



Future-past Asymmetries, Evidential Grounding, and Projection

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1 Introduction

I develop a lexical solution to some important puzzles recently discovered by Ninan (forthcoming), which highlight striking asymmetries between future- and past-directed talk.

1.1 The asymmetry

Suppose at 6 PM I am cooking dinner for my kids before going out. Based on my extensive knowledge of their taste, I assertively utter *the kids will like this pasta*. In this context, my assertion seems flawless. Later, I receive a text message from the babysitter that says *the kids ate their dinner and are in bed now* (assume that this conveys no new information about whether the kids liked the pasta or not). Suppose someone asks: “Did the kids like their dinner?”. In this context, the response *the kids liked the pasta* would be defective, for it would suggest I have evidence that stems directly from the event itself. Summarizing the pattern:

- | | | | | |
|-----|----|---------|--------------------------------|-------------------------------------|
| (1) | a. | (early) | The kids will like this pasta. | [good on the basis of the evidence] |
| | b. | (late) | The kids liked this pasta. | [bad on the basis of same evidence] |

The puzzle is how to account for these asymmetries between future- and past-directed speech, while accepting that, in the early context, (1-a) is roughly equivalent to (1-b) in the late context.

1.2 My proposal in a nutshell

I develop the idea that the puzzle arises from the different evidential requirements imposed by modal items such as *will* as opposed to (tensed) bare predication. A view along these lines is sketched in chapter 13 of Cariani (2021) but that development is self-avowedly preliminary, especially with regards to how these requirements are to project under embeddings .

More specifically, I suggest that (1-b) is defective because ordinary predications (such as *the kids liked this pasta*) must be grounded in the following sense: the speaker’s evidence for the relevant proposition must be causally upstream from the eventualities that the proposition is about. The reason why (1-a) is good, as uttered in its context, is that modals can modulate (i.e., either completely defuse, or reorient) these lexical requirements.

At the heart of my approach is a generalization of Willer & Kennedy’s (2022) idea of *grounding*, understood as a “sincerity condition” on assertion—a lexically encoded requirement to the effect that the speaker’s mental state must relate appropriately to the subject matter

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of the assertion. Willer & Kennedy go on to apply this idea to some specific puzzles, such as explaining how the acquaintance inference arises. In their analysis, adjectives like *tasty* encode acquaintance requirements—constraints to the effect that the speaker has had the relevant experience. These constraints percolate up through the semantic composition, so that *this apple is tasty* is grounded iff the speaker is acquainted with the specific apple.

While I borrow Willer & Kennedy’s concept of grounding, my intended application requires that we take grounding constraints to apply well beyond the boundaries of subjective language. Furthermore, since I am only focused on cases in which grounding requires the availability of a specific kind of evidence, I will refer to this as *evidential grounding* (so as to keep the concept more clearly distinct from the concept of grounding that is prominent in metaphysics).

2 Quick overview of other positions

The nascent literature on Ninan’s asymmetry puzzle has identified several alternative positions worth acknowledging. While there is no space here for a full critique—my focus being on positive development, rather than on shutting down alternatives—it is valuable to touch briefly on some of these arguments.

Ninan (forthcoming) critiques lexical views that impute the asymmetry to the hypothesis that *will* is a (non-veridical) necessity operator. Ninan leverages, among other things, arguments by Cariani and Santorio (2018) to the effect that *will* is not a necessity operator at all.

Ninan also refutes the idea that the asymmetry is due to differences in what evidence is *potentially available* to the speaker at the two times. After all, it is easy to modify the case so that the same kinds of evidence are available at the two times. For example, we can imagine that, before going to bed, both the kids and the babysitter take a pill which erases all their memories of the evening. Despite the fact that in this variant the earlier and later contexts share the same evidence, the judgments that drive the case do not substantively change.

Ninan’s own positive account, which involves positing differences in how potential abnormalities can affect future- and past-directed knowledge is, in turn, critiqued in Cariani (2021), based on the observation that it is possible to imagine future-directed claims that are undermined by abnormalities in the past.

Another, more general, objection for any knowledge-based view adapts a version of an objection raised, in a different context, by Ninan himself (2014).¹ It seems plausible that we are in a position to assert (2-a) when talking about an apple we have not tried. Under the knowledge norm of assertion, if someone is in a position to assert (2-a), they must know its content. However, if *must* is veridical, (2-a) plausibly entails (2-b). If knowledge is closed under single-premise entailment, it follows that one must also know (2-b).

- (2) a. This apple must be tasty.
b. This apple is tasty.

Similarly, in the case of future-past asymmetries, one is plausibly in a position to assert (3-a). If the knowledge norm of assertion is operative, one must know its content. If *must* is veridical and knowledge is closed under single-premise entailment, one must thus also know (3-b).

- (3) a. The kids must have liked the pasta.
b. The kids liked the pasta.

¹I am referring here to the discussion in Ninan (2014, p. 304-305). In Cariani (2021), I misattributed this argument, having forgotten that a variant of it had first shown up in the context of Ninan’s own discussion of the acquaintance inference. I’ll take this as a chance to correct the record.

Upshot: the unassertibility of (1-b)-(3-b) is not due to lack of knowledge, and so, the past-tense asymmetries are not asymmetries of knowledge. Of course, this argument is not a decisive refutation of knowledge-based views, since it can be blocked by denying any of (a) the knowledge norm of assertion; (b) the veridicality of *must*, or (c) the closure of knowledge under single-premise entailment. More argument is needed, but this is surely one direction in which that argument might develop.

3 General Structure of a Lexical Analysis

3.1 Grounding vs. directness.

The present lexical analysis claims that (1-b) demands a distinctive kind of evidence, whereas (1-a) does not. It is tempting to say that (1-b) demands *direct* evidence. (I myself did so in chapter 13 of Cariani 2021.) But there are reasons to avoid this conceptualization. The concept of directness is already recruited in the literature on the evidentiality of *must* and specifically in the literature on Karttunen’s problem (e.g. by von Fintel & Gillies 2010). There is no reason to think that the relevant evidential requirement must be the same across the two puzzles. If anything, the evidential contribution of *will* is known to be distinct from that of *must* (Winans 2016).

I propose that (1-b), and bare (present- and past-directed) predication generally, demands that the evidence be **grounded** in the event described by the prejacent, and relatedly that we describe certain lexical items as having **evidential grounding requirements**.

The exact analysis of grounded evidence can be investigated, in a modular fashion, as independent from the semantic questions that are focused on in this paper. My rough proposal is that we think of these grounding constraints in causal terms. Roughly the requirement is that the speaker’s belief must be causally downstream from the eventualities that it is about.² For example, my belief that the kids enjoyed the pasta ought to be causally downstream from the event of their enjoying it.

Thinking of grounding in causal terms makes a remarkable prediction about scenarios in which the existence of known common causes supplies excellent inductive evidence for certain propositions, and yet seems insufficient to assert them. For example, suppose that, for whatever reason, we are trying to investigate whether the Post printed that some candidate for office, Ms. Brown let’s say, won an election. I am unable to find a copy of the Post, but I can find a copy of the Times. The Times indeed says that Brown won the election. Naturally, there is a very strong correlation between what the Times and the Post decide to print. However, it is clear that I am not in a position to assert:

- (4) The Post printed that Brown won the election.

3.2 Grounding constraints vs. ordinary presuppositions.

If grounding requirements are lexically encoded, they are plausibly not part of at-issue content, nor are they entailed by it. One way to see this, is to notice that *the kids did not like the pasta* is as much in need of grounding as (1-b), but *the kids must have liked the pasta* is not.³

Reflecting on how grounding constraints are to be treated as elements of meaning motivates a series of important desiderata:

²This was also the proposal of Cariani 2021, alongside the now-deprecated talk of *directness*.

³See, however, Dinges & Zakkou (2021), for a defense of the entailment view.

Desideratum 1. A model of not-at-issue content that is capable of capturing evidential grounding must be unlike the partial function model of presupposition.

After all, (1-b) does not go truth-valueless if the speaker’s belief is not evidentially grounded.

Unlike ordinary presuppositions, grounding constraints do not project in conditional antecedents, questions, restrictors, and modals. Instead, their projection pattern appears closer to the projection pattern of acquaintance requirements (Ninan 2014, 2020, Anand and Korotkova 2018, Kennedy and Willer 2018, 2022). Here is a comparison of the two paradigms. The projection pattern of acquaintance requirements is in (5) and the analogous pattern for future-past asymmetries is in (6). I mark examples as ‘ $\hookrightarrow \nabla$ ’ or ‘ $\nrightarrow \nabla$ ’ depending on whether they involve a grounding requirement.

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|-----|----|---|--------------------------|
| (5) | a. | That apple is tasty | $\hookrightarrow \nabla$ |
| | b. | If that apple is tasty, he will purchase a whole bag of them. | $\nrightarrow \nabla$ |
| | c. | Is that apple tasty? | $\nrightarrow \nabla$ |
| | d. | The apple might be tasty. | $\nrightarrow \nabla$ |
| | e. | The apple will be tasty. | $\nrightarrow \nabla$ |
| (6) | a. | The kids did not like the pasta | $\hookrightarrow \nabla$ |
| | b. | If the kids liked the pasta, they went to bed happy. | $\nrightarrow \nabla$ |
| | c. | Did the kids like the pasta? | $\nrightarrow \nabla$ |
| | d. | The kids might have liked the pasta. | $\nrightarrow \nabla$ |
| | e. | The kids will like the pasta. | $\nrightarrow \nabla$ |

This pattern motivates:

Desideratum 2. Basic projection and obviation facts must be accounted for.

Failure of grounding requirements to project under questions is strongly suggestive that these requirements are not presuppositional. So this is plausibly viewed as a theory of projection that is additional to, and developed alongside, the standard theory of presupposition projection.

4 Disjunction and conjunctions.

An important challenge for any approach in this style comes from projection under disjunction and conjunction. Here are some examples and the desiderata they motivate:

- | | | | |
|-----|----|--|--------------------------|
| (7) | a. | Either the kids liked the pasta or they liked the salad. | $\hookrightarrow \nabla$ |
| | b. | Either the kids liked the pasta or they didn’t. | $\nrightarrow \nabla$ |
| | c. | The kids liked the pasta and the salad. | $\hookrightarrow \nabla$ |
| | d. | The kids did not both like the pasta and the salad. | $\hookrightarrow \nabla$ |

Some specific commentary on these examples is in order. I mark (7-a) as having a grounding requirement, because it generates a contrast with its future-directed counterpart (*either the kids will love the pasta or the kids will love the salad*). This requirement is subtler, however, than the grounding requirement of the bare (1-a). One way to appreciate this, is that there are disjunctions like (7-b) that have no grounding requirements at all. Another crucial observation is that (7-c) and (7-d) do not have the same grounding requirements. For example, one can assert (7-d) merely on the basis of grounded evidence that the kids did not like the pasta.

Summing up, these examples motivate four more desiderata (using ‘GR(A)’ to abbreviate \lceil the grounding requirement of A \rceil):

Desideratum 3. Substantive GRs must project through disjunction ($\text{GR}(A \text{ or } B) \neq \top$).

Desideratum 4. $\text{GR}(A \text{ or } B)$ is less stringent than $\text{GR}(A) \cup \text{GR}(B)$.

Desideratum 5. In light of (7-c), $\text{GR}(A \text{ and } B) = \text{GR}(A) \cap \text{GR}(B)$

Desideratum 6. In light of (7-d), $\text{GR}(\neg(A \text{ and } B)) \neq \text{GR}(A \text{ and } B)$.

Ultimately, **Desideratum 6** will require the projection system to be bilateral.

5 The Formal System

I propose a formal system for modeling grounding requirements and their projection behavior that meets all of these desiderata. To account for **Desideratum 1**, the system deploys a multi-dimensional model of meaning (parallel to treatments of presupposition in Karttunen & Peters 1979, Sudo 2012, Mandelkern 2016). In this model, truth-conditions and grounding requirements may hold, or fail to hold, independently. For example, an utterance of (1-b), expresses a proposition that is fully evaluable for truth or falsehood, even if one of its grounding constraints is false. In fact, the present theory even entails that such propositions may be *known*.

The combination of desiderata outlined in the previous section motivates some additional design principles. In particular, as noted, **Desideratum 6** motivates a bilateral system: in a unilateral projection system A and its negation would have to share their GR s, which contradicts the Desideratum. Furthermore, the combination of **Desiderata 3** and **4** requires attention to how the grounding requirements may be satisfied, beyond satisfaction of the GRs of the individual disjunct. My hypothesis is that (7-b) shows that arguments from the negation of one conjunct to the second conjunct may also clear the grounding requirements of a disjunction.

Vector-based meanings

Moving on to the specifics of the system, I model meanings as n -tuples, where the first coordinate is the contribution to truth-conditions, the second coordinate is the ‘positive grounding’ (=the grounding requirement in a positive context), and the third coordinate is the ‘negative grounding’ (=the grounding requirement that would emerge in negative environment, e.g. if negated). I omit ordinary presuppositions to simplify notation: they would be assigned another coordinate. Given expression e , let $[e]$ be the meaning vector of e , and $[e]_n$ its n -th coordinate.

Next, stipulate:

Core grounding principle An assertive utterance of A is defective unless the positive grounding requirement, $[A]_2$, is satisfied in the context of utterance.

Because in the present setting, grounding requirements are modeled as possible world propositions, the satisfaction of A ’s grounding requirements amounts to the claim that the second coordinate of A ’s meaning vector is true at the world of the context.

Entries for the sentential connectives

The entries below regulate the behavior of the sentential connectives. Let $g(A, B)$ stand for the proposition that is true in world x if there is an argument available in context from A to B .

- (8) a. **Negation:** $[not A] = \langle W - [A]_1, [A]_3, [A]_2 \rangle$
 b. **Disjunction:** $[A \text{ or } B] = \langle [A]_1 \cup [B]_1, [A]_2 \cup [B]_2 \cup g(\neg A, B) \cup g(\neg B, A), [A]_3 \cap [B]_3 \rangle$.

- c. **Conjunction:** $[A \text{ and } B] = \langle [A]_1 \cap [B]_1, [A]_2 \cap [B]_2, [A]_3 \cup [B]_3 \cup g(A, \neg B) \cup g(B, \neg A) \rangle$.

For each connective, the first coordinate merely registers the standard Boolean behavior. Note also that our theory about negation is a bit subtler than the original hypothesis in which it fixes grounding requirements. Instead, it swaps positive and negative requirements.

Entries for obviators

Our framework allows a particularly simple treatment for the phenomenon of obviation. Obviators are those expressions that disable grounding requirements. In the present system, they do this by intervening on the grounding coordinates of their prejacent's meanings. Consider, for instance, the modals *might* and *will*. For the sake of determinacy and simplicity, give *might* a contextualist semantics where it quantifies over a contextually determined modal domain $d_{c,w}$ and *will* a selection semantics (in the style of Cariani & Santorio 2018, Cariani 2021). Let \top stand for a tautology. Sample vector meanings for these items might be:

- (9) a. **Might:** $[might A]^{c,w} = \langle \lambda w. \exists v \in d_{c,w}, [A]_1^{c,v}, \top, \top \rangle$
 b. **Will:** $[will A]^{c,w} = \langle \lambda w. [A]_1^{c,sel(h_c(w),w)}, \top, \top \rangle$

In both cases, the modals obviate by wiping the evidential constraints that derive from their prejacent, and replacing them with the tautological constraint.

6 Illustrations

Let s_c be the speaker in context c and let's work with the simplest of our examples. To derive the fact that *Ms. Brown won* and *Ms. Brown did not win* have the same grounding requirement, suppose that at the level of the semantics of the verb things start out symmetric.

- (10) $[won]^{c,w} = \langle \lambda x \lambda w. x \text{ won in } w,$
 $\lambda x \lambda w. s_c \text{ has downstream evidence in } w \text{ that settles whether } x \text{ won},$
 $\lambda x \lambda w. s_c \text{ has downstream evidence in } w \text{ that settles whether } x \text{ won} \rangle$

To derive the full semantics of *Ms. Brown won*, compose this point-wise with $[Ms.Brown]$ i.e., $\langle Ms.Brown, Ms.Brown, Ms.Brown \rangle$.

- (11) $[Ms. Brown won]^{c,w} = \langle \lambda w. Ms. Brown \text{ won in } w,$
 $\lambda w. s_c \text{ has downstream evidence in } w \text{ that settles whether Ms. Brown won},$
 $\lambda w. s_c \text{ has downstream evidence in } w \text{ that settles whether Ms. Brown won} \rangle$

Because the positive and negative side are identical, *Ms. Brown did not win* differs from *Ms. Brown won* only in its at-issue coordinate.

Finally, the bilateral system's power shows up for conjoined and disjoined grounding requirements the system, as shown by the contrast between the semantic values A and B versus that of $\neg(A \text{ and } B)$.

- (12) $[A \text{ and } B] = \langle [A]_1 \cap [B]_1, [A]_2 \cap [B]_2, [A]_3 \cup [B]_3 \cup g(A, \neg B) \cup g(B, \neg A) \rangle$.

- (13) $[\neg(A \text{ and } B)] = \langle \overline{[A]_1 \cap [B]_1}, [A]_3 \cup [B]_3 \cup g(A, \neg B) \cup g(B, \neg A), [A]_2 \cap [B]_2 \rangle$

Because the two sentences differ in their positive GR, their acceptability conditions differ not just with respect to the at-issue content, but also with respect to their GR.

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