Variable implicativity in *enough* constructions: causation, coercion, and composition

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Abstract

***Enough* constructions** (*be* ADJ *enough to* ϕ) license a complex, variable, and aspect-sensitive pattern of complement inferences, in certain cases mimicking the inferential profile of complement-entailing **implicative** verbs (Karttunen, 1971; Hacquard, 2005). This paper presents a survey of the inferential behaviour of English and French *enough* constructions, arguing that complement inferences arise only in the context of a specific conspiracy of lexical, compositional, and contextual features. Building on von Stechow et al. (2004), I offer a semantic analysis which derives the observed inferential patterns, treating *enough* constructions as claims which attribute to their subjects the stative capacity for complement-realization, in view of some allocation of the matrix property ADJ. Where ADJ introduces a dynamic (action-oriented, dispositional) property and background knowledge supports a causal relationship between ADJ-characterized action and the *enough* complement, complement entailments follow just in case the utterance context further demands an eventive interpretation for the matrix property attribution; such contexts trigger a special, **evidential** form of **aspectual coercion** (Fernald, 1999) which applies selectively to dynamic-property statives and returns a predicate of evidentiary actions for the property in question. The analysis makes good on Hacquard's (2005) intuition that *enough*'s inferences are genuine instances of **implicativity** by unifying the former with Nadathur's (2023) causal account of lexical implicative semantics: more broadly, it suggests a deep connection between implicativity, causal reasoning and the semantics of (un)realized ability (Bhatt, 1999).

1 Introduction

Karttunen (1971) characterizes the class of complement-taking **implicative verbs** in terms of a systematic pattern of complement entailments, demonstrated in (1)-(2) for *manage* and *dare*.

(1) a. Mallory **managed** to summit Everest.   → *Mallory summited Everest.*
   b. Mallory did not **manage** to summit Everest.   → *Mallory did not summit Everest.*

(2) a. We **dared** to enter Mammoth Cave.   → *We entered Mammoth Cave.*
   b. We did not **dare** to enter Mammoth Cave.   → *We did not enter Mammoth Cave.*

Despite the close relationship that (1)-(2) suggest between an implicative assertion and that of its complement, it is intuitively clear that the two claims are not interchangeable. The distinction

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between them is usually attributed to presuppositional or *not at-issue* content introduced by the implicative: (2a)-(2b), for instance, both indicate that entering the cave requires courage.

While the analysis of implicatives has sparked a significant amount of interest in the semantic literature (see, among others, Coleman 1975; Karttunen and Peters 1979; van Leusen 2012; Baglini and Francez 2016; Nadathur 2019, 2023; White 2019; Zuber 2020), investigations of implicativity have for the most part sidelined a second, related class of predicates, described by Karttunen (1971) as 'ambiguously' implicative (pp.354–356). This class includes complex *enough* predicates: as (3) demonstrates, the inferential profile of certain *enough* constructions closely parallels that of lexical implicatives, but weakens complement entailments to (defeasible) implicatures.[1]

(3) a. Jean **was nimble enough** to escape.   ⤳ *Jean escaped.*
     b. Jean **was** not **nimble enough** to escape.   ⤳ *Jean did not escape.*[2]

Tightening the connection between *enough* predicates and lexical implicatives, Hacquard (2005) observes that inferences such as those in (3) become full-blown entailments under overt perfective aspect: complement denial contradicts the French *assez* ('enough') claim in (4a), while (4b) cannot be coherently followed by a complement affirmation.

(4) a. Jean **a été assez agile** pour s'enfuir,   #mais il ne s'est   pas enfui.
        Jean has be.PP enough agile for REFL-flee.INF, but   he NEG REFL-is NEG flee.PP.

        'Jean was-PFV nimble enough to escape, #but he did not escape-PFV.'[3]

     b. Jean n'**a**   pas **été assez agile** pour s'enfuir,   #mais il s'est   enfui.
        Jean NEG-has NEG be.PP enough agile for REFL-flee.INF, but   he REFL-is flee.PP.
        'Jean was-PFV not nimble enough to escape, #but he escaped-PFV.'

Based on data like (4), Hacquard proposes that *assez/enough* predicates share the complement-entailing semantics of the 'true' (lexical) implicative class. While the similarity between (1)/(2) and (4) motivates a unified approach, full equivalence faces several analytical challenges within and across languages. First, not all French *enough* constructions conform to the pattern in (4): perfective *être assez grande* ('be old enough') in (5) is perfectly compatible with complement denial.

(5) Amira **a été assez grande** pour boire   de l'alcool,   mais elle ne   l'a
     Amira has be.PP enough old   for   drink.INF of the-alcohol, but she NEG it-has
     jamais bu.
     never drink.PP.

     'Amira was-PFV (became) old enough to drink alcohol, but she never drank-PFV it.'

Secondly, as Hacquard observes, 'full' implicativity in French is aspectually driven, so that the imperfectively-marked counterparts of (4) pattern with English *enough* in (3) in permitting the denial of their complement inferences.

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[1]Karttunen also describes *too* constructions (e.g., *Jean was too slow to escape*) as ambiguously implicative: they show the same inferential variability as the *enough* constructions discussed in this paper, *modulo* a reversal of polarity between matrix and complement inferences. I omit *too* constructions here for reasons of space (but see Meier 2003; Hacquard 2005; Marques 2012; Nadathur 2019.

[2]The negative inference in (3b)is stronger than its positive counterpart, and some readers may judge it, *prima facie*, to be an entailment. I offer support for the indicated judgements in §3.

[3]The PFV annotation in these translations corresponds to the use of the French *passé composé*, which combines a present auxiliary (*avoir*) with the past participle (PP) of the main verb. *Passé composé* has largely supplanted the simple past (*passé simple*) as the perfective marker in spoken French (see, e.g., Hacquard 2009).

(6) a. Jean **était**　　　**assez agile** pour s'enfuir,　　　mais il ne　s'est　　pas enfui.
　　　Jean be.PST.IPF enough agile　for　REFL-flee.INF, but　he NEG REFL-is NEG flee.PP.
　　　'Jean was-IPF nimble enough to escape, but he did not escape-PFV.'

　　 b. Jean n'**était**　　　pas **assez agile** pour s'enfuir,　　mais il s'est　　enfui.
　　　Jean NEG-be.PST.IPF NEG enough agile　for　REFL-flee.INF, but　he REFL-is flee.PP.
　　　'Jean was-IPF not nimble enough to escape, but he escaped-PFV.'

Finally, the inference patterns of lexical implicatives contrast with those of *enough* predicates in both English and French. The English contrast can be seen in the comparison between (1)/(2) and (3); (7) shows that French implicative *réussir* ('succeed', 'manage') does not share the aspect sensitivity of *être assez rapide* ('be fast enough'), instead licensing complement entailments regardless of aspectual marking. This difference is unexpected if *enough* predicates are 'at base' implicative.

(7) a. Jean **a réussi**　　　à s'enfuir,　　#mais il ne　s'est　　pas enfuir.
　　　Jean has succeed.PP at REFL-flee.PP, #but　he NEG REFL-is NEG flee.PP
　　　'Jean managed-PFV to escape, #but he did-PFV not escape.'

　　 b. Jean **réussissait**　　　à s'enfuir,　　#mais il ne　s'est　　pas enfuir.
　　　Jean succeed.PST.IPF at REFL-flee.PP, #but　he NEG REFL-is NEG flee.PP
　　　'Jean managed-IPF to escape, #but he did-PFV not escape.'

Taken together, the data in (1)-(7) present a complex picture. On the one hand, there is a strong intuitive connection between the interpretation of predicates like *be fast enough/être assez rapide* and that of lexical implicatives, and the reality of this semantic connection is supported by Hacquard's perfective data. On the other hand, there is evidently some optionality in the implicative behaviour of *enough*, and comparing (4) and (6) to (7) shows that the underlying semantics of *enough* predicates and lexical implicatives cannot be fully equivalent. A satisfactory account must explain not only the variable strength of *enough* complement inferences, but also their distribution: if a unified analysis of lexical and *enough* implicativity is to be had, it must simultaneously explain the convergence between (1)/(2) and (4), the non-implicativity of (5), defeasibility in (3) and (6), and locate the source of aspect sensitivity (seen in the comparison of 4 and 6) in some semantic feature of *enough* constructions which is not shared with 'true' implicative claims.

This paper aims to meet the above challenges. I analyze the entailments in (4) as genuinely implicative in the following sense: they reflect the presence of compositionally and contextually constructed semantic structure that mirrors the complement-entailing lexical semantics of true implicatives. I take as my starting point Nadathur's (2023) causal analysis of implicative verbs, on which the inferential profile of *manage* and *dare* is derived from presupposed relationships of causal necessity and sufficiency between some prerequisite condition (associated with the matrix verb) and the realization of the implicative complement (see also Baglini and Francez 2016). I show that *enough* constructions license implicative-pattern inferences just in case the combination of an 'actionable' matrix adjective (e.g., *fast* or *loud*, but not *tall* or *old*) and its (modal) relationship to the *enough* complement replicate the background causal structure of a lexical implicative. In addition, I argue that *enough* predicates differ crucially from Nadathur's lexical implicatives in the asserted (*at-issue*) dimension: where lexical implicatives assert the realization of the relevant causal prerequisite, thus leading to complement entailment, actionable-property *enough* predicates at base assert only their subjects' potential for realizing the causal prerequisite. This difference in asserted content corresponds to a difference in *aspectual class*, so that while implicative claims

are *eventive*, the aspect-sensitivity of *enough* claims can be attributed to their underlying *stativity*, which triggers reinterpretation (or *aspectual coercion*; Moens and Steedman 1988; de Swart 1998; Bary 2009) in composition with the perfective aspect.

The paper is structured as follows. §2 provides an overview of the causal approach to implicative semantics, summarizing and synthesizing the conclusions of Nadathur (2023). §3 examines the sources of empirical variation in *enough* claims, arguing that (defeasible) implicativity arises just in case the combination of matrix adjective and complement lends itself to a causal interpretation. §4 addresses the interaction between actionable-property *enough* predicates and aspectual marking, proposing that causal *enough* claims are among a class of 'dynamic' statives which—when perfectively marked—are reinterpreted as manifestations of the properties they attribute. In the case of causal *enough* claims, this *evidential* coercion neutralizes the contrast between *enough* predicates and lexical implicatives, producing the convergent pattern first noted by Hacquard (2005). § summarizes the main proposals, and concludes by offering some directions for future investigation.

2   Implicative inferences as causal entailments

In order to pursue seriously the thesis that *enough* complement inferences (where they arise) represent genuine instances of *implicativity*, we need to first establish a semantic characterization of this property. Here, I use Nadathur's (2023) causal approach to implicatives as a basis for identifying three core semantic features which lead to the target inferential profile. I conclude the section by discussing the consequences of this approach for an implicative treatment of *enough* predicates.

2.1   The architecture of implicative meaning

In addition to the characteristic entailment patterns in (1)-(2), a semantic treatment of lexical implicativity must also derive the non-equivalence of an implicative assertion and its complement, attributed by Karttunen (1971) to presuppositional content.

(1)   a. Mallory managed to summit Everest.   → *Mallory summited Everest.*
       b. Mallory did not manage to summit Everest.   → *Mallory did not summit Everest.*

(2)   a. We dared to enter Mammoth Cave.   → *We entered Mammoth Cave.*
       b. We did not dare to enter Mammoth Cave.   → *We did not enter Mammoth Cave.*

While there has been significant disagreement as to the precise content of *manage*'s presuppositions (see, e.g., Coleman 1975; Karttunen and Peters 1979; Baglini and Francez 2016), Nadathur (2023) suggests that the picture is clearer with 'lexically-specific' verbs like *dare* or *condescend*, shown below: in each case, the implicative verb introduces a particular requirement or *prerequisite* for complement realization.

(8)   a. We dared/did not dare to enter Mammoth Cave.
           ⟩⟩ Daring (courageous) action was required to enter the cave.
       b. The president condescended/did not condescend to meet with the petitioners.
           ⟩⟩ Suppressing disdain or disinterest was required to meet with the petitioners.

The need for the prerequisite (its status *qua* prerequisite) and its characterization are evidently projective. However, the matrix polarity of an implicative claim determines whether or not the

prerequisite was satisfied: thus, as (9) demonstrates, the truth-value status of the prerequisite (that is, whether or not the presupposed requirement was met) appears to be entailed by an implicative claim. Moreover, this truth value correlates with the realization or non-realization of the implicative complement, suggesting a relationship of necessity and sufficiency between the two eventualities.

(9)   a. We dared to enter Mammoth Cave (#but we didn't have the courage).
          → We were daring/behaved courageously (and entered the cave).
       b. We did not dare to enter Mammoth Cave (#but we had the courage).
          → We were not daring/did not behave courageously (and did not enter the cave).

As Nadathur (2023) observes, this pattern of presupposition and assertion conforms to the implicative semantic schema first proposed by Karttunen (1971, p.352):

> [...] let us ignore the individual differences among implicative verbs and try to state precisely in what respect they are all alike. Let v stand for any implicative verbs and S for the [...] complement of that verb. [...] I assume that, in the representation of the main clause, $v(S)$ constitutes the central part of the proposition [...] the semantic analysis of the whole sentence can be represented by the following schema:

(10)   *Presupposition: $v(S)$ is a necessary and sufficient condition for S*
        Proposition: $v(S)$

Karttunen's schema straightforwardly predicts the inference patterns of verbs like *dare* and *condescend*, if the "central part of the proposition"—i.e., the implicative assertion—is taken in each case to be the realization of the relevant (lexically-specified) prerequisite. A positive implicative claim asserts $v(S)$, satisfying a sufficient precondition for complement S, and generating positive complement entailments when presupposition and assertion are taken together. Conversely, a negative claim asserts the falsity of $v(S)$, indicating that a necessary precondition for S fails, and consequently deriving the failure of S itself.[4]

Within the parameters of Karttunen's scheme, Nadathur proposes that *manage* can be analyzed as an underspecified or semantically bleached implicative, which indicates the existence of *some* determinative prerequisite for complement realization, but which does not lexically encode a characterization of this prerequisite. The non-specificity of *manage* is then recruited to explain the apparent malleability of its projective content, which has been argued to vary at least between inferences of effort, intention, and unlikeliness. (1a) and its negation readily license all three inferences, as shown in (11), but data from Baglini and Francez (2016, pp.545–546; 12a, 12b) and Coleman (1975, p.78; 12c) indicate that any of these inferences can be contextually blocked without infelicity, as long as some other projective inference remains intact. (12a) licenses a projective inference of intention, but neither effort nor unlikeliness; (12b) licenses effort and intention inferences but not unlikeliness, and (12c) licenses unlikeliness, but neither effort nor intention.

(11)   Mallory managed/did not manage to summit Everest.
       a. *Licenses:* Summiting Everest was effortful for Mallory.
       b. *Licenses:* Mallory intended to summit Everest.

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[4]See Nadathur (2023) for additional English and Finnish data which support the generalizability of this scheme.

c. *Licenses:* It was unlikely that Mallory would summit Everest.

(12)   a. Clad in civilian clothes [...], they easily managed to get back over the Volga.

b. Now it's becoming obvious that Fork will manage to kill someone important.

c. Harry spent all evening trying very hard not to insult Ursula, but he managed to insult her, all the same.

With Baglini and Francez, Nadathur suggests that apparently context-sensitive projective content is predicted if *manage* presupposes something that is relatively abstract. Thus, if the core presupposition is simply that some condition (or set thereof) is necessary and sufficient for complement realization, additional context can support an interpretation on which the positive resolution of this condition requires effort, is intentionally linked to the implicative complement, or on which successful resolution is *a priori* unlikely. We might then expect a speaker to select implicative *manage* when the discourse context supports the existence of some potential obstacle to complement realization (see also Karttunen, 2014), but where no available verb provides an appropriately specific characterization of the action or eventuality needed to overcome this obstacle (or where the speaker is simply unable or unwilling to commit to such a characterization).

2.2   Causal dependence in implicative semantics

2.2.1   Motivating a role for causal dependence

Nadathur argues that Karttunen's schema is subject to a constraint on necessity/sufficiency. If proposition A is necessary for proposition B, we expect B to be false in *relevant* worlds where A does not obtain. Likewise, if A is sufficient for B, we expect B to be true in all *relevant* A-worlds. (10) leaves open what the appropriate notion of relevance might be: i.e., whether implicative verbs invoke a particular flavour of modality, or are (modally) underspecified. Nadathur argues that lexical implicatives require that the relevant prerequisite is *causally* necessary sufficient for complement realization. The consequence of this restriction is that we expect implicative verbs to be used just in case (a) prerequisite satisfaction concretely precipitates a causal chain which effects (brings about) complement realization, and (b) prerequisite failure concretely blocks all causal pathways from the reference time situation to complement realization.

Example (13) provides some support for the causal restriction by showing that the salience of a *deontically* necessary and sufficient condition does not (by itself) license the use of *manage*.

(13)   a. *Context.* In the United States, being 18 years old is a legally necessary and legally sufficient condition for male citizens to register for selective service (you are prohibited from registering before you are 18, and obligated to register thereafter). Juniors in U.S. high schools are typically between 16 and 18 years old; suppose that the information that Khalid is a high school junior is shared in the utterance context, but that while the speaker is aware of his precise age, the addressee may not be.

b. ?Khalid managed to register for selective service.

(13b) need not be infelicitous, but crucially cannot make reference to the salient deontic prerequisite: a speaker who knows that Khalid has just turned 18 cannot use (13b) to convey this information. Assuming that the satisfaction of some salient prerequisite is part of *manage*'s assertion, the intended use of (13b) should be possible if Khalid's turning 18 provides an acceptable (licensing)

prerequisite: the actual interpretation of (13b) shows that it is not. Intuitively, (13b) suggests that Khalid overcame some concrete obstacle to registration: for instance, that he successfully navigated a complex process, or even tricked an official into accepting his (underage) registration as valid. Each of these inferences involves resolving circumstances that stand *causally prior* to registration, supporting the claim that only causal prerequisites can accommodate the use of *manage*.

Combining the causal restriction with Karttunen's original schema results in Nadathur's proposed semantic template for implicative verbs.

(14) **Causal semantics for implicatives.** Given an implicative verb I, an individual argument x, and a one-place predicate P, the implicative proposition $I(x, P)$:

  a. *Presupposes:* the existence of a predicate A such that $A(x)$ is *causally necessary* and *causally sufficient* for $P(x)$ in the utterance context.

  b. *Asserts:* the satisfaction (truth) of $A(x)$

Per Proposal 14, implicatives vary with respect to what they lexicalize about the presupposed prerequisite $A(x)$, but uniformly encode its existence and causal relationship to complement $P(x)$. The semantic structure above is responsible for the characteristic inferential profile of lexical implicatives, deriving complement entailments, not at-issue inferences, and polar entailments with respect to prerequisite status (see, e.g., 9). The prerequisite presupposition blocks a false assertoric equivalence between implicative claims and their unembedded complements; the asserted content in (14b) handles polar prerequisite entailments. In addition, the causal restriction explains data like (13), restricting the use of lexical implicatives to contexts in which the licensing prerequisites are causally-determinative ancestors of the complement, and thus have the effect of precipitating or precluding complement realization.

2.2.2 Causal dependence relations, semi-formally

Nadathur (2023) formalizes the notions of causal necessity/sufficiency in terms of Schulz's (2011) framework for **causal entailment** in a *structural equation causal model* (Pearl, 2000). This sets up a system which in some way parallels 'classical' logical entailment, but in which the familiar logical concept of "what follows" from a particular set of facts is translated instead to a notion of "what results" in the normal course of events as projected from a given context or situation. Causal inference can then be understood as a particular type of modality, aimed at capturing intuitions about how situations ordinarily (stereotypically) develop.

The underlying assumption is that causal reasoning constitutes a language-independent cognitive capacity. Causal information constitutes knowledge about how the world works: I assume that some notion of causal influence is conceptually atomic, and, accordingly, that intuitions about causal consequences are based on cognitive representations of causal influence networks in which certain eventualities (effects) depend on particular combinations of other states and events (causes; see Mackie 1965 and, more recently, Hobbs 2005; Nadathur and Lauer 2020; Baglini and Bar-Asher Siegal 2020, among others). Causal reasoning then constitutes the application of a set of (relevant) causal laws to a particular state of affairs: these laws, established through some combination of experience and experimentation, allow us to predict the *normal causal developments* (NCDs; Nadathur and Lauer 2020) of the starting state.

To illustrate: the toy scenario in (15a) describes a situation s_{stop}. (15b) describes the set of causal laws relevant to s_{stop}, and which license inferences about certain propositions whose truth

or falsity is not part of s_{stop}.[5]

(15) **The automated train door.** (Nadathur, 2023)

    a. Ria is in a subway car. At the moment, the train is stopped at a station, and Ria has not (yet) pressed the green button labeled 'open door.'

    b. In the subway system that Ria is currently using, train car doors open under two conditions: (a) if the train has come to a standstill and (b) if the door-open button has been pressed.

(15a) (s_{stop}) could be part of two kinds of worlds: worlds in which the door opens, and worlds in which the door remains shut. Only shut worlds are causally normal. The situation s_{shut} (in which the train is stopped, Ria has not pressed the button, and the train door is shut) is the only NCD (causally consistent extension) of s_{stop}. Somewhat more formally, an NCD of situation s is a larger situation s' which agrees with s on any established facts and adds only information which is predicted by applying the causal laws to s. In the context of (15), s_{shut} exhausts the causal consequences of s_{stop}: s_{shut} therefore represents the *maximal* NCD of s_{stop}, and any facts established by s_{shut} are *causally entailed* by s_{stop}.[6]

    A *structural equation model* (SEM) codifies this kind of reasoning. The first component of an SEM is a *directed acyclic graph* whose vertices comprise a set of relevant propositional variables, and whose edges represent (directed) causal influence links. Figure (1a) provides the graphical model for (15b): this reflects that the door's status (i.e., the value of O) depends on both the train's motion (S) and on the button (B), but does not specify precisely how. The nature of the causal dependencies, also contained in (15b), is captured by the accompanying *structural equation* in Figure (1b). In general, an SEM contains an equation like f_O for each dependent variable in the associated graph, thus specifying how the value of any dependent variable changes based on valuations for its full set of (immediate) causal ancestors.

B	S	O
0	0	0
0	1	0
1	0	0
1	1	1

$$f_O =$$
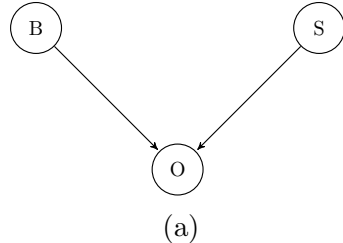
(a)   (b)

Figure 1: Structural equation model for the automated door scenario (S = whether or not the train is at a standstill, B = whether or not Ria presses the button, O = whether or not the train door opens

    The reasoning based on s_{stop} can be read directly from Figure (1): given (15a), we check whether we have values for the full set of parents for any dependent (and undetermined) propositional variables. In this case, s_{stop} supplies two facts: $\langle S, 1 \rangle$ and $\langle B, 0 \rangle$, which jointly correspond to the second line of the f_O truth table. We conclude that the situation which contains $\langle S, 1 \rangle$, $\langle B, 0 \rangle$, and

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[5]These inferences are valid only if we assume that (15a) contains all of the relevant information for Ria (e.g., that it is not the case that the button is broken, etc); causal inference is thus a type of closed-world reasoning.

[6]In a larger model, we might use the causally-derived state of the train door to work out additional causal consequences of s_{stop}; see Schulz (2011) for a formal treatment of the iterative calculation works. As long as the set of relevant propositional variables is finite, the calculation of causal consequences necessarily has a fixed point, corresponding to the maximal NCD of the starting situation.

adds the corresponding value of O ($\langle O, 0\rangle$) constitutes an NCD of s_{stop}, and consequently that s_{stop} causally entails that the train door is shut.

Causal dependencies are many-to-one relations: effects depend on collections of other conditions. In the linguistic context, however, causal relationships—for instance, as predicated by *causative verbs*—often appear as binary relations (see, e.g., Dowty 1979). This difference can be reconciled if linguistic representations make reference to *parts* of causal chains or complexes, in particular singling out causes that stand in particular structural relations to effects (dependent variables) within a larger causal complex. Following Nadathur and Lauer (2020), the truth conditions of different causal expressions vary due to their reference to distinct structural relations: such binaries include causal necessity and sufficiency.

Binary relations are considered with respect to a background, which contains valuations for some but not necessarily all of the causal ancestors of the designated effect. A fact $\langle C, c\rangle$ is *causally sufficient* for $\langle E, e\rangle$ (where $c, e \in \{0, 1\}$) in context s just in case adding $\langle C, c\rangle$ to s guarantees $\langle E, e\rangle$; $\langle C, c\rangle$ is *causally necessary* for $\langle E, e\rangle$ relative to s just in case the only causally consistent routes from s to $\langle E, e\rangle$ also validate $\langle C, c\rangle$. Definition 16 is adapted from Nadathur and Lauer.

(16) Let D be an SEM over a finite set Σ of propositional variables. Let $\langle C, c\rangle$ and $\langle E, e\rangle$ be facts (assignments of $c, e \in \{0, 1\}$ to variables $C, E \in \Sigma$), and let s be a situation (a set of facts whose domain is a subset of Σ).

    a. **Augmenting a situation with a fact.** The situation $s[C \to c]$ is defined as the situation which is identical to s except that it (re)assigns C to the value c.

    b. $\langle C, c\rangle$ is **causally sufficient** for $\langle E, e\rangle$ iff

      i. the maximal NCD of s does not fix $\langle E, e\rangle$

      ii. the maximal NCD of $s[C \to c]$ fixes $\langle E, e\rangle$

    c. $\langle C, c\rangle$ is **causally necessary** for $\langle E, e\rangle$ iff

      i. the maximal NCD of s does not fix $\langle E, e\rangle$

      ii. there is a supersituation s' of $s[C \to c]$ such that s' does not contain $\langle E, e\rangle$ and the maximal NCD of s' fixes $\langle E, e\rangle$

      iii. there is no supersituation s'' of s such that s'' does not contain $\langle E, e\rangle$, and the maximal NCD of s'' fixes $\langle E, e\rangle$, but does not fix $\langle C, c\rangle$.

In the automated door scenario, Ria's pushing the button in s_{stop} ($\langle B, 1\rangle$) is causally necessary and sufficient for the door to open ($\langle O, 1\rangle$). We have already seen that s_{stop} causally entails $\langle O, 0\rangle$, so the maximal NCD of s_{stop} does not contain $\langle O, 1\rangle$, satisfying condition (i) of Definitions 16b-16c. However, the NCDs of the augmented situation $s_{\text{stop}}[B \to 1]$ does contain $\langle O, 1\rangle$ (see line 4 of f_O in Figure 1b), satisfying condition (ii) for causal sufficiency. Situation $s_{\text{stop}}[B \to 1]$ also satisfies condition (ii) for causal necessity. Finally, since there is no supersituation of s_{stop} which entails $\langle O, 1\rangle$ without fixing it directly, condition (iii) for causal necessity is also satisfied.

Proposal (14) therefore predicts that s_{stop} is an appropriate context for implicative *manage*:

(17) The train has come to a standstill at the station, but Ria has not (yet) pushed the button.

    a. Ria managed to open the train door.   ($\leadsto$ *She pushed the button*)

    b. Ria did not manage to open the train door.   ($\leadsto$ *She did not push the button*)

The predictions appear to be upheld: either (17a) or (17b) is in principle felicitous, and—for a hearer who is fully aware of the utterance context—which sentence is used not only entails a state for the train door, but settles whether or not Ria pressed the button.

2.2.3 Causal premise semantics

Following Kaufmann (2013), the information encoded by an SEM for causal relations can be integrated with the premise semantics for modality, allowing us to treat causal necessity and sufficiency as particular flavours of more general relations. I provide only a sketch of a *causal premise semantics* here, and refer the technically-minded reader to Kaufmann for a more careful presentation.

The basic idea is that the NCDs of a given starting situation s_w correspond to (sets of) optimal worlds: s_w provides a circumstantial modal base from which alternatives are projected, and an appropriate ordering source is extracted from the causal laws of an SEM. Intuitively, a causal ordering source corresponds to Kratzer's (1981) notion of *stereotypicality*: causality as modal flavour is thus relevant not only for causative lexical semantics, but also for counterfactual conditionals, epistemic 'backtracking', and other contexts which invoke stereotypicality (see, a.o. Schulz, 2011; Henderson, 2014; Ciardelli et al., 2018).

Kaufmann converts the directed dependencies of a causal model into a premise set by pairing each line of a structural equation table with an implication from a conjunction of valued ancestral propositions to the associated value of the dependent variable. The premises generated from Figure 1 are given in (18): given a variable X, I let x represent the proposition (fact) $\langle X, 1 \rangle$ and $\neg x$ represent $\langle X, 0 \rangle$. The first premise in (18) corresponds to the first line of Figure (1b), and so on.

(18)   Premise set corresponding to f_O in Figure 1:
$$\{(\neg b \wedge \neg s) \to \neg o, (\neg b \wedge s) \to \neg o, (b \wedge \neg s) \to \neg o, (b \wedge s) \to o\}$$

The ordering source thus constructed achieves the desired result: causally-optimal worlds are just those which (a) preserve facts established by the starting situation s_w, and (b) conform to the causal laws (*modulo* violations in s_w)—i.e., worlds which realize the maximal NCDs of s_w.[7]

Causal necessity and sufficiency can then be defined in terms of the set $\mathrm{CAUS}_D(s_w)$ of causally optimal worlds relative to $s_w \subseteq w$ and dynamics D:

(19)   Let W be the set of worlds, D a dynamics for W. Let s be a consistent set of propositions, and let x, y be (causally relevant propositions) such that the starting situation $s \subseteq w^*$ does not causally entail $x, \neg x$, or y. Then:

   a. x is **causally sufficient** for y with respect to s just in case

$$\forall w \in \mathrm{CAUS}_D(s)[x(w) \to y(w)]$$

   b. x is **causally necessary** for y with respect to s just in case

$$\forall w \in \mathrm{CAUS}_D(s)[\neg x(w) \to \neg y(w)]$$

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[7]Nadathur (2019) further assumes that the evaluation world w^* is causally normal by default, so that the set of causally optimal worlds relative to situation s_w and causal model D necessarily contains w^*; this is justified by the observation that, when causal expectations are not borne out, we tend to conclude that we are missing relevant information, not that our world is causally defective.

Note that (19) requires us to check the relationship between X and Y in the NCDs of s which also validate x (for sufficiency) or $\neg x$ (for necessity). Such worlds need not simply augment s with a value for X, but must also validate a causally-normal process for arriving at a valuation of X from s: this means that causal sufficiency and causal necessity can hold even if simply augmenting s with a value for X is not enough to guarantee or preclude the desired value for Y, as long as the implication holds once we have validated a maximally causally normal path from s to x (or $\neg x$).[8]

2.3 The semantic parameters of implicativity

Proposal (14) establishes that three parameters work together in the implicative inferential profile:

(i) the (presupposed) existence of a necessary and sufficient condition for complement realization,

(ii) a causal restriction on the modal flavour of necessity and sufficiency,

(iii) an assertion which resolves the truth-value status of the prerequisite (and thus 'activates' the necessary and sufficient condition to precipitate or preclude complement realization)

Features (i)-(iii) are all encoded in the lexical representation of 'true' implicatives, but there is no reason to expect the same from phrasal predicates such as *be fast enough*. Indeed, given the observed variability of *enough* inferences, we should not expect to find (i)-(iii) encoded in a single lexical item, but instead to come together in the composition of *enough*, (particular) matrix adjective-complement pairs, and the interaction of the whole predicate with grammatical aspect. Each of the components of an *enough* construction should make an independent and potentially variable contribution to the overall semantic profile: moreover, if complement-entailing *enough* constructions (such as 4) are truly instances of implicativity, it should be only in these cases that (i)-(iii) are fully (re-)assembled. Defeasibly-implicative or non-implicative constructions, such as (3) and (5), respectively, should relax (or even omit) one or more of the components of implicativity.

§3 argues that this is exactly how variable implicativity works in *enough* constructions. I preface this investigation with a brief examination of how changes to (i)-(iii) might affect the behaviour of a complement-embedding predicate.

Prerequisite necessity/sufficiency. Parameter (i) identifies some condition $A(x)$ as both necessary and sufficient for the truth of the complement $P(x)$. This makes $A(x)$ determinative of $P(x)$ when necessity/sufficiency are interpreted causally, resulting in a two-way entailment pattern. Weakening (i) to a single dependency type predicts changes to inferential profile.

Suppose that we have a complement-taking predicate I which indicates only the necessity of $A(x)$ for its complement $P(x)$. Assuming that conditions (ii)-t(iii) are held constant, such a predicate would maintain entailment from $\neg I(x, P)$ to $\neg P(x)$, but fail to give rise to a corresponding positive inference. One-way necessity-only implicatives of this type are indeed attested (see Karttunen, 2012; Nadathur, 2023); one example is the Finnish verb *jaksaa* ('have strength'; 20):

(20)　a.　Sampo jakso-i　　　　　noust-a.
　　　　　Sampo have.strength-PST.3SG rise-INF.

　　　　　'Sampo had the strength to rise.'　　　　　　　　　　　$\not\to$ ($\rightsquigarrow$) *Sampo rose.*

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[8]Generating an appropriate circumstantial modal base s in the premise semantics framework is not simply a matter of selecting all of the causally relevant propositions, but may also require revisions which preclude an entailment from s to x or $\neg x$. Kaufmann details a revision procedure (for counterfactual scenarios) which can be adopted here.

b. Sampo e-i jaksa-nut   noust-a.
 Sampo NEG-3SG have.strength-PP.SG rise-INF.

 'Sampo did not have the strength to rise.'   → *Sampo did not rise.*

Similar examples from English might include semi-modal *be able* (see Karttunen 1971, 2012, Bhatt 1999), as well as phrasal predicates such as *have the strength, have the courage, have the opportunity,* and so on. There is some disagreement with respect to the non-defeasibility of negative complement inferences in the *have the X* construction: some informants find examples like (21a) acceptable, while others prefer (21b), suggesting that a generic operator (independently known to suspend witnessing requirements; Carlson 1977) is needed to avoid complement preclusion.[9]

(21) a. Sampo didn't have the strength to get up, ?but he did it by sheer force of will.

   b. Sampo didn't *really* have the strength to get up, but he did it by sheer force of will

 Insofar as the inferences of English *enough* constructions are defeasible, parameter (i) is a reasonable place to expect *enough* predicates to diverge from 'true' two-way implicatives. Defeasibly-implicative *enough* constructions (such as 3) are nevertheless inferentially distinct from a one-way predicate such as *jaksaa* in (20), in that defeasibility is not limited to one matrix polarity.

Causal flavour. §2.2 previewed the effects of relaxing the causal restriction on modal flavour (parameter ii). If the necessity/sufficiency of $A(x)$ for $P(x)$ is modally unrestricted, the consequences of asserting or denying $A(x)$ will vary based on whether or not the set of optimal worlds necessarily includes the evaluation world. Circumstantial constructions, which are associated with a realistic modal domain, will therefore give rise to implicative pattern entailments, but neither epistemic nor deontic claims need behave in an implicative manner. As we will see, *enough* constructions vary in modal flavour, which explains the non-implicativity of examples like (5).

Asserted content. It is harder to see how variation in parameter (iii) might be achieved, since—on the current analysis—this parameter contains the entire assertoric contribution of an implicative predicate. The picture is clearer if we compare a lexical implicative with a *have the X* construction: (22a) indicates (asserts) that Oliver actively deployed courage, but (22b) indicates only that the necessary/sufficient courage was available.

(22) a. Oliver dared to ask for more.
   → *He acted courageously and (thus) asked for more.*

   b. Oliver had the necessary and sufficient courage to ask for more.
   → *He had the capacity to act with the necessary/sufficient courage for asking for more.*

Thus, while both (22a) and (22b) plausibly establish the prerequisite status of (acting with) courage, they differ in asserted content: (22b) 'weakens' the assertion of courageous action to the attribution of a (potentially latent) capacity. The result is that—even in the presence of an implicative-pattern causal dependency between $A(x)$ and $P(x)$—no complement entailment follows from (22b). The difference between action and capacity for action is thus another means by which complement

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[9]Curiously, a second class of sufficiency-only implicatives does not seem to be attested. Coercive causatives like *force* have the right inferential profile, but are structurally (syntactically) distinct from implicatives in both English and Finnish (L. Karttunen, p.c.); additionally, these verbs predicate rather than presupposing causal information.

inferences might become defeasible, without changes in the presuppositional structure introduced by parameters (i)-(ii). Insofar as an action/latency distinction has consequences for the aspectual properties (*Aktionsart*) of a potentially-implicative predicate, parameter (iii) variations can be recruited to explain the interaction between implicativity and grammatical aspect in a way that variations in parameters (i)-(ii) cannot.

3 Implicative variation in *enough* constructions

The implicative patterns of *enough* constructions present three interlocking puzzles. The first, that of inference **optionality**, is illustrated by the contrast between implicative (4a) and non-implicative (5), repeated from §1 (see also Karttunen 1971; Meier 2003). The second puzzle, that of **variable inference strength**, arises in the contrast between perfective (4a) and its imperfective counterpart (6a) (as well as defeasibly-implicative English (3a); see also Hacquard 2005; Marques 2012).

(4a) Jean a   été   assez agile pour s'enfuir,   #mais il ne   s'est   pas enfui.
      Jean has be.PP enough agile for   REFL-flee.INF, but   he NEG REFL-is NEG flee.PP.
      'Jean was-PFV nimble enough to escape, #but he did not escape-PFV.'

(5)   Amira a   été   assez   grande pour boire   de l'alcool,   mais elle ne   l'a
      Amira has be.PP enough old   for   drink.INF of the-alcohol, but she NEG it-has
      jamais bu.
      never drink.PP.
      'Amira was-PFV (became) old enough to drink alcohol, but she never drank-PFV it.'

(6a) Jean était   assez agile pour s'enfuir,   mais il ne   s'est   pas enfui.
      Jean be.PST.IPF enough agile for   REFL-flee.INF, but he NEG REFL-is NEG flee.PP.
      'Jean was-IPF nimble enough to escape, but he did not escape-PFV.'

The third puzzle is new. It has to do with variation in the **inferential profile** of implicative *enough* constructions: while examples like (3) give rise to a two-way inference pattern, we also find constructions like (23), which license a distinct one-way profile in the pattern of necessity-only lexical implicatives like Finnish *jaksaa* ('have strength', 20).

(3)   a. Jean was nimble enough to escape.   ⤳ *Jean escaped.*
      b. Jean was not nimble enough to escape.   ⤳ *Jean did not escape.*

(23) a. Nima was tall enough to reach the top shelf.   ⤳̸ *Nima reached the top shelf.*
      b. Nima was not tall enough to reach the top shelf. → *Nima did not reach the top shelf.*

The contrast between (3) and (23) largely carries over to aspectually-marked data: *être assez grand/e* resists perfective marking, and my informants find (24) uninterpretable rather than contradictory (compare to 4a). The negative inference of (23b) is insensitive to aspect, and is not rendered defeasible with the imperfective in (25), in contrast with the reported judgement for (6b).

(24) (??)Nima a   été   assez grand pour atteindre l'étagère du   haut, mais il ne
      (??)Nima has be.PP enough tall   for   reach.INF the-shelf of.the top, but he NEG
      l'a   pas atteinte.
      it-has NEG reach.PP.
      intended: 'Nima was-PFV tall enough to reach the top shelf, but he did not reach it.'

(25)   Nima n'était   pas assez   grand pour atteindre l'étagère du   haut, #mais il
         Nima NEG-be.PST.IPF NEG enough tall   for   reach.INF the-shelf of.the top,   #but   he
         a   réussi   à l'atteindre.
         has succeed.PP at it-reach.INF.
         'Nima was-IPF not tall enough to reach the top shelf, #but he managed-PFV to reach it.'

(6b)   Jean n'était   pas assez   agile pour s'enfuir,   mais il s'est   enfui.
         Jean NEG-be.PST.IPF NEG enough agile for   REFL-flee.INF, but   he REFL-is flee.PP.
         'Jean was-IPF not nimble enough to escape, but he escaped-PFV.'

A satisfactory treatment of *enough* implicativity must account for each of these puzzles. An account which makes good on the implicativity thesis, moreover, must provide a principled link between these patterns and the presence or absence of elements of the implicative semantic template, as set out in §2.3: this section aims to do just this. I present a baseline modal semantics for *enough* predicates, building on von Stechow et al. (2004), and argue that this treatment induces a necessity presupposition which makes *enough* claims structural cousins of (one-way) implicative verbs. I then present an opinionated survey of the empirical landscape, using the necessity-based semantics for *enough* as a basis for three main claims.

1. Variability in the modal flavour of *enough* constructions directly predicts inference **optionality** (see also Meier 2003): implicativity is restricted to circumstantially-interpreted claims.

2. Where implicativity arises, **inferential profile** is governed by the matrix adjective: we observe a one-way profile where the adjective introduces a *static* enabling condition for the complement proposition, and a (default) two-way pattern just in case the adjective picks out a *dynamic* (actionable) property whose manifestation causes complement realization.

3. Variability in **inference strength** is governed by grammatical aspect (Hacquard, 2005). I propose that this follows from the interaction between aspect and the at-base stative nature of *enough* claims. Where *enough* attributes a static property (e.g., height), aspect does not interact with implicativity, but where a dynamic capacity is attributed, the perfective converts the main clause assertion from latency to 'performance', bringing it into alignment with the eventive, prerequisite-realizing assertions of lexical implicatives.

3.1   The necessity semantics for *enough*

Following von Stechow et al. (2004), *enough* constructions can be treated as degree comparatives with a modal component: the subject's actual allotment of some gradable property is compared to some allotment of the same property which is relevant for complement realization. The paraphrase below is due to von Stechow et al., but is similar in spirit to proposals from Nelson (1980); Bierwisch (1987); Meier (2003), and Schwarzschild (2008) (see also Hacquard 2005; Fortuin 2013; Nadathur 2019; Grano 2022).

(26)   Bertha is old enough to drive. $\sim$ *Bertha is as old as she is required to be in order to drive.*

Gradable adjectives relate individuals and (sets of) degrees on an appropriate *scale* (Seuren, 1984; von Stechow, 1984; Kennedy, 2001). Making the (over)simplifying assumption that these scales are isomorphic to the nonnegative real line, positive polarity adjectives relate individuals to

intervals of the form $[0, n]$ (for nonnegative n), while their negative counterparts relate individuals to intervals of the form (n, ∞). (27b) shows the interpretation of a simple measure claim.

(27) a. $[\![\text{old}]\!] := \lambda w \lambda d \lambda x.\mathsf{age}(w)(x) \geq d$, where $\mathsf{age} := \lambda w \lambda x.x$'s age in w
    b. $[\![\text{Bertha is 18 years old}]\!]^{w^*} = [\![\text{old}(18 \text{ years})(\text{Bertha})]\!]^{w^*} = \mathsf{age}(w^*)(\mathsf{B}) \geq 18\mathsf{y}$

Comparative operators (*more, -er, as . . . as*) perform set comparisons between two open degree predicates; (28b) illustrates for an equative with an overtly modalized complement (see Heim 2001). I assume that *required* is deontically interpreted, invoking a circumstantial modal base and a deontic ordering source, and abbreviate the resulting set of optimal worlds as $\mathrm{DN}(w^*)$.

(28) a. $[\![\text{as}]\!] := \lambda w \lambda P \lambda Q.Q(w) \supseteq P(w)$
    b. Bertha is as old as she is required to be.
        $\sim$ (as λ_1 ($\mathrm{MUST}_{\text{deon}}$ (Bertha$_2$ is d_1 old))$_3$ (she$_2$ is d_3 old))
        i. $[\![(28\text{b})]\!]^{w^*} = \{d : \mathsf{age}(w^*)(\mathsf{B}) \geq d\} \supseteq \{d : \forall w \in \mathrm{DN}(w^*)[\mathsf{age}(w)(\mathsf{B}) \geq d\}$
        ii. *The set of degrees d of age that Bertha actually has is a superset of the set of degrees d such that in all deontically optimal worlds, Bertha is at least d degrees tall.*

The left hand set in (28b-i) has the form $[0, n]$, where n is Bertha's actual age ($\mathsf{age}(\mathsf{B})(w^*)$). Assuming a context which supplies some age requirement, the right hand set represents the intersection over $w \in \mathrm{DN}(w^*)$ of intervals of the form $[0, \mathsf{age}(w)(\mathsf{B})]$, and corresponds to the set of degrees of age that Bertha has in the optimal world where she is youngest. (28b) thus establishes that Bertha's age meets some minimum standard: this is the same as saying that Bertha is old *enough*, a result which von Stechow et al. capture by analyzing *enough* as an equative operator embedding a universal modal quantifier that scopes over its complement.[10] The proposal is extended to complement-taking *enough* claims by treating the complement as a purpose clause which enters into the restriction of the embedded modal (see also von Fintel and Iatridou 2005):

(29) $[\![\text{enough}]\!] :=$
    $\lambda w \lambda P_{set} \lambda Q_{sedt} \lambda x_e.\{d : Q(w)(x)(d)\} \supseteq \{d : w' \in \mathrm{OPT}_{f,g}(w)[P(w')(x) \rightarrow Q(w')(x)(d)]\}$

(30) Bertha is old enough to drive.
    a. $[\![(30)]\!]^{w^*} = \{d : \mathsf{age}(w^*)(\mathsf{B}) \geq d\} \supseteq \{d : \forall w \in \mathrm{DN}(w^*)[\mathsf{drive}(w)(\mathsf{B}) \rightarrow \mathsf{age}(w)(\mathsf{B}) \geq d\}$

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[10]Von Stechow et al. (2004) pair this analysis with a dual treatment of *too* (e.g., *Bertha is too young to drive*) as a strict comparative embedding an existential modal (*Bertha is younger than she is allowed to be in order to drive*). I omit discussion of *too* in this paper for reasons of space, but the implicative facts are parallel to those for implicative *enough*, modulo a reversal of polarity between the matrix and complement clauses.

The 'modal-comparative' approach (von Stechow et al.) is offered against an analysis from Meier (2003) on which the modality inherent to *enough* claims is not directly contributed by *enough*, but instead results from selection for modalized complement. By building on Heim's (2001) treatment of regular comparatives with overtly modal complements (see also Krasikova 2011), the modal-comparative account avoids stipulating the distribution of max/min operators in degree set comparisons (a stipulation which is necessary on Meier's 'modal-clause' account; see von Stechow et al., Nadathur 2019 for discussion). Ultimately, von Stechow et al.'s truth conditions are equivalent to Meier's, at least for the types of data considered here. I adopt the modal comparative approach as more amenable to an explication of the implicative data, but Grano (2022) motivates pursuing the modal clause analysis as a means of unifying *enough* claims with infinitival complements with the (somewhat more marginal) interpretation of finite-complement *enough* claims like (1).

(1) Bertha is old enough that she can drive.   (see also Grano, p.117)

> b. *Bertha is (actually) at least as old as she is across all of the deontically optimal worlds where she drives (thus, at least as old as the legal driving minimum).*

I argue that this analysis must be coupled with a presupposition to the effect that the matrix property plays a difference-making role in the realizability of the complement proposition. Such a presupposition is needed to capture the intuitive judgements in (31), which show that *enough* predicates are not felicitous when the matrix property is irrelevant to complement-realization, either due to the categorical impossibility of the complement, as in (31a) (so that no degree is complement-compatible) or its triviality, as in (31b) (where no degree is complement-excluding).

(31)   a. ??Nima is tall enough to travel faster than the speed of light.[11]

       b. ??Nima is tall enough to breathe.

A prohibition against such contexts gives rise, on the semantics in (29), to a necessity presupposition: in particular, to the presupposition that there is some 'threshold' degree d_n of the matrix adjective which represents a boundary between a part of the adjectival scale that is compatible with the *enough* complement, and a part of the scale which straightforwardly precludes complement realization. (This requirement might also be regarded as a diversity condition on the modal base with respect to the specified purpose clause.)

To see where the 'threshold' notion comes from, consider the right hand set from (28b-i), rewritten explicitly as an intersection in (32).

(32) $\bigcap\limits_{w \in \text{DN}(w^*):\text{drive}(w)(\mathsf{B})} \{d : \text{age}(w)(\mathsf{B}) \geq d\}$

If driving a car is impossible (illegal) at any age, there can be no worlds w in $\text{DN}(w^*)$ such that $\text{drive}(w)(\mathsf{B})$ holds, and (32) must be empty: this makes (28b-i) vacuously true, counter to intuition. If driving is instead free of age restrictions, there should be arbitrarily small sets in the intersection in (32), which is therefore $\{0\}$, again rendering (28b-i) vacuously true. The existence of a (nonzero) threshold degree d_n (here, a legal minimum for driving) handles both problems by ensuring that (32) is neither empty nor $\{0\}$. The necessary presupposition is spelled out in (33): going forward, I suppress the specification that $d_n > 0$ for readability.

(33)   A statement of the form x *is* ADJ *enough to* P is felicitous at a world w just in case:

$$\exists d_n > 0 : \forall w' \in \text{OPT}_{f,g}(w)[P(w')(x) \rightarrow \text{ADJ}(w')(x)(d_n)]$$

With (33) in place, *enough* claims closely parallel simple measure statements like (27b), with the degree value constructed by means of the (modal) presupposition: positive *enough* claims establish that their subjects' degree of the matrix property suffices to meet the threshold mark (i.e., fall on

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[11]This judgement is based on the *categorical* impossibility of the complement. *Enough* can be felicitous where its complement is locally precluded by some circumstance independent of the matrix property:

(1)   Shireen was tall enough to ride the rollercoaster, but she was too young to be allowed in the amusement park.

The contrast between (1) and (31a) supports the existence of a necessity condition, insofar as the former's felicity is due to the existence of a (minimum) necessary degree of height for rollercoaster-riding. Whether or not Shareen actually rides the rollercoaster depends on a larger set of conditions.

the complement-conducive side of d_n), while negative claims establish that the subject falls short, thus failing to fulfill a necessary condition for complement realization.[12]

(34)   *Attributive semantics for* enough:
$$[\![\text{enough}]\!] := \lambda w \lambda P \lambda Q \lambda x . Q(w)(x)(\iota d : \forall w' \in \text{ACC}(w)[P(w')(x) \rightarrow Q(w')(x)(d)])$$

The modal semantics for *enough* claims situates them as near relatives of one-way, necessity-only lexical implicatives. Both types of predicates (a) presuppose the necessity of some (matrix-specified) condition for complement realization and (b) assert that this requirement was met.

3.2   Optionality and modal flavour

Enough claims and one-way implicatives differ with respect to modal flavour. Lexical implicatives are restricted to causal interpretations, while the modal flavour of an *enough* construction is instead resolved contextually, and on the basis of world knowledge. Since there are well-known laws establishing age requirements for driving and drinking alcohol, (26) (above) and (35) are deontically interpreted; (23a) naturally receives a circumstantial interpretation.

(35)   Amira is old enough to drink.   (23a)   Nima is tall enough to reach the top shelf.

Variation in modal flavour explains the optionality of *enough* implicativity. The necessity presupposition (34) establishes a relationship between prerequisite (non-)satisfaction and complement (non-)realization across the modal domain, which constrains evaluation world w^* whenever $w^* \in \text{ACC}(w^*)$. Since the deontically-optimal worlds ($\text{DN}(w^*)$) need not include w^*, no implicative inferences are predicted for deontic *enough*. This is spelled out for (35) below.[13]

(36)   a. $[\![\text{Amira is old enough to drink}]\!]^{w^*} = 1$ iff
$\text{age}(w^*)(\text{A}) \geq (\iota d_n : \forall w \in \text{DN}(w^*)[\text{drink}(w)(\text{A}) \rightarrow \text{age}(w)(\text{A}) \geq d_n])$
       b. $[\![\text{Amira is not old enough to drink}]\!]^{w^*} = 1$ iff
$\text{age}(w^*)(\text{A}) < (\iota d_n : \forall w \in \text{DN}(w^*)[\text{drink}(w)(\text{A}) \rightarrow \text{age}(w)(\text{A}) \geq d_n])$

Both examples compare Amira's actual age to the legally-specified minimum for alcohol consumption, and therefore constrain whether or not she can drink legally in w^*. Since we do not in general expect that individuals act on their legal rights, nor that they refrain from all prohibited activity, (36a) is correctly predicted to be felicitous in contexts where Amira is a known teetotaler, and (36b) in contexts which establish her underage drinking habit. The judgements in (37) are replicated in French, even with perfective marking on the matrix clause, as in (38).

(37)   a.   Amira was old enough to drink, but she never touched a drop.
       b.   Amira was not enough to drink, but she had some wine at her birthday party anyway.

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[12]Whether d_n is a maximum or a minimum depends on adjective polarity. Swapping *old* for its negative counterpart turns the minimum threshold in (30) into a maximum, as in (1). The existence and minimality/maximality of d_n are preserved under negation, supporting the presuppositional diagnosis for (33).

(1)   Bertha is { young enough / not young enough } to drive.
      ⟫ *There is a maximum legal driving age.* ($\exists d_n : \forall w \in \text{DN}(w^*)[\text{drive}(w)(\text{B}) \rightarrow \text{age}(w)(\text{B}) < d_n])$

[13]Epistemic modal domains need not be realistic, so epistemic *enough* is not predicted to be implicative. Where such constructions are observed, the prediction appears to be upheld (see Nelson 1980; Nadathur 2019 for data).

(38) a. Amira a été assez grande pour boire de l'alcool, mais elle ne l'a
        Amira has be.PP enough old   for drink.INF of the-alcool, but she NEG it-has
        jamais bu.
        never drink.PP.

        'Amira was-PFV (became) old enough to drink alcohol, but she never drank-PFV it.'

    b. Amira n'a   pas été assez grande pour boire de l'alcool, mais elle a
        Amira NEG-has NEG be.PP enough old   for drink.INF of the-alcool, but she has
        bu   du   vin à son anniversaire.
        drink.PP of-the wine at her birthday.

        'Amira was-PFV not (did not become) old enough to drink alcohol, but she drank wine
        at her birthday.'

The predictions are robust: out-of-the-blue judgements of deontic constructions like (26), (35) or their negations do not generally reflect even one-way implicative defaults, and it is easy to find natural examples (indicated by $^\gamma$) in explicitly non-implicative contexts. In context, (39) laments the death of the subject; my informants report a default to this type of interpretation, even when presented with this sentence out of context.[14]

(39) $^\gamma$Lee Halpin was [not old enough] to die for a story—even one that needed telling.

The link between optionality and modal flavour is clearly demonstrated by considering a 'minimal pair' like (40), in which the same predicate is non-implicative under a deontic ('idealistic') interpretation, but licenses implicative inferences where it is interpreted circumstantially.

(40) a. Juri was clever enough to be a rocket scientist. $\not\rightsquigarrow$ *Juri was a rocket scientist*
    b. Juri was clever enough to leave the party early. $\rightsquigarrow$ *Juri left early.*

This contrast—originally noted by Meier (2003)—suggests that circumstantial constructions are the prime candidates for implicativity. This is precisely what the necessity-based semantics predict, since the modal domain for circumstantial claims is always realistic. Predictions for (23) are spelled out below, and reflect the one-way profile. (41a) does not require that Nima reached the shelf, but since his actual height is below d_n in (41b), he cannot in this case reach the shelf.

(41) a. $[\![\text{Nima is tall enough to reach the shelf}]\!]^{w^*} = 1$ iff
        $\mathsf{height}(w^*)(\mathsf{N}) \geq (\iota d_n : \forall w \in \mathrm{CR}(w^*)[\mathsf{reach\text{-}shelf}(w)(\mathsf{N}) \rightarrow \mathsf{height}(w)(\mathsf{N}) \geq d_n])$
    b. $[\![\text{Nima is not tall enough to reach the shelf}]\!]^{w^*} = 1$ iff
        $\mathsf{height}(w^*)(\mathsf{N}) < (\iota d_n : \forall w \in \mathrm{CR}(w^*)[\mathsf{reach\text{-}shelf}(w)(\mathsf{N}) \rightarrow \mathsf{height}(w)(\mathsf{N}) \geq d_n])$

Parallel one-way predictions are supported for other circumstantial claims. A non-implicative interpretation is evidently acceptable in (42); simultaneously, (43a)-(44b) are judged to be contradictory, supporting the predictions of the necessity semantics under negation.[15]

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[14]Some deontic constructions do seem to license complement inferences. These cases uniformly involve contexts where a prohibition is subject to on-the-spot enforcement by a regulatory authority: thus the 'implicative' interpretation of (1) follows from assumptions about rule enforcement, and not directly from the semantics of the claim.

(1) $^\gamma$The last time we visited . . . [my son] was not tall enough to ride the . . . Spider-Man . . . ride.

[15]It is possible to assert a modified form of complement realization under negation, as in (1):

(42) $^\gamma$Although [the package was small enough to go through the letterbox], she found a note from Hermes saying it had been delivered to a safe place, namely "the window".

(43) a. Nima was not tall enough to reach the top shelf, #but by standing on his toes and straining he managed to reach it.

b. The package was not small enough to go through the letterbox, #but I pushed and pushed and got it through.

The one-way pattern carries over to French. As previously noted, (23a) is marked in the perfective (see 24), and the same is true of (44a); neither claim seems to entail its complement. The imperfective translations of (23a) (see 25) and (44b) are judged contradictory, indicating that the predicted entailment to complement non-realization persists irrespective of grammatical aspect.

(44) a. ??Le paquet a été assez petit pour tenir dans la boîte aux lettres, mais
The packet has be.PP enough small for fit.INF in the box of.the letters, but
le facteur l'a passé par la fenêtre.
the postman it-has put.PP through the window.
'The packet was-PFV small enough to fit in the mailbox, but the postman put-PFV it through the window.'

b. Le paquet n'était pas assez petit pour tenir dans la boîte aux
The packet NEG-be.PST.IPF NEG enough small for fit.INF in the box of-the
lettres, #mais je l'ai fait entrer.
letters, #but I it-have make.PP enter.INF
'The packet was not small enough to fit in the mailbox, but I made-PFV it go in.'

Thus far, the necessity semantics offers an empirically-supported explanation for the optionality of *enough* implicativity, and predicts a(n observed) one-way pattern of complement inferences for circumstantial claims. We run into trouble, however, when we consider circumstantial claims of the type analyzed by Hacquard (2005): like (3), (45) licenses a (defeasible) two-way pattern, which strengthens to full entailment only under perfective marking in French (compare 4 to 46).

(45) a. Juno was fast enough to win the race. $\rightsquigarrow$ *Juno won the race.*

b. Juno was not fast enough to win the race. $\rightsquigarrow$ *Juno did not win the race.*

(46) a. Juno a été assez rapide pour gagner la course, #mais elle n'a pas
Juno has be.PP enough fast for win.INF the race, #but she NEG-has NEG
gagné.
win.PP
'Juno was-PFV fast enough to win the race, #but she did not win-PFV.'

b. Juno n'a pas été assez rapide pour gagner la course, #mais elle a
Juno NEG-has NEG be.PP enough fast for win.INF the race, #but she has
gagné.
win.PP.

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(1) Nima was not tall enough to reach the top shelf, but by standing on a stepstool he managed to reach it.

This is not really an implicative cancellation, since the event realized in the continuation is arguably not the same sort of event as the one ruled out by the main claim. The implicative entailment that Nima did not (and could not) reach the top shelf *unaided* persists in (1), and is not affected by his success in finding a workaround.

'Juno was-PFV not fast enough to win the race, #but she won-PFV.'

(47)   a.   Juno était   assez   rapide pour gagner la   course, mais elle n'a   pas
            Juno be.PST.IPF enough fast   for   win.INF the race,   but   she NEG-has NEG
            gagné.
            win.PP

            'Juno was-IPF fast enough to win the race, but she did not win-PFV.'

       b.   Juno n'était   pas assez   rapide pour gagner la   course, mais elle a
            Juno NEG-be.PST.IPF NEG enough fast   for   win.INF the race,   but   she has
            gagné.
            win.PP.

            'Juno was-IPF not fast enough to win the race, #but she won-PFV.'

These data pose two problems. First, nothing we have said so far predicts complement entailments for positive, perfective *enough* claims like (46a). Secondly, the necessity presupposition predicts only the judgement for negated perfective *enough* in (46b) (compare 4b) and not the judgements reported for (45b) or (47b) (compare 3b and 6b, respectively), which indicate compatibility with complement realization. Both sets of judgements indicate a clear difference between the interpretation of 'one-way' vs 'two-way' *enough* constructions which—insofar as both types of constructions are circumstantial—is not explained by modal flavour alone. I focus first on accounting for the positive entailment before returning to the negative defeasibility puzzle in §3.6.

3.3   Necessity, sufficiency, and grammatical aspect

If the implicative hypothesis is correct, the semantic feature that differentiates two-way from one-way, necessity-presupposing *enough* constructions should be an additional sufficiency presupposition (i.e., that the necessary degree d_n of the matrix adjective guarantees complement realization). With a sufficiency condition in place, the behaviour of perfective constructions like (4) and (46) would follow immediately: if having degree d_n of the matrix property (circumstantially) guarantees the *enough* complement, a positive *enough* claim, $\text{ADJ}(x)(d_n)(w^*)$ (per 34) immediately entails $P(x)$.

This observation forms the basis of Hacquard's (2005) proposal. She suggests that *enough* claims are "at base" implicative, presupposing the joint necessity and sufficiency of a particular degree of the matrix property for the *enough* complement. The lexical entry in (48) makes *enough* constructions (degree-based) modally-variable counterparts of lexical implicatives, and derives the interpretations in (49), adopting for the moment Hacquard's treatment of PFV as existentially closing over past times (p.86).

(48) $[\![\text{enough}]\!] := \lambda w \lambda P \lambda Q \lambda x . Q(w)(x)(\iota d : \forall w' \in \text{ACC}(w)[Q(w')(x)(d) \leftrightarrow P(w')(x)]$

(49)   a. $[\![\text{Juno a été assez rapide pour gagner la course}]\!]^{w^*,t^*} = 1$ iff
            $[\![\text{PFV(Juno be fast enough to win the race)}]\!]^{w^*,t^*} = 1$ iff
            $\exists t[t \prec t^* \wedge \text{speed}(w^*)(t)(\mathsf{J}) \geq (\iota d : \forall w \in \text{CR}(w^*)[\text{speed}(w)(\mathsf{J}) \geq d \leftrightarrow \text{win}(w)(\iota x.\text{race}(x))(\mathsf{J})])]$

       b. $[\![\text{Juno n'a pas été assez rapide pour gagner la course}]\!]^{w^*,t^*} = 1$ iff
            $[\![\text{PFV(NEG(Juno be fast enough to win the race))}]\!]^{w^*,t^*} = 1$ iff
            $\exists t[t \prec t^* \wedge \text{speed}(w^*)(t)(\mathsf{J}) < (\iota d : \forall w \in \text{CR}(w^*)[\text{speed}(w)(\mathsf{J}) \geq d \leftrightarrow \text{win}(w)(\iota x.\text{race}(x))(\mathsf{J})])]$

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Since Hacquard's analysis is designed to derive two-way complement entailment, it is too strong for both the imperfective claim in (47) as well as the English claim in (45) (see also 6, 3). Hacquard accounts for the imperfective by proposing that the French *imparfait* can introduce a covert genericity operator (see also Bhatt 1999). GEN quantifies over a set of normal worlds in which its prejacent is realized; in (50), the propositional variable R in (50) captures any contextually-relevant domain restrictions, including the prejacent's presupposition (see Schubert and Pelletier 1989).

(50) $[\![\text{GEN}]\!] := \lambda w \lambda R \lambda P. \forall w' \in \text{NORM}(w)[R(w') \rightarrow P(w')]$

This results in the following interpretations for (47a)-(47b):

(51) a. $[\![(47a)]\!]^{w^*} = [\![\text{GEN}(\text{Juno be fast enough to win the race})]\!]^{w^*} = 1$ iff
$\forall w \in \text{NORM}(w^*)$
$[(\iota d : \forall w \in \text{CR}(w^*)[\text{speed}(w)(\mathsf{J}) \geq d \leftrightarrow \text{win}(w)(\iota x.\text{race}(x))(\mathsf{J}))]) \rightarrow \text{speed}(w)(\mathsf{J}) \geq d]$

b. $[\![(47b)]\!]^{w^*} = [\![\text{GEN}(\text{Juno not be fast enough to win the race})]\!]^{w^*} = 1$ iff
$\forall w \in \text{NORM}(w^*)$
$[(\iota d : \forall w \in \text{CR}(w^*)[\text{speed}(w)(\mathsf{J}) \geq d \leftrightarrow \text{win}(w)(\iota x.\text{race}(x))(\mathsf{J}))]) \rightarrow \text{speed}(w)(\mathsf{J}) < d]$

c. All normal worlds in which there is a necessary and sufficient degree of speed for Juno to win the race are worlds in which she does (51a) / does not (51b) have that speed.

Nothing ensures that w^* is normal by its own standards, let alone that it belongs to the subset of NORM(w^*) in which the presupposition obtains; consequently, (51a)-(51b) can be true in the absence of verifying instances for the prejacent or its negation, respectively. To extend Hacquard's proposal to the English examples in (45) and (3), we must further assume that English employs covert aspectual distinctions, making (45a) ambiguous between an episodic, complement-entailing (perfective) interpretation and a generic (imperfective) one. This story gains some support from (52), but only to the extent that continuations which force a generic reading (by indicating the atypicality of the matrix situation) are needed to support the cancellation of complement inferences.[16]

(52) a. Juno was (ordinarily) fast enough to win the race, but she was sick and ran slowly yesterday (and so she did not win).

b. Juno was not (really) fast enough to win the race, but all of the best runners were sick yesterday (and so she won anyway).

Hacquard thus provides an account of two-way *enough* implicativity and its aspect sensitivity which aligns in several respects with lexical implicativity. The proposal falls short, however, on both the optionality and inferential profile puzzles (as well as in the comparative analysis of *enough* constructions and true implicatives; see below), ultimately calling into question the plausibility of the proposed sufficiency presupposition as an across-the-board component of *enough*.

Although Hacquard's proposal seems at first to capture the non-implicativity of deontic *enough*, a deontic sufficiency condition turns out to be too strict, predicting that (53) should be felicitous only in contexts where it licenses an implicative interpretation:

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[16]More precisely, the prediction from genericity (coupled with 48) is that complement inferences should *only* be cancellable with GEN; this may be diagnosed by checking if acceptable cancellation contexts necessarily indicate atypicality of the reference situation. The prediction is questionable for positive *enough* claims: (1) can be felicitous in a context where Juno's choosing to sit out a race is not unusual at all.

(1) Juno was fast enough to win the race, but she decided not to run yesterday (and so she did not win).

(53) ⟦Amira a été assez grande pour boire de l'alcool⟧$^{w^*,t^*}$ = 1 iff
      $\exists t[t \prec t^* \wedge \mathsf{age}(w^*)(t)(\mathsf{A}) \geq (\iota d : \forall w \in \mathrm{DN}(w^*)[\mathsf{age}(w)(\mathsf{A}) \geq d \leftrightarrow \mathsf{drink}(w)(\mathsf{A})])]$

In (53), joint necessity/sufficiency establishes the deontic equivalence of Amira's being at least age d_n and drinking alcohol. The modal domain $\mathrm{DN}(w^*)$ thus contains exactly two kinds of worlds: worlds where Amira is over d_n and drinks, and worlds where she is underage and abstains. The exclusion of underage drinking worlds follows from the necessity presupposition alone, but exclusion of overage abstinence worlds is a consequence of sufficiency, and it is here that the problem arises. A claim like (53) (or 35) is clearly felicitous in a real-world context, in which there are no laws which oblige one to consume alcohol upon reaching the legal drinking age. If (53) is correct, the exclusion of overage-but-abstinent worlds from $\mathrm{DN}(w^*)$ cannot follow from ordering source constraints, but must instead be imposed by the modal base: (53) should then be felicitous only where Amira's circumstances ensure that she drinks if she is at least age d_n. Since this guarantee is circumstantially effected, it follows from (53) that Amira does drink: a deontic sufficiency condition thus wrongly predicts that the real-world felicity of (53) depends on its implicative interpretation.

Across-the-board sufficiency is also difficult to maintain in the face of one-way circumstantial constructions (not discussed by Hacquard). With respect to (23), it is not plausible that there is *any* degree of height which guarantees a shelf-reaching (nor, for 42, that there is some packet size which guarantees placement through the mail slot); (23) is a perfectly reasonable observation to make if Nima just happens to be standing near the relevant shelf. Differential semantic status for necessity and sufficiency is also supported by (54a)-(54b), which show that *be tall enough* is compatible with the denial of sufficiency, but not with the denial of necessity.[17]

(54) a. Nima is tall enough to reach the top shelf, but that doesn't mean he will do it.
      b. Nima is not tall enough to reach the top shelf, ??but that won't prevent him from doing it (unaided).

I conclude that a sufficiency presupposition *à la* Hacquard cannot be maintained as a universal feature of *enough*. Nevertheless, although sufficiency is untenable for deontic and one-way circumstantial constructions, we cannot throw it out altogether. Puzzlingly (given the preceding discussion), a sufficiency condition *does* seem supported for two-way, perfective (i.e., complement-entailing) *enough* claims. This is shown, for instance, by the markedness of (55a) in the context below, which suspends the inference that Juno's speed is sufficient for a race win by establishing the relevance of a second, unrelated condition which is both necessary and contextually unresolved.

(55) *Context.* Juno is competing in today's race, which is about to begin. Just before the starting gun, we hear an announcement that the age qualifications were revised upwards, but the specifics are not provided. Since Juno was already on the cusp of being too young to qualify, we are not sure if she meets the qualifications any longer, and the gun goes off before we can find out anything more. You go to make inquiries, while I watch the race, so only I see that Juno crosses the finish line first. Immediately after the race, and before you have the chance to tell me what you have learned, I report the result to you by saying:

      a. ?Juno a   été   assez rapide pour gagner la   course.
         Juno has can.PP enough fast   for   win.INF the race.

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[17]One might try to argue that sufficiency is masked in (54a) by covert genericity, but I do not find this very plausible. Genericity requires (54a) to describe a situation in which w^* is abnormal, and (54a) invites no such inference; (54a) is in fact marked with an overt indicator of genericity (e.g., *Nima is ??ordinarily tall enough …*) in the matrix clause.

'?Juno was-PFV fast enough to win the race.'

My informants report that (55a) is only acceptable if its complement is interpreted narrowly, as indicating that Juno was first across the finish line. Crucially, such an interpretation makes her speed a sufficient condition for complement realization, since crossing the finish line first does not depend on age qualifications. If the complement is instead interpreted to mean that Juno was (or will be) officially treated as the winner, (55a) becomes infelicitous. These judgements support the relevance of an implicative-style sufficiency condition, since they suggest that a (two-way, complement-entailing) *enough* claim is felicitous only where satisfying the baseline necessity condition is also enough to guarantee complement realization.[18]

This discussion points to a 'hybrid' approach to *enough*'s presuppositions: the necessity semantics in (34) establish a semantic baseline, to which certain (ostensibly circumstantial) constructions appear to add a sufficiency presupposition. For this approach to be explanatory, however, we need to determine what distinguishes the one-way circumstantial predicates from their two-way, sufficiency-inducing counterparts: a satisfactory account should not only explain why the extra presupposition is triggered in the two-way cases, but should also handle the contrast between negated one- and two-way claims, explaining why the necessity-driven inferences of imperfective two-way constructions are defeasible (as reported by Hacquard), while those of one-way constructions are not.[19] Finally, a proper account of 'selective' sufficiency should address a lacuna in Hacquard's

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[18]Hacquard (2005) motivates sufficiency with (1): she reports that (1a) is felicitous just in case Nick's fame is taken for granted, making wealth determinative for the invitation. This relies on the judgement that (1a) exhibits a two-way implicative pattern, but the judgements I have elicited for (1a) leave me unsure that this is the correct classification for *être assez riche*.

(1)   *Context.* I am having a conversation with my cousin in Los Angeles about the glamourous life of Hollywood's jet-set. She tells me about a very exclusive party on the hills and in the course of the conversation, she establishes that in order to get invited, one has to be both rich and famous. Her friend Pierre jumps into the conversation and says:

   a. Nick a   été   assez riche pour se   faire   inviter.
      Nick has be.PP enough rich for   REFL make.INF invite.INF
      'Nick was-PFV rich enough to be invited.'

One of my informants argued for a non-implicative interpretation in (1a), suggesting that the perfective might instead indicate that—while Nick was at some relevant past time sufficiently rich to warrant invitation—he had, at the time of invitation, dropped below the cutoff. If this is correct, then (1a) is most likely a one-way construction. The latter classification is compatible with an implicature to Nick's fame, insofar as there is a robust pragmatic tendency for mentioned conditions to be interpreted exhaustively (see also Geis and Zwicky 1971 on *conditional perfection*, Nadathur and Lauer 2020; Nadathur 2019 on 'antiperfection'), which would in this case lead the listener to reason from Pierre's mention of a single (necessary) condition to the conclusion that no other necessary conditions were contextually relevant for invitation (i.e., that Nick's fame was sufficient).

[19]Meier (2003) accounts for (two-way) interpretations via modal flavour, suggesting that positive inferences arise when *enough* is interpreted against a *totally realistic* modal base ($\text{ACC}(w^*) = \{w^*\}$). Since the modal base must contain a complement-realizing world, this forces w^* to be complement-realizing, and the entailment follows. The explanation is incompatible with the semantics developed in §3.1, since on this account the existence of a difference-making threshold degree requires $\text{ACC}(w^*)$ to include both complement-realizing and complement-falsifying worlds.

Meier's proposal, which treats *Nima is tall enough to reach the shelf* as equivalent to *Nima's height is as least as great as the height d such that, if Nima is d tall, he can reach the shelf* only requires the modal base to contain goal-realizing worlds, and so appeal to total realism fares somewhat better here. There are, however, other problems. First, there is no obvious reason that overt perfective—which includes full implicativity—should affect the structure of the modal base. Secondly, totally realism fails for negated *enough*: since *Nima is not tall enough to reach the shelf* equates to *Nima's height is less than the height d such that, if Nima is d tall, he can reach the shelf*, a totally realistic

implicative analysis: we need to explain why the strength of complement inferences from two-way *enough* claims is aspect sensitive, where no such effect is observed for lexical implicatives. This is illustrated in the comparison between (4)/(6) and (7):

(56) a. Juno was fast enough to win races, but she didn't win any races.

     b. Juno managed to win races, #but she didn't win any races.

(57) a. Juno était   assez   rapide pour gagner les courses, mais elle n'a   jamais
         Juno be.PST.IPF enough fast   for   win.INF the races,   but   she NEG-has never
         gagné de course.
         win.PP a   race.
         'Juno was-IPF fast enough to win races, but she never won a race.'

     b. Juno réussissait   à gagner les courses, #mais elle n'a   jamais gagné de
         Juno succeed.PST.IPF at win.INF the races,   #but   she NEG-has never win.PP a
         course.
         race.
         'Juno managed-IPF to win races, #but she never won a race.'

As Hacquard acknowledges, any account on which the underlying semantic structure of (two-way) *enough* claims is essentially implicative will not predict the differences above. Thus, even if two-way constructions do indeed introduce an implicative-pattern sufficiency condition, there must be some persist, aspect-relevant difference between the structure of (e.g.) (45) and a corresponding claim in which *be fast enough* is replaced by *manage*.

3.4 Adjective type and contingent sufficiency

The answer to the sufficiency puzzle lies in the nature of the matrix adjective, and the consequences that this has for the relationship between the matrix property attribution and complement realization. One-way circumstantial constructions involve matrix adjectives that describe essentially **static** properties of individuals (i.e., properties with no relationship to action, such as *tall* or *small*), while two-way constructions involve adjectives that describe potentially latent but **dynamic** properties (such as *fast* or *nimble*, which characterize individuals in view of their actions). The inference-relevant distinction between static and dynamic properties emerges readily when we consider the reasoning involved in linking a property attribution to the possibility of realizing a particular (complement) eventuality.

    It is intuitively clear why Nima's height in (23) is not in general sufficient for complement realization. Being (at least) the necessary height will *enable* him to reach the shelf, should he otherwise be in a position to do so, but actually reaching the shelf depends on a range of other conditions: whether or not Nima is near the shelf at reference time, has full range of motion, and—most importantly—whether or not, independently of his height, he makes an attempt.

(23) Nima was tall enough to reach the top shelf.

    Calculation of d_n for (23) proceeds in terms of a particular chain of hypothetical reasoning. In considering Nima's height across shelf-reaching worlds, we are implicitly looking at a set of

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domain again forces w^* to be a shelf-reaching world, directly counter to the target inference.

worlds in which every other condition needed for a successful shelf-reaching has also been resolved in a goal-conducive manner.[20] Assigning a truth value to (23) determines whether or not Nima's actual height would produce a shelf-reaching outcome, *were all other necessary conditions for shelf-reaching satisfied* (Nima's location, range of motion, intention, etc). A positive answer means that he *can* reach the shelf in view of his height (although other actual facts may still prevent him; hence the acceptability of 54a). The necessity presupposition is thus also one of **hypothetical** or *contingent* **sufficiency**: sufficiency is not logically 'active' in (23) because there is in general no reason to assume that all other conditions work out in the goal-conducive way.

Contingent sufficiency also applies to two-way constructions like (45):

(45) Juno was fast enough to win the race.

Once we fix certain evaluation world circumstances—race length, the set of other runners, and so on—determining d_n requires us to look at (partially) realistic worlds where Juno wins the race. These race-winning worlds must, *ipso facto*, be ones in which certain other conditions are satisfied, including that Juno shows up at the starting line, and that she makes a good faith attempt to win, presumably by running as fast as she can once the gun sounds. As in the height example, then, the truth of (45) amounts to the assessment that Juno's actual speed *suffices* for her to win the race just in case all other preconditions are satisfied, and Juno actually makes an attempt.

At this point, the backgrounds for interpreting (23) and (45) come apart in an important way. In the one-way case, the (temporally) proximate cause of Nima's reaching the top shelf—i.e., his attempt to do so—is a *a priori* independent of his height. In the two-way case, however, there is no way to fully separate a win attempt from speed: Juno's attempt must be *characterized* by speed.

Let us assume that an attribution of speed d_n is, like a height or age attribution, at-base stative: since speed characterizes action, the attribution must express an individual's (latent) capacity for performing actions at speed d_n (or higher). In (45), the contingent sufficiency of *having* (being capable of) speed d_n is based on the actual sufficiency of a race-time manifestation: if Juno is capable of running at speed d_n, and shows up at the starting line having met all other qualifications, then running at or above the necessary race-winning speed will *guarantee* that she wins. Consequently, contingent sufficiency here amounts to the *causal* sufficiency presupposition in (58) (where $\text{INST}(\mathsf{speed}(\mathsf{J})(d_n)(w))$ represents Juno's manifestation of speed to at least degree d_n). Note that (58) is distinct from the sufficiency condition proposed by Hacquard, which does not require the matrix property to be made manifest in action.

(58) $\forall w \in \text{CAUS}(w^*)[\text{INST}(\mathsf{speed}(w)(\mathsf{J})(d_n)) \rightarrow \mathsf{win}(w)(\iota x.\mathsf{race}(x))(\mathsf{J})]$ (causal sufficiency)
      where $d_n = \iota d : \forall w \in \text{CR}(w^*)[\mathsf{win}(w)(\iota x.\mathsf{race}(x))(\mathsf{J}) \rightarrow \mathsf{speed}(w)(\mathsf{J})(d)]$

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[20]This glosses over several interesting features of a sensible modal base for circumstantial *enough*. By definition, the modal base must fix some of the evaluation world facts (including, for 23, the height of the relevant shelf); however, in order to satisfy the necessity presupposition and allow shelf-reaching worlds into $\text{CR}(w^*)$, it must simultaneously abstract away from other facts. For instance, (23) remains felicitous if Nima has recently pulled a muscle and cannot raise his hands: assuming that this fact currently prevents him from trying to reach the top shelf, it must be left out of the modal base. The accessible worlds that (23) invokes must be (partially) realistic in a special way—they omit evaluation world facts which block a good faith attempt by Nima to reach the top shelf, *as long as these circumstances can be reasonably seen to be mutable*. This differentiates felicitous (23) in the pulled-muscle context from an impossible-complement example like (31a) (since there are no reasonable changes to Nima's circumstances which would allow him to attempt lightspeed travel). One of the facts that $\text{CR}(w^*)$ must abstract away from is Nima's actual height: determining d_n on the von Stechow et al. semantics requires considering alternatives in which Nima's height varies. Krasikova (2011) formalizes the role of variation over degrees as a comparison of alternatives; her account of modalized comparatives is a potential starting point for future refinements of the current proposals.

I propose that one-way claims like (23) and (42) represent a class of 'true' circumstantial *enough* constructions, subject only to the baseline necessity condition, but that two-way constructions have a natural causal interpretation. The latter claims preserve the necessity semantics of other *enough* constructions, but—due to the action-characterizing nature of the properties involved—they induce a joint presupposition of *causal* necessity and sufficiency between a manifestation of the matrix property and the *enough* complement's realization. This presupposition can be formalized as in (59), but the proposal does not require that dynamic circumstantial constructions are semantically more complex than other *enough* claims: rather, (59) is simply a consequence of combining the necessity semantics with world knowledge about the relationship between a particular dynamic adjective and a particular goal.

(59) Causal necessity and sufficiency for $[\![\text{enough}(P)(Q)(x)]\!]^w$:
$\forall w' \in \text{CAUS}(w)[\text{INST}(Q(w')(x)(d_n)) \leftrightarrow P(w')(x)]$
where $d_n = \iota d : \forall w' \in \text{CR}(w)[P(w')(x) \rightarrow Q(w')(x)(d)]$

This explanation of the one- and two-way contrast makes certain predictions about the extent of two-way interpretations: they should not only be restricted to circumstantially-interpreted *enough* claims with dynamic matrix adjectives, but should additionally occur only where (a) the dynamic adjective plausibly characterizes a proximate cause of complement realization, and (b) the reference time of the matrix clause overlaps with that of the complement, so that a matrix manifestation of the (necessary) adjectival degree can in fact be identified with a good-faith attempt at complement realization. Both of these predictions appear to be upheld.

Enough constructions like (60a) resist interpretation for the same reason that trivial-complement *enough* claims like (31b) are odd: it is difficult to imagine how the matrix adjective can provide a difference-making threshold for complement realization. (60b) is even more informative. While some degree of strength is presumably necessary for winning any race, strength is not usually the defining characteristic of a win attempt. Accordingly, (60b) only invites implicative interpretations if we supply a specialized context in which strength rather than speed is indeed determinative: suppose for instance that Juno is competing in an endurance event, which one wins not by crossing a finish line first, but by completing the course distance while carrying the most weight. In a more typical context, however, (60b) might be a natural claim to make if Juno is known to be recovering from illness, in order to assert that her current strength will not be an obstacle; in this case, speed is still understood to be the actual proximate cause of a potential win, and (60b) is only implicative if we independently supply the remaining necessary conditions (including that Juno was capable of the necessary speed, and in a position/disposed to manifest it). Examples like (60c)-(60d), in which the dynamic matrix property plausibly characterizes the process of goal-realization, license implicative inferences with minimal context.

(60)   a. ??Juno was loud enough to win the race.
       b. Juno was strong enough to win the race.   *context-dependent*
       c. $^\gamma$[Swinkels] was nimble enough to scoop it up before the ball crossed the goal line.
                                            ⤳ *Swinkels scooped up the ball in time.*
       d. She was tactful enough not to shatter his illusions.
                                            ⤳ *She did not shatter his illusions.*

Finally, a temporal constraint on *enough* implicativity is independently suggested by Marques

(2012).[21] He argues, with reference to the Portuguese data in (61), that where matrix and complement times are independently specified, even perfective marking fails to produce implicative entailments. The observation is replicated for French in 62); likewise, English (63) does not default to an implicative interpretation.

(61) No   último encontro, ele foi   humilhado o   suficiente para agora recusar o
     in.the last   meeting, he was.PFV humiliated the enough   to   now refuse the
     convite   para um novo encontro (mas parece que já   se   esqueceu, porque está
     invitation for a   new meeting (but appears that already REFL forgot   since is
     a pensar aceitar).
     at think   accept.INF).

     'In the last meeting, he was humiliated enough to refuse now the invitation for a new meeting (but apparently he already forgot, since he is planning accept the invitation).'

(62) Quand je l'ai   vue   courir la semaine dernière, Juno a   été   assez rapide
     When I she-have see.PP run.INF the week   last,   Juno has be.PP enough fast
     pour gagner la   course d'aujourd'hui, mais il s'est   avéré   qu'elle a   couru
     for win.INF the race   of-today,   but it REFL-is establish.PP that-she has run.PP
     beaucoup plus lentement aujourd'hui.
     much   more slow   today.

     'When I saw-PFV her run last week, Juno was-PFV fast enough to win today's race, but it turned out that she ran-PFV much more slowly today.'

(63) When I watched her run last week, Juno was fast enough to win today's race.
     compatible with: Juno ran too slowly to win today; Juno did not participate, etc.

Taken together, these data provide strong support for the view that implicative interpretations for *enough* claims depend on an interpretation of the matrix property attribution (i.e., the core assertion) as describing not a latent capacity, but instead a complement-time realization of what is (presupposed to be) a causally necessary and sufficient condition for complement realization.

3.5   Capacity and instantiation

Stative/eventive disambiguation.   The distinction between circumstantial *enough* constructions with static vs. dynamic adjectives captures a significant difference between one- and two-way constructions, but does not yet fully explain their inferential profiles. The suggestion made above is that a dynamic *enough* claim licenses an implicative inference just in case the matrix property attribution—at base one of latent capacity—is interpreted as a manifestation of the capacity in question. The two possibilities—capacity and instantiation—correspond to a difference in what an *enough* claim asserts. A capacity assertion establishes the possibility that the subject performs the proximate cause of the *enough* complement, but cannot in general guarantee complement realization. An instantiated interpretation, however, is one on which sufficient cause for the complement

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[21]Suggestively, Marques (2012) argues that implicative readings arise only with *evaluative* adjectives such as *corajosa* ('brave') and *inteligente* ('intelligent'); he suggests that this is because such properties are not measurable independently of the *enough* complement, in whose realization they are actively involved. It is worth noting that Marques's evaluative adjectives share the action-oriented nature of *fast* and *loud*.

is realized: this 'activates' contingent causal sufficiency, licensing the implicative inference. On an instantiated reading, then, a dynamic circumstantial *enough* claim shares both the presuppositional structure and the asserted content of a lexical implicative. The two-way implicative profile should therefore co-occur with instantiated interpretations of the matrix attribution.

The predicted correlation obtains. As (64) shows, English dynamic adjective attributions are ambiguous between stative (capacity-attributing) readings and eventive (instantiated) readings.

(64)   Juno was fast.   *Eventive:* At some past time, Juno did something quickly.
                             Stative: At some past time, Juno had the capacity for quick actions.

The two readings can be disambiguated by temporal modification affecting the length of the reference interval (and, by proxy, the episodic nature of the main claim). Short reference intervals, as in (65a), license instantiated readings more readily than extended reference periods (as in 65b).

(65)   a. Juno was fast this morning.   *Eventive:* She did something fast this morning.
       b. In her twenties, Juno was fast.   *Stative:* She had the capacity to do fast things.

The same pattern extends to complex *enough* claims: the short, episodic context in (66a) most naturally describes an event in which Juno's speed was measured to be at least d_n—that is, an event of Juno doing something at speed d_n or higher. Coupled with the causal presupposition in (59), this licenses the inference that she won the race. The preference for an instantiated reading is strong enough that—absent further context—complement cancellation is extremely marked. (66b), on the other hand, privileges a stative reading of the matrix attribution, and is thus perfectly compatible with complement denial: where we have no reason to assume that sufficient cause for the complement occurred, we also have no reason to infer that the complement was realized.

(66)   a. At today's track meet, Juno was fast enough to win her race, ??but she did not win.
       b. In her twenties, Juno was fast enough to win local 5Ks, but she never participated.

In French, grammatical aspect appears to select between stative and eventive interpretations for a dynamic capacity attribution (cf. Homer 2011). Perfective (67a) describes a manifestation of speed, while its imperfective counterpart in (67b) licenses the pure capacity reading.

(67)   a. Juno a   été   rapide (#mais elle n'a   rien   fait).
           Juno has be.PP fast   (#but she NEG-has nothing do.PP).

           'Juno was-PFV fast (#but she didn't do-PFV anything).'
           Eventive: Juno did something fast.
       b. Juno était   rapide (mais elle n'a   rien   fait).
           Juno be.PST.IPF fast   (but she NEG-has nothing do.PP).

           'Juno was-IPF fast (but she didn't do-PFV anything).'
           Stative: Juno was capable of doing fast things.

As a result, perfectively-marked dynamic *enough* claims can be non-defeasibly implicative: since the matrix clause in (46a) is interpreted as a manifestation of the necessary/sufficient cause of complement realization, the complement itself follows via causal entailment. Imperfective *enough* remains compatible with both complement realization and complement failure.

(46a) Juno a   été   assez   rapide pour gagner la   course, #mais elle n'a   pas gagné.
       Juno has be.PP enough fast   for   win.INF the race,   #but she NEG-has neg win.PP

       'Juno was-PFV fast enough to win the race, #but she did not win-PFV.'

(47a) Juno était   assez   rapide pour gagner la   course, mais elle n'a   pas gagné.
       Juno be.PST.IPF enough fast   for   win.INF the race,   but she NEG-has neg win.PP

       'Juno was-IPF fast enough to win the race, but she did not win-PFV.'

The puzzle of inference strength—and its connection to grammatical aspect—can thus be explained as a consequence of the aspectual class ambiguity inherent to dynamic property adjectives. The difference between French and English has to do with the means of disambiguation. Since disambiguation is largely contextual for English, nothing forces a particular attribution to take a manifested interpretation: this leads to a defeasible tendency for complement inferences from dynamic (implicative) *enough* claims. In French, however, the choice of reading is fully determined by grammatical marking. Perfective aspect forces a manifested reading for a dynamic *enough* construction (and hence an implicative entailment), so a speaker must choose the imperfective if the non-implicative (stative, capacity-attributing) interpretation is intended.

Defeasibility under negation.   We are now quite close to a complete picture of variable *enough* implicativity, having provided full (if partly informal) explanations of both the **optionality** and **strength variation** puzzles set out at the beginning of §3. We have also linked the puzzle of **inference profile variation** to the conceptual role played by a circumstantial *enough* construction's matrix adjective, but a few loose ends remain. Most immediately, we still need to explain why, despite an across-the-board necessity condition, the complement inferences of negated English and French imperfective two-way *enough* constructions are felt to be defeasible, while those of one-way constructions in the same grammatical contexts are not.

To understand how variation in the matrix adjective type corresponds to two distinct defeasibility patterns, it is helpful to consider contexts in which the implicative inferences of negated two-way *enough* constructions can be felicitously overridden. As far as I can determine, such contexts divide into two general types, corresponding to two distinct interpretations of the main *enough* claim. Crucially, both of these interpretations are available for the dynamic, action-oriented matrix adjectives that appear in two-way implicative *enough* constructions, but are not compatible with the static properties of their one-way counterparts.

The first sort of cancellation context, exemplified in (68), involves an 'ongoing' or progressive interpretation of the main *enough* claim, paired with a complement-affirming continuation which signals the occurrence of some (unexpected) interruption to the ordinary development of this process.[22] (68a)-(68b) both describe in-progress manifestations of speed strictly less than the projected race-winning minimum d_n, and indicate that this was punctuated by some eventuality which temporarily changed the winning threshold. In particular, Juno's race win is made possible in these contexts because of (temporary, exceptional) changes to the speed-winning relationship which crucially occurred during some process constituting Juno's attempt to win the race.

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[22]Progressive readings are well attested for the French *imparfait*. A parallel interpretation is more marginal for English, but—insofar as it offers the only sensible interpretation of the speed attribution in an example like (1)—is evidently not impossible for past-tense dynamic property claims.

(1)   While I was watching, Juno was very fast (but I only caught a few moments of the race before I had to leave).

(68) a. Juno was not fast enough to win the race, but the lead runner tripped on the final lap,
so she won anyway.

    b. Juno n'était   pas assez   rapide pour gagner la   course, mais la   coureuse
Juno NEG-be.PST.PFV NEG enough fast   for   win.INF the race,   but the runner.F
en tête a   trébuché   dans la   dernière manche, et   donc, Juno a   gagné (après
at head has stumble.PP in   the last   lap,   and so,   Juno has win.PP (after
tout).
all).

'Juno was-IPF not fast enough to win the race, but the lead runner tripped-PFV on the
final lap, and so, Juno won-PFV (after all).'

The compatibility of complement realization with progressively-interpreted negated *enough* can be regarded as a special case of the well-known *imperfective paradox* (Dowty, 1979). Like all progressive interpretations, this reading relies on the availability of an eventive ('happening') interpretation for the modified predicate. Such a reading (in the form of manifestation) is possible for dynamic property *enough* claims, but not for those with static adjectives: there is no reading for (23b) on which the main claim describes a 'happening', let alone one in progress. Imperfective static adjective attributions similarly lack progressive interpretations in French (and are also reportedly incompatible with the periphrastic construction *être en train de*/'be in the process of').

(23b) Nima was not tall enough to reach the top shelf.

(25) Nima n'était   pas assez   grand pour atteindre l'étagère du   haut.
Nima NEG-be.PST.IPF NEG enough tall   for   reach.INF the-shelf of.the top.
'Nima was-IPF not tall enough to reach the top shelf.'
Impossible: Nima was in the process of not being tall enough to reach the top shelf.

The second type of complement-compatible context for negated two-way *enough* is characterized by habituality. The claims in (69)-(70) establish that, across the reference interval, Juno's (maximal) speed typically falls short of the race-winning threshold d_n; each continuation is felicitous only insofar as it picks out a singular, atypical episode within the reference interval in which either the speed requirement for winning was exceptionally low (69), or Juno's own actual speed (as measured by performance) was exceptionally high (70). These interpretations rely not only on the intuitive atypicality of the continuation eventuality, but also on the temporary nature of the speed-relevant change: these features allow the 'local' relationship between speed and winning to violate the necessity condition established by the main *enough* claim without falsifying this claim on a habitual, latent-capacity reading.[23]

(69) a. Juno was not (ordinarily) fast enough to win the race, but it turned out that everyone
else had the flu and ran quite slowly, so she won.

    b. Juno n'était   pas assez   rapide pour gagner, mais ses concurrents
Juno NEG-be.PST.IPF NEG enough fast   for   win.INF, but   her competitors
étaient   malades cette journée-là   et ils   ont couru lentement.
be.PST.IPF ill   DEM daytime-DIST and they have run.PP slowly.

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[23]Habituality, like progressivity, is a well attested interpretation for the French *imparfait*. Its availability for the English simple past is brought out with the inclusion of overt markers of typicality such as *ordinarily, really*.

'Juno was-IPF not fast enough to win, but her competitors were ill that day and ran-PFV slowly.'

(70) a. Juno was not (ordinarily) fast enough to win the race, but (due to a drug) she ran extraordinarily quickly that day and actually managed to win.

b. Juno n'était   pas assez   rapide pour gagner la   course, mais (à   cause
Juno NEG-be.PST.IPF NEG enough fast   for   win.INF the race, but (from cause
d'un médicament) elle a   couru inhabituellement vite à   cette fois-là   et elle
of-a drug)   she has run.PP unusually   fast on DEM time-DIST and she
a   réussi   à gagner.
has succeed.PP at win.INF.

'Juno was-IPF not fast enough to win the race, but (because of a drug) she ran unusually fast on that occasion and managed to win.'

A habitual, exception-tolerating interpretation is in principle available for degree attributions where the relevant property can vary (a) temporarily and (b) non-monotonically: changes count as 'exceptional' only insofar as they are non-permanent and subject to reversion to form. Dynamic property attributions satisfy these conditions: for instance, the habitual interpretations in (69)-(70) can correspond to a statistically-prevalent relation between Juno's (measured) speed and that of other race participants without being falsified by occasional short-lived deviations from the norm (see also §4.3). Static property attributions, however, are incompatible with habituality. Individual's heights are generally understood to change only monotonically over time (precluding reversion to a norm; see 71a). Additionally, while it is certainly possible for the dimensions of an inanimate object to vary non-monotonically, such changes are typically brought about by deliberate intervention, and so not conceptualized as temporary or exceptional.

(71) a. Nima was not ??ordinarily tall enough to reach the shelf, ??but some days he was taller and managed it.

b. My hand was not ??ordinarily small enough to fit into the glove, ??but the glove briefly became larger, so I got my hand in.

Inferential profile and adjective type.   The conclusion is that both of the inferential contrasts which distinguish two-way from one-way circumstantial *enough* claims—full complement entailment in positive, perfective cases and defeasibility of complement denial for negated English and imperfective claims—can be linked to the nature of the matrix adjective in two-way constructions. One-way claims involve static adjectives that are circumstantially but not causally involved in realizing the *enough* complement, and which do not vary over time in accordance with an individual's behaviour and activities. Two-way claims give rise to the two-way, aspect-sensitive inference profile observed by Hacquard 2005) because they involve dynamic, action-characterizing properties which are causally involved in complement realization, and which (insofar as they are measured via manifestations) can vary temporarily, exceptionally, and non-monotonically over time.

3.6   Summary

Table 1 summarizes the parameters of variation in the implicativity of *enough* constructions, in terms of the semantic components that govern them. Blanks in the table indicate that a given

parameter does not affect the licensing of inferences; $+/-$ in the rightmost columns indicate matrix polarity (as well as the polarity of the associated complement inference)

| modal flavour | parameter of variation | | | inference | |
	adjective type	temporal spec.	aspect	+	−
non-circumstantial (deontic)	—	—	—	↛	↛
circumstantial	static	—	—	↛	→
	dynamic	no overlap	—	↛	⇝
		overlap	unmarked	⇝	⇝
			imperfective	⇝	⇝
			perfective	→	→

Table 1: Governing parameters of *enough* implicativity

As per Table 1, **optionality** in *enough* implicativity is tied to modal flavour, variation in **inferential profile** is linked to a contrast in the construction's matrix adjective type, and **strength variation** results from a complex, aspect-governed interaction between adjective type, aspectual class, and temporal interpretation. *Enough* constructions are fully implicative just in case they are circumstantially interpreted, involve a dynamic matrix adjective (which characterizes the necessary/sufficient proximate cause of complement realization), provide overlapping temporal specifications for matrix and complement clauses, and where their matrix assertions are understood not as latent capacity attributions, but instead as instantiations (of the complement-causing action).

These observations vindicate the thesis that *enough* complement inferences, where they arise, are genuine instances of implicativity. Indeed, *enough* inferences are derived from the same semantic components as the complement entailments of lexical implicatives: (i) a presupposition which establishes the relevance of a necessary/sufficient prerequisite for complement realization, (ii) a causal interpretation of necessity and sufficiency, and (iii) an assertion which settles the truth value status (occurrence) of the causal prerequisite. These components are encoded together in the lexical semantics of implicative verbs (see Proposal 14), but emerge by means of a complex set of contextual and compositional interactions in the case of *enough* constructions.

As a baseline, *enough* claims impose only a relationship of necessity between a matrix property and the complement proposition; unlike the presuppositions of lexical implicatives, this relationship can vary in modal flavour. However, when an *enough* construction occurs with both circumstantial modality and a (suitable) dynamic adjective, the baseline semantics for *enough* (and its 'hypothetical' sufficiency reasoning; see §3.4) induces a second presupposition to the effect that an appropriately-timed instantiation of the property attributed in the main clause is *causally* necessary and sufficient for complement realization. The second presupposition fully replicates the causal background structure of lexical implicatives. However, while lexical implicatives assert prerequisite realization, dynamic *enough* constructions are compatible with a weaker interpretation: that their subjects are merely capable of realizing the complement's prerequisite cause. It is only where aspectual marking (or aspectually-relevant context) licenses a manifested interpretation of the property attribution that an *enough* assertion exactly matches that of a lexical implicative.

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Thus, fully-implicative behaviour arises only where modality, adjective type, and temporal context come together to recreate implicative semantic structure (see the last line of Table 1).

Once these criteria have been established, the last piece of the empirical puzzle falls into place. Recall that Hacquard's (2005) proposal, which involved adopting an across-the-board presupposition of joint necessity and sufficiency between a degree attribution of the matrix property and the *enough* complement, incorrectly predicted that the complement inferences of lexical implicatives should be sensitive to aspectual marking in the same way as *enough* inferences (see §3.3). The current account makes no such prediction, and offers instead a straightforward explanation for the observed contrast between the strength and distribution of lexical vs. *enough* implicativity.

As emphasized above, the crucial difference between lexical implicatives and (two-way) implicative *enough* claims is in asserted content. Lexical implicatives assert the realization of their causal prerequisites: since the prerequisite in question is encoded as an action of the implicative subject, this content is at-base eventive. As a result, where they occur with imperfective marking (or extended temporal reference), lexical implicative claims take a habitual (repetitive, regular) interpretation. This is reflected in (72a)/(73a), for instance: the claim that Morgan managed to solve riddles over an extended time period describes a regular pattern of performing riddle-solving's proximate cause, resulting in correspondingly regular riddle-solving. The habitual interpretation is compatible with occasional failures, but is not acceptable where complement failure represents a norm within the reference interval, as in (72b)/(73b) and (72c)/(73c).

(72) a. Morgan (generally) managed to solve riddles, but this riddle was too difficult for her.
      b. Morgan (generally) managed to solve riddles, #but most of the time she failed.
      c. Morgan (generally) managed to solve riddles, #but she never solved a riddle.

(73) a. Morgan réussissait   à résoudre les énigmes, mais cette énigme-là   était
         Morgan succeed.PST.IPF at solve.INF the riddles, but DEM riddle-DIST be.PST.IPF
         trop difficile pour elle.
         too difficult for   her.
         'Morgan managed-IPF to solve riddles, #but that riddle was-IPF too difficult for her.'
      b. Morgan réussissait   à résoudre les énigmes, mais d'habitude, elle n'en
         Morgan succeed.PST.IPF at solve.INF the riddles, but of-habit,   she NEG-them
         résolvait   jamais.
         solve.PST.IPF never.
         'Morgan managed-IPF to solve riddles, #but usually she did-IPF not solve them.'
      c. Morgan réussissait   à résoudre les énigmes, mais elle ne résolvait   jamais
         Morgan succeed.PST.IPF at solve.INF the riddles, but she NEG solve.PST.IPF never
         d'énigmes.
         INDEF-riddles
         'Morgan managed-IPF to solve riddles, #but she never solved-IPF any riddles.'

By contrast, implicative *enough* claims have a 'true' stative interpretation, on which it is established that Morgan has the capacity to realize the causal prerequisite for riddle-solving, but not that she (necessarily) acts on this capacity. As a result, non-episodic *enough* is compatible not only with singular (atypical) complement failures (compare 74a/75a to 72a/73a, respectively), but also with regular (74b, 75b) or even categorical (74c, 75c) complement non-realization. Empirical contrasts

in the temporally-driven interpretation of lexical implicatives vs. implicative *enough*, then, fall out from contrasts in the baseline assertions of the two constructions.

(74) a. Morgan was clever enough to solve riddles, but she didn't attempt this one.

b. Morgan was clever enough to solve riddles, but most of the time she got them wrong.

c. Morgan was clever enough to solve riddles, but she never did it.

(75) a. Morgan était   assez   intelligente pour résoudre les énigmes, mais elle n'a
      Morgan be.PST.IPF enough clever   for   solve.INF the riddles,   but   she NEG-has
      pas essayé de résoudre cette énigme.
      NEG try.PP of solve.INF this   riddle.

      'Morgan was-IPF clever enough to solve riddles, but she did not try to solve this riddle.'

b. Morgan était   assez   intelligente pour résoudre résoudre les   énigmes,
      Morgan be.PST.IPF enough clever   for   solve.INF the   riddles, but
      mais   d'habitude,elle n'en   résolvait   jamais.
      of-habit, she   NEG-them solve.PST.IPF never

      'Morgan was-IPF clever enough to solve riddles, #but usually she did-IPF not solve them.'

c. Morgan était   assez   intelligente pour résoudre les énigmes, mais elle ne
      Morgan be.PST.IPF enough clever   for   solve.INF the riddles,   but   she NEG
      résolvait   jamais d'énigmes.
      solve.PST.IPF never   INDEF-riddles

      'Morgan was-IPF clever enough to solve riddles, but she never solved-IPF any riddles.'

This section focused on linking the empirical patterns of variable implicativity to the components and compositional features of *enough* claims. In so doing, I have provided strong evidence in support of the claim that the (aspect-sensitive) complement inferences of *enough* constructions are genuine instances of implicativity. The next section takes up the details of temporal interpretation.

4   Aspect and implicativity

I assume a three-times system (Reichenbach, 1947), wherein grammatical aspects relate a *situation* or *event* time to a salient reference interval (supplied by tense), and pronominal tenses (Partee, 1973; Kratzer, 1998) establish a relationship between the reference time and the utterance time. I couple this with a partially (neo-)Davidsonian perspective, but divide VP predicates into *statives* and *eventives*. Stative predicates describe (Vendlerian) *states*: situations which are *fully divisive* (true at any subinterval of an instantiation; Krifka 1998; Bary 2009), and which can be said to *hold* or *obtain* at temporal intervals, but not to *happen*. Eventive predicates describe *eventualities* (events and processes; Mouratelos 1978; Bach 1986; Krifka 1998), situations that *happen* or *occur*, have internal structure and/or involve action or change.

Concretely, the domain of times $D_i = \langle T, \prec_i \rangle$ comprises a set of non-empty intervals, partially ordered by a precedence relation $\prec_i$; two times t_1, t_2 *overlap* ($t_1 \circ t_2$) iff they cannot be ordered.[24] Events (domain D_v) are mapped to times using the *temporal trace* function τ (Krifka, 1998). Within

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[24]The precedence relation $\prec_i$ is induced via a total order $\prec$ on the set $T_p \subseteq T$ of *temporal points* (comprising minimal elements of T); $t_1 \prec_i t_2$ iff $\forall t_p \in T_p \cap t, \forall t'_p \in T_p \cap t'$, we have $t_p \prec t'_p$ (see Condoravdi 2010).

this framework, I treat eventives as predicates of events (type $\langle v, t \rangle$), while statives express relations between individuals and times (type $\langle e, \langle i, t \rangle \rangle$). Assuming that individual arguments are merged below aspect, but that tense applies above aspect, statives will combine with grammatical aspects as predicates of times (type $\langle i, t \rangle$).

Preliminary lexical entries for tenses and aspects are given in (76)-(77) (cf. Klein, 1994; Kratzer, 1998). I assume (for now) that aspects are compatible with both statives and eventives, and that perfective and imperfective operators contrast in how they relate reference and situation times; perfectives contain a situation within reference time (IN), while imperfectives contain the reference time within a situation (ON).

(76) a. $[\![\text{PST}]\!]^w := t$, defined iff $t \prec_i \text{now}$ b. $[\![\text{PRS}]\!]^w := t$, defined iff $t \circ \text{now}$

(77) a. $[\![\text{PFV}]\!]^{w,t} := \lambda P.\text{IN}(t, w, P)$, where $\text{IN}(t, w, P) = \begin{cases} \exists e[\tau(e) \subseteq t \wedge P(w)(e)] & \text{for } P \in D_{vt} \\ \exists t'[t' \subseteq t \wedge P(w)(t')] & \text{for } P \in D_{it} \end{cases}$

     b. $[\![\text{IPF}]\!]^{w,t} := \lambda P.\text{ON}(t, w, P)$, where $\text{ON}(t, w, P) = \begin{cases} \exists e[\tau(e) \supset t \wedge P(w)(e)] & \text{for } P \in D_{vt} \\ \exists t'[t' \supset t \wedge P(w)(t')] & \text{for } P \in D_{it} \end{cases}$

(78) illustrates the interpretation of an eventive past perfective: (78b) requires the existence of an evaluation world event of Maria swimming, contained within a salient past time.

(78) a. Maria a   nagé.   b. $[\![(78a)]\!]^{w^*,t^*} = [\![\text{PST}(\text{PFV}(\sqrt{\text{Maria swim}}))]\!]^{w^*,t^*}$
       Maria has swim.PP $= \text{IN}(t^*\{\prec_i \text{now}\}, w^*, \lambda w \lambda e.\text{swim}(w)(e)(\text{M}))$
       'Maria swam-PFV.' $= \exists e[\tau(e) \subseteq t^*\{\prec_i \text{now}\} \wedge \text{swim}(w^*)(e)(\text{M})]^{25}$

4.1 Temporal semantics for *enough* constructions

Our first task is to update the interpretation of measure statements. I take these attributions to be at base stative, intuitively describing measurements that hold at world-time pairs. (80) provides a time-sensitive interpretation for a measure statement in the past imperfective, using the updated lexical entry for *old* in (79).

(79) $[\![\text{old}]\!] = \lambda w \lambda t \lambda d \lambda x.\text{age}(w)(t)(x) \geq d$

(80) a. Bertha avait   18 ans.   b. $[\![(80a)]\!]^{w^*,t^*} = [\![\text{PST}(\text{IPF}(\sqrt{\text{Bertha be 18}}))]\!]^{w^*,t^*}$
       Bertha have.PST.IPF 18 years. $= \text{ON}(t^*\{\prec_i \text{now}\}, w^*, \lambda w \lambda t.\text{age}(w)(t)(\text{B}) \geq 18\text{y})$
       'Bertha was 18 years old.' $= \exists t[t \supset t^*\{\prec_i \text{now}\} \wedge \text{age}(w^*)(t)(\text{B}) \geq 18\text{y}]$

Extrapolating from (80), an *enough* claim should establish that its subject's measure of the matrix adjective is at least d_n at reference time. Assuming that *enough* complements share temporal specification with the matrix clause derives the interpretation in (81); note that modal alternatives are now projected from world-time pairs (cf. Thomason 1984; where the temporal index t is larger than a point, I assume that projection is relative to the earliest moment in t).

(81) $[\![\text{Bertha était assez grande pour conduire}]\!]^{w^*,t^*}$
     $= [\![\text{PST}(\text{IPF}(\sqrt{\text{Bertha be old enough to drive}}))]\!]^{w^*,t^*}$

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[25] Here, $\text{swim}(w^*)(e)(\text{M})$ is shorthand for a representation like $\text{swim}(w^*)(e) \wedge \text{Agent}(e)(\text{M})$.

$$= \mathsf{ON}(t^*\{\prec_i \text{ now}\}, w^*, \lambda w \lambda t.\mathsf{age}(w)(t)(\mathsf{B}) \geq d_n)$$
$$= \exists t[t \supset t^*\{\prec_i \text{ now}\} \wedge \mathsf{age}(w^*)(t^*)(\mathsf{B}) \geq d_n],$$
$$\text{where } d_n = \iota d : \forall w \in \mathrm{DN}(w^*, t^*)[\mathsf{IN}(t^*, w, \lambda w \lambda e.\mathsf{drive}(w)(e)(\mathsf{B})) \rightarrow \mathsf{age}(w)(t^*)(\mathsf{B}) \geq d]$$

We have seen, of course, that the *enough* complement can come with a(n implicit) temporal specification that need not overlap with matrix time (another respect in which *enough* contrasts with lexical implicatives; see Wurmbrand 2014). Nevertheless, the matrix-complement relationship is subject to certain temporal constraints. In particular, the complement situation cannot precede the matrix evaluation time; temporal separation appears acceptable only where the complement is in the matrix future (as in 61-63 from §3.4), but not if it is in the matrix past, as in (82).

(82) #Ludo is old enough to vote last year.[26]

We adjust (81) to specify that the runtime of the potential driving event is no earlier than the matrix evaluation time; insofar as the matrix property is relevant for the subject's ability to realize the complement, I assume that its modally-embedded occurrence is contemporaneous with the complement. An updated lexical entry for *enough* is given below.

(83) $[\![\text{enough}]\!]^{w,t} = \lambda P \lambda Q \lambda x.Q(w)(t)(x)(\iota d : \forall w' \in \mathrm{ACC}(w,t)[\mathsf{IN}(t'\{\not\prec_i t\}, w', P) \rightarrow Q(w')(t')(x)(d)])$

4.2 Aspectual coercion

We now predict the following interpretation for a perfective, dynamic property *enough* construction:

(84) $[\![\text{Juno a été assez rapide pour gagner la course}]\!]^{w^*,t^*}$
$$= [\![\mathrm{PST}(\mathrm{PFV}(\sqrt{}\text{Juno be fast enough to win the race}))]\!]^{w^*,t^*}$$
$$= \mathsf{IN}(t^*\{\prec_i \text{ now}\}, w^*, \lambda w \lambda t.\mathsf{speed}(w)(t)(\mathsf{J}) \geq d_n)$$
$$= \exists t[t \subseteq t^*\{\prec_i \text{ now}\} \wedge \mathsf{speed}(w^*)(t)(\mathsf{J}) \geq d_n],$$
$$\text{where } d_n = \iota d : \forall w \in \mathrm{CR}(w^*, t^*)[\mathsf{IN}(t'\{\not\prec_i t^*\}, w, \mathsf{win}(\mathsf{J})(\iota x.\mathsf{race}(x))) \rightarrow \mathsf{speed}(w')(t')(\mathsf{J}) \geq d)]$$

(84) establishes that t^* contains an interval at which Juno's speed was at least the circumstantially necessary speed for winning. If we further assume that the relevant race coincides with the matrix time ($t' =_i t^*$), (84) further sets Juno's speed at or above d_n during the race. This falls short of the interpretation discussed in §3.5, since nothing in the interaction between *enough* and PFV (as defined in 77a) forces an eventive reinterpretation for the main property attribution.

The relevant reinterpretation—on which an ostensibly stative attribution of some dynamic property is understood to describe an eventive manifestation of this property—is an instance of a more general, robustly-observed tendency for statives to resist straightforward composition with perfective aspects. In certain cases, like (85a), this resistance produces uninterpretability. In others, like (85b), it produces interpretations which systematically diverge from the predictions of direct composition with a perfective operator along the lines of (77a).

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[26]Past-oriented complement eventualities become acceptable only with the inclusion of the perfect auxiliary (English *have*, French *avoir*). Assuming that the effect of a perfect is to shift its prejacent backwards from its own evaluation time, data like (1) are compatible with the claim that complement time (ostensibly, the result state of a prior prejacent eventuality) must be at or subsequent to the time of the matrix clause.

(1) Ludo is old enough to have voted last year.

(85) a. ??Nima a   été   grand.
        ??Nima has be.PP tall.

        Predicted, unavailable: Reference time contains a time at which Nima exceeded the contextual average for height.

    b. Soudain, Nur a   été   triste.
        Suddenly, Nur has be.PP sad.

        Predicted: Reference time contains period in which Nur was sad.
        Observed/actual: Suddenly, Nur became sad / began to feel sad.

The effects in (85) are typically explained as the result of a semantic incompatibility between the uninflected input predicate and the selectional restrictions of PFV (Moens and Steedman, 1988; de Swart, 1998; Bary, 2009, a.o.). Within the current framework, the problem can be formalized as one of type-level mismatch, if we assume that PFV selects exclusively for eventives, as in (86).[27]

(86) $[\![\text{PFV}]\!]^{w,t} := \lambda P_{vt}.\text{IN}(t, w, P)$ (eventive-selecting perfective)

Aspectual mismatches can be repaired (and successful composition achieved) just in case a stative input to (86) can be mapped to a related eventive. This process is called **aspectual coercion**: the *inchoative* interpretation in (85b) results from mapping a predicate of times at which Nur's sadness obtains to a predicate of 'transition-into' events, in which Nur crosses the boundary from not being sad into being sad. Composition requires a bridging mechanism—a *coercion operator*—to be inserted between the stative and the selective aspectual marker, as shown in (88). (87) offers a possible implementation for inchoative coercion (but see also Bary 2009).

(87) $[\![\text{INCHO}]\!] = \lambda w \lambda P_{it} \lambda e.\exists t_1, t_2 [t_1 \prec_i t_2 \wedge t_1, t_2 \subseteq \tau(e) \wedge \neg P(w)(t_1) \wedge P(w)(t_2)]$

(88) $[\![\text{Nur a été triste}]\!]^{w^*,t^*} = [\![\text{PST}(\text{PFV}(\text{INCHO}(\surd\text{Nur be sad})))]\!]^{w^*,t^*}$
      $= \text{IN}(t^*\{\prec_i \text{now}\}, w^*, \lambda w \lambda e.\text{INCHO}(\lambda w \lambda t.\text{sad}(w)(t)(\text{N}))(w)(e))$
      $= \exists e[\tau(e) \subseteq t^*\{\prec_i \text{now}\} \wedge \exists t_1, t_2[t_1 \prec_i t_2 \wedge t_1, t_2 \subseteq \tau(e) \wedge \neg\text{sad}(w^*)(t_1)(\text{N}) \wedge \text{sad}(w^*)(t_2)(\text{N})]]$

Where coercion is triggered, the availability of reinterpretation is constrained both by selection from a (small) set of available coercion operators and by the contextual compatibility of the result (see also de Swart 1998). For instance, while the adverbial *soudain* ('suddenly') in (85b) indicates a short reference interval, privileging a punctual interpretation, the same underlying stative might instead be coerced into a *complexive* reading in a temporally extended context. Complexive interpretation can be derived using MAX, as shown in (89b).[28]

(89) Hier,   Nur a   été   triste. $\sim \text{PST}(\text{PFV}(\text{MAX}(\surd\text{Nur be sad})))$
      Yesterday, Nur has be.PP sad.

      'Yesterday, Nur was-PFV sad.'
      Observed/actual: Yesterday contained a maximal period of Nur being sad.

    a. $[\![\text{MAX}]\!] := \lambda w \lambda P_{it} \lambda e.P(w)(\tau(e)) \wedge \forall t'[\tau(e) \subset t' \rightarrow \neg P(w)(t')]$

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[27]Much of the coercion literature treats statives as belonging to a special class of eventuality predicates. On such an approach, the relevant formal mismatch can either be achieved by defining PFV to select for eventuality predicates with particular aspectual properties (e.g., quantization; Krifka 1998), or by dividing $\mathcal{E}$ into distinct semantic subtypes.

[28]MAX follows a proposal from Bary, who assumes that PFV selects for *quantized* (not eventive) predicates. I suspect that complexive coercion involves a deeper change, resulting in an interpretation on which sadness is a *dynamic* emotional process (see also Özyıldız 2021), but I cannot explore this idea here.

b. $[\![(89)]\!]^{w^*,\text{yst}} = \exists e[\tau(e) \subseteq \text{yst}\{\prec_i \text{now}\} \wedge \text{sad}(w^*)(\tau(e))(\mathsf{N}) \wedge \forall t[\tau(e) \subset t' \rightarrow \neg\text{sad}(w^*)(t)(\mathsf{N})]]$

Coercion fails where no available operator produces a coherent result. This is, arguably, what goes wrong in (85a): since height is typically regarded as a stable (or non-decreasing) property, neither an instantaneous transition nor a complexive reading is plausible. Repair-resistant mismatch also explains the unacceptability of perfectively-marked static *enough*, as in (24).[29]

(24) (??)Nima a   été   assez grand pour atteindre l'étagère du   haut.
      (??)Nima has be.PP enough tall   for reach.INF the-shelf of.the top.

   Intended, unavailable: 'Nima was-PFV tall enough to reach the top shelf.'

4.3 Evidential coercion for dynamic properties

If dynamic property attributions like *be fast* are, at base, (individual-level) statives, they can only compose with the perfective aspect by means of aspectual coercion. It seems clear that neither INCHO nor MAX will derive the interpretation observed in (67a): I therefore propose that this effect reflects the insertion of a third, **evidential** (manifesting) coercion operator, here labeled INST.

(67a) Juno a   été   rapide. $\sim$ PST(PFV(INST($\sqrt{}$Juno be fast)))
       Juno has be.PP fast.

   'Juno was-PFV (did something) fast (#but she didn't do-PFV anything).'

Descriptively, evidential coercion maps dynamic, action-oriented statives to properties of *witnessing* eventualities—i.e., eventualities which provide evidence in support of the associated stative by allowing direct observation or measurement of the relevant actionable property (as demonstrated by the individual to which it is attributed). If Juno's having speed d is constructed as a capacity for action of a particular type, her performance of this kind of action—say, running at speed d or higher—is precisely the type of event which might be cited to justify the stative claim, and thus a plausible output of perfective-triggered evidential coercion.

Although evidential coercion has received less (and less systematic) attention than either its inchoative or complexive alternatives, it is not unattested (see Fernald, 1999; Homer, 2011, 2021). Goldsmith and Woisetschlaeger (1982, p.85) note that some individual-level statives compose with the English progressive to produce a reading matching the above description: "where the non-progressive [(90a)] characterizes a person, the progressive reports on behaviour." The 'behavioural' reading, ostensibly triggered by an eventive-selecting progressive (see Moens 1987, a.o.), describes Alvin engaging in the type of behaviour which would justify (90a) if it turns out to be part of a regular pattern for Alvin.[30]

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[29]Other static properties are less repair-resistant. Age increases continuously, but is conventionally tracked discretely: this appears sufficient to license an inchoative (transition-into) interpretation for perfectively-marked (5).

(5) Amira a   été   assez grande pour boire   de l'alcool,   mais elle ne   l'a   jamais bu.
     Amira has be.PP enough old   for drink.INF of the-alcohol, but she NEG it-has never drink.PP.

   'Amira was-PFV (became) old enough to drink alcohol, but she never drank-PFV it.'

[30]Similarly, Bary (2009) notes that progressives compose with statives just in case there is some pragmatically-available action which warrants a description in terms of the relevant property. Although she does not make this explicit, the property in question must then be one which coherently characterizes events.

(90)   a. Alvin is polite.   (as a general fact about Alvin)

       b. Alvin is being polite   (e.g., by giving up his subway seat)

Fernald (1999), from whom I adopt the term *evidential*, observes that coerced 'behavioural' readings for individual-level English statives such as *be clever, be pedantic* (*dispositional evaluatives*; see, e.g., Demonte 2019) extend to non-progressive contexts.[31] The temporal adverbs of quantification in (91) intuitively quantify over events in which their subjects are "behaving [...] in a manner consistent with having the property denoted by the [individual-level property]." Fernald contrasts the statives that license evidential interpretations with those that do not (including *be tall* and *be Norwegian*, in 92) in terms of the degree to which the underlying predicate is associated with "standard behaviours" over which the subject "potentially has control" (p.52–55).[32]

(91)   a. Zaphod is rarely clever.   (92)   a. ??Nima is sometimes tall.

       b. Pickwick is often pedantic.   b. ??Torvald is often Norwegian.

The contrast in (91)-(92) maps onto the one identified in §3.4. Evidentially-coerced interpretations are available for dynamic, action-oriented properties, which apply to individuals in view of their potential for participating in behaviours of a particular, lexically-specified character. These interpretations are unavailable for static properties, since there is no behaviour which can be cited as constitutive evidence for the truthful attribution of the stative. By definition, static properties are those which must be assessed via direct observation or measurement of the individual to which they are applied, without reference to actions or events.

I suggest that evidential coercion is a selective operation, available as a repair mechanism only for those statives which are conceptually dependent on behaviours or events.[33] Dependence cuts two ways: evidential coercion requires an inherent association between a stative property and some pattern of behaviour, and this association is in turn a consequence of the stative characterization's ontological dependence on the existence of evidentiary (witnessing) eventualities. In other words, while (79) (see §4.1) offers a suitable semantic analysis for a static predicate like *be old*, a parallel representation would be both inadequate and misleading in the dynamic case.

A more appropriate treatment of *be fast* (for instance) might be along the lines of (93). Here, the stative speed of some individual x over a temporal interval t is expressed in terms of an expectation that x can take actions of a "fast" character. Per (93), an individual-level claim of speed is made with respect to a particular kind of behaviour (Q), reflecting the intuition that x *is fast* does not require a capacity for speed in all actions taken by x, but only in some (contextually-relevant) behavioural arena (running, mathematical calculation, etc). The first line in (93) establishes a minimum evidence requirement (one fast performance of Q by x during the reference interval t), and the second is intended to express x's reguarly-distributed tendency or *disposition* for speed in

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[31]Nadathur (2019) calls this *instantiative* coercion, but the target interpretations are parallel to Fernald's. I find the *evidential* label to be more evocative of the relationship between stative and eventive uses of dynamic properties.

[32](92b) is better than (92a). Insofar as there are 'typically Norwegian' behaviours, this supports the current characterization of evidential coercion: see also Martin and Piñón (2020) on denominal/deadjectival French verbs which describe 'stereotypical' behaviours associated with the denotata of the predicates from which they are derived.

[33]Homer (2021), who is the first (in 2011) to my knowledge to discuss evidential-type interpretations in the presence of overt perfective, arrives at a different but related conclusion, characterizing reinterpretation candidates as predicates which license a modal entailment. I suspect that Homer's 'actualistic' coercion overgenerates: see the appendix.

doing Q; $\mathscr{R}_t^Q$ introduces a contextually-determined regular partition of t (cf. Deo 2009), whose cell size/partition measure depends on both Q and t.[34]

(93) $\quad [\![\text{fast}]\!]^{w,t} = \lambda x. \exists Q_{vt}[\text{IN}(t, w, \lambda w \lambda e. Q(w)(e)(x) \wedge \text{speed}(e) \geq d_Q))$
$\quad\quad\quad\quad \wedge \; \forall t' \in \mathscr{R}_t^Q[\exists w' \in \text{CR}(w,t)[\exists e. \tau(e) \circ t' \wedge Q(w')(e)(x) \wedge \text{speed}(e) \geq d_Q]]$

The speed specification in (93) constitutes a lexically-specified behavioural characterization peculiar to *fast*; other dynamic statives are associated with different *character*s. Letting $\text{Char}(S)$ stand in for this specification, I propose (94) as a rough template for the stative, individual-level use of dynamic capacity predicates.[35]

(94) $\quad [\![S_{\text{dyn}}]\!]^{w,t} = \lambda x. \exists Q_{vt}[\text{IN}(t, w, \lambda w \lambda e. Q(w)(e)(x) \wedge \text{Char}(S)(e))$
$\quad\quad\quad\quad \wedge \; \forall t' \in \mathscr{R}_t^Q[\exists w' \in \text{CR}(w,t)[\exists e. \tau(e) \circ t' \wedge Q(w')(e)(x) \wedge \text{Char}(S)(e)]]$

(95a) sets out the conditions under which an eventive predicate P can qualify as evidence for dynamic stative S with respect to an individual argument x. I define the evidential coercion operator INST in terms of Evid: INST maps $S(x)$ to a unique, contextually-salient evidentiary predicate. Insertion of INST will result in an eventuality description which licenses the appropriate Character and Participant entailments (Agent or Theme) and which can license the underlying stative over the runtime of an event in its denotation, but not necessarily over a longer interval.

(95) $\quad$ a. $\text{Evid}(P_{vt}, S_{\text{dyn}}(x))$ iff $\forall e, w[P(w)(e) \rightarrow [\text{Char}(S)(e) \wedge \text{Part}(e)(x) \wedge S(w)(\tau(e))(x)]]$
$\quad\quad\quad\quad\quad\quad\quad\quad\quad \wedge \; \forall w, t[\forall t' \in \mathscr{R}_t^P[\exists e. \tau(e) \circ t' \wedge P(w)(e) \rightarrow S(w)(t)(x)]]$

$\quad$ b. $[\![\text{INST}]\!] := \lambda w \lambda S_{it} \lambda e. (\iota P_{vt}. \text{Evid}(P, S(x)))(w)(e)$

(96) shows the results of evidential coercion for the perfective of a monoclausal dynamic stative:

(96) $\quad$ a. Khalid a été drôle. $\quad\quad\quad\quad\quad\quad$ PST(PFV(INST($\sqrt{}$Khalid be funny)))
$\quad\quad\quad$ Khalid has be.PP funny.

$\quad\quad\quad$ 'Khalid was-PFV (did something that was) funny.'

$\quad$ b. $[\![(96a)]\!]^{w^*, t^*} = \text{IN}(t^*\{\prec_i \text{now}\}, w^*, \lambda w \lambda e. \text{INST}(\lambda w' \lambda t. [\![\text{funny}]\!](w')(t)(\text{K}))(w)(e))$
$\quad\quad\quad = \exists e[\tau(e) \subseteq t^*\{\prec_i \text{now}\} \wedge (\iota P. \text{Evid}(P, [\![\text{funny}]\!](\text{K})))(w)(e)]$

(96a) will therefore be true just in case Khalid has, within reference time, performed some action—telling a good joke, doing an impression—which evidences his (individual-level) funniness as at or above some contextual threshold; i.e., if the instantiated evaluation world event e is funny (has the event Character associated with *funniness*) and if events of this general sort, regularly instantiated over an interval t', would license the stative attribution of funniness to Khalid directly.

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[34]The tendency for speed is defined weakly here, based on my subjective impression that one does not need to regularly perform a behaviour Q at speed in order to be considered fast at Q: it is enough to be *capable* of regular fast performances of Q. Fernald's (1999) reference to 'controllable' behaviour may reflect a similar intuition.

[35]The first, minimum-evidence conjunct should most likely be omitted for certain dynamic properties, such as non-agentive dispositions like *cost* (see the appendix), which do not require any witnesses in order to hold over a certain period. The definition of the *evidence* relation in (95a) will not be affected by this.

4.4 Coercion and complement inferences

Implicative interpretations. Returning to *enough* constructions, recall that circumstantially-interpreted claims with dynamic adjectives exhibit 'fully implicative' behaviour only where some additional conditions are met: the matrix adjective must plausibly characterize the proximate cause of the complement eventuality, and the temporal specification of the complement must overlap with the reference time of the matrix clause. These features support a contextual presupposition of causal sufficiency between a manifested interpretation of the matrix attribution and the realization of the *enough* complement. As a result, the application of evidential coercion to a dynamic, causal *enough* claim will license a (causal) implicative entailment.

Example (97) illustrates. Under evidential coercion, (97) returns an event in which Juno evidences speed of d_n or higher. Given the causal presupposition associated with (97) (updated to the temporal framework in 98), together with the assumption that the complement's time (i.e., the time of the referenced race) overlaps with matrix time, (97) describes the execution of a causally-sufficient condition for Juno to win the race, and thus derives the desired implicative inference.

(97) $[\![$Juno a été rapide pour gagner la course$]\!]^{w^*,t^*}$
$= [\![\text{PST}(\text{PFV}(\text{INST}(\sqrt{}\text{Juno be fast enough to win the race})]\!]^{w^*,t^*}$
$= \text{IN}(t^*\{\prec_i \text{ now}\}, w^*, \lambda w \lambda e.\text{INST}(\lambda w' \lambda t. [\![\text{fast}]\!] (w')(t)(\mathsf{J})(d_n))(w)(e))$
$= \exists e.[\tau(e) \subseteq t^*\{\prec_i \text{ now}\} \wedge (\iota P.\mathsf{Evid}(P, [\![\text{fast}]\!] (\mathsf{J})(d_n)))(w^*)(e)],$
where $d_n = \iota d. \forall w \in \text{CR}(w^*,t^*)[\text{IN}(t\{\not\prec_i t^*\}, w, \text{win}(\iota x.\text{race}(x))(\mathsf{J}) \rightarrow [\![\text{fast}]\!] (w)(t)(\mathsf{J})(d))]$

(98) Causal sufficiency for dynamic *enough* constructions:
$\forall w \in \text{CAUS}(w^*,t^*)[\text{AT}(t\{\not\prec_i t^*\}, w, \text{INST}(\lambda w \lambda t. [\![\text{fast}]\!] (w)(t)(\mathsf{J})(d_n))) \rightarrow \text{IN}(t, w, \text{win}(\iota x.\text{race}(x))(\mathsf{J}))],$
where d_n is as defined in (97)[36]

Coercion also takes place in the negative case in (99). Here, the stative predicate in the scope of the perfective attributes speed lower than the threshold degree d_n to Juno. Evidential coercion still returns a witnessing event for speed, but in this case the evidenced speed will be insufficient for Juno to win the race. Since the causally normal developments of a below-threshold speed manifestation will not include winning, we derive the observed entailment to complement negation.

(99) $[\![$Juno n'a pas été rapide pour gagner la course$]\!]^{w^*,t^*}$
$= [\![\text{PST}(\text{PFV}(\text{INST}(\sqrt{}\text{NOT}(\text{Juno be fast enough to win the race}))]\!]^{w^*,t^*}$
$= \text{IN}(t^*\{\prec_i \text{ now}\}, w^*, \text{INST}(\lambda w' \lambda t.\neg [\![\text{fast}]\!] (w')(t)(\mathsf{J})(d_n)))$
$= \exists e.[\tau(e) \subseteq t^*\{\prec_i \text{ now}\} \wedge (\iota P : \mathsf{Evid}(P, \neg [\![\text{fast}]\!] (\mathsf{J})(d_n)))(w^*)(e)],$ where d_n is as in (97)

English does not have a surface marker for the perfective aspect. Nevertheless, as discussed in §3.5, past-tense uses of dynamic statives are systematically ambiguous between eventive (evidentially reinterpreted) and stative (unmodified) readings, suggesting that coercion processes can occur in the absence of overt triggers (see also Fernald 1999). Taking into account the strong correlation between episodic contexts and evidential interpretations (see 65), the emergence of complement inferences for dynamic *enough* claims in English can be attributed to the presence of a *covert* perfective operator. As a result, we observe strong implicative inferences when the reinterpreted property reading is coupled with the contextually-supplied causal background in (98).

(65) a. Juno was fast this morning.   *Eventive:* She did something fast this morning.

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[36]$\text{AT}(t, w, P)$ instantiates P so that it fully coincides with t.

b. In her twenties, Juno was fast.   *Stative:* She had the capacity to do fast things.

(45) a. Juno was fast enough to win the race. $\rightsquigarrow$ *Juno won the race.*

b. Juno was not fast enough to win the race. $\rightsquigarrow$ *Juno did not win the race.*

Crucially, however, since nothing in the observable structure of an English *enough* claim forces a speaker to indicate their choice between eventivity and stativity, a uncoerced (non-evidential) reading is always available for claims like (45a)-(45b), though it may be pragmatically dispreferred. The result is thus as suggested in §3.5: the defeasibility contrast between French and English *enough* claims is not due to an underlying difference in the semantics of *enough* and *assez*, or in the emergence of a causal sufficiency condition, but results instead from a contrast in the surface status of aspectual markers in the two languages.

Lastly, although evidential coercion appears to be the default repair mechanism for dynamic statives, it is not the only option for composition with an eventive-selecting perfective operator. As suggested in §4.2, selection of a coercion operator is influenced by context: thus, if it is indeed aspectual coercion which precipitates the implicative inferences in (97)-(99), contexts which privilege non-evidential coercion should license non-implicative readings for perfective dynamic *enough* claims. The prediction is upheld: (100a) and (100b) are both felicitous and non-implicative.

(100) a. Olga a   soudain été   assez forte pour soulever un frigo, mais elle n'a
        Olga has suddenly be.PP enough strong for   lift.INF   a   fridge, but   she NEG-has
        pas essayé de le faire.
        NEG try.PP of it do.INF.

        'Olga suddenly became strong enough to lift a fridge, but she did not try to do it.'

b. Pendant deux heures ce   matin, Olga a   été   assez forte pour soulever un
        during   two   hours DEM morning, Olga has be.PP enough strong for   lift.INF   a
        frigo, mais elle ne   l'a   jamais fait.
        fridge, but   she NEG it-has never   do.PP.

        'For two hours this morning, Olga had enough strength to lift a fridge, but she never did it.'

I assume that modification by *soudain* ('suddenly') in (100a) privileges inchoative coercion, while the bounding temporal modifier in (100b) (*pendant deux heures ce matin*; 'for two hours this morning') privileges a complexive interpretation. This provides strong support for a coercion-based account of *enough*'s aspect-sensitive implicativity, since it shows that where an evidential interpretation is blocked or dispreferred, the implicative inference also vanishes.

Non-implicative interpretations.   In the absence of overt perfective marking, non-implicative interpretations for positive dynamic *enough* constructions need little further explication. A stative property attribution composes directly with the imperfective marker (assumed to appear covertly in English) to produce a reference time state in which the sentential subject is asserted to be capable of (i.e., have a tendency or disposition toward) manifesting the matrix property to the necessary threshold degree d_n (again as defined in 97). Like (97), (101) is associated with the background causal assumption in (98), but causal sufficiency remains 'inactive' since (101) does not entail a race time manifestation of Juno's speed.

(101) $[\![\text{PST}(\text{IPF}(\sqrt{}\text{Juno be fast enough to win the race}))]\!]^{w^*,t^*}$
$= \exists t[t \supset t^*\{\prec_i \text{now}\} \wedge \exists Q_{vt}[\text{IN}(t,w,\lambda w\lambda e.Q(w)(e)(x) \wedge \text{speed}(e) \geq d_n))$
$\wedge \; \forall t' \in \mathscr{R}^Q_t[\exists w \in \text{CR}(w^*,t^*)[\exists e.\tau(e) \circ t' \wedge Q(w)(e)(x) \wedge \text{speed}(e) \geq d_n]]]$

The more complex cases are those which involve matrix negation, since compatibility with a non-implicative interpretation appears to go against the expectation set by the baseline necessity condition of *enough* (here, that the subject's capacity for the threshold degree of the matrix adjective is circumstantially necessary for the complement realization). As discussed in §3.5, complement-compatible uses of negated circumstantial *enough* arise exclusively with progressive or habitual readings. It turns out that the progressive effect can be explained in terms of evidential coercion, while the revised analysis of dynamic statives offered in §3.3 accounts directly for the habitual case.

We have already seen that progressive marking can trigger evidential readings for dynamic statives (see 90b). This suggests that the progressive patterns with the perfective in selecting for eventives, although it shares the 'including' semantics of the imperfective as set out in (77b).

(102) $[\![\text{PRG}]\!]^{w,t} := \lambda P_{vt}.\text{ON}(t,w,P)$

Progressive interpretations are well-attested for imperfectively-marked French claims, supporting the hypothesis that the French *imparfait* can be realized as PRG in certain contexts, such as where aspect-supplementing temporal information supports an episodic/active perspective on events (see, e.g., 68b). I assume that the *imparfait* is elsewhere realized as a stative-selecting IPF (so that PRG and IPF divide the labour attributed to IPF in 77b). Inserting PRG between tense and the (negated) *enough* radical in (103) produces a past in-progress manifestation of below-threshold speed.

(68b)   Juno n'était   pas assez   rapide pour gagner la course, mais la   coureuse en
        Juno NEG-be.PST.PRG NEG enough fast   for win.INF the race,   but the runner.F at
        tête a   trébuché   dans la   dernière manche, et   donc, Juno a   gagné (après tout).
        head has stumble.PP in   the last   lap,   and so,   Juno has win.PP (after all).
        'Juno was-PRG not fast enough to win the race, but the lead runner tripped-PFV on the final lap, and so, Juno won-PFV (after all).'

(103) $[\![\text{Juno n'était pas assez rapide pour gagner la course}]\!]^{w^*,t^*}$
$= [\![\text{PST}(\text{PRG}(\text{INST}(\text{NOT}(\sqrt{}\text{Juno be fast enough to win the race}))))]\!]^{w^*,t^*}$
$= \text{ON}(t^*\{\prec_i \text{now}\}, w^*, \lambda w\lambda e.\text{INST}(\lambda w'\lambda t.\neg[\![\text{fast}]\!](w')(t)(\text{J})(d_n))(w)(e))$
$= \exists e.[\tau(e) \supset t^*\{\prec_i \text{now}\} \wedge (\iota P : \text{Evid}(P, \neg[\![\text{fast}]\!](\text{J})(d_n)))(w^*)(e)]$, where d_n is as in (97)

To the extent that the joint effect of contextual causal sufficiency and the core circumstantial necessity condition establish the causal necessity of a threshold manifestation (see 104, adapted from 59), (103) leads to the expectation that Juno's reference time activities do not result in her winning the race. Crucially, however, this prediction is based on causal relationships as predicted from the reference time perspective, which is—by definition—fully contained within Juno's performance.

(104)   Causal necessity and sufficiency for $[\![\text{enough}(P)(\text{ADJ})(x)]\!]^{w,t}$:
$\forall w' \in \text{CAUS}(w,t)[\text{AT}(t'\{\not\prec_i t\}, w', \text{INST}(\lambda w\lambda t.\text{ADJ}(w)(t)(x)(d_n))) \leftrightarrow \text{IN}(t',w',P(x))]$,
where $d_n = \iota d.\forall w' \in \text{CR}(w,t)[\text{IN}(t'\{\not\prec_i t\}, w', P(x)) \rightarrow \text{ADJ}(w')(t')(x)(d))]$

What is causally normal (optimal) at a particular time (or, more precisely, at the start of a particular temporal interval) need not continue to be causally normal thereafter. To change causal

expectations, however, some event which is excluded from the reference time causal model (and is thus not foreseeable based on the facts taken to be causally relevant at reference time) must enter the salient causal landscape. This is precisely what happens to allow Juno's win in a context like (68b): although Juno's win is causally abnormal (deviant) from the reference perspective, her opponent's unexpected mishap subsequently and abruptly changes the causal landscape, prompting a downward revision of the threshold necessary speed and allowing Juno to win the race in spite of the reference time validity of (104). Such a change is required to get around the necessity condition, explaining why an unelaborated, progressively-interpreted claim like (105) strongly invites inferences about the post reference-time occurrence of some abnormal or otherwise unexpected event (a burst of additional speed by Juno, a mishap to the other contestants, and so on).[37]

(105) Pendant que je regardais,   Juno n'était   pas assez   rapide pour gagner
      During   that I watch.PST.PRG, Juno NEG-be.PST.PRG NEG enough fast   for   win.INF
      la   course, mais elle a   finalement gagné.
      the race,   but   she has finally   win.INF.
      'While I was watching, Juno was not fast enough to win the race, but she won in the end.'

Negated dynamic *enough* claims are also compatible with complement realization in habitual contexts, such as (69a) (see also 69-70).

(69a)   Juno was not (ordinarily) fast enough to win the race, but it turned out that everyone else had the flu and ran quite slowly, so she won.

This is rather less puzzling than it was before §4.3, as our revised analysis of dynamic statives now allows an individual x to verify dynamic property S over an interval t just in case x exhibits a regularly-distributed tendency for acts with the character specified by S. Interpreted statively, then, the *enough* claim in (69a) requires Juno to have a regular reference-time disposition for running slower than the necessary threshold speed d_n, but this claim is compatible with the possibility that she occasionally (and exceptionally) runs at or above speed d_n during t. If one such exceptional performance happens to coincide with the relevant race event, the truth of (69a) (likewise, in the parallel French examples in §3.5) does not rule out that Juno unexpectedly wins.

Comparison with lexical implicatives. Lexical implicatives and the implicative subclass of *enough* predicates crucially differ with respect to the content and aspectual class of their assertions: this difference derives the observed contrast in the aspect sensitivity of their complement inferences. Lexical implicatives' complement entailments persist under imperfective marking because these claims assert the eventive realization of a necessary/sufficient prerequisite for their

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[37]Evidential readings are also possible for imperfectively-marked but episodic positive *enough* claims, with parallel results: complement denial in (1) requires the occurrence of some post reference time interruption/intrusion on Juno's (sufficient) speed manifestation (which is not accounted for in the reference time perspective).

(1)   Juno était   assez   rapide pour gagner la   course, mais elle est tombée près de la   ligne d'arrivée
    Juno be.PST.IPF enough fast   for   win.INF the race,   but   she is   fall.PP   near of the line   of-arrive.PP
    et   n'a   pas gagné.
    and NEG-has NEG win.PP.
    'Juno was-IPF fast enough to win the race, but she fell-PFV near the finish line and did not win-PFV.'

complements (see §2, Nadathur 2023). If the non-progressive imperfective selects for stative inputs (as suggested above), imperfectively-marked lexical implicatives must undergo eventive-to-stative coercion.[38] Based on the intuitive interpretation of imperfectively-marked *réussir* ('manage', 'succeed'), the default reinterpretation appears to be a **habitual** one:

(106) Morgan réussissait   à résoudre les énigmes.
       Morgan succeed.PST.IPF at solve.INF the riddles.

       'Morgan (typically) managed to solve riddles.'

(107a) provides a preliminary proposal for HAB, on which it maps an eventive input P to a predicate of times during which P is instantiated at a majority of contextually-relevant intervals (i.e., those which satisfy some salient predication R); I assume that R minimally picks up any presuppositions associated with P (cf. Schubert and Pelletier 1989 on GEN). (107c) spells out the results of inserting HAB between the implicative sentence radical and the imperfective marker.

(107) a. $[\![\text{HAB}]\!] := \lambda w \lambda t \lambda R_{it} \lambda P_{vt}.\text{MOST } t'[t' \subset t \wedge R(w)(t')][\text{IN}(t', w, P)]$
       b. $[\![\text{manage}]\!]^{w,t} := \lambda e \lambda P_{vt} \lambda x.(\iota A_{vt}.\forall w' \in \text{CAUS}(w,t)[\text{AT}(t,w',A(x)) \leftrightarrow \text{IN}(t,w',P(x))])(w)(e)$
       c. $[\![(106)]\!]^{w^*,t^*} = [\![\text{PST}(\text{IPF}(\text{HAB}(\sqrt{}\text{Morgan manage to solve riddles})))]\!]^{w^*,t^*}$
          $= \exists t[t \supset t^*\{\prec_i \text{now}\}$
          $\wedge \text{ MOST } t'[t' \subset t \wedge \iota A.\forall w \in \text{CAUS}(w^*,t')[\text{AT}(t',w,A(x)) \leftrightarrow \text{IN}(t',w',\text{solve-riddles}(M))]]$
          $[\text{AT}(t',w,A(x))]$

On the habitual reading, imperfectively-marked *manage* (*réussir*) requires that most temporal intervals which are subintervals of some interval containing the (past) reference time and which also verify the causal presupposition of *manage* are times which instantiate an event of Morgan realizing the causally-sufficient prerequisite for riddle-solving. Each of these cause realizations is necessarily linked to a realization of the *manage* complement, making not just the prerequisite but also its result constitutive of Morgan's 'habit'. Non-universal quantification in HAB renders this interpretation compatible with a small number of complement failures (accounting for the acceptability of 72a and 73a), but directly contradicts any claim that establishes Morgan's regular or uniform failure to solve riddles, as shown in (72c) and (73c) (see also 72b, 73b).

(72c) Morgan (generally) managed to solve riddles, #but she never solved a riddle.

(73c) Morgan réussissait   à résoudre les énigmes, mais elle ne   résolvait   jamais
       Morgan succeed.PST.IPF at solve.INF the riddles,   but   she NEG solve.PST.IPF never
       d'énigmes.
       INDEF-riddles

       'Morgan managed-IPF to solve riddles, #but she never solved-IPF any riddles.'

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[38] Eventive lexical implicatives are in principle compatible with a progressive use of the French *imparfait*, but this interpretation appears (for some reason) to be marginal, paralleling judgements of progressive English implicatives.

(1) a. ??Ana was daring to enter the cave (…when a terrible scream startled her and she ran away.)
     b. ??Mika was managing to open the door (…when her strength unexpectedly gave out.)

To the extent that my informants accept the examples in (1), they pattern with progressively-interpreted *enough* claims, permitting complement non-realization just in case some unexpected interference with the causal landscape blocks the (reference time) expectation of complement realization.

No contradiction arises where *manage* is replaced with a dynamic *enough* predicate, as in (74c)-(75c), because an imperfective interpretation of the stative attribution requires only that Morgan has the disposition (regular capacity) to behave with degree d_n of cleverness, but does not entail an instantiation of the proximate cause of riddle-solving in any particular (riddle-containing) situation.

(74c)   Morgan was clever enough to solve riddles, but she never did it.

(75c)   Morgan était   assez   intelligente pour résoudre les énigmes, mais elle ne
        Morgan be.PST.IPF enough clever   for   solve.INF the riddles,   but she NEG
        résolvait   jamais d'énigmes.
        solve.PST.IPF never   INDEF-riddles

        'Morgan was-IPF clever enough to solve riddles, but she never solved-IPF any riddles.'

4.5   Revisiting the three puzzles

At the beginning of §3, I outlined three puzzles in the implicativity of *enough* claims: inference optionality, variation in inferential profile, and (aspect-sensitive) inference strength variability. §3-§4 provided empirical and formal accounts of these puzzles, which I summarize briefly below.

Optionality.   Deontic (non-circumstantial) *enough* constructions lack implicative defaults, while circumstantial claims show some form of implicativity (§3.2, see also Karttunen 1971; Meier 2003). I argued that this *optionality* is predicted and explained by the necessity semantics for *enough* introduced in §3.1 (cf. von Stechow et al. 2004), once we recognize that constraints on the matrix-complement relationship in an *enough* construction are enforced only over the appropriate modal quantificational domain. Deontic quantificational domains need not include the evaluation world, so reality in these cases need not conform to *enough*'s necessity condition. However, since circumstantial modal domains do include the evaluation world, these constructions are formally predicted to exhibit (at least) a one-way, necessity-driven pattern of complement inferences.

Distribution/inferential profile.   Within the circumstantial subgroup of *enough* constructions, we find a contrast between 'two-way' and 'one-way' claims: the former license aspect-sensitive implicative inferences under both matrix polarities, and the latter only in the (necessity-driven) negative case. I suggested in §3.4 that this contrast follows from a difference between *dynamic* vs. *static* matrix adjectives, and the way in which the properties these predicates invoke are conceptually involved in the realization of the *enough* complement. Dynamic property adjectives license two-way implicative inferences just in case they can be understood as invoking a property which characterizes a sufficient (proximate) cause of the *enough* complement; in combination with the necessity semantics from §3.1, this structure very nearly replicates the implicative semantic profile proposed by Nadathur (2023), on which lexical implicatives assert the realization of a prerequisite (action) which is presupposed to be *causally necessary and sufficient* for their complements.

Inference strength.   In §3.5, I linked the *variable strength* puzzle to an interaction between aspectual class and grammatical aspect (see §3.5); §4 aimed to formalize this proposal. I argued that the eventive interpretation of perfectively-marked dynamic property *enough* constructions is a case of *aspectual coercion*, here treated as an operation which repairs a type mismatch between an

eventive-selecting perfective and an at-base stative *enough* input. I suggested that the target interpretation for dynamic *enough* reflects the effect of a less-studied (but not unattested) **evidential** form of coercion, which applies exclusively to dynamic statives in virtue of their ontological dependence on the existence of 'witnessing' behavioural events (§4.2-§4.3). Based on this characterization of its target inputs, I offered a formal proposal for evidential coercion (INST; 95b), on which it maps a dynamic stative to a salient predicate of events which witness the original property by exhibiting the appropriate (lexically-specified) behavioural character, and which, if regularly instantiated over some interval t, would entail the truth of the stative at t. §4.4 shows (a) how perfective-triggered evidential coercion derives 'full' (two-way, entailed) implicativity when it occurs in tandem with contextual support for a two-way causal presupposition and matrix-complement temporal overlap, (b) how the behavioural nature of dynamic property claims predicts the non-implicativity of imperfectively-marked negated dynamic *enough*, and (c) how aspectual class explains the differential aspect sensitivity of complement inferences in *enough* vs. lexical implicative claims.

5 Conclusions and outlook

This paper offers an account of the variable implicativity of *enough* constructions which draws on lexical semantics, compositional structure, and contextually-supplied causal knowledge to make good on the hypothesis that *enough*'s complement inferences, where they arise, are derived from the same semantic components as the characteristic complement entailments of lexically implicative verbs (Nadathur 2023). Although this unified analysis vindicates to some degree Hacquard's (2005) claim that *enough* is semantically implicative, I have shown that her original observations (see §1, §3.3) are the product of a specific and distributionally-restricted conspiracy: *enough* constructions mimic the inferential profile of lexical implicatives only where fine-grained aspectual class properties (associated with the property invoked by the matrix adjective) and contextual knowledge (about modal flavour and the causal background against which the *enough* complement is realizable) come together to recreate the complex lexical semantic structure of 'true' implicative verbs.

This paper makes a broader case for the relevance of causal information across the lexical, compositional, and discursive levels. The underlying idea is that causal structure of the sort that supports implicative inferences can not only be lexically referenced (as by lexical implicatives) and/or license pragmatic inferences (e.g., about narrative coherence; Hobbs 1990, a.o.), but can also bridge between the lexical and pragmatic levels, supplementing lexically-encoded information (such as the necessity presupposition of *enough*) with structured world knowledge in a manner that has observable consequences for compositional interpretation and non-defeasible entailment.

The account presented here supports a view of implicativity as a semantic phenomenon grounded in causal structure, and in particular grounded in causal structure pertaining to an individual's ability to realize goals in view of their propensity for realizing a more immediate, intermediary causing condition. This suggests—in keeping with an intuition expressed by Bhatt (1999)—a deep connection between implicative semantics and the longstanding puzzle of **actuality inferences**, wherein past tense ability attributions imply the realization of their complements (see also Thalberg 1972). Like the implicative inferences of (dynamic, causal) *enough* constructions, ability predicates' actuality inferences are sensitive to aspectual marking: as shown in (108), perfectively-marked French abilitative *pouvoir* ('can) licenses **actuality entailments**, but its imperfective alternative remains compatible with complement non-realization.[39]

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[39]Actuality entailments are observed across a wide range of aspect-marking languages; the literature is rather

(108) a. Olga **a pu**   soulever cette table, #mais elle ne   l'a   pas fait.
           Olga has can.PP lift.INF   this   table, #but   she NEG it-has NEG do.PP
           'Olga could-PFV lift this table, #but she did not do it.'

       b. Olga **pouvait**   soulever cette table, mais elle ne   l'a   jamais fait.
           Olga can.PST.IPF lift.INF   this   table, but   she NEG it-has never do.PP
           'Olga could-IPF lift this table, but she never did it.'

On the current analysis, *enough* claims are a special type of ability attribution, wherein the subject's ability to realize the complement depends on their propensity for realizing actions characterized by the matrix property. This sets up an analogy between prerequisite-specifying lexical implicatives and *manage*, on the one hand, and *enough* and 'pure' ability predicates, on the other:

$$dare : manage :: be\ brave\ enough : be\ able\ /\ can_{able}$$

Dare and *manage* share core causal structure, but differ in prerequisite specificity; following Nadathur (2023), this explains their shared inferential profile as well as contrasts in their appropriate use contexts. The suggestion above is that the parallels between (causal) *enough* constructions and ability attributions (compare 4a/6a to 108) can likewise be explained by treating *be brave enough* as a prerequisite-specifying structural counterpart to actualizing ability predicates.

If the analysis provided here is on the right track, implicative *dare* contrasts with *be brave enough* in that the former is both eventive and prerequisite-realizing, while the latter is stative and prerequisite-permitting: this explains differences in the strength and aspect sensitivity of these predicates' complement inferences. *Manage* is then the eventive, prerequisite-realizing alternative to a stative, prerequisite-permitting ability predicate. Extending the current account of implicativity to actuality inferences, then, requires positing that ability attributions describe a complex causal structure between some (underspecified) action and the realization of the ability target. Such an analysis makes ability claims complex causal dispositions, subject to evidential coercion when they occur in eventive-selecting perfective contexts, and thus to recreating the full semantic structure of *manage* in these environments. The idea gains some support from Bhatt (1999), who points out that the parallels between actualized ability and *manage* extend beyond complement entailment to a shared presupposition of complement non-triviality (see 109): this is explained in terms of the presupposed causal background in the implicative case (Nadathur, 2023).

(109) Mika { managed / did not manage / was able / was not able } to breathe normally.
       ⟩⟩ *Breathing normally was non-trivial (difficult, unexpected, abnormal?) for Mika*

The semantic details and consequences of this informally-sketched proposal—and the corresponding success of extending a congruent analysis from lexical implicative and *enough* claims to ability attributions—are beyond the scope of this paper, and will have to be explored elsewhere. Nevertheless, while a complex, tiered structure for ability diverges from the standard linguistic (premise semantics) treatment, it is not without precedent in the philosophical literature (Brown, 1988; Belnap, 1991; Mandelkern et al., 2017, a.o.). Looking ahead, the true viability of an implicative approach to the semantics of ability will be measured not only in its success in accounting for aspect-sensitive actuality inferences, but also in its success in using complex causal structure to

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extensive. See, a.o., Bhatt (1999); Hacquard (2006); Mari and Martin (2009); Piñón (2009); Matthewson (2012); Mari (2016); Alxatib (2020); Homer (2021); Nadathur (2019, 2021); Hacquard (2020) provides a recent overview.

explain a number of long-observed peculiarities in the modal logic of ability claims as compared to other uses the possibility modal, and other flavours of possibility (Kenny, 1976, a.o.).

Appendix: Homer's (2021) actualistic coercion

Homer (2011, 2021) describes the effects of a manifesting form of aspectual coercion in French, noting that perfectively-marked statives like *coûter* ('cost') and *être intelligent* ('be intelligent') license entailments to "the existence of some pragmatically-determined event" (2021, p.22). He argues that these entailments cannot be derived via either inchoative or complexive coercion, and attributes them instead to a novel **actualistic** operation (ACT): the target interpretations appear to be the same as those derived by *evidential* coercion.

(110) a. La maison a   coûte cher.
    the house   has cost.PP dear.
    'The house cost-PFV a lot.'
    → *The house was bought.*

   b. Jean a   été   intelligent.
    Jean has be.PP intelligent.
    'Jean was-PFV intelligent.'
    → *Jean acted cleverly.*

Homer treats states as a subtype of eventualities, and assumes that perfectives select for *quantized* (inherently bounded; Krifka 1998) predicates: PFV thus composes with achievement and accomplishment predicates, but is incompatible with state and process predicates.[40] ACT reinterprets predicates which license modal entailments or presuppositions, including dynamic statives (which establish the property-haver's potential for participating in certain types of event; see §4.3). In (111), R represents the input predicate, while Q is contextually supplied; the second conjunct of 111) ensures that Q is quantized. The last conjunct constrains the local relationship between Q and R, using Beaver and Krahmer's (2001) presupposition operator ∂ to require that ACT is defined only where the strongest modal entailment of a reference time R-eventuality is necessary and sufficient for a reference time Q-event.

(111) $[\![\text{ACT}]\!] := \lambda w \lambda t \lambda R_{vt} \lambda Q_{vt} \lambda e. Q(e)(t)(w) \wedge \forall e_1 [e_1 \sqsubset e \rightarrow \neg Q(e_1)] \wedge [\exists e_2 : R(e_2)(t)(w)]$
$\wedge \partial (\exists e_3 : Q(e_3)(t)(w) \wedge \tau(e_3) \subseteq t] \leftrightarrow \Omega),$

with Ω the strongest entailment of $\exists e : R(e)(t)(w)$ of the form $[\text{Mod}(\exists e_4 : P(e_4)(t))]$, $\text{Mod} \in \{\Diamond, \Box\}$ and P some predicate of eventualities.

The effect of ACT is shown in (112), with θ_{c} the contextual standard for (house) prices; I suppress the quantization conjunct. R's modal entailment Ω (here, a presupposition) is expressed as the

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[40]This restriction aligns with much of the coercion literature, and gains support from the observation that perfective processes can have complexive readings. Given an 'included' semantics for PFV, the default reading of (1) suggests the presence of MAX: this is expected if PFV selects for quantized inputs, but not if it is compatible with all eventives.

(1) Juno a   couru ce   matin.
  Juno has run.PP this morning.

  'Juno ran-PFV this morning.' (*This morning contained a maximal/completed running eventuality by Juno.*)

(1) requires an alternative explanation on an account (as in §4) on which PFV composes with process predicates. I cannot explore the motivations for such an account here, but the simplest approach might fold complexive meaning (as in 89a) into the contribution of PFV (cf. Krifka 1998). Coupled with a treatment of statives as temporal predicates, this move preserves a selectional restriction based on semantic type (rather than on finer-grained aspectual properties), and is compatible with a partitive theory of aspect (Filip, 2000; Filip and Rothstein, 2005; Altshuler, 2014).

possibility of a buying event.[41] Provided that the context supports the inference that the house's buyability is necessary and sufficient for a Q event, (112) instantiates a Q-event within reference time, as well as a reference-time-overlapping state of the house's price exceeding θ_c. This produces the interpretation in (110a)—a reference time house-buying—as long as the best candidate for Q is the prejacent of the modal presupposition Ω.

(112) $[\![(110a)]\!]^{w^*,t^*} = [\![\text{PST}(\text{PFV}(\text{ACT}(Q_{\text{qn}})(\sqrt{\text{the house cost much})})))]\!]^{w^*,t^*}$
$= \exists e[\tau(e) \subseteq t^*\{\prec_i \text{now}\} \land Q(e)(w^*) \land \exists e_1[\mu_{\text{cost}}(\iota x.\text{house}(x))(e_1)(w^*) \geq \theta_c \land \tau(e_1) \circ t^*]$
$\land \partial(\exists e_2[Q(e_2)(w^*) \land \tau(e_2) \subseteq t^* \leftrightarrow \Omega)]],$
where $\Omega = \exists w \in \text{CR}(w^*)[\exists e_3[\text{buying}(e_3)(w) \land \text{Theme}(e_3)(\iota x.\text{house}(x)) \land \tau(e_3) \circ t^*]]$

ACT's presupposition requires that any felicitous context for (110a) makes the house's buyability necessary and sufficient for its purchase. Practically speaking, the 'actualistic' interpretation should arise only where any other conditions for house-buying (an interested and qualified buyer, a willing mortgage lender, etc) are taken for granted. As these conditions are necessarily satisfied in any context where the house is actually purchased, the presuppositional component of ACT is, *ipso facto*, compatible with contexts where the actualistic interpretation is observed. What is more surprising is that the target interpretation seems to be available even in contexts where the interpreter must do quite a bit of work to accommodate ACT's presupposition (e.g., where the house is known to be an undesirable purchase, or has been on the market for a long time with no interest). To the extent that (110a) is surprising in these contexts, the result is not incompatible with ACT, but it is at least difficult to determine whether markedness follows from the difficulty of presupposition accommodation or simple incongruity between the context and the target entailment.

As formulated, ACT appears to predict the possibility of certain actualistically coerced readings which are not in fact available. Consider, for instance, (113) as a background for (110a):

(113) Last week we disagreed about our friend's house. I thought she was selling it, but you did not. We made a bet and then walked over to her house to find out. There was a 'for sale' sign in the yard, listing an unusually high price.

In this context, the quantized predicate $\sqrt{}$*I win the bet* is both salient and consistent with the presuppositional requirements of ACT; as far as I can tell, nothing precludes its selection as Q. Crucially, since this Q depends only on the house's *buyability*, its realization is independent of an actual buying; my informants nevertheless judge that (110a) can only be used here to describe an actual buying, and *not* to establish the outcome of the bet.

Overprediction may also be an issue for static circumstantial *enough* constructions:

(24) (??)Nima a été assez grand pour atteindre l'étagère du haut.
(??)Nima has be.PP enough tall for reach.INF the-shelf of.the top.

Intended, unavailable: 'Nima was-PFV tall enough to reach the top shelf.'

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[41] Homer (2021, p.27) supports the presuppositional diagnosis of 'buyability' for *coûter* by contrasting it with *valoir* ('be worth'): *coûter* is infelicitously applied to the not-for-sale *Mona Lisa*, but *valoir* is perfect in the same context.

(1) a. #Combien coûte *La Joconde*?
#how.much cost.PRS the *Mona Lisa*
'?How much does the *Mona Lisa* cost?'

b. Combien vaut *La Joconde*?
how.much be.worth.PRS the *Mona Lisa*
'How much is the *Mona Lisa* worth?

Suppose that Nima and his friends are playing a game in which the first person to get an object from the relevant shelf wins, and suppose it is Nima's turn to try. This context satisfies all necessary conditions for the *enough* complement other than the one involving Nima's height: thus, it is a context in which the stative predication $\mathsf{height}(w)(e)(\mathsf{N}) \geq d_n$ licenses an entailment to the circumstantial possibility of reference time complement realization. Moreover, given the assumption that Nima is in position and ready to make the attempt, the modal entailment is necessary and sufficient for an actual shelf-reaching. Consequently, ACT should permit an interpretation for (24) on which the quantized predicate Q is given by the complement $\sqrt{}$*Nima reach the shelf*, resulting in an implicative entailment in this context. Empirically, however, no such reading arises.

The problem with $\sqrt{}$*I win the bet* and $\sqrt{}$*Nima reach the shelf* as candidates for Q in (110a) and (24), respectively, is that neither predicate has an inherent relationship to the original stative. It seems to me that excluding candidates of this sort—and thereby forcing Q to be the prejacent of Ω in (110a) as well as ruling out a coerced interpretation for (24)—requires restricting Q in (111) so that it bears a uniform, context-free (thus, lexical or conceptual) connection to R. Such a restriction gets us very close to the idea expressed in §4.3: actualistically (evidentially) coercible statives are coercible because they rely (ontologically) on well-defined eventive witnesses, and it is this type of witness which is instantiated by coercion.

Adding such a restriction to ACT seems to preserve the spirit of Homer's operation, especially as the type of link I have in mind is naturally tied to the modal entailments of dynamic statives. The content of the restriction would, however, amount to imposing some version of the Evidence relation (95a) on Q, effectively reducing the difference between ACT and INST to the presuppositional contribution of ACT (which, as noted above, is tricky to assess empirically).[42] If I understand Homer, a strong motivation for ACT's presupposition is the observation that the coerced event for perfective dispositions like (110a) persists under negation (see 114a) and thus does not behave like an ordinary entailment. As shown in (114b), ACT derives the desired result as long as the modal presupposition Ω is as in (112) and Q defaults to Ω's prejacent: Ω ensures the existence of a reference time Q-event, so (114b) reduces to the claim that the house was bought during t^* and that no state wherein it was priced above θ_c overlaps with t^*.

(114) a. La maison n'a   pas coûté   cher. $\rightarrow$ *The house was bought.*
        the house NEG-has NEG cost.PP dear.
        'The house did-PFV not cost a lot.'

    b. $[\![(114a)]\!]^{w^*,t^*} = [\![\text{PST}(\text{NEG}(\text{PFV}(\text{ACT}(Q)(\sqrt{}\text{the house cost much}))))]\!]^{w^*,t^*}$
       $= \neg\exists e[[\tau(e) \subseteq t\{\prec_i t^*\} \wedge Q(e)(w^*)] \vee \neg\exists e_1[\mu_{\mathsf{cost}}(\iota x.\mathsf{house}(x))(e_1)(w^*) \geq \theta_c \wedge \tau(e_1) \circ t]]$

    c. *Presupposition introduced by* ACT: $\exists e_2[Q(e_2)(w^*) \wedge \tau(e_2) \subseteq t\{\prec_i t^*\}] \leftrightarrow \Omega$

As it turns out, the effect in (114a) is also predicted by INST, as long as negation scopes immediately above the degree-attributing sentence radical, but below aspect (and thus below coercion). In parallel with the derivation (99) (see §4.4), this will produce a stative predication of the house having below-θ_c cost, which can only be evidenced by a buying event (wherein the traded value is below θ_c). On Homer's analysis, however, negation is assumed to scope between tense and aspect

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[42]Where a dynamic *enough* predicate is coerced, ACT's presupposition does not obviate the causal presupposition associated with implicativity. ACT relates the subject's capacity for manifesting the matrix property to their actually doing so, while the implicative inference requires an independent link between property-manifestation and complement realization. It is possible that implicative inferences involve two contextually-induced necessity/sufficiency presuppositions, but—absent clear evidence for ACT's presupposition—evidential coercion may be more parsimonious.

(as shown in 114b), and in this case it is only the presuppositional component of ACT that ensures the occurrence of a house-buying. Independent arguments for the correct treatment of negation may thus in the final analysis serve to adjudicate between INST and a(n evidentially constrained) version of ACT, but I will have to leave this matter to be examined elsewhere.

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