A conceptual and a grammatical distinction for modals

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1. Two kinds of modals, two kinds of forces

The progressive and generic/habitual uses of imperfectives have long been claimed to be modal, with universal quantification over "normal" or "inertial" worlds or situations (Cipria and Roberts 2000, e.g.). Futures such as *be going to* and *will* have also been claimed to be modal in the same sense (Copley 2002b, e.g.). Assuming that both claims are correct, an account of the obvious differences between modal aspects and modal futures is needed. In this paper I will propose a general outline for such an account, with a view towards an eventual full formal implementation.

1.1. Initial data

We might at first assume that modal imperfectives place an event overlapping with the local evaluation time, while modal futures place it following the local evaluation time (where the local evaluation time is determined by tense). Contrasts such as the one in (1), for example, support such a generalization.

(1) a. #John is getting sick tomorrow. imperfective, physical[1]
b. John is going to get sick tomorrow. future, physical

Many thanks to Barry Schein, Jim Higginbotham, Sabine Iatridou, several anonymous reviewers, and audiences at NELS 35, Kyushu University, MIT, UCLA, and USC.

[1]The reasons for this annotation will become clear shortly.

Here, although both the progressive and *be going to* share some sort of "ongoingness" in their meaning,[2]they differ in their compatibility with the future temporal adverbial *tomorrow*. The sentence *John is getting sick* can only refer to an event that is ongoing at the local evaluation time, which in this case is the utterance time. The generalization seems fairly straightforward: the progressive talks about the local evaluation time, and *be going to* talks about some time that is in the future with respect to the local evaluation time. Let's call this generalization "G1":

(2) G1: Progressives place their event overlapping the local evaluation time; future modals place their event after the local evaluation time.

Yet in many languages, English included, G1 is not valid. It is well known that some progressives can be used to talk about the future when the event under discussion is something that is planned or scheduled, as in (3a), and indeed the modal future *be going to* in (3b) seems to make a similar reference to an ongoing intention for John to make pizza.

(3) a. John is making pizza tomorrow. aspect, intentional
b. John is going to make pizza tomorrow. future, intentional

So although in some cases, namely those that are non-intentional as in (1), the initial generalization holds, it does not hold for all cases. When intentions (schedules, plans) are considered, as in (3), the generalization is simply wrong, and we are left without an idea of the difference between aspectual modals and future modals.

The kind of progressive exemplified in (3a) is often called a *futurate* reading. One may object here that futurate readings are entirely different animals from other readings of imperfectives, and so do not properly belong in a discussion of "normal" imperfectives. But as I will argue, this different animal – a more future-like behavior when it comes to intentional cases – shows up elsewhere, and therefore is deserving of inclusion in this initial collection of facts.

Another objection is that futurates are too normal for consideration; it has become common, since Dowty (1979), to treat the intention stage as a preparatory stage to the event, and then this event is what the progressive operates on. But it seems very strange to consider it as an early stage of the event. For example, the planning stage can have an independent temporal adverbial, and participate in anaphora:

(4) a. **When I talked to the baseball commissioner last week,** the Red Sox were playing the Yankees three times in the first week in May.
b. **That** made me think I should get some tickets.

Thus, while the intention or plan is required to include the local evaluation time in futurates, it is implausible to consider it an early stage of the event itself. Later we will see that this impulse to make the intention part of the event is really unnecessary.

[2]Elsewhere (Copley 2001, 2002a,b, 2004) I have argued that this "ongoingness" corresponds to sharing a Kleinian (Klein 1997) imperfective component, i.e., inclusion of the topic interval within a larger interval over which branching takes place.

A similar pattern to the one we have just seen for progressives and *be going to* can also be observed in generic/habitual sentences and dispositional *will* sentences, both of which assert a lawlike connection between the subject and the event. The difference, at least initially, appears to be that habituals, as in (5a), require the event to have been instantiated at least once. We may conclude this because the continuation *though thankfully it's never come to that* induces a contradiction. On the other hand, the dispositional in (5b)[3] does not contradict the continuation, and therefore does not seem to require instantiation of the event.

(5) a. #Our grad students are so tough, they even eat cardboard, though thankfully it's never come to that. aspect, physical
b. Our grad students are so tough, they will even eat cardboard, though thankfully it's never come to that. future, physical

Thus, our initial generalization concerning the difference between habituals and dispositionals is G2:

(6) G2: Habituals require the event to have been instantiated at least once before the local evaluation time; dispositionals do not require the event to have been instantiated before the local evaluation time.

However, G2 turns out to be as untenable as G1 – and in a suspiciously similar way. As pointed out by Carlson (1995), some habituals do not require instantiation. One such habitual is given in (7a); as with the dispositional in (7b), the continuation does not induce a contradiction.

(7) a. Our grad students answer the mail from Antarctica, though there hasn't been any so far. imperfective, intentional
b. Our grad students will answer the mail from Antarctica, though there hasn't been any so far. future, intentional

Crucially, the event there is intended by (we assume) the faculty; the exceptionality to G2 must stem from the fact that the lawlike connection between the subject and the event is manmade rather than physical. What is interesting about the fact that the law is manmade is that it should remind us of the exception to G1, which also involved a manmade law of a sort, in the form of a schedule or plan. So perhaps G1 and G2 are somehow analogous, in a manner yet to be explicated.

Before offering an explication, I would like to forestall a possible objection to this analogy. In what sense (the objection goes) is (6a) not intentional? Surely the students are agents of eating-cardboard events, and being agents, have intentions to carry out these events. Therefore, the difference between (6a) and (7a) is not one of physical laws versus intentional laws. Therefore, G2 is not analogous to G1.

[3]There is of course another reading of (4b), placed in better context as: 'There's nothing you can do about it, the students will just keep on eating cardboard.' We will ignore this reading here. The idea that these are different readings is supported by the fact that in at least one language (some varieties of Indonesian) these readings are expressed by different morphemes (Copley 2004).

This objection is not valid, however. Mere agenthood does not entail intentionality of the agent to carry out the event; agents can certainly do things accidentally. But let us suppose that the agents in question in (6a) do actually intend to eat cardboard. Their intentions to eat cardboard have nothing to do with the analogy between G1 and G2, because the intentionality of the agent to carry out the event is not where the distinction lies between (6a) and (7a). Rather, the distinction is in the source of the lawlike connection between the agent and the event. The connection is physical in (6a) in that it has to do with properties of the students that dispose them to eat cardboard. The connection is manmade in (7a), to the extent that it results from an obligation, rather than a disposition. This is the reason why the objection is not valid. Yes, agents may very well intend to carry out events, but this kind of intention is not the kind of intention under discussion.

With that objection out of the way, let us consider how to unify G1 and G2 (and their exceptions). What does overlapping the local evaluation time (as in G1) have to do with having at least one instantiation before the local evaluation time (as in G2)? Here it will be useful to think a little about the difference between the meaning of progressives and habituals, to subtract that difference from the equation, and hopefully to be left with equals on either side. Progressives involving physical forces, on any account, predicate a single occurrence of the event, ongoing at the local evaluation time, while habituals involving physical forces say of an event that in any of a contextually supplied kind of situation, the event holds, as result of an ongoing lawlike connection between the subject and the event. What these have in common, though, is the requirement that at least part of the event be before the local evaluation time. The exceptions to G1 and G2, the intentional cases, are exceptions precisely in that this requirement is not obeyed.

The table in (8) sums up this new generalization; the imperfective “no!”’s are the exceptions to G1 and G2.

(8) Must the event be at least partly before the local evaluation time?

		physical	intentional
imperfective	progressive	yes	no!
future	*be going to*	no	no
imperfective	habitual	yes	no!
future	dispositional	no	no

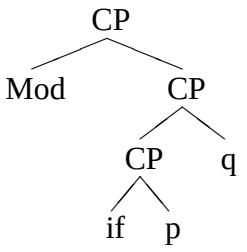
It so happens that this initial pattern is supported further by examples in which these modals in certain kinds of conditionals. We turn now to these cases.

1.2. Modals in conditionals

The generalization noted for imperfectives and futures applies to conditionals as well, as demonstrated in (10) through (13) below. A sidebar: We are only considering conditionals in which the modal takes wide scope. I have argued elsewhere (Copley 2002b, 2004) that

in conditionals like those in (10) through (13), the aspectual or future modal takes scope over the entire conditional, as in (9).

(9)



While conditionals can have other structures, this structure is the one we are interested in, as it guarantees that the modal will take the local evaluation time as its temporal argument.

These wide scope conditionals exhibit the same pattern of judgments observed above: intentional cases of imperfectives are allowed to be somewhat "looser" than physical cases of imperfectives, and behave more like the futures do.

If you drop that vase:

(10) a. #it's breaking. imperfective, physical
b. it's going to break. future, physical

(11) a. you're picking it up. imperfective, intentional
b. you're going to pick it up. modal future, intentional

(12) a. #it breaks. imperfective, physical
b. it will break. future, physical

(13) a. you pick it up. imperfective, intentional
b. you will pick it up. modal future, intentional

The contrast in (10) shows that in physical cases, progressives are not grammatical the way *be going to* is. However, in an intentional case as in (11a), the progressive is possible. This looks very similar to what we have seen before. Likewise, the contrast in (12) demonstrates that physical habituals are not as permissive as dispositional *will*. Actually, not all physical habituals are bad; those in (14) are fine.

(14) a. If you drop a vase, it breaks.
b. If you drop this kind of vase, it breaks.

But this is exactly the point: the examples in (14) are fine just to the extent that these kinds of events have already been instantiated. The example in (12a) presumably, if true, describes a non-repeatable event, so it can't already have happened. And it is exactly in this case that the physical habitual is bad. The intentional habitual, in (13a), however, is fine. Thus we can see that the same patterns hold here as with the other data.

So: While the futures are apparently insensitive to any variation between physical facts and intentions, the aspects are sensitive to them, behaving more like futures in the

intentional cases. What could account for this pattern?

2. Ordering

First let us look at the imperfective modals, as they are more discriminating, and hence (with any luck) more informative, than the future modals.

2.1. Unasking the question

The pattern of the imperfective data is still rather unsatisfying at the moment; there are glaring exceptions to our generalizations. So let us try to look at the pattern from another perspective. Instead of asking what requirements are placed on the event time in all four cases of imperfectives, let us ask instead what it is (call it "X") that is required to overlap the local evaluation time in all four cases.

It seems clear that X cannot be the event time. Of the four kinds of imperfective sentences, only the physical progressive cases seem to require the event time to overlap the local evaluation time. In the intentional progressive (i.e., the futurate) cases, the event time does not overlap the local evaluation time; it is in the future. And certainly no one has ever suggested of habituals that an instantiation of the event needs to overlap the local evaluation time. This is a prominent property of generics and habituals, that an instantiation of the event need not be taking place at the local evaluation time. In generics and habituals, rather, what overlaps the local evaluation time is the lawlike connection between the subject and the event. For physical habituals, this amounts to the combination of properties that engenders the lawlike connection (so this combination of properties would be X). In intentional habituals, it is the manmade law or rule. Likewise, in intentional progressives (futurate readings), it is the manmade plan or schedule that must overlap the local evaluation time.

We have then three plausible candidates for X, and one mystery. The three plausible candidates are: plans in intentional progressives (futurates), manmade laws in intentional habituals, and physical properties in physical habituals. The mystery is what X would be in physical progressives. If this story is correct, the fact that the event time overlaps the local evaluation time in physical progressives is actually a red herring. *There is no such requirement in the grammar.* It is, rather, always X that must overlap the local evaluation time. X is obviously not an intention in the physical cases, but it is something else, and it just so happens that X in the physical cases either corresponds to the event, or is something that in progressives has the same run time as the event.

Perhaps we can shed light on the mystery X by considering what role the other Xs play. Since two of the Xs deal with intention, shading into obligation, let us turn to the semantics of intention and obligation. Fortunately, intention and obligation are known to have formally similar meanings, and there is no need to start from scratch in understanding them.

2.2. Intentions and forces

Intention and obligation are both treated formally as ordering sources; the concept of the ordering source was created in order to solve a problem having to do with modality in a possible worlds framework (see, e.g., Lewis 1986, Kratzer 1991).

As background to this problem, note that a modal such as *must* is taken to quantify universally over possible worlds that satisfy some particular propositions. In the case of epistemic *must*, the propositions are those that the speaker knows to be true. Epistemic *must* thus quantifies over the set of worlds that satisfy those propositions that the speaker knows to be true. Since knowledge cannot be contradictory, there will always be such a set. (If it were mere belief that were involved, this might not be the case, as beliefs might be contradictory.)

Now consider deontic *must*. At first glance it looks as though deontic *must* quantifies over the set of worlds that satisfy those propositions that represent (manmade) laws or ideals[4] Suppose that I only have enough clean clothes to make it through tomorrow. Suppose also that the propositions in (15) are true.

(15) a. I want to have clean clothes.
b. I don't want (= want not) to do my laundry. ¸ I don't want to (= want to not) have someone else do my laundry.
c. I don't want to (= want to not) buy new clothes.

Assuming that the only ways I am going to get clean clothing are by washing my clothes myself, having someone else do it for me, or buying something new to wear, then there is no world in which all of the desires expressed in (15) are true, because taken together they are contradictory. And yet the desires in (15) are perfectly natural simultaneous desires, and it is perfectly natural to say in this situation that I must (or *have to*) do my laundry.

One solution is to weight the desires and have *must* quantify over the worlds that come closest to being ideal, by satisfying the most important desires. The desires thus provide an ordering source for the possible worlds: based on the weighting of the desires, the worlds will be ordered according to how well they satisfy these desires. In this case, on the most natural weighting of the desires in (15), the most ideal worlds would be those in which I give in and do my laundry, because presumably my desire to avoid doing my laundry is not as strong as the other desires.

Returning to the argument at hand: recall that we are trying to determine a general rule for what X is, where X is the thing that must overlap the local evaluation time in imperfectives. We have three plausible Xs, two of which have to do with intentions (i.e., plans, manmade laws and the like). Since intentions provide ordering sources, we may assume that in these intentional cases, X provides the ordering source.[5]

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[4]Of the speaker, or of someone else?

[5]Carlson also pointed out other habituals that do not require instantiation. These are habituals that involve machines of some kind.

(i) a. This car goes 180 miles per hour.
b. This machine crushes oranges.

Now, what about the physical cases? Recall that X for physical habituals was whatever properties of the subject cause the lawlike connection between subject and event. We had no good idea about X for physical progressives. However, now that we know we are looking for an ordering source, there is a good candidate, namely *inertia*. This idea of an inertial ordering source looks appropriate as well for physical generics and habituals. "Normal cases according to some law" are like "inertia worlds": If nothing disturbs the lawlike connection, the connection actually holds. This would then be why generics and habituals admit exceptions: The habitual in (16), for instance, can be true even though some exceptional dogs have three legs.

(16) Dogs have four legs.

The existence of exceptions does not affect the truth of (16), because (16) is only about the normal situations. All the cases in which dogs have three legs are in fact non-normal situations, those in which some mutation or accident has taken place. Thus we can justify a hypothesis that treats X in the physical cases, both progressive and habitual, as being inertia.

Furthermore we should note that inertia, like intention, can be treated as an ordering source (see for instance Portner 1998). For just as there may be desires of varying strengths, that may oppose each other, so too there may be physical forces or dispositions of varying strengths, that oppose each other. In general, physical forces have an underlying conceptual similarity with intentions. An intention or desire is an impetus towards worlds of the maximum possible contentment; a physical force is an impetus towards worlds of the maximum possible entropy (we might think of this as maximum contentment of the physical universe).

One question that arises is whether intentional forces and physical forces are involved in the same ordering source, or whether a modal can have only one or the other. It seems that the former is true; they actually compete to form a net force, and it is the net force that is X. If they didn't compete, it would be possible to felicitously say (17) simply on the basis of wanting it to be so.

(17) I am winning the election tomorrow.

But these are not the felicity conditions for (17). The only way in which (17) could be uttered felicitously is if the speaker had knowledge of forces that ensured his or her winning. Wanting is not enough, unless the speaker actually has the ability to turn their wants into reality. That is, the modal doesn't just use the net desire, it has to take other forces into account. So it seems that there are not two ordering sources, just one, an inertial one, that considers both intentional and physical forces.

But intentional and physical forces do seem to have a major difference. Intentional forces such as plans and laws can have local application but spatiotemporally distant ef-

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What is the nature of the laws in these examples, that allow the lack of instantiation? I suggest the fact that there is a designer means there is a manmade law, and therefore the designer could have in mind situations that haven't arisen yet.

fects. That is, one can place an obligation on someone else to carry something out later.[6] But physical forces are typically limited to the here and now. One apparent exception might be gravity, which seems to act at a distance. But of course, we don't expect even Newtonian physics to necessarily interact with grammar. Rather, we expect some sort of naïve physics, part of our cognitive birthright, to have some sort of interaction with the grammar. And equally, some sort of naïve psychology, with which to understand intentions.

Returning to the main argument, here then is a plausible reason why X was so hard to see in physical progressives, but so easy to see in intentional progressives. Physical forces disappear into their effects, as it were, while intentional forces have a life of their own. But both are apparently treated similarly in the modal semantics.

So far, we have only discussed forces with respect to aspectual modals; this afforded us a different understanding of why our original generalizations about the difference between aspectual and future modals failed. However, we still have to say what the correct difference is between aspectual and future modals.

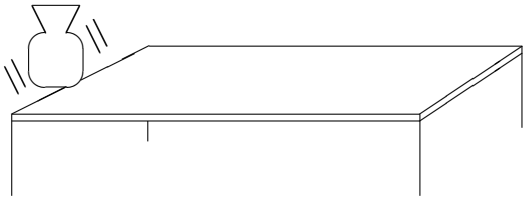
3. Reasoning

I have argued that imperfectives require X to overlap the local evaluation time. X was the net force, composed out of intentions ("forces of will") and physical forces alike. Now we turn to future modals, and the difference between them. The proposal is that future modals require X, the net force, to be future with respect to the local time of evaluation. (Of course the local time of evaluation for futures such as *will* and *is going to* is present.) It is this grammatical difference that is the semantic distinction promised in the title of this paper by the term "reasoning."

To argue for this idea, let us consider the case of a vase sitting on a table. When the vase is sitting on the edge of the table, teetering, as depicted below, it is possible to use felicitously either the aspectual modal in (18a) or the future modal in (18b).

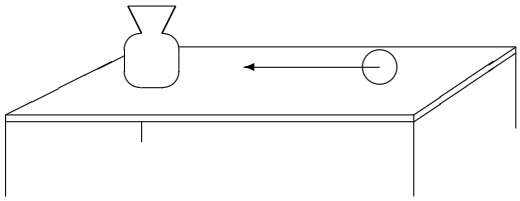
[6] Also, intentional forces necessarily involve an animate entity to carry out plan, since inanimate objects don't listen to our plans.

(18) a. The vase is falling.
b. The vase is going to fall.



However, in the following situation, where the vase is sitting solidly in the center of the table, with a ball rolling towards it, it is only possible to felicitously use the future modal.

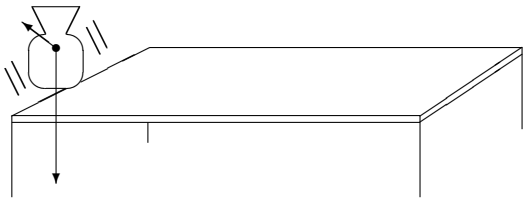
(19) a. #The vase is falling.
b. The vase is going to fall.



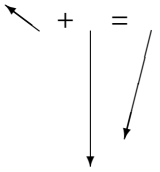
This minimal pair of physical cases (progressive and *be going to*) will help us determine the distinction between imperfectives and futures in general. As I have proposed, the progressive requires there to be a force overlapping the local evaluation time (here the utterance time) that is a vase-falling kind of force. To determine if there is such a force in this situation, we use vector addition to add up the force vectors. Then we look in the lexicon to see if the effect caused by the force counts as a vase-falling motion. Note that we are only interested in what would happen in the absence of other disrupting forces; this is inertia. This process is diagrammed below in (20).

(20)

Step 1: force vectors

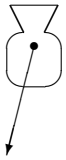


Step 2: vector addition



Step 4: check lexicon

Step 3: assume nothing disturbs force, i.e., vector is motion vector

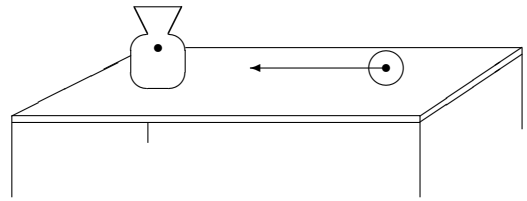


vase fall?

Because in this situation we do end up with a vase-falling vector, the progressive is possible. But in the situation where the vase is not moving, if we apply the same process (shown below), the vase vector is zero, and does not count as a vase-falling vector; so the progressive is not possible.

(21)

Step 1: force vectors



Step 2: vector addition

(nothing to add)

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Step 4: check lexicon

Step 3: assume nothing disturbs force, i.e., vector is motion vector

vase fall?

However, in the same situation, *be going to* is possible, even though the progressive is not. This suggests that *be going to* must be able to consider all of the forces in the following diagram, not just the current forces on the vase, and work out how they will eventually affect the vase. That is, in evaluating future modals, we calculate from forces in the current situation to future forces, which have a future effect.

How might intention come into this discussion? In fact, it is possible to use *be going to* even in a situation where the vase is sitting on the table. You could still say felicitously that it's going to fall if you had an intention to knock it over or knew someone else to have such an intention. You could only use the progressive if there was a current schedule for such a thing to happen. The basic idea is still the same; the future modal requires only

that there be a future intention (calculated to follow from current conditions) while the progressive requires that there be a current intention, i.e., a plan.

Likewise, in more familiar cases, the progressive seems to be about plans or obligations, as in (22a), while the future leaves room for one to not have made up one's mind yet, as in (22b):

(22) a. I think I'm teaching tomorrow.
b. I think I'm going to teach tomorrow.

This is exactly the same as what we saw in the physical cases: the progressive requires current forces (where in this case the current forces, being intentions, can have effects in the future). *Be going to*, as before, can talk about future developments; future forces that follow causally from current forces.[7]

So far, then, we have a story about the difference between progressives and *be going to*. But recall, the larger project is to explicate the difference between aspectual modals and future modals in general. Is the difference between habituals and dispositionals the same kind of difference as that between progressives and *be going to*? Consider, for instance, the pair in (23).

(23) a. Norvin eats doughnuts.
b. Norvin will eat doughnuts.

Our theory predicts that habituals require the force that results in the Norvin-eating-doughnuts action – that is, Norvin's properties that cause him to eat doughnuts – to overlap the local evaluation time. In the dispositional, we predict that it should be true just in case the current situation will develop into one with such a force. Indeed that seems to reflect the contrast in (23). And similarly, in cases that involve manmade laws, as in (24), the contrast is as expected.

(24) a. Mary answers the mail from Antarctica.
b. Mary will answer the mail from Antarctica.

The example in (24a) feels like a current law, while the example in (24b) seems to express a more distant law.

All of these contrasts are difficult to tease apart. However, this fact should not deter us. There are two choices in the face of such subtle (though real) contrasts. We could of course abdicate, and give up trying to come up with a more precise characterization of these contrasts, because we cannot find truth-functional contrasts. The other choice is to find easier cases, where the contrast *is* truth-functional, and which are closely related to the more difficult cases. Then that analysis can be justifiably exported to account for the more subtle cases. This is the route we have taken here. It is predicated on the idea

[7] For reasons of space, I will have to omit discussion of two apparently problematic kinds of progressives: progressive achievements, as in *The penny is hitting the ground*, and "clockwork" futurates, as in *The sun rises/is rising at 5 tomorrow.* But see Copley (to appear) for discussion.

that progressives are to *be going to* sentences exactly in the same way that habituals are to dispositionals; the same distinction is at work in both domains.

From here on, I will refer to this distinction as a distinction of *reasoning*. The idea behind this name is simply that depending on whether the modal is aspectual or future, the chain of reasoning one is allowed to use to get to the net force. In both cases you begin with a current situation (a situation overlapping the local evaluation time). Aspectual modals can only look at forces within the local evaluation time; these modals, let us say, have "direct" reasoning, as all you are allowed to do is to look at the current situation. For future modals, the net force is determined through a causal chain from the current situation to a later one; let us say that these modals have "extrapolative" reasoning.

Before moving on to consider whether this distinction will be a useful one, I would like to step back a bit and consider how this proposed distinction is different from a more familiar distinction, that of tense.

Tense helps determine what situation is used to calculate the net force, by telling us what time is the local evaluation time, that the situation must overlap.[8] Tense is oblivious to whether the net force that the modal is interested in is a current force or a future force. In either case the same situation – a current one – is used.[9]

4. Conclusions and further directions

The preceding discussion provides merely a sketch of both the grammatical and cognitive elements that would need to be marshalled in order to account for the judgments under discussion. I will have to leave a more detailed investigation of both of these components, and therefore more detailed predictions, to later work. However, it is possible to outline the impact of this general line of inquiry both on typology – i.e., what ought to be possible grammatically – and on ontology – i.e., what ought to be possible conceptually.

One typological expectation is that distinctions in reasoning should occur with other modals besides the ones we have discussed (just as tense occurs with other modals, e.g.). This expectation seems to be borne out. Cross-linguistically, root modals can be realized with either aspectual or future morphology. The Tagalog abilitative, which expresses physical ability, is one such modal (as shown in (25) below). Compositionally, such forms are obscure; e.g., a future-marked abilitative does not mean 'will be able to.' But the imperfective-marked form requires instantiation, while the future-marked form does not, as expected if the contrast is the grammatical distinction of reasoning argued for above.

[8] I have outlined a role for aspect elsewhere (Copley 2004); in this discussion, aspect would also have a role constraining the situation.

[9] Aspect is also different from this new distinction. I take aspect to provide both a binder for a temporal variable, and a relation between that variable and the local evaluation time. Like tense, it has the effect of modifying the time of the local situation used to determine the net force (or ordering source). The "ongoingness" that progressives and *be going to* share, I have argued in (Copley 2004, etc.) is a kind of aspect; namely, an operator that introduces a superinterval of the temporal argument.

(25) Dell (1987) (physical forces only)

a. Nakakainom siya ng sampung bote nang sunod-sunod.
abil-impf-drink he-nom gen ten bottle nang follow-follow
'He can drink ten bottles in a row.' (must have at least started to do so)

b. Makakainom siya ng sampung bote nang sunod-sunod.
abil-future-drink he-nom gen ten bottle nang follow-follow
'He can drink ten bottles in a row.' (need not ever have done so)

Interestingly, Tagalog is a so-called "tenseless" language, which has been taken not to mark tense morphologically, but instead to mark "aspect": perfective, imperfective, and future (what Schachter and Otanes (1972) call "contemplative"). Note that this is a bit strange, as we are not used to thinking of futures as "aspects". But with the new distinction of reasoning, we have another option: perhaps what Tagalog marks is values of reasoning, not values of aspect, and perhaps the perfective is a third value of reasoning, one in which a past force causes the local situation. Then we would have three values of reasoning:

(26) Values of reasoning (speculative!)

a. retrospective: local situation follows from past forces (perfectives? resultatives?)

b. direct: local situation includes forces (imperfectives) , extrapolative: future forces follow from local situation (futures)

As yet we have no precise prediction for the meanings of "retrospective reasoning" forms, but we expect something like a perfective or resultative.

As far as ontological issues, this line of inquiry raises intriguing issues. First, it promises a framework under which "forces of will" and physical forces have a connection both to modality and to events. It does this by recognizing that forces have a double role: They are used in the calculation of the ordering source, but they also intuitively have effects (resulting events). Whatever formal mechanism is ultimately used to model forces (functions from situations to properties of situations, perhaps), I expect that taking forces seriously will allow us to revisit problems that have in the past not yielded cleanly to an event-based analysis: "accidental" action, for instance (e.g. Dell 1987, for Tagalog), or indeed the problem of whether statives have an event argument, the key notion about (many) states being that there is no associated net force.

Secondly, this way of looking at modals rests on the idea that there may be conceptual distinctions (like the distinction between intentions and physical forces) that are not necessarily grammatical distinctions, but are part of our general cognitive model of the world. The study of semantics, then, may have something to say about this cognitive model; and research on cognitive models may have something to say about semantics.

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