
'Our telephone is supposed to be broken, which I find annoying.'
(adapted from Matthewson and Truckenbrodt, 2018: 279)

(37) [Nobody has said anything so far about what people should bring to the party, or what people will bring. I ask you: What should everyone bring?]
Peter **soll** Brötchen mitbringen.
Peter soll bread.rolls bring.with
'Peter is supposed to bring bread rolls.'
≈ 'I want Peter to bring bread rolls.'

Crucially, root *sollen* can be felicitous even if there was no prior utterance, as long as the non-origo restriction is not violated. This is the case in (37), for example, which expresses an utterance-time speaker preference directed at Peter, who is not the addressee. In (38) and (39), there is likewise no violation of the non-origo restriction since the sentences express utterance-time speaker preferences that either have no addressee at all (in the case of (38)), or are directed at a rather unspecific group (in the case of (39)).

(38) Es **soll** aufhören zu regnen.
it soll stop to rain
≈ 'I want it to stop raining.' [1→0 present]

(39) [You live in a closed community of 25 people. Your bakery, Filou, is scheduled to close. The other 24 people have all said they agree with Filou closing. You alone want it to stay open. So far, you haven't told anybody your preference, but you write a protest sign that says:]
Filou **soll** bleiben.
Filou soll stay
≈ 'I want Filou to stay.' [1→3 present]

Bochnak and Csipak's (2018) account wrongly predicts that *sollen* is infelicitous in these cases, since there is no plausible earlier utterance to be reported. Hinterwimmer's (2013) account seems to fare better, because it says that the prior intentional act need not be a speech act; It 'may even be a mental event of having an intention to bring about the respective state of affairs.' Hinterwimmer's account, however, has problems capturing the difference between these and the [1→2 present] cases, which are excluded on our account, since there doesn't seem to be a contrast between the two types of example in whether there is a prior intentional act. Hinterwimmer (2013) sketches a potential solution to this problem: Whenever the imperative can be used to state the relevant preference directly, conveying its existence indirectly via invoking a prior intentional act is dispreferred because it is less economical, i.e. there is competition between root *sollen* and the imperative. In Section 5 we will see, however, that there are arguments against a competition-based account of the distribution of *root* sollen. Additionally, the ontological status of the intentional acts assumed by Hinterwimmer (2013) is rather unclear. We therefore conclude that the account argued for in this paper–according to which root *sollen* carries a non-origo restriction–is empirically more successful than the accounts of Hinterwimmer (2013) and Bochnak and Csipak (2018). This indirectly strengthens our analysis of the imperative in terms of the Kaplanian context.

5. Formal implementation and an alternative account

The denotations of the imperative and root *sollen* stated in Section 3 as (14) and (15) are repeated here as (40) and (41), respectively. In (42) and (43), formally more precise entries are provided, which are based on Kratzer's (1981, 1991b) analysis of modal verbs in terms of quantification over the worlds in the modal base *f* that make as many propositions in the ordering source *h* true as possible. The origo/non-origo restriction is stated as a restriction on the arguments of the ordering source *h*, which we assume to be bouletic, while the modal base is doxastic. Consequently, the universal quantifier in both (42) and (43) quantifies over those worlds that are compatible with what is known at the evaluation time that make as many preferences true as possible that the contextually determined value of the free variable *j* has at the time and world of evaluation regarding the individual referred to by the subject argument of *sollen*. In the case of the imperative, it is presupposed that the arguments of the bouletic ordering source *h* are identical with the parameters of the utterance context, while in the case of root *sollen*, non-identity is required with respect to at least one parameter.

(40) $[\![\text{IMP}_j]\!]^{c,g,t,w} = \lambda P\, \lambda y : <g(j),y,t,w> = c\ .$ [g(j) wants P(y) at t in w]

(41) $[\![\text{root-}\textit{sollen}_j]\!]^{c,g,t,w} = \lambda P\, \lambda y: <g(j),y,t,w> \neq c\ .$ [g(j) wants P(y) at t in w]

(42) $[\![\text{IMP}_j]\!]^{g,c,t,w,f,h} = \lambda P \lambda y: <g(j),y,t,w> = c\ .\ \forall w'\ [w' \in \text{BEST}_{h(g(j),t,w)}(\cap f(g(j),w,t)) \rightarrow P(y)(t)(w')]$

(43) $[\![\text{root-}\textit{sollen}_j]\!]^{c,g,t,w,f,h} = \lambda P\, \lambda y: <g(j),y,t,w> \neq c\ .\ \forall w'\ [w' \in \text{BEST}_{h(g(j),t,w)}(\cap f(g(j),w,t)) \rightarrow P(y)(t)(w')]$

Instead of assuming the imperative and *sollen* to have the directly opposing presuppositions stated in (40)/(42) and (41)/(43), respectively, one might also assume that while both items have identical at-issue meanings (Potts, 2005), only the imperative has a genuine presupposition–namely the origo restriction. What seems to be the inverse presupposition for root *sollen* would instead be derived from the pragmatic principle *Maximize Presupposition* (Heim, 1991; Schlenker, 2005; Chemla, 2008; Sauerland 2008, a.o.). Setting aside the various differences in technical implementation, the idea shared by all versions of Maximize Presupposition that have been proposed can be stated as follows: Whenever there are two items α and β that (a) are comparable in terms of syntactic complexity, (b) have identical at-issue meanings and (c) differ with respect to their presuppositions insofar as α presupposes more than β, and α's presuppositions are satisfied in a context, a sentence containing β has to be replaced by a syntactically parallel sentence containing α.

Maximize Presupposition accounts for the infelicity of (44a) in any context, for example: Assuming that the indefinite and the definite article only differ insofar as the latter presupposes existence and uniqueness, while the former does not have any presupposition, Maximize Presupposition correctly predicts that (44a) has to be replaced by (44b), or, put differently, that the existence of the alternative in (44b) blocks the utterance of (44a).

(44) a. * A sun is shining.
b. The sun is shining.

Applying the same reasoning to an example such as (17a), repeated here as (45a), we would say that utterance of this sentence is blocked in the context provided by the existence of the alternative in (17b), repeated here as (45b), since (a) the imperative and root-*sollen* have identical at-issue meanings and (b) the origo-restriction of the imperative is satisfied.

(45) a. [Do you need anything while I'm out? Yes, …]
Du **sollst** Brötchen mitbringen.
you soll bread.rolls bring.with
'You're supposed to bring bread rolls.'
≈ 'I want you to bring bread rolls.'
b. Bring Brötchen mit.
bring bread.rolls with
'Bring bread rolls.'

The problem with the alternative account just sketched is that we have to assume that the two syntactically rather different structures given in schematic form in (46) are compared, contra Katzir (2007). The heads being compared would be IMP and [$_{\text{DECL}}$ *sollst*], both bouletic Cs,

but the other considerable syntactic differences between the two structures would need to be ignored for the comparison to be successful.

(46)	Spec,CP	C		V	V
		[**IMP** bring$_1$]	Brötchen	mit__$_1$	
	du	[DECL **sollst$_2$**]	Brötchen	mitbringen$_1$	____$_2$

Because of this problem, and because of another, more indirect argument against a competition-based account of the distribution of root *sollen* which will be discussed in Section 6, we stick with the account argued for above, according to which the imperative is subject to an origo restriction, while root-*sollen* is subject to a non-origo restriction.

6. A comparison of root *sollen* and *be supposed to*

The closest equivalent of *sollen* in English is *be supposed to* (Bochnak and Csipak, 2018). Like epistemic *sollen*, epistemic *be supposed to* is only reportative, not inferential, as shown by the contrast between (47) and (48):

(47) [M tells me that when P proposed to her, he even went down on his knee. Later, I tell K:]
P **is supposed to** have even gone down on his knee in front of her.

(48) [I saw Maria going into the kitchen. The back door of the kitchen is rarely used. Nobody has said anything about Maria. I say:] (Matthewson and Truckenbrodt, 2018:302)
Maria must/# **is supposed to** be in the kitchen.

Similarly, like root *sollen,* root *be supposed to* is good in purely bouletic contexts such as the one in (49), and bad in teleological ones like the one in (50):

(49) [M, a doctor who works in a hospital, gets a surprising text message from her daughter. M shows L the text and says: Look, …]
I **am supposed to** get her morphine. (Matthewson and Truckenbrodt, 2018:300)

(50) [Maria just received two important emails. She has the goal of answering important emails right away. Nobody asked her to answer her emails right away. Maria calls Peter and says:] (Matthewson and Truckenbrodt, 2018:301)
I **am supposed to** still answer two emails before I come home.

Unlike *sollen*, however, root *be supposed to* is good in purely deontic contexts as in (51):

(51) [Maria and Lisa are playing chess. Maria sometimes makes moves that don't follow the rules. Lisa explains each rule when this happens. Now Maria is castling and places the pieces in the wrong way. Lisa says:] (Matthewson and Truckenbrodt, 2018:301)
You **are supposed to** put the king next to the rook.

Crucially, *be supposed to* is subject to a similar, but slightly different non-origo restriction than root *sollen*: *be supposed to* disallows the expression of the speaker's preference at the utterance time. A representative sample of the relevant data is given in (52)–(54):

(52) [Do you need anything while I'm out? I think and decide what I want:]
You'**re supposed to** bring bread rolls.' #[1→2 present]

(53) [Why are you in the bakery now?]
I'**m supposed to** bring Maria bread rolls. [3→1 present]

(54) [Does anyone want me to bring them anything? Yes, …]
You'**re supposed to** bring Maria bread rolls. [3→2 present]

The crucial difference between *sollen* and *be supposed to* is that while *sollen* allows utterance-time speaker-preferences for anyone other than the addressee, *be supposed* to disallows *any* utterance-time speaker preferences, as shown by the contrasts between (55a) and (55b), and (56a) and (56b):

(55) a. Es **soll** aufhören zu regnen.
it soll stop to rain
b. # It'**s supposed to** stop raining. [1→0 present]

(56) [You live in a closed community of 25 people. Your bakery, Filou, is scheduled to close. The other 24 people have all said they agree with Filou closing. You alone want it to stay open. So far, you haven't told anybody your preference, but you write a protest sign that says:]
a. Filou **soll** bleiben.
Filou soll stay
b. # Filou **is supposed to** stay. [1→3 present]

We therefore propose the denotation in (57) for bouletic *be supposed to*, according to which the non-origo restriction is not specific to the addressee.

(57) $[\![\text{bouletic-}\textit{be-supposed-to}_j]\!]^{c,g,t,w} = \lambda P\, \lambda y: \langle g(j),t,w\rangle \neq \langle c_{Sp,}\, c_{T,}\, c_W\rangle$. [g(j) wants P(y) at t in w]

Significantly, in contrast to *sollen*, *be supposed to* is **not** in complementary distribution with the imperative since it is infelicitous in contexts where the imperative is also bad: It is at least odd to say *Stop*! to the rain or *Stay*! to Filou, yet *be supposed to* is still ruled out there. *Be supposed to* is also bad in more ordinary [1→3] cases where the imperative is not licensed: (58), for example is acceptable only if there was a pre-existing preference for Peter to bring bread rolls (i.e. if the time parameter is non-origo).

(58) [What should everyone bring to the party?]
Peter **is supposed to** bring bread rolls. [1→3 present]

Thus, *be supposed to* seems to have a wired-in non-origo restriction. This makes it plausible that *sollen* has a slightly different non-origo restriction: It only disallows [1→2 present], but allows the expression of utterance-time speaker preferences directed at other persons.

7. Conclusion

In this paper, we have proposed an analysis of the imperative and the German root modal *sollen* according to which both items have the same bouletic meaning, but are subject to different presuppositions: The quadruple <x,y,t,w> of the bouletic attitude holder x, the agent y of the prejacent, the time and the world of the preference, must be identical to the utterance context $<c_{Sp}, c_{Ad}, c_T, c_W>$ in the imperative, and must be different from the utterance context with root *sollen*. From these requirements, the performativity of the imperative and the anti-performativity of root-*sollen*, as well as their complementary distribution, can be derived.

We have shown that the proposed analysis has empirical advantages over previous accounts by Hinterwimmer (2013) and Bochnak and Csipak (2018), which assume a uniform semantics for both root and epistemic *sollen*. Finally, we have compared *sollen* to its closest equivalent in English, *be supposed to*, showing that the two are subject to similar, but slightly different constraints: In contrast to root *sollen*, which only disallows utterance-time speaker preferences when they are directed at the addressee, *be supposed* to disallows utterance-time speaker preferences altogether. In contrast to root *sollen*, *be supposed to* is thus not in complementary distribution with the imperative. Consequently, its distribution cannot be derived from the assumption that the imperative is subject to an origo-restriction in combination with Maximize Presupposition. This, together with inherent problems concerning the non-parallelism of the compared alternatives, has led us to the conclusion that our analysis is to be preferred to a conceivable alternative account of the distribution of root *sollen* in terms of Maximize Presupposition.

We end this paper by mentioning a potential problem for our analysis that we do not have fully satisfactory answers to at present, but which we are planning to take up in future research.[2] Recall from Section 3 that in a question like (21), repeated here as (59), *sollen* is correctly predicted to be felicitous by our account because the speaker is asking about a preference of the addressee directed at the speaker. The problem now is that the addressee can felicitously answer that question as in (60), which expresses an utterance-time speaker preference for the addressee and therefore violates the non-origo restriction.

(59) [I'm at the bakery, calling you on the phone.]
Soll ich Brötchen mitbringen?
soll I bread.rolls bring.with
'Am I supposed to bring bread rolls?'
≈ 'Do you want me to bring bread rolls?' [2→1 present]

(60) Ja, du **sollst** Brötchen mitbringen
yes, you soll bread.rolls bring.with
'Yes, you're supposed to bring bread rolls.'
≈ 'Yes, I want you to bring bread rolls.' [1→2 present]

A potential solution would be to say that by uttering *ja* 'yes' first, the speaker already indicates the existence of the preference asked for at the utterance time. By the time at which she continues with *Du sollst Brötchen mitbringen*, that sentence therefore automatically expresses a past preference that extends to the present, similarly to cases such as (27) and

[2] We are grateful to Tue Trinh for pointing this problem out to us.

(28) discussed in Section 3 above. While the presence of *ja* 'yes' is preferred, it is also preferred in other answers to *yes-no* questions that repeat the content of the question, so the issue is not easy to test and we leave it open here.

References

Bochnak, M.R. and E. Csipak (2018). Reportative and deontic modality in English and German. In Robert Truswell et al. (eds.), *Proceedings of Sinn und Bedeutung 21*, Vol 1: 199-214.

Chemla, E. (2008). An anti-introduction to presuppositions. In *Presuppositions and implicatures: Proceedings of MIT-France workshop on scalar implicature and presupposition*, volume 60.

Condoravdi, C. and S. Lauer (2012). Imperatives: Meaning and illocutionary force. *Empirical issues in syntax and semantics*, 9: 37-58.

Diewald, G. (1999). *Die Modalverben im Deutschen. Grammatikalisierung und Polyfunktionalität*. Tübingen: Niemeyer. [Reprint 2012: de Gruyter, Berlin].

Glas, R. (1984). *'sollen' im heutigen Deutsch. Bedeutung und Gebrauch in der Schriftsprache*. Tübingen: Stauffenburg Verlag.

Grosz, P. (2009). German particles, modality, and the semantics of imperatives. In *Proceedings of NELS 39, ed. S. Lima, K. Mullin and B. Smith*, 323-336.

Han, C. (2000). *The structure and interpretation of imperatives: mood and force in universal grammar*. Garland Publishing/Routledge: New York.

Heim, I. (1991). Artikel und Definitheit. In *Semantik, Semantics. Ein internationales Handbuch der zeitgenössischen Forschung*, eds. Arnim von Stechow and Dieter Wunderlich, 487-536. Berlin, New York: Walter de Gruyter.

Heim, I. (1992). Presupposition projection and the semantics of attitude verbs. *Journal of Semantics* 9, 183-221.

Hinterwimmer, S. (2013). The semantics of German *sollen*. Session 6*, Semantics-Pragmatics-Interfaces*, International Congress of Linguistics, University of Geneva.

Kaplan, D. (1989). Demonstratives: an essay on the semantics, logic, metaphysica, and epistemology of demonstratives and other indexicals. In J. Almog, J. Perry and H. Wettstein (Eds.), *Themes from Kaplan*, 481-563. Oxford: Oxford University Press.

Katzir, R. (2007). Structurally-defined alternatives. *Linguistics & Philosophy* 30: 669-690.

Kaufmann, M. (2012). *Interpreting imperatives.* Dordrecht: Springer.

Kaufmann, M. (2016). Fine-tuning natural language imperatives. In *Proceedings of DEON 2014* (special issue of *Journal of Logic and Computation).*

Kaufmann, S. and M. Schwager (2009). A unified analysis of conditional imperatives. *Semantics and Linguistic Theory* 19:239–256.

Kratzer, A. (1981). The notional category of modality. In H.J. Eikmeyer and H. Rieser (Eds.), *Words, worlds, and contexts*, pp. 37-74. Berlin: de Gruyter.

Kratzer, A. (1991a). Conditionals. In A. von Stechow and D. Wunderlich (Eds.), *Semantik. Ein internationales Handbuch der zeitgenössischen Forschung*, pp. 651-656. Berlin/New York: de Gruyter.

Kratzer, A. (1991b). Modality. In A. von Stechow and D. Wunderlich (Eds.), *Semantik. Ein internationales Handbuch der zeitgenössischen Forschung*, pp. 639-650. Berlin/New York: de Gruyter.

Lauer, S. (2013). *Towards a dynamic pragmatics*. Doctoral dissertation, Stanford University.

Matthewson, L. and H. Truckenbrodt (2018). Modal flavour/modal force interaction in German: *soll*, *sollte*, *muss*, and *müsste*. *Linguistische Berichte* 255: 259-312.

Oikonomou, D. (2016). Covert modals in root contexts. Ph.D. thesis, Massachusetts Institute of Technology.

Portner, P. (2007). Imperatives and modals. *Natural Language Semantics* 15(4): 351-383.

Portner, P. (2016). Imperatives. In Aloni, M. and van Rooij, R., eds, *Cambridge Handbook of Semantics*. Cambridge: Cambridge University Press.

Potts, C. (2005). *The logic of conventional implicatures*. Oxford, New York: Oxford University Press.

Sadock, J. M. (1974). *Toward a linguistic theory of speech acts*. New York: Academic Press.

Sauerland, U. (2002). The present tense is vacuous. *Snippets* 6: 12-13.

Sauerland, U. (2008). Implicated presuppositions. In *The discourse potential of underspecified structures*, ed. A. Steube, 581-600. Berlin: Mouton de Gruyter.

Schlenker, P. (2005). The lazy Frenchman's approach to the subjective. Speculations on reference to worlds and semantic defaults in the analysis of mood. In *Romance Languages and Linguistic Theory 2003*, eds. T. Geerts, I. van Gynneken and H. Jakobs, 269-309. Amsterdam/Philadelphia: John Benjamins.

Schwager, M. (2006). Interpreting imperatives. Doctoral thesis, Johann-Wolfgang-Goethe Universität.

Sode, F. and H. Truckenbrodt (2018). Verb position, verbal mood, and root phenomena in German. In M. Antomo and S. Müller (Eds.), *Non-canonical verb positioning in main clauses. Linguistische Berichte Sonderheft*, pp. 91-135. Hamburg: Buske.

Stalnaker, R. (1975). Indicative conditionals. *Philosophia* 5 (3): 269–286.

Wilson, D. and D. Sperber (1988). Mood and the analysis of non-declarative sentences. In Dancy, J., Moravcsik, J. and Taylor, C., (Eds.) *Human Agency: Language, Duty and Value*, pp. 77-101. Stanford, CA: Stanford University Press.