Talking about the future in Zapotec*

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The future, as we all know, can be quite uncertain. Often no one knows what will happen, even if we have fairly complete information about what has already taken place. Of course, philosophers have long puzzled over how we are still able to make claims about the future — the problem of "future contingents" — as well as what the implications are for the logical relations between simple future sentences, like (1), and more complex ones.

(1) There will be a sea battle tomorrow.

Looking across languages, only at form, they seem to have a diversity of grammatical devices for navigating this uncertainty. Some use modal auxiliaries, as English does, while others have verbal inflection that enables future talk, as in Italian, and yet others use modal particles, as Greek does (Giannakidou and Mari 2018, Ippolito and Farkas 2022).

But what are the pieces of *meaning* which language makes available for talking about the future?

In recent years, the literature has converged on a consensus that, at least in these languages which have been best studied, future talk always involves a modal component, even if it is not always clear how this interacts with temporality (Copley 2002, Condoravdi 2003, Kaufmann 2005, Werner 2006, Klecha 2014, Giannakidou and Mari 2018). With this largely settled, the subsequent literature has consisted of a back and forth about what bodies of information factor into modal reasoning about the future. Within the standard framework for modal semantics (Kratzer 1981), it has been concerned with whether the modal base for future markers is based on knowledge or some set of facts about the world,

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and whether ordering sources bringing in other kinds of considerations — expectations about what happens normally, desires, etc. — are also involved.

I will focus here on two future markers in Southeastern Sierra Zapotec (*Dille'xhunh* or *Dille'xhonh*), a closely related group of varieties from the Sierra Norte of Oaxaca, Mexico.[1]

(2) a. **Gak**[1] yejw[3] wxe[1].
happen.POT rain tomorrow
'It will rain tomorrow.' (FSR, SLZ1098, 00:27)
["If I'm sure it's going to happen..."]

b. **Wak**[1] yejw[3] wxe[1].
happen.DUB rain tomorrow
'It will rain tomorrow.' (FSR, SLZ1098, 6:45)
["But I'm not certain, if there is no certainty..."]

In traditional grammars, they are called the *potential* and the *dubitative*. When asked, speakers frequently describe a difference in the degree of certainty between them. The potential is used when the speaker is "*seguro* (certain)", while the dubitative is used when they are less certain or have "*dudas* (doubts)".

I will aim to advance an analysis of these two future categories, with an eye toward understanding what they can tell us about the theory of how language can describe the future. The leading idea is that, with the dubitative, a speaker expresses just as much "certainty" as with the potential. The "doubts" instead arise from uncertainty in the speaker and addressee's mutual commitment space.

This is enabled by a semantics for these two categories which is nearly identical. Both the potential and the dubitative encode a *strong necessity modal* — not a weak necessity modal — with either a metaphysical or epistemic modal base. The way this modal component interacts with temporality is also the same for both future categories: their temporal orientation

[1]Zapotec languages (Oto-Manguean: Oaxaca, Mexico) exhibit dense variation: distinct dialects are spoken in towns only a few miles apart, and sharp language boundaries are hard to draw. This article includes data from the closely related Sierra Norte varieties of Santiago Laxopa, San Sebastián Guiloxi, and Santa María Yalina, for which I report my own fieldwork data, as well as the slightly more divergent variety of San Bartolomé Zoogocho (Long 1993, Long and Cruz 2000). Following the *Catálogo de las lenguas indígenas nacionales* (Instituto Nacional de Lenguas Indígenas 2008), I refer to them together as Southeastern Sierra Zapotec.

Original data comes from meetings with four adult speakers living in the large diaspora community in California. All four learned Zapotec as their first language and moved to the United States as adults. I have been working with three of the speakers continuously since 2016 and the fourth starting in 2022. Our (bi)weekly meetings took place with Spanish as the intermediate language and remotely by Zoom in 2020–2021. All data from other sources has been orthographically normalized and morphologically reanalyzed.

The orthography used is the *alfabeto práctico de zapoteco de la Sierra Juárez*, distributed by the Centro de Investigaciones y Estudios Superiores en Antropología Social and used widely by Zapotec speakers in the Sierra Norte, as well as in California. For original fieldwork data, tone is transcribed phonetically with superscripted numerals, representing three levels of tone ranging from 1 (highest) to 3 (lowest).

The interlinear abbreviations used are: AN = animal, COMP = completive, CONT = continuative, DEF = definite, DUB = dubitative, EL = elder human, EXCL = exclusive, FREQ = frequentative, HU = (non-elder) human, IN = inanimate, INCL = inclusive, NEG = negative, NOM = nominalizer, PAST = past, PL = plural, POT = potential, Q = question particle, REP = repetitive, SG = singular, STAT = stative, VEN = venitive.

comes from *prospective aspect* (Kratzer 2011, Matthewson 2012). However, unlike the potential, the dubitative also encodes a *verum operator*, which places certain conditions on the common ground. This ensures for the dubitative only that conversational participants' shared commitments are not settled with respect to the prejacent, though it does not prevent the speaker from having private commitments that do.

These Zapotec varieties show one way in which discussions of modal reasoning about the future, which have been concerned primarily with which bodies of information are involved, might be brought closer to the dynamics of conversation. Folding modal semantics into a pragmatic theory of how issues are raised and resolved is something aimed for in other modal domains, including epistemic and priority modality (Groenendijk and Stokhof 1975, Veltman 1996, Portner 2009, Rubinstein 2012, 2021). But it has not been a focus in the literature on the future.

1. The basics of future reference in Zapotec

I will start with the basics of how future reference works. The potential and dubitative are just two of several "aspects" found in Southeastern Sierra Zapotec, realized through inflectional morphology on the verb. When there is no intervening morphology (e.g., associated motion, plural marking), their exponents are idiosyncratically conditioned by the verb stem, and may involve stem allomorphy as well.

(3) a. **Tsyitj**^{1}=lhenh^{1}=a'^{3}=ba'^{2} na'a^{3}tek^{3}na'a^{3}.
play.CONT=with=1SG=3.HU right.now
'I am playing a joke on him right now.' (FSR, SLZ009-s, 2)

b. **Uditj**^{1}=lhenh^{1}=a'^{3} lhe'^{1} ne^{3}je^{1}.
play.COMP=with=1SG 2SG yesterday
'I played a joke on you yesterday.' (FSR, SLZ015-s, 3)

c. Wxe^{1} **chitj**^{1}=ba'^{2}.
tomorrow **play.POT**=3.HU
'S/he will play tomorrow.' (RM, GZYZ082-s, 9)

d. **U**^{1}**yitj**^{1} Ma^{1}ria='nh^{3} wxe^{1}.
play.DUB Maria=DEF tomorrow
'Maria will play tomorrow.' (RD, SLZ1097, 32:08)

The *continuative* in (3a) conveys imperfective aspect and the *completive* in (3b) perfective aspect, while the potential and dubitative in (3c–d) describe future-shifted eventualities. The potential exhibits several allomorphs: some are segmentable (*y-*, *g-*, *e-*), and some are not, including devoicing and the affrication found with *-yitj* 'play' above. The form of the dubitative is, by contrast, much more regular. It always contains a bilabial sonorant, though the specific form it takes (*w-*, *we-*, or *u-*) depends on the verb stem's initial segment.

In information seeking exchanges, both the potential and dubitative can only describe an eventuality located in the future of the utterance time. They are compatible only with future temporal adverbials, not past ones.

(4) a. **Ye^{1}lla'a^{1}** wxe^{1}.
be.hot.POT tomorrow
'It will be hot tomorrow.' (RM/FA, GZYZ164, 51:55)

b. **#Ye^{1}lla'a^{1}** ne^{3}je^{1}.
be.hot.POT yesterday
Intended: 'It was going to be hot yesterday.' (RM/FA, GZYZ164, 52:05)

(5) a. **We^{1}lla'a^{1}** wxe^{1}.
be.hot.DUB tomorrow
'It will be hot tomorrow.' (RM/FA, GZYZ164, 52:00)

b. **#We^{1}lla'a^{1}** ne^{3}je^{1}.
be.hot.DUB yesterday
Intended: 'It was going to be hot yesterday.' (RM/FA, GZYZ164, 52:10)

It is possible for both future categories to describe a past eventuality in some contexts — see Section 3 — but they still maintain a future orientation, from a past perspectival point.

Both the potential and dubitative clearly have a modal component. First, both the potential and dubitative can be restricted by an *if*-clause.

(6) a. . . . **she bi yolle nhis uchinh=to' nachh**
if NEG contain.STAT water POT.use=1PL.EXCL then
shej=to' chope ni'a bej che=to'.
POT.go=1PL.EXCL two time well of=1PL.EXCL
'. . . **if there is no water on hand to use**, we **[will] make** two trips to our well (to get water).' (Long 1993:67–68)

b. Lenh gate'teze shej=chho **ullelh**=kze da'
however wherever go.POT=1PL.INCL **be.found.DUB**=certainly thing
ye'ej gaw=chho kon **she nhak=chho liger**. . .
drink.POT eat.POT=1PL.INCL just **if be.STAT=1PL.INCL diligent**
'However, wherever we go there **will be** something for us to eat **if only we are diligent**. . . ' (Long 1993:75)

Second, the acquaintance inference introduced by predicates of personal taste is obviated under modals (Klecha 2014:445–451), as it is also under both the potential and dubitative.

(7) Context: A man is making cat food for his cat. He never tastes it. He says:

a. Sia^{1}=dzgwa^{1} **ga^{1}ke^{1}** ye^{3}le'^{3} wao^{3} tse^{3} biz^{1} nhi^{3}.
delicious=a.lot **be.POT** NOM eat of cat this
'This cat food will be delicious.' (RM/FA, GZYZ166, 7:50)

b. Sia^{1}=dzgwa^{1} **wa^{1}ke^{1}** ye^{3}le'^{3} wao^{3} tse^{3} biz^{1} nhi^{3}.
delicious=a.lot **be.DUB** NOM eat of cat this
'This cat food will be delicious.' (RM/FA, GZYZ166, 8:30)

Given the type of food the man is making, he can have no actual experience of how it tastes; yet he is still able to describe it as tasty, using either the potential or dubitative.

While it is clear that these two future categories encode modality, it is not obvious what kind this is. In Long and Cruz's (2000:427–430) grammar on the Zoogocho variety, the potential is simply characterized as "generally referring to the future". It appears to have a range of uses similar to *will* (Copley 2002), to make a prediction (8) or express intention (9).

(8) Context: A child breaks their new toy. Their mother says to them:

Elhok^{1} xa^{1}=u'=nh^{3} ka^{1}te'^{3} e^{1}nezd^{3}=e'^{1} blha'^{3}=o^{3} ju^{1}get^{3}
get.mad.POT father=2SG=DEF when know.POT=3.EL break.COMP=2SG toy
tsi^{1}=u'=nh^{3}.
of=2SG=DEF
'Your father will get mad when he gets home.' (FA/RM, GZYZ079, 59:00)

(9) "Nha'^{3} **gunh**^{12}=dzu^{3}=ba'^{2} **pre**^{1}**gunt**^{3} chi^{1} u^{1}kaw^{3}da^{2}=ba'^{2}
so **do.POT**=1PL.INCL=3.HU **question** if accept.DUB=3.HU
u^{1}ka'a^{3}=ba'^{2} bi'i^{12} tse^{3}=lhe^{1}."
marry.DUB=3.HU child of=2PL
'"We will ask her if she wants to marry your son," [they said].' (IVJ, SLZ2028-t1, 5)

The dubitative is described, by contrast, as referring to the future "but only when there is an element of doubt or uncertainty", mirroring speakers' informal reports. From text examples like (10a–b), it is hard to get a sense of how it is used when there is doubt or uncertainty.

(10) a. **Uzi**'=lj=e' do to chop gayoa pes.
take.DUB=perhaps=3.EL around one two hundred peso
'He'll probably take a few hundred pesos.' (Long 1993:183)

b. Le **wat**=kze=chho.
for **die.DUB**=certainly=1PL.INCL
'We will inevitably die.' (Long 1993:95)

In (10a), any "uncertainty" the dubitative might convey is occluded by an epistemic possibility adverb; in (10b), it is compatible with an adverb of epistemic certainty. In grammars for other Zapotec varieties, no significant interpretative differences with the potential are even noted (Black 2000:29, Solá-Llonch 2021:45).

2. Pulling the potential and dubitative apart

Given the informal descriptions above, the dubitative would seem to be a good candidate for expressing either mere possibility or a weak necessity modal (like *should* or *ought to*). As I will show, however, neither of these makes the right empirical cut between how the potential and dubitative are used in conversation.

When conversational participants agree on how an issue is settled, only the potential is felicitous. That is, the dubitative is felicitous when it has not been settled in the speaker and

addressee's shared commitment space. This suggests the potential and dubitative have the same strength — both are strong necessity modals — but diverge along another dimension.

2.1 They are both necessity modals

It is easy to demonstrate, in the first instance, that both future categories express necessity, and not mere possibility, using standard patterns of inference. *Necessarily p and necessarily not p* is a contradiction, so the parallel sentences in the potential and dubitative should be infelicitous if they conveyed necessity, as they indeed are.

(11) Context: My mother is sick. It is difficult for her to move around and she has been leaving the house less recently. My sister and I are discussing whether she will be able to leave the house tomorrow, considering when she last left and whether she needs food. I conclude our discussion by saying:

a. #**Y-i-**^{1}**ga'an**^{3}=e'^{1} yu'u=nh^{13} wxe^{1} nha'^{3}
POT-FREQ-stay=3.EL house=DEF tomorrow and
y-i-^{1}**yej**^{1}=e'^{1} wxe^{1}.
POT-FREQ-go.out=3.EL tomorrow
Intended: 'She will stay at home tomorrow, and she will go out tomorrow.'
(RD, SLZ1097, 1:16:17)

b. #**W-e-**^{1}**ga'an**^{3}**=e'**^{1} yu'u=nh^{13} wxe^{1} nha'^{3}
DUB-FREQ-stay=3.EL house=DEF tomorrow and
w-i-^{1}**yej**^{1}**=e'**^{1} wxe^{1}.
DUB-FREQ-go.out=3.EL tomorrow
Intended: 'She will stay at home tomorrow, and she will go out tomorrow.'
(RD, SLZ1097, 1:19:19)

If either future category expressed possibility, then conjoining it with its inner negation should not result in a contradiction.

2.2 Weak versus strong necessity

Even if the potential and dubitative are both necessity modals, they could differ in their strength. The potential might convey *strong* necessity, and the dubitative *weak* necessity.

Some necessity modals intuitively express a more extreme degree of necessity than others. This is true across modal flavors, as shown for epistemic modals in (12) and priority modals in (13): the weak necessity modals in (b) examples do not convey the same degree of either certainty or requirement as the (a) examples.

(12) a. She **has to/must** have arrived at home by now.
b. She **ought to/should** have arrived at home by now.

(13) a. (To protect your skin), you **have to/must** wear sunscreen.
b. (To protect your skin), you **ought to/should** wear sunscreen.

Rubinstein (2012, 2021) identifies a number of grammatical properties of weak necessity modals, including modal harmony patterns, particular interactions with negation, and a compatibility with degree constructions, as well as some subtle discursive characteristics. Some of these are oriented specifically toward deontic and other priority modals, which are not relevant for understanding future modality, while others are difficult to apply in Zapotec.

But, as von Fintel and Gillies (2010) argue, it should be possible to observe — very directly — any weakness a modal might exhibit by looking in contexts where full certainty about an issue is guaranteed.

(14) Context: Chris has lost her ball. She knows with full certainty it is either in Box A or B or C. She says: "The ball is in A or in B or in C. It is not in A. It is not in B."

So, it **must/has to** be in C. (von Fintel and Gillies 2010:362)

In such a context, a strong necessity epistemic modal, like *must* or *have to*, is felicitous and shows no sense of weakness.

While we often emphasize its uncertainty, due to the indeterminacy that often exists about what will take place, we sometimes do achieve *virtual certainty* about the future, based on specific facts about the world. The context in (15), like the one above, guarantees that conversational participants will find the ball, given what they know about the world at the time of utterance. In such a context, the potential is felicitous, while the dubitative is not.

(15) **Hidden Ball Located:**
Context: Juan and Maria have a ball and three boxes. They put the ball in one of the boxes. Then, while Juan is watching, Maria moves the boxes around and marks them with numbers. So, the two know that the ball is in one of the boxes, but not which one. Then, Juan opens Boxes 1 and 2: both are empty. Maria says:

a. Lhu'u^{1} kaj^{1} u^{3}yu^{3}ne^{3}=nha^{3}, **ye**^{1}**lleld**^{3}=dzu^{3} pe^{1}lot^{3}=enh^{3}.
in box third=TOP **POT.find**=1PL.INCL ball=DEF
'We will find the ball in the third box.' (RM/FA, GZYZ166, 23:20)

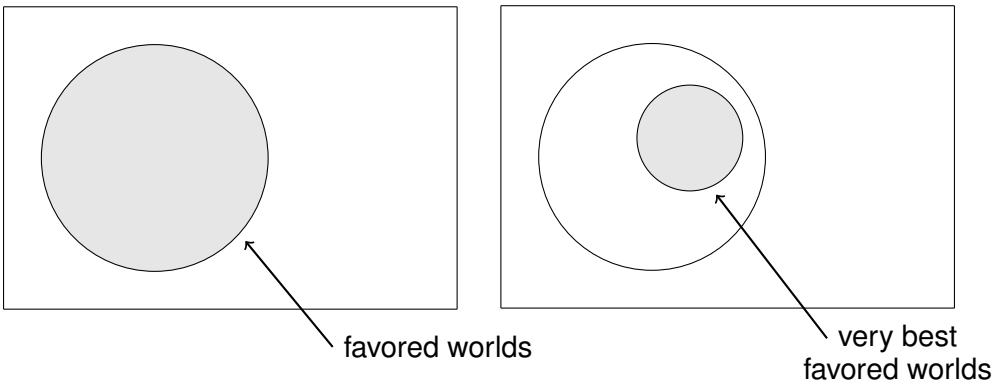
b. #**We**^{1}**lleld**^{3}=dzu^{3} pel^{1}ot^{3}=enh^{3} lhu'u^{1} kaj^{1} u^{3}yu^{3}ne^{3}.
DUB.find=1PL.INCL ball=DEF in box third
Intended: 'We will find the ball in the third box.' (RM/FA, GZYZ165, 41:15)

In their commentary, speakers emphasize the certainty with which Maria can use the potential. For the dubitative, they report that it is infelicitous because there seems to be no reason for her to use it, since she knows the ball is in Box 3.

So, the potential's behavior in **Hidden Ball Located** is compatible with strong necessity, while the dubitative's infelicity looks potentially like a sign of weak necessity. To see why, we need an actual semantics for weak necessity modals.

In their theory of *ought*, von Fintel and Iatridou (2008) aim to capture the intuition that what it and other weak necessity modals serve to do is say that among the worlds in the modal base that are most highly ranked by the ordering source — what they call the *favored worlds* — the worlds in which the prejacent of *ought* holds are better, in some way, than worlds in which it does not hold.

(16) **Strong necessity:** **Weak necessity:**



Thus, while a strong necessity modal requires the prejacent to hold throughout all its favored worlds, as determined by its modal base and ordering source, a weak necessity modal only requires the prejacent to hold in the *very best* of these favored worlds.

von Fintel and Iatridou implement this intuition by relativizing *ought* to two ordering sources: a primary ordering source, which contributes to determining the set of favored worlds, and a *secondary* ordering source — an additional measure which favored worlds must satisfy, thereby restricting the domain of the modal even further, to the very best favored worlds, where the prejacent must hold. What is this additional ordering source? They propose that a weak epistemic necessity modal is relativized not just to whatever "hard and fast evidence" is available, which they share with strong necessity modals, but also to a body of information about "what is normally the case".

We might be able to understand the infelicity of the dubitative in **Hidden Ball Located** in these terms. If, as a weak necessity modal, it must differentiate in some way among the favored worlds compatible with the circumstances at the time of utterance, then it will not be able to do so when virtual certainty about the future has been established. The speaker and addressee have all the information they need, to determine definitively that the prejacent will hold in the future, given how the world has developed up until the time of utterance. There is, thus, no need for a secondary ordering that would restrict the modal domain further — no need for additional considerations by which to measure what the very best worlds are.

2.3 There is no difference in strength

This does not, however, help us understand why a small change to this context makes the dubitative felicitous. In **Partially Hidden Ball**, objective circumstances are no different, though conversational participants' knowledge of these circumstance are changed.

(17) **Partially Hidden Ball:**
Context: Juan and Maria have a ball and three boxes. They put the ball in one of the boxes. Then, while Maria is not looking, Juan moves the boxes around and marks them with numbers. So, Juan knows which box the ball is in, but Maria doesn't. Then, Juan opens Box 1, which is empty. Maria must guess which of the other boxes the ball is in. But instead she says: "I can't guess!" Juan says:

a. Lhu'u^{1} kaj^{1} u^{3}yu^{3}ne^{3}=nha^{3}, **ye**^{1}**lleld**^{3}=u'^{3} pe^{1}lot^{3}=enh^{3}.
in box third=TOP **POT.find**=2SG ball=DEF
'You will find the ball in the third box.' (RM/FA, GZYZ165, 4:58)

b. **We**^{1}**lleld**^{3}=u'^{3} pel^{1}ot^{3}=enh^{3} lhu'u^{1} kaj^{1} u^{3}yu^{3}ne^{3}.
DUB.find=2SG ball=DEF in box third
'You will find the ball in the third box.' (RM/FA, GZYZ165, 6:24)

While the speaker knows which box the ball is located in, the addressee only has partial knowledge. In this context, the dubitative becomes just as good as the potential. This is surprising if the dubitative is a weak necessity modal.

For comparison, consider the use of *ought* or *should* in an asymmetric epistemic context. My intuition is that saying *#The ball **ought to/should** be in Box 3* in **Partially Hidden Ball** is infelicitous. It implies that the speaker — like the addressee — considers it to be a live possibility that the ball is either under Box 2 or 3. The addressee might be justified to follow up by saying, "Didn't you look under all three boxes?"

Simply thinking about the *type* of information that the modal is sensitive to is perhaps not so useful here for understanding why this might be. Recall that von Fintel and Iatridou characterize the body of considerations that determine the set of favored worlds as the "hard and fast evidence", with some additional considerations having to do with "what is normally case" responsible for differentiating amongst them further.

Rather than individuating conversational backgrounds in this way, Rubinstein (2012) shows it is possible to characterize them according to their discourse status. Unlike strong necessity modals, which are relativized solely to conversational backgrounds which participants are collectively committed to, she argues that weak necessity modals must differentiate amongst the favored worlds, using some considerations which they are *not* collectively committed to. The weirdness of *ought* or *should* in asymmetric epistemic contexts could come, then, from (i) their requirement that the modal base and primary ordering source be collective commitments, which determine a set of favored worlds, (ii) from which a secondary ordering source is able to carve out a set of very best worlds satisfying the prejacent. This is not satisfied in **Partially Hidden Ball**, since the speaker knows whether the prejacent is true or not. Hence, the speaker and addressee's collective commitments do not make both the prejacent and its negation live possibilities.

The dubitative clearly does not have the same requirement, based on its felicity in this context. Since the speaker's epistemic state can be settled relative to the prejacent, the dubitative must require something much weaker than a weak necessity modal. It seems simply to require that there be a *lack of collective commitment* about the prejacent. Or, in other words, for the common ground not to be settled with respect to it.

(18) **Dubitative Generalization:**
The dubitative is felicitous when the prejacent is not settled in the common ground.

This does not preclude the prejacent from being a private commitment of the speaker, settled in just their epistemic state.

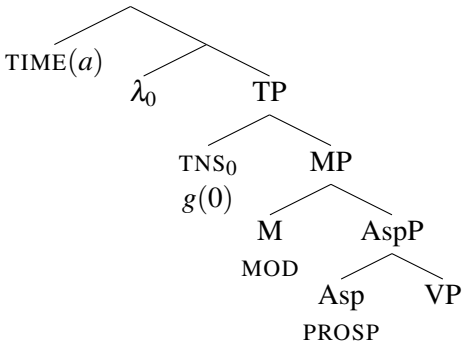
3. Analyzing the two futures in Zapotec

Where does this requirement on the common ground for the dubitative come from? I argue that it comes from a verum operator, which imposes a requirement on what can be in the common ground.

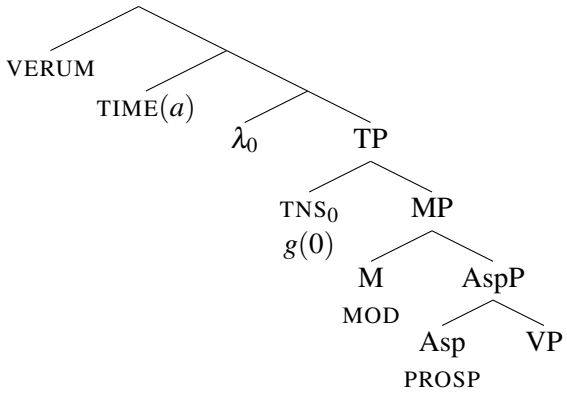
This analysis of the two future categories in Southeastern Sierra Zapotec has the following components: (i) *a modal component:* Both the potential and dubitative encode a strong necessity modal, which can use either a metaphysical or epistemic modal base and a (possibly empty) ordering source; (ii) *a temporal component:* This modal does not encode any temporal shifting, as Abusch (1998) proposes. Instead, the temporal orientation is provided by prospective aspect (Matthewson 2012); and (iii) *a verum operator:* Only the dubitative encodes a verum operator, which takes scope over the entire clause (including the modal) and imposes certain requirements on the shared commitment space, as well as conversational participants' private commitment spaces.

These components are organized in the logical forms for the dubitative and potential below. The only difference is the presence of the VERUM operator in the dubitative.

(19) a. **Potential:**



b. **Dubitative:**



The modal's temporal perspective comes from tense here, as in English (Abusch 1998), even though Zapotec languages are morphologically tenseless (Toosarvandani 2021).

3.1 The modal component

This means the dubitative can be just as strong as the potential, with both future categories conveying strong necessity. The modal can have either an epistemic or metaphysical modal base, much as in Condoravdi's (2003) account of *will*.

(20) $[\![\,\text{MOD}\,]\!]^w(P) = \lambda t \forall w' \in max_{h(t)(w)}(f(t)(w))\,[P(w')(t)]$
where $f(t)(w) = \{w' : w'$ is compatible with what is known in w at $t\}$, or
$\{w' : w'$ is a metaphysical alternative of w at $t\}$

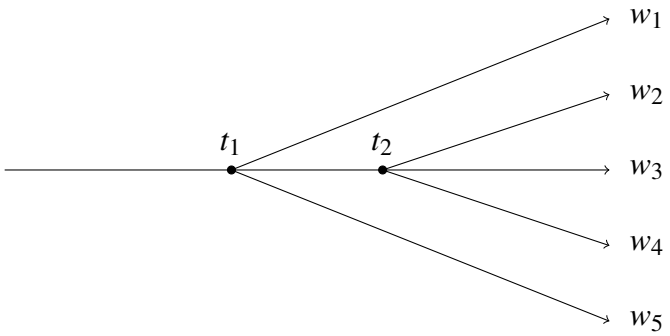
The epistemic modal base include all the worlds compatible with what is known (by someone) in the world of evaluation. The metaphysical modal base, by contrast, includes

all the "metaphysical alternatives" of the world of evaluation. These involve looking at all the ways the actual world might evolve, from a certain time forward, based on a global understanding of how the world is at that time.

With a future contingent proposition, there could be more than one way that things turn out, since the issue it presents is not settled by what has transpired up until the present. These are circumstances where there is more than one *live possibility* in the future. It is standard to represent the structure of these possibilities using a world-time model (Thomason 1984). In such a model, worlds are complete histories through time. But for any given time and world, there are other worlds which can be identical to it, in all respects at all times in the past, though these might diverge in the future.

So, you can think about every world, at a given time, as belonging to an equivalence class of worlds with identical pasts up through that time. The metaphysical alternatives of a world w at a time t, then, are the worlds in its equivalence class, which are identical to w up through t. As time proceeds, a world's metaphysical alternatives shrink, as fewer possibilities remain live as time goes by. Issues that were open before are decided, rendering worlds that were metaphysical alternatives before, no long alternatives.

(21)



Thus, at time t_1, worlds w_1 through w_5 are all metaphysical alternatives. But by t_2, circumstances have changed, and one or more facts distinguish w_1 and w_5. So at t_2, only w_2 through w_4 are still metaphysical alternatives, identical to each other in all respects up through t_2.

Metaphysical live possibilities are also epistemic possibilities, since if an issue is not settled by all the circumstances through the present, then it is not possible to know how it will turn out. But there can be epistemic uncertainty without metaphysical uncertainty, as we have seen. When every equivalence class of metaphysical alternatives is settled uniformly, even if this is in different ways, we are in a state of epistemic ignorance about how the world will turn out, even though it is not indeterminate how it will turn out, given a particular set of circumstances. In this model, then, an epistemic state is a union of sets of equivalence classes of worlds at a given time. An epistemic state can exhibit different kinds of uncertainty about the future: uncertainty about virtual certainty or true metaphysical uncertainty.

In this way of thinking, both the potential and dubitative must allow for either a metaphysical modal base or an epistemic one. When there is metaphysical uncertainty, it is still possible to discriminate amongst future live possibilities on the basis of other types of information. For both the potential and dubitative, this can involve beliefs about what happens in the normal course of events, as in **Ice Cream Stand**.

(22) **Ice Cream Stand:**
Context: Maria and her son Pedro are walking down the street. They see an ice cream seller, who is selling ice cream for $2. Pedro says he wants an ice cream. Their house rule is that he can have only one ice cream per day. Maria gives Pedro $5 and says:

a. **Yi**^{1}**yo**^{1}**n**=e'^{1} lhe'^{1} cho^{3}ne^{3} do^{1}lar^{1}.
return.POT=3.EL 2SG three dollar
'He will give you three dollars back.' (RM/FA, GZYZ164, 22:31)

b. **We**^{1}**yo**^{1}**n**=e'^{1} lhe'^{1} cho^{3}ne^{3} do^{1}lar^{1}.
return.DUB=3.EL 2SG three dollar
'He will give you three dollars back.' (RM/FA, GZYZ164, 23:05)

Maria makes a prediction here about how the world will turn out — her son will get three dollars back — based on her understanding of the current circumstances and how things normally go (that people generally provide accurate change).

For both potential and dubitative, it is also possible to discriminate amongst future live possibilities on the basis of the speaker's desires, as in **Family Trip** below. Here, the speaker says that the world will turn out a certain way, based on her preference.

(23) **Family Trip:**
Context: A family has decided to go on a road trip from Los Angeles to San Francisco, but their car is not working. The mother's sister has a car they could use, but the sisters are not speaking now. The mother has also said many times that she does not want to speak with her sister anymore. She is talking with her child about the trip, who says: "We aren't going to ask your sister to borrow her car?" The mother says:

a. **Tsilj**^{1}=dzu^{1} yi^{1}tu^{1} karw^{13}.
POT.look.for=1PL.INCL another car
'We will look for another car.' (RM/FA, GZYZ164, 31:14)

b. **U**^{1}**yilj**^{1}=dzu^{1} yi^{1}tu^{1} karw^{13}.
DUB.look.for=1PL.INCL another car
'We will look for another car.' (RM/FA, GZYZ164, 32:00)

While some, like Giannakidou and Mari (2018), have considered the possibility that future markers only convey epistemic modality, I do not see how this can be the case here. These seem to be irreducibly metaphysical, relying on facts about the actual world.

As we saw in the **Partially Hidden Ball** context in (17), when there is an epistemic asymmetry between conversational participants, both the potential and dubitative become possible. Here, both future categories must use an epistemic modal base, since there are no other grounds by which to settle whether the ball is under Box 3 or not. It is only relative to the speaker's (Juan's) knowledge that the prejacent can be settled.

The potential and dubitative do not seem, then, to differ on the basis of the kind of modality they convey.

3.2 Temporal components

They also do not differ in their temporal components. Following Matthewson (2012), I take the modal's temporal orientation — for both the potential and dubitative — to be given by prospective aspect. This moves the time at which an eventuality is evaluated into the future.

(24) $[\![\text{PROSP}]\!](P) = \lambda t \exists t' \exists e[P(e) \wedge \tau(e) \circ t' \wedge t \prec t']$

This is motivated by the fact that, even though an epistemic modal base is, in principle, possible for both the potential and dubitative — as we just saw in asymmetric epistemic contexts — neither future category can have a *present* epistemic interpretation. They cannot be used to talk about what must be the case right now, given current knowledge. As in (25), they cannot describe Pedro's being cold *at* the time of utterance.

(25) Context: My cousin Pedro doesn't like cold weather. Even when he visits California, he is cold. Right now (in January), Pedro is in Alaska. I say:

a. #**Ye**[1]**yag**[3] Bed[1]w='nh[3] na'a[1].
be.cold.POT Pedro=DEF now
Intended: 'Pedro will be cold now.' (RD, SLZ1097, 51:50)

b. #**We**[1]**yag**[3] Be[1]dw='nh[3] na'a[1].
be.cold.DUB Pedro=DEF now
Intended: 'Pedro will be cold now.' (RD, SLZ1097, 50:02)

Any present temporal orientation is simply ruled out by prospective aspect, which requires the eventuality described to follow the time at which the modal's domain is determined.

I take the modal's temporal perspective to come from tense (Abusch 1998), even though Zapotec is morphologically tenseless. It provides a distinguished variable, which is abstracted over. In root clauses, following Pancheva and Zubizarreta (to appear), I assume it is saturated by a deictic pronoun in the left periphery (Kusumoto 1999).

(26) $[\![\text{TIME}(a)\ \lambda_0\ t_0\ \text{MOD PROSP VP}]\!]^{u,a,w} =$
$\forall w' \in max_{h(\text{TIME}(a))(w)}(f(\text{TIME}(a))(w))\ \exists t' \exists e[[\![\text{VP}]\!]^{u,a,w'}(e) \wedge \tau(e) \circ t' \wedge \text{TIME}(a) \prec t']$

I assume the deictic pronoun picks out the time of an *assessment* context (a), rather than the utterance context, to account for the fact that the modal's temporal perspective cannot generally be shifted into the past in root contexts (Toosarvandani 2021).

Neither the potential nor the dubitative can have a future-in-the-past reading — past perspective with future orientation — in an information seeking exchange.

(27) (*E beyoll Pedronh le'ejenh neje?* 'Did Pedro build the corral yesterday?')

a. #**Ye**[1]**yoll**[3]=ba'[2]=nh[3], perw[1] btahs[3]=ba'[2].
do.POT=3.HU=3.IN but sleep.COMP=3.HU
Intended: 'He was going to build it, but he fell asleep.'
(RM/FA, GZYZ164, 1:09:10)

b. #**U**[1]**yoll**[3]=ba'[2]=nh[3], perw[1] btahs[3]=ba'[2].
do.DUB=3.HU=3.IN but sleep.COMP=3.HU
Intended: 'He was going to build it, but he fell asleep.'
(RM/FA, GZYZ164, 1:09:00)

However, with the narrative setup in (28), both the potential and dubitative are able to have past perspective.

(28) a. Nlle'e[13] bzu[1]lao[3] gok[3] yejw=nh[3]. **E**[1]**lhua**[1] Pe[1]dro=nh[3]
nighttime begin.COMP happen.COMP rain=DEF **clean.POT** Pedro=DEF
yel[3], perw[1] bi[1]tu[1] blhua[1]=ba'[2]=nh[3].
milpa but NEG clean.COMP=3.HU=3.IN
'Last night, it started to rain. Pedro was going to clean the milpa, but he couldn't.' (FA/RM, GZYZ164, 1:11:12)

b. Nlle'e[13] bzu[1]lao[3] gok[3] yejw=nh[3]. **U**[1]**lhua**[1] Pe[1]dro=nh[3]
nighttime begin.COMP happen.COMP rain=DEF **clean.DUB** Pedro=DEF
yel[3], perw[1] bi[1]tu[1] blhua[1]=ba'[2]=nh[3].
milpa but NEG clean.COMP=3.HU=3.IN
'Last night, it started to rain. Pedro was going to clean the milpa, but he couldn't.' (FA/RM, GZYZ164, 1:11:40)

This follows if TIME(a) is, as a default, identical to the utterance time, though it can be shifted pragmatically into the past in narratives (Anand and Toosarvandani 2017, 2018).

In terms of both their modal and temporal properties, then, the potential and dubitative show no significant differences.

3.3 Verum and the conversational dynamics of future talk

How does a VERUM operator derive the difference between them? I adopt the following felicity conditions for this operator in Southeastern Sierra Zapotec:

(29) VERUM ϕ is felicitous in an utterance context u iff:

(i) ϕ is not settled in the common ground of u, i.e., $c \cap \phi \neq \varnothing$ and $c \cap \neg\phi \neq \varnothing$, and

(ii) the speaker of u believes that a conversational participant in u is, possibly privately, committed to $\neg\phi$.

In this way of thinking, VERUM is not related to focus, as is sometimes proposed (Lohnstein 2016, Samko 2016). The conditions in (29) relate it more directly to work which takes verum operators to presuppose a particular QUESTION UNDER DISCUSSION (QUD) (Gutzmann et al. 2020). In fact, the first condition above might be reduced to a non-triviality condition on a polar QUD corresponding to the verum operator's prejacent.

The first condition in (29) requires VERUM's prejacent not to have been settled already. This is the source of the "doubt" involved in the dubitative: it involves a lack of a collective

commitment to the prejacent. This does not, however, preclude just the speaker from being committed to its truth. Their private epistemic state could be settled with respect to the prejacent. By contrast, the potential lacks the VERUM operator, and so it will be felicitous even in contexts where the prejacent is settled in the common ground.

To illustrate, take the difference between the potential and dubitative in contexts like **Hidden Ball Located** in (15), where the context ensures virtual certainty about the future, which conversational participants share knowledge about. The dubitative is infelicitous here because VERUM requires that the proposition that they will find the ball in Box 3 not be settled, either positively or negatively, in the common ground. But in this context, all conversational participants share the same knowledge about the ball's location: they share the virtual certainty that they will find the ball in that box at the time they are speaking.

This does require some theory of how negation interacts with the modal component. While I treat VERUM as taking syntactic scope over the modal, it must divide the context set up in the same way that a polar question with *will* does.

(30) Will it rain? $\approx \{\Box p, \Box \neg p\}$

The question *Will it rain?* asks whether it is necessarily the case that it rains or it is necessarily the case that it does not rain. This surprisingly low scope for negation has been accounted for in different ways, including a homogeneity presupposition (Copley 2002, Winans 2016).

The syntax of verum

Some syntactic differences between the future categories, identified first by Solá-Llonch (2021) for Lachiroag Zapotec, support the presence of a verum operator in the dubitative.

First, the dubitative must occur with verb-initial word order, even though preverbal elements are otherwise possible (focused arguments, clitic left dislocated topics, adverbs). The potential permits — and in some cases prefers — a preverbal element. (This is shown below for a temporal adverb, but the same generalization holds for preposed arguments.)

(31) (*Bixtse'nh jalhe tsitj=u' wxe?* 'Why will Maria not play tomorrow?')

a. **U**^{1}**yitj**^{1} Ma^{1}ria='nh^{3} wxe^{1}.
play.DUB Maria=DEF tomorrow
'Maria will play tomorrow.' (RD, SLZ1097, 32:08)

b. *Wxe^{1} **u**^{1}**yitj**^{1} Ma^{1}ria='nh^{3}.
tomorrow **play.DUB** Ma^{1}ria=DEF
Intended: 'Maria will play tomorrow.' (RD, SLZ1097, 32:00)

c. Wxe^{1} **tsitj**^{1} Ma^{1}ria='nh^{3}.
tomorrow **play.POT** Maria=DEF
'Maria will play tomorrow.' (RD, SLZ1097, 30:50)

Second, the potential can appear with sentence negation, while the dubitative is strictly forbidden with it.

(32) a. Bi^{1}tu^{1} **tsitj**^{1} Ma^{1}ria=nh^{3} pe^{1}lot^{1}=enh^{3} wxe^{1}.
NEG **play.POT** Maria=DEF ball=DEF tomorrow
'Maria won't play basketball tomorrow.' (FA/RM, GZYZ162, 59:40)

b. *Bi^{1}tu^{1} **u**^{1}**yitj**^{1} Ma^{1}ria=nh^{3} pe^{1}lot^{1}=enh^{3} wxe^{1}.
NEG **play.DUB** Maria=DEF ball=DEF tomorrow
Intended: 'Maria won't play basketball tomorrow.'
(FA/RM, GZYZ162, 1:00:20)

Finally, the potential can appear in wh-questions, while the dubitative never can.

(33) a. Nhu^{31} **tsib**^{1} yu^{3}ge^{3}lho^{3}le^{3} la^{3}dze^{3} nhi^{3} wxe^{1}?
who **clean.POT** all clothes here tomorrow
'Who will clean all these clothes tomorrow?' (FA/RM, GZYZ163, 53:34)

b. *Nhu^{31} **u**^{1}**dib**^{1} yu^{3}ge^{3}lho^{3}le^{3} la^{3}dze^{3} nhi^{3} wxe^{1}?
who **clean.DUB** all clothes here tomorrow
'Who will clean all these clothes tomorrow?' (FA/RM, GZYZ163, 54:42)

Solá-Llonch (2021) considers the possibility that dubitative verbs move into the left periphery, blocking preverbal material, negation, and wh-phrases (cf. Lee 2006). This proposal has the potential to associate the syntactic properties of the dubitative with a VERUM operator, taking sentential scope.

The pragmatics of verum

With just the first condition in (29), the verum operator is able to derive the generalization about when the dubitative is felicitous. But all by itself, it only requires that the common ground not be settled with respect to the prejacent.

Something more than a simple non-settledness requirement seems needed, since the dubitative is somewhat strange in an out of the blue context.

(34) Context: I see one day that my neighbor's chickens are listless and do not have any water. I knock on neighbor's door, and I say:

a. **Ye**^{1}**lla'a**^{1}=dzgwa^{1} wxe^{1}.
be.hot.POT=a.lot tomorrow
'It is going to be really hot tomorrow.' (RD, SLZ1100, 39:58)

b. #**We**^{1}**lla'a**^{1}=dzgwa^{1} wxe^{1}.
be.hot.DUB=a.lot tomorrow
'It is going to be really hot tomorrow.' (RD, SLZ1100, 41:30)

In this context, there is simply no previous discussion of whether the weather was going to be hot or not, and yet the dubitative is infelicitous.

There have been recent proposals that verum operators require the prejacent's negation be present in the discourse context in some way, either by making it anaphorically accessible

or part of the addressee's public commitments. For example, Gutzmann et al. (2020) propose that VERUM conveys that the speaker wants to prevent the QUD from being resolved in favor of $\neg\phi$, when $\neg\phi$ has been "proposed or... at least, been made salient". Along similar lines, Matthewson (2021) proposes for Gitksan that VERUM is only licensed when "the speaker believes some interlocutor to be publicly committed" to $\neg\phi$.

Explicit mention of the prejacent's negation in an emphatic disagreement does seem to make the dubitative felicitous — and the potential, potentially, somewhat dispreferred.

(35) Context: I am complaining that you never come to visit me. I say: *Bitu yidu' dewiu' nada' yeyull iz.* 'You won't come visit me this new year.' You say:

a. ??**Yi**[1]**d**=a'[3] de[1]-wia[3] lhe'[1].
come.POT=1SG VEN-visit 2SG
Intended: 'I WILL come visit you!' (FA/RM, GZYZ165, 1:34:40)
[RM: "More normal, *wida'*..."]

b. **Wi**[1]**d**=a'[3] de[1]-wia[3] lhe'[1]!
come.DUB=1SG VEN-visit 2SG
'I WILL come visit you!' (FA/RM, GZYZ165, 1:34:30)

However, it is not clear that the verum operator actually requires the prejacent's negation to have been "proposed or made salient", in the way Gutzmann et al. (2020) propose. It is possible to use the dubitative to simply confirm a previous assertion.

(36) Context: Maria is going to play for the basketball team tomorrow morning. We both know Maria, and we are talking about how she might play. You say: *Wxe tsitj Marianh wenh.* 'Maria will play well tomorrow.' I confirm:

a. **Tsitj**[1]=ba'[2] wenh[1] wxe[1].
play.POT=3.HU good tomorrow
'She WILL play well.' (FA/RM, GZYZ166, 49:48)

b. **Uyitj**[1]=ba'[2] wenh[1] wxe[1].
play.DUB=3.HU good tomorrow
'She WILL play well.' (FA/RM, GZYZ166, 49:34)

In this context, prejacent's negation — that Maria will not play well — is not mentioned and does not appear to have been made particularly salient in this context. So this cannot be a requirement for licensing VERUM, at least not in Southeastern Sierra Zapotec.

Similarly, there are many spontaneously produced examples of the dubitative, in which a negative proposition is never explicitly mentioned. These suggest that a proposal more like Matthewson's (2021), in which the verum operator makes reference to participants' conversational commitments, may be appropriate.

(37) Context: A person is giving advice to a couple upon their marriage.
'Today you, man and woman, have become one... Don't do things just as you please... If you do just like you've been doing, then there will be trouble in your household... Be united in whatever happens. If good things happen, then both of you will benefit by it, and...'

she to yela' zi' le gonxhenhlalle' le **ude**=kz=enh kate'
if a NOM painful IMP be.patient.POT for **pass.DUB**=certainly=3.IN when
llinh lla te=nh.
arrive.POT day pass.POT=3.IN
'if something [is] difficult, be patient, for it **will pass** when the time comes for it to pass.' (Long 1993:65)

By using the dubitative in this monologue, the speaker seems to be entertaining the possibility that perhaps the young couple thinks that any difficulties will *not* eventually pass.

So, in addition to the requirement it imposes on the current common ground, the verum operator in Southeastern Sierra Zapotec appears to express something about how the speaker thinks the question might be resolved, given their interlocutors' commitments. From this spontaneously produced example, it is clear that these commitments need not be made public for the verum operator to be felicitous. As a first attempt, we might say, as in the second condition in (29), that the speaker must believe that a conversational participant in the conversation is, possibly privately, committed to the prejacent's negation. This is still a weaker pragmatics than what Matthewson proposes for Gitksan, however, which requires a *public* commitment to the negation of the prejacent.

4. Conclusion

I have advanced an account of two future categories in Southeastern Sierra Zapotec. The potential and dubitative have a modal semantics that is nearly identical: both are strong necessity modals. However, just the dubitative encodes a verum operator which imposes conditions on the discourse context, in particular on what can already be settled in the common ground.

This additional meaning component makes it easy to confuse the dubitative with a weak necessity modal, which involves its prejacent not being settled in its modal domain. For weak necessity modals, however, this domain is plausibly a product of conversational participants' *collective lack of commitment* with respect to the prejacent, so that each conversational participant's epistemic state will also not be settled with respect to the prejacent. By contrast, the dubitative seems to have a weaker requirement: it only requires that there be a *lack of collective commitment* with respect to the prejacent.

There are some resemblances to epistemic futures in other languages, particularly in Greek and Italian (Giannakidou and Mari 2018, Ippolito and Farkas 2022). The future markers in these languages seem to require that the prejacent not be settled in the speaker's epistemic state, so that they are never able to express full certainty. This result is ultimately quite different from the requirement imposed by the dubitative, which a speaker can use felicitously even when they are certain about an issue.

It is clear, from just this brief comparison, that more fine-grained semantic investigations of future modality are needed. Given this somewhat preliminary investigation of two future categories in Zapotec, this should probably include increased attention to the dynamics of conversation, and how issues are raised and resolved when talking about the future.

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