Pre-publication version of

Tim Stowell   (2007)   "Sequence of Perfect"

Published Version:

Tim Stowell   (2007)   "Sequence of Perfect"
in Louis de Saussure, Jacques Moeschler and Genoveva Puskas (eds.)
Recent advances in the syntax and semantics of tense, mood and aspect
(Trends in Linguistics Vol. 185)   Berlin: Mouton De Gruyter, pp. 123-146.

Sequence of Perfect
Tim Stowell
UCLA

0.   Introduction

In this article I will argue that the English infinitival perfect (have+-en) functions as a true past tense in at least some cases, reviving an old analysis (Hoffman 1966). I will review Hoffman's three main arguments for this position, and reject two of them while accepting the third. In addition, I will show that the infinitival perfect resembles the English preterit *past* in exhibiting a "simultaneous" present-tense-like interpretation when embedded within a main clause containing past tense. This type of interpretation, a paradigmatic example of "sequence of tense", is commonly assumed to be possible only with finite tenses. The broader implication is that infinitival clauses may contain tenses–at least past tense.

1.   Temporal argument structure and interpretation

In a main clause, tenses conventionally convey a temporal relation between the actual Utterance Time (UT) and what Klein (1994) calls the "Topic Time". In simple sentences lacking auxiliary verbs, Klein's Topic Time (TT) corresponds roughly to the Reichenbach's (1947) traditional notion of the "event time" (ET), but in sentences containing aspectual auxiliary verbs, the TT is a time related to the ET by the aspectual semantics of the auxiliary.
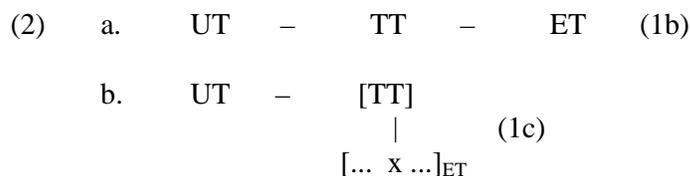
Following previous work, I assume that tenses are dyadic predicates expressing a temporal ordering relation holding between two time-denoting arguments. I refer to the external argument of a tense as its Reference Time argument (RT); the internal argument of the tense is Klein's TT. In a main clause, the RT of a tense denotes the actual UT. Thus a main clause tense orders the UT in relation to the TT. Past tense is assumed to be a temporal ordering predicate meaning 'after'; it orders its external RT argument (denoting the UT) after its internal argument (the TT).

In (1a-c), the past tense locates the actual UT after the TT:

(1)   a.   Max ate an apple.
         b.   Max had eaten an apple.
         c.   Max was eating an apple.

In (1a), there is no aspectual auxiliary, so TT and ET coincide; thus, the past tense orders the UT after the ET (the time interval of the apple-eating event). In (1b) and (1c), the periphrastic aspectual auxiliary constructions express a temporal ordering relation between the TT and the ET. The periphrastic perfect *have+-en* resembles the preterit past tense in expressing anteriority, or past-shifting; just as *past* locates UT after TT, so *have+-en* locates TT after ET. The periphrastic progressive *be+-ing* locates the TT within the ET; here the TT denotes a sub-interval of ET.

Consequently (1b) and (1c) involve reference to three distinct times UT, TT, and ET, represented schematically in the traditional time-line diagrams in (2), where time flows from right to left:

(2)   a.   UT   –   TT   –   ET   (1b)

         b.   UT   –   [TT]
                                 | (1c)
                        [... x ...]$_{ET}$

In subordinate clauses, tenses work somewhat differently. First, they may be used to express a relation between the TT of the subordinate clause and a time other than the actual UT. Typically the 'other time' in question is the ET of the matrix clause, as in (3):

(3)   Bill said that Max ate an apple.

In (3), the main clause *past* locates the UT after the main clause TT. Since there is no aspectual auxiliary in the main clause, the main clause TT (TT-1) is the main clause ET (ET-1, denoting the time at which Bill spoke). The subordinate complement clause also contains no aspectual auxiliary, so its TT (TT-2) coincides with its ET (ET-2, denoting the time at which Bill ate an apple). If the past tense in the complement clause (Past-2) functions like its main clause counterpart (Past-1), it should order the complement clause Reference Time (RT-2) after TT-2 (=ET-2). Since sentence (3) must be understood to unambiguously locate ET-1 after ET-2 , RT-2 must denote the same time as ET-1, since Past-2 orders it after TT-2. We can capture this by assuming (4):

(4)   The RT of a complement clause is controlled (bound) by the main clause ET-1.

The temporal interpretation of (3) is represented schematically in (5):

(5)   UT/RT-1   –   TT1/ET1/RT-2   –   TT2/ET2
                   past-1   past-2

Thus, (3) reports a prior event of Bill uttering (1a), where the complement clause (*that Max ate an apple*) faithfully conveys the content of (1a) (*Max ate an apple*).

2.   Finite SOT: simultaneous interpretation of *past* in finite complement clauses
A second difference between main clause and complement clause tense interpretation is illustrated by sentences (6a-b):

(6)   a.   Bill said that Max had eaten an apple.
        b.   Bill said that Max was eating an apple.

If the complement clause past tense (Past-2) in (6a-b) were semantically equivalent to its counterpart in (3), we would expect that ET-1 should control RT-2, and that Past-2 should order ET-1/RT-2 after TT-2. In (6a), the complement clause perfect *have+-en* should then locate TT-2 after ET-2, while the complement clause progressive *be+ing* should locate TT-2 within ET-2. Thus we should expect temporal interpretations along the lines of (7a-b), with both sentences making reference to four distinct times:

(7) a. UT/RT-1   –   TT-1/ET-1/RT-2   –   TT-2   –   ET-2   (6a)
                    past-1   past-2   perf

   b. UT/RT-1   –   TT-1/ET-1/RT-2   –   TT-2   (6a)
                    past-1   past-2 | – – – prog
                                                            [... x ...]$_{ET-2}$

While it is possible to understand (6a-b) in this way in certain restricted circumstances discussed below, the most salient interpretation of (6a-b) involves reference to only three distinct times, where TT-2 coincides with TT-1/ET-1/RT-2, as in (8):

(8) a. UT/RT-1   –   TT-1/ET-1/RT-2/ TT-2   –   ET-2   (6a)
                 past-1   perf

     b. UT/RT-1   –   TT-1/ET-1/RT-2/ TT-2   (6a)
                 past-1 | <—   prog
                                      [... x ...]$_{ET-2}$

The interpretation associated with (8a-b) is one in which the past-shifting semantics of Past-2 is entirely absent, as though the complement clause *past* were being interpreted as a present (zero) tense rather than as a past tense. (For concreteness I assume that present tense expresses coincidence, or simultaneity, between RT and TT.) Thus, (6a) can be used to report a prior event of Bill uttering (9a), and (6b) can be used to report a prior event of Bill uttering (9b):

(9)   a.   Max has eaten an apple.
         b.   Max is eating an apple.

In the same way, (10a) can be used to report a prior event of Bill uttering either (10b) or (10c):

(10)   a.   Bill said that Max was in Paris.
         b.   Max is in Paris.
         c.   Max was in Paris.

The 'simultaneous' interpretation of subordinate clause *past* is an instance of the phenomenon of Sequence-of-Tense (SOT), involving distinctive correspondences between meaning and morpho-syntactic form in complement clause tenses falling under the scope of a higher past tense, especially in contexts involving indirect discourse, reporting speech or mental attitudes.

There are two well-known distributional restrictions on the simultaneous interpretation of the preterit *past*. The first is that it is possible only when the clause containing the *past* is embedded within a main clause containing another (past-shifting) past tense, as in (6). The second is that it is possible only when the TT argument of *past* contains a stative predicate, as in (10a), or perfect or progressive aspect, as in (6a-b), or a temporally quantified or habitual predicate, as in (11):

(11)   a. Bill said that Max ate an apple every day.
         b. Bill said that Max ate apples.

Suppose that there is an aspectual super-category STATIVE, comprising conventional stative predicates, predicates headed by perfect or progressive aspect, and temporally quantified or habitual predicates. This class contrasts with episodic eventive predicates (of all aspectual subclasses, including activities). We need not be concerned here with the semantic principles defining this grouping here. Now, the constraint on the simultaneous interpretation can be expressed descriptively as in (12a) or (12b):

(12)   a. The internal argument of a temporal-ordering predicate expressing simultaneity
        must be the time of a STATIVE eventuality.
    b. The internal argument of a temporal-ordering predicate expressing simultaneity
        may not be the time of a (non-STATIVE) episodic eventive eventuality.

The STATIVE constraint in (12) applies to other simultaneous tense interpretations as well. In particular, it also applies to uses of finite *present* in sentences such as (13a-b), as is well known:

(13)   a. #Max **eats** an apple.
    b. #Bill will say that Max **eats** an apple.
    c. Max **is** eating an apple.
    d. Bill will say that Max **is** eating an apple.
    e. (Bill will say that) Max **eats** apples every day.

Here the TT must contain a STATIVE predicate, as in (13c-e). Sentences (13a-b) are anomalous; they cannot be interpreted as non-progressive analogues of (13c-d), with the present tense conveying simultaneity between RT (UT) and TT (ET) in (13a) and between RT-2 (ET-1) and TT-2 (ET-2) in (13b). Sentences like (13a) are appropriate as headlines, where the understood tense is that of a recent past (past-shifting, rather than simultaneous), or as captions on photographs or illustrations, where there is no interpretation of simultaneity between the time of the event depicted and any other time.

        I have suggested elsewhere (Stowell 1995a, 1995b, 2006) that the past-shifting and simultaneous interpretations of the English preterit *past* in sentences like (6a-b) and (10a) involve two distinct tenses; the past-shifting reading involves a true past tense, while the simultaneous reading involves a distinct "zero" or (non-indexical) "present" tense. I call the former tense PAST and the latter tense PRESENT. While this might suggest that the finite preterit *past* is ambiguous between two lexical meanings (PAST and PRESENT) , I suggest instead that *past* should be thought of as a temporal analogue of a determiner heading a time- (or event-) denoting expression, but also incorporating a polarity marker, indicating that the phrase it heads falls within the semantic scope of a true PAST tense.

        On this view, true semantic (past-shifting) PAST tense is covert (null); *past* is just the head of the TT argument, falling under the scope of PAST. When *past* occurs as the head of a main clause TT, the true tense of the clause must be PAST in order to license *past*. But when *past* occurs as the head of a complement clause TT, it can be licensed by falling under the scope of a main clause PAST, in which case the covert tense of the complement clause is free to be either PAST (past-shifting) or PRESENT (simultaneous). Completing the picture, the morpheme *present* does not convey PRESENT (simultaneity), rather, it is also the head of a TT argument, but it conveys the opposite polarity relation of *past*: the TT that it heads may *not* fall within the semantic scope of PAST.

        When a complement clause contains *past*, and the TT is STATIVE, as in (6a-b) and (10a), the tense is normally interpreted as if it were simultaneous PRESENT, as we have seen. But a complement clause containing *past* and a STATIVE TT can also be understood to contain a true past-shifting (non-SOT) PAST, locating the matrix event time after the TT, thus resembling the interpretation of *past* with an episodic eventive TT in (3). As noted by Boogaart (1995), however, this is possible only when the subordinate clause TT is understood to be simultaneous to a time already under discussion in the prior discourse; I will refer to this discourse-supplied time as the DT. For example (10a), repeated here, can be used to report Bill's testimony in a criminal trial:

(10)   a.   Bill said that Max was in Paris.

In this context, the DT is the time of the alleged crime, and Bill asserts that Max was in Paris at the DT. Thus, even on the past-shifted reading of *past*, the STATIVE TT must be understood to be simultaneous with some other time. The same is true with all other subtypes of STATIVE predicates; they must normally be construed as simultaneous with some other time, either with the main clause ET-1 (when the tense conveys simultaneity) or with a DT.

This raises the question whether the morpheme *past* ever conveys actual temporal past-shifting with TTs of STATIVE eventualities (as it clearly does with TTs of episodic eventive eventualities). The answer is "yes". On the past-shifted readings of sentences like (6a-b) and (10a), where the TT is simultaneous with a DT, the DT must be understood to be prior to the main clause ET–the time at which Bill spoke in (10a). This must be the effect of the past-shifting interpretation of *past* within the complement clause, since without this it should be possible for the TT to be simultaneous with a DT that is subsequent to the matrix ET.

It is a matter of controversy exactly how SOT works and whether the phenomenon is restricted to intensional contexts associated with predicates of speech, belief, and modality. In this paper I will ignore these issues as much as possible, focusing instead on the parallel between SOT interpretations of *past* in finite complement clauses exemplified in (6a-b) and cases involving non-finite *have+-en* to which I now turn.

3.   Infinitival tense?
Infinitival clauses are traditionally assumed to differ from finite clauses in three major respects. First, infinitival clauses (at least in English) lack any overt manifestation of subject-verb agreement. Second, infinitival clauses (at least in English) lack overt nominative subject DPs; the subject DP is typically either absent or null, though in some cases non-nominative subjects are possible. Third, infinitival clauses are widely, though not universally, believed to lack tense.

That infinitives do not contain tense is, of course, the traditional view. It directly accounts for the obvious fact that conventional tense affixes do not appear in them. On the other hand, from a semantic point of view, infinitives can express the same basic temporal ordering relations that are conventionally expressed in simple finite clauses by *past*, *present*, and the future modal *will*. To convey past-shifting, infinitives use the bare perfect, composed of the root form of the auxiliary *have* and a past participial complement (*have+-en*), as in (14a). To convey simultaneity (14b) or future-shifting (14c), infinitives require no additional morphology at all.

(14)   a.   Sam believed Mary to have left.
        b.   Sam believed Mary to be in Paris.
        c.   Sam expected Mary to leave.

So are infinitives really tenseless, or do they harbor tenses after all? More concretely, do infinitives contain overt or covert syntactic elements that should be categorized as tenses, conveying the semantic notions of past, present, and future? The answer depends, first and foremost, on how one defines "tense".

From a semantic perspective, three main ideas have been advanced:

(15)   i.   Tenses express temporal shifting (or lack thereof) with respect to a Reference Time (RT); the RT is the Utterance Time (UT), at least in main clauses.
        ii.   Tenses are referential expressions analogous to pronouns, but referring to

times rather than to individuals.
  iii.   Tenses should be distinguished from aspects in being absolute, or indexical, always taking the UT as the RT.

(15i) expresses the traditional, intuitive, view that tenses express the basic notions of past, present, and future. (15ii) captures a number of syntactic parallels between tenses and pronouns, and has been widely influential, especially in the semantics literature. Advocates of this view generally also accept (15i), but assume that the temporal-shifting function is subordinate to the referential function, taking temporal shifting to be the main component of a restriction on the reference of the tense. (15iii) is controversial, both with respect to the analysis of English tenses and with respect to the analysis of so-called relative tenses in many languages. These ideas have been adopted in various combinations in specific theories of tense that have been advanced in the literature.

    To convince all tense theorists that infinitives contain tenses, it would be necessary to show that infinitives contain elements conveying a semantics that corresponds to all three of (15i-iii). I will not do that in this paper, but I do intend to argue that infinitival perfect behaves like a past tense by either of the first two definitions (15ii-ii). The infinitival perfect plainly does not behave in a way consistent with (15iii), but I do not believe that (15iii) should be taken to be a necessary property of true tenses.

    In what follows I will assume the theory of tense that I have advocated elsewhere (Stowell (1995a,b, to appear)). The theory assumes that the functions associated with (15i) and (15ii) are syntactically dissociated from each other. The temporal ordering function (15i) is assigned to the category Tense (T), while the temporal reference function (15ii) is assigned to the time-denoting arguments of tense, notably to the TT argument. Contrary to (15iii), I assume that tenses are *not* intrinsically absolute or indexical; indexical interpretations of subordinate clause tenses arise when the application of overt or covert (LF) movement applies, moving the subordinate TP or CP out of the scope domain of one or more higher tenses. This type of movement can be triggered by various factors (including the need to express *de re* reference).

    To account for the phenomenon of SOT, I further assume (16i-iii):

(16)   i.   The English tenses PAST and PRESENT are covert (phonetically null).
        ii.   The morphemes *past* and *present* are temporal analogues of determiners, the heads of TT arguments referring to times.
        iii.   *past* and *present* differ from each other in encoding a scopal polarity relation to PAST: *past* must fall under the scope of PAST, whereas *present* may not.

By (16i-ii), the English finite "tense" morphemes *past* and *present* are not true tenses (expressing temporal ordering relations) but rather heads of the TT arguments of tenses. The *past/present* contrast expresses a scope relation to true PAST tense, similar to the traditional account of the *any/some* contrast (that it expresses a scope relation to negation or a downward-entailing operator). This approach agrees with Partee (1973) and Enc (1986, 1987) in claiming that the English morphemes *past* and *present* are (the heads of) time-denoting expressions (as in 15ii), but it disagrees with their accounts in claiming that these morphemes do not directly express any temporal ordering function (15i), even as a restriction on the referential function.

    It is sometimes asserted that past-shifting tenses have an "absolute" (indexical) tense interpretation whereas past-shifting aspects have only a relative time-shifting interpretation. The absolute/relative distinction hinges on whether the tense is interpreted indexically or not; in our terms, this depends on whether the RT of the tense denotes the actual UT or some

other time such as the main clause ET. But the finite preterit *past* in the subordinate clauses in (3), repeated here, has a relative, rather than an absolute, interpretation, so it cannot be that only absolute tenses are true tenses.

(3)   Bill said that Max ate an apple.

The same is true of *past* and *present* in examples like (17):

(17)   a. John will/might say that Max tricked him.
        b. John will/might say that he is thirsty.

Furthermore, present and past tenses in Japanese have relative, rather than absolute, interpretations when they occur in subordinate clauses, as in (18a-b), just like *have+-en* in an English infinitival complement. The same is also true of tenses in relative clauses in Japanese, as in (18c).

(18)   a.   Taroo-wa [$_{CP}$Hanako-ga   Tookyoo-ni i-ta   to]   it-ta.
                Taro-TOP   Hanako-NOM Tokyo-LOC   be-PST COMP say-PST
                'Taro said that Hanako was (=had been) in Tokyo.' (Past shifted only)

        b.   Taroo-wa Hanako-ga   Tookyoo-ni i-ru   to   it-ta.
                Taro-TOP Hanako-NOM Tokyo-LOC be-NONPST COMP say-PST
                'Taro said that Hanako was (*lit.* = is) in Tokyo.' (Simultaneous)

        c.   Taroo-wa   waratte i-ru   otoko-o   mi-ta.
                Taro-TOPIC laughing be-NONPST man-ACC see-PST
                'Taro saw a man who was/is laughing.'

The same is true of tenses in many languages. One can, of course, maintain that none of these are true tenses because of their non-indexical character, but given the non-indexical character of the English tenses in (3) and (17), it is doubtful that the indexicality criterion (15iii) can be maintained.

        Tenses in relative clauses have been claimed to have an indexical interpretation, but Abusch (1988) showed that this was not the case for relative clauses construed *de dicto* or *de se*, suggesting that the scope construal of the relative clause is responsible for the indexical tense interpretation when the relative clause is construed *de re*. I will therefore assume that tenses do not have to be indexical in order to count as true tenses.

        In Section 4, I will argue that infinitives containing the bare perfect must be assumed, in some cases, to contain a (covert) counterpart to the same semantic formative PAST that is associated with finite clauses containing the preterit *past*. If true tenses are temporal ordering predicates as in (15i), then it is the presence or absence of these elements (rather than the morphemes *past* and *present*) that determines whether infinitives are tensed or tenseless. Those who would defend a referential semantics for tenses, as in (15ii), might object that this criterion alone is insufficient. Although I have suggested that the temporal reference function should be associated with the TT argument of a tense rather than with the tense itself, I will argue in Section 5 that the infinitival perfect behaves like the finite preterit *past* in functioning as the head of a referential TT argument. The argument is based on the observation that the infinitival perfect behaves like the finite preterit past in exhibiting a simultaneous (SOT) interpretation. The broader conclusion is that infinitival clauses containing the perfect must be assumed, in some cases at least, to contain a past tense

regardless of whether one assumes a predicative theory of tense of the sort I have advocated, or a referential theory of tense of the Partee/Enc variety.

4.   The ambiguity of the infinitival perfect
4.1   Past tense vs. perfect aspect
If infinitives were really tenseless, the nonfinite perfect in (19) would have to convey only an aspect, and not a true (PAST) tense.

(19)   Max believes Sam to have left.

However, there is little empirical content to this claim unless one can show that the semantics associated with the finite preterit *past* morpheme is fundamentally different from that of the infinitival perfect, in a way that follows naturally from the assumption that *past* conveys a true tense and that the infinitival perfect does not.

The idea that the infinitival perfect is, or can be, a true past tense was proposed by Hoffman (1966). Working within the framework of the Standard (*Aspects*) theory, Hoffman assumed that infinitival clauses are derived transformationally from finite clause Deep Structure sources. He derived infinitival *have+-en* from three distinct finite sources–the preterit *past* (*-ed*), the present perfect (*has+-en*), and the past perfect (*had+-en*)–so that (20) corresponds to any of (21a-c):

(20)   Caesar is believed to have lived in Rome.

(21)   a. It is believed that Caesar lived in Rome.
         b. It is believed that Caesar has lived in Rome.
         c. It is believed that Caesar had lived in Rome.

Deep Structure was assumed to be the sole syntactic level of representation at which semantic interpretation occurs (the syntactic locus of the syntax-semantics interface, in Minimalist terms.) Hoffman's theory thus predicted that the infinitival perfect should be able to behave like any of the finite tense constructions in (21a-c) with respect to semantic tests distinguishing the tense constructions from each other. It also predicted that the infinitival perfect should display ambiguous syntactic behavior corresponding to its three sources, depending on the stage in the derivation at which the infinitive is created and distinctions among the three distinct tense constructions are neutralized.

Before proceeding further, it should be noted that there are two very different ways of interpreting Hoffman's insight theoretically. First, it could be, as he has it, that the infinitival perfect has three distinct subtypes, corresponding more or less directly to its three finite counterparts in (21). Translating his claim into the present framework, this would imply that infinitival perfect clauses may contain any of the following three combinations: (a) a past tense; (b) a present tense and a perfect; (c) a past tense and a perfect. All three interpretations involve the presence of a tense within the infinitive: a past tense in (a) and (c), and a present tense in (b). This interpretation of the ambiguity of (20) assumes, of course, that infinitival clauses may contain tense. An alternative interpretation of (20) and (21), compatible with the traditional assumption that infinitives are tenseless, would be that the infinitival perfect in (20) is simply vague, rather than ambiguous, along the dimension of the distinctions among the finite tense constructions in (21). Of course, some combination of the two approaches might turn out to be correct.

4.2   Specific past time adverbs: infinitival perfect as past

Hoffman's diagnostic tests were stated as descriptive generalizations, and were not given an explicit syntactic or semantic analysis. First, to show that the infinitival perfect can behave like the preterit past and unlike the present perfect, he pointed out that it can co-occur with "a time adverb [that] designates a past time point, e.g. *at 3 p.m. yesterday*". This is the familiar restriction on the English present perfect involving referential definite past-time adverbs, illustrated in (22):

(22)   a.   He came last Tuesday.
            b. *He has come last Tuesday.
            c.   He is rumored to have come last Tuesday.

It should be noted that the past perfect and future perfect both differ from the present perfect in not being subject to this restriction. Still, the infinitival perfect in (22c) cannot naturally be interpreted as either a past or future perfect, so Hoffman is probably correct in claiming that the infinitival perfect in (22c) corresponds semantically most closely to the preterit past. But whether the test in (22) specifically diagnoses the presence of a syntactic or semantic counterpart to a past tense in the infinitive is another matter. Insofar as the definite time-adverb restriction applies specifically to the present perfect, it could be that the infinitive simply contains a bare (tenseless) perfect, which might be expected to behave like the finite future and past perfects in not being subject to a restriction that applies only when the present tense is involved. Thus, the test in (22) turns out not to be decisive.

4.3   Now: infinitival perfect as present perfect

Hoffman's second test was intended to show that the infinitival perfect can behave a finite present perfect–and unlike a finite preterit past or past perfect–in being compatible with the time-adverb *now*. Actually, I think that Hoffman's description of the facts is insufficiently fine grained. The past perfect is compatible with a non-indexical relative (narrative past-time) interpretation of *now*, indicated by ^, in (24c) and (25c); the same interpretation arises, somewhat marginally without a prior discourse context, with the preterit past in (25a) and with the future perfect in (24d) and (25d).

(23)   a.   He is reported/believed to have drunk a gallon of vodka by now.
            b.   He is alleged/believed to have finished eating now.

(24)   a. *(It is reported that) he drank a gallon of vodka by now.
            b.   (It is reported that) he has drunk a gallon of vodka by now.
            c. ^(It is reported that) he had drunk a gallon of vodka by now.
            d.   ^(It is expected that) he will have drunk a gallon of vodka by now.

(25)   a. ^(It is alleged that) he finished eating now.
            b.   (It is alleged that) he has finished eating now.
            c. ^(It is alleged that) he had finished eating now.
            d.   ^(Is is expected that) he will have finished eating now.

Example (24a) is worse than (25a) presumably because the preterit past in combination with an episodic eventive VP is incompatible with any completive adjunct PP headed by *by*, as illustrated by (26):

(26)   ??(It is reported that) he drank a gallon of vodka by 5 o'clock.

In any case, the correct descriptive generalization about *now* seems to be that an indexical

interpretation is possible if the clause containing it contains the present perfect but not if it contains the preterit past or the past or future perfect.

Does this tell us that the infinitival perfect in (23) contains a counterpart to the present perfect? Unfortunately, the answer is less clear than what Hoffman claimed. If the test specifically diagnoses the presence of a present tense within the clause, then the answer is "yes". If, on the other hand, the test simply diagnoses the absence of a past- or future-shifting tense, i.e. the absence of a tense or modal shifting the topic time (TT) away from the present (UT), then the answer is "no", since the hypothesis that infinitives are tenseless is compatible with the latter claim. Can one choose between these views? To resolve this the first step is to formulate a more articulate theory of the basis of the relevant constraint on the indexical interpretation of *now*. When a time adverbial occurs with a perfect it can in principle associate either with the ET or with the TT (the so-called result state time). In the case of an indexical adverb like *now*, the only option is the result time. When the TT is the complement of a past tense (on either a past-shifted or simultaneous-past reading), or of a future modal, the TT cannot refer to the UT and indexical *now* is excluded. The question of whether the infinitival perfect in (18) contains a counterpart to the present tense thus hinges on whether a present tense is required within the clause in order for perfect to provide a TT that the indexical *now* can associate with. I see no reason to believe that this must be the case, so it must be concluded that Hoffman's second test is also indecisive.

4.4   Double past-time adjuncts: Infinitival perfect as past perfect

Hoffman's final test intended to show that the infinitival perfect can correspond uniquely to the finite past perfect with a particular combination of temporal adjuncts, as in (27) and (28):

(27)   He is rumored to have seen her [only once before] [when I met him].

(28)   a.   *It is rumored that he saw her only once before when I met him.
        b.   *It is rumored that he has seen her only once before when I met him.
        c.   It is rumored that he had seen her only once before when I met him.

The test works because the two adjuncts have to associate with distinct past times. The adjunct *when*-clause in (27) and (28c) is associated with the TT (the perfect result time). It contains a past tense, so the TT must itself be in the past. This is what excludes the present perfect in (28b). The first adjunct, *only once before,* is existentially quantified, binding an event or ET variable, and it internally locates ET in the past relative to another time T' (ET is before T'). Now, T' is covert, but it is anaphorically bound by the TT (the perfect result time) in (27) and (28c). Since the two adjuncts modify distinct past times, they are incompatible with the preterit past in (28a) since it lacks an aspectual auxiliary, its ET functions as its TT, and it fails to provide two distinct time-denoting arguments for the adjuncts to modify. Now, since the infinitival perfect in (27) is compatible with this combination of adjuncts, it must provide two distinct time-denoting arguments for the adjuncts to modify. In principle, the past-shifting perfect should provide them.

Must we assume that the infinitive contains a past tense in addition to the perfect? At first glance, the answer might appear to be "no", on the following grounds: as long as there is no present tense in the infinitive, one might assume that the TT (the perfect result time) is free to refer to any time, past or present; if it picks out a past time, it can be compatibly modified by the past-tense when-clause, and its ET can of course be bound by the existentially quantified adjunct. On closer inspection, however, the answer must be "yes", since an ECM infinitive with a STATIVE TT cannot normally receive a past-shifting

interpretation:

(29)   He is rumored to be tall.

Here the content of the infinitival clause must have an indexical present-tense interpretation. Now, while one can attribute a past-shifted ET to the perfect aspect in the infinitive in (27), once cannot attribute a past-shifted TT to it on the basis of the perfect aspect alone. Therefore the infinitival perfect in (27) must contain a past-shifting tense to locate the TT in the past in (27), exactly as Hoffman claimed. The same is true of somewhat simpler examples like (30):

(30)   John is believed to have already left when I met him.

Thus it seems that Hoffman's third test provides positive evidence in favor of the view that infinitival perfects must be capable of encoding a past tense, at least in combination with a pure perfect aspect. How exactly the infinitival perfect manages to encode *two* past-shifting tenses in (27) and (30) will be addressed in Section 6.
        Chris Collins (personal communication) has suggested that the examples in (27) and (29) might be assumed to involve simple iteration of the perfect, as in (31), with subsequent reduction of *have had* to *have* in (27) and (29) as a type of haplology:

(31)   a.   %He is rumored to have had seen her [only once before] [when I met him].
         b.   %John is believed to have had already left when I met him.

Collins points out correctly that examples like (31) are common in many dialects, and are abundantly provided by web searches, in examples such as the following:

(32)   Unfortunately, a company ... appears to have had already gone out of business by
         then.

Though many speakers (including me) find examples like (31) and (32) utterly ungrammatical, they are clearly attested for many speakers; I do not know whether this correlates with geographically defined dialects or is a matter of idiolectal variation.
        Even granting a haplology analysis of (27) and (29) along the lines that Collins suggests, one might still conjecture that true iteration of the perfect is not in general permitted (e.g. in finite clauses) in dialects that allow (31) and (32), in which case the first perfect in these examples might be argued to correspond to an independent past tense. However, examples of iterated perfects in finite clauses turn up with surprising frequency in web searches (with both present perfect and past perfect), in examples like those in (33):

(33)   a.   Hoboken has had begun planning discussions about options for clearly
                 identifying certain routes as through-traffic bypasses

         b.   The JISC had approved the funding to begin in August, although Liverpool
                 had had begun work already.

So it seems that iteration of the perfect is possible in some dialects and that this is a plausible analysis of the infinitival examples in (31) and (32).
        But whether (27) and (29) in the standard dialect involve an iterated perfect that undergoes haplology is another matter. The haplology rule in question would have to be

arbitrarily confined to infinitives, since the present perfect in finite clauses can never be construed as an iterated perfect in examples like (34a):

(34)   John has left. (not: "It has been the case that John had left"

It is less easy to rule out an iterated perfect interpretation for the past perfect in a finite clause, but if it were possible, then examples such as (35) ought to be possible, with the first adjunct associating with the event time (the time at which John saw her) and the second and third adverbials associating with the result-times of the two perfects:

(35)   John had seen her [only once before] [when I met him] [when I left].

I find such examples impossible to parse, suggesting that the putative iterated perfect and its associated rule of haplology is disallowed in finite clauses. While it is hypothetically possible that this is allowed specifically in infinitives, I consider this possibility unlikely.

5.   Infinitival Sequence of Tense
5.1   Sequence of Perfect
        A different kind of argument for the presence of a past tense within infinitives comes, surprisingly, and ironically, from cases where the infinitival perfect seems to lack any past-shifting interpretation at all. These are cases, hitherto unnoticed to my knowledge, where the infinitival perfect behaves like an SOT preterit past, allowing a simultaneous (relative present, or "zero") tense interpretation when embedded under a past tense main verb:

(36)   a. Caesar (had) actually believed his wife to have been in Rome at that time.
        b. Caesar (had) once alleged Pompey to have been a scoundrel.
        c. After the battle, Caesar appeared to his soldiers to have been unwell.

Although a past-shifting interpretation for the infinitival perfect is possible here, it is not required; (36a-b) are ambiguous along the simultaneous vs. past-shifted interpretation in exactly the same way as their finite counterparts in (37a-b) are:

(37)   a. Caesar (had) actually believed that his wife was in Rome at that time.
        b. Caesar (had) once alleged that Pompey was a scoundrel.
        c. After the battle, it appeared to his soldiers that Caesar was unwell.

Although the past-shifted interpretation is favored in (36), as the simultaneous interpretation is favored in (37), both interpretations are possible in both cases. (I find that the simultaneous reading is slightly more natural in (36a-b) when the main clause contains the past perfect, though the reading is still possible with the simple past.)
        Comparing (36a-c) to (38a-c), we find that the examples in (38) are temporally unambiguous, having only a simultaneous interpretation:

(38)   a. Caesar (had) actually believed his wife to be in Rome at that time.
        b. Caesar (had) once alleged Pompey to be a scoundrel.
        c. After the battle, Caesar appeared to his soldiers to be unwell.

Many speakers prefer (38) over (36) to express a simultaneous reading, but (36) allows it too.
        Given the analysis of SOT summarized above, the facts suggest that the infinitival perfect, like the finite preterit *past*, actually functions not as a past-shifting tense, but rather as

the referential head of a TT argument, incorporating a PAST polarity marker indicating that it falls under the scope of a (covert) PAST. On the past-shifted reading, the PAST licensing the infinitival perfect polarity item resides within the infinitive; on the simultaneous reading, the infinitival perfect polarity item is licensed by the main clause PAST, and the infinitive contains a covert PRESENT tense instead.

There does seem to be a very subtle difference between (38) and the simultaneous reading of (36), though it is not clear to me precisely what is involved. This difference may be related to the contrast between (39) and (40):

(39)   a.   John told me yesterday that next week his mother would believe him to have been sick.
         b.   John told me yesterday that next week he would claim to have been sick.

(40)   a.   John told me yesterday that next week his mother would believe that he was sick.
         b.   John told me yesterday that next week he would claim that he was sick.

Whereas (40) allows a simultaneous (present) tense interpretation of the most deeply embedded clause, relative to the event time of the clause immediately containing it, this does not seem to be possible for the infinitival perfect in (39). Examples like (40), originally due to Kamp and Rohrer (1983), were cited by Abusch (1988) as evidence against the view that the simultaneous (SOT) reading of *past* actually involves an indexical past tense. That an analogous simultaneous reading is apparently impossible in (39) might be taken as evidence for the opposite view. This, however, would be a surprising conclusion to draw about the infinitival perfect, since it would entail that the infinitival clause contains an indexical (past) tense where the finite clause in (40) does not. In any case, the available interpretation in (39) is not an indexical past, but rather a past-shifted reading relative to the event time of the clause immediately containing it. The same is true of (41), without the indexical adverb in the intermediate clause:

(41)   Caesar told Mark Anthony that his wife would believe him to have been in Rome.

Rather, it seems that the infinitival perfect disallows a simultaneous (SOT-type) reading when the future-shifting *woll* intervenes between the perfect and the PAST tense that licenses the SOT effect, unlike the situation with finite *past* in (40). This suggests that there is a locality condition governing the licensing of infinitival SOT that does not constrain finite SOT.

Infinitival control clauses often have a future-shifting tense interpretation relative to the event time of the main clause control verb. In these contexts, Stowell (1982) assumed the presence of a future-shifted tense within the infinitive; Wurmbrand (2005) suggests that in such cases there is a covert infinitival counterpart to *woll* (which she takes not to be a true tense). These views turn out to be indistinguishable, given a

(43)   Caesar (had) expected/hoped/wanted/promised to be in Rome when his wife arrived.

In these contexts I find that a simultaneous (non-past-shifted) reading of the infinitival perfect is possible, though it involves simultaneity with the future-shifted time introduced by the infinitival counterpart of *woll*, rather than with the matrix event time associated with the intensional verb:

(44)   Caesar (had) expected/hoped/wanted/promised to have been in Rome when his wife

arrived.

Example (44) has a counterfactual flavor that is somewhat less favored in (43), so it is possible that, when the infinitival perfect licenses a simultaneous reading in future-shifted infinitives, the perfect is used to encode counterfactuality. In this respect, the infinitival perfect again resembles the preterit *past* in a finite clause, which allows a present-tense construal in weakly counterfactual conditionals, such as (45):

(45)   If John was here, he would be hiding somewhere.

Interpretations essentially parallel to (44) are also observed in finite complements as in (46a), where the covert future-shifter is replaced by *would* (formed by combining *past* with *woll*):

(46)   a.   Caesar (had) expected/hoped/promised that he would have been in Rome
                when his wife arrived.

        b.   Caesar (had) expected/hoped/promised that he would be in Rome when his
                wife arrived.

Thus it seems that the intervention effect that blocks the simultaneous reading of the infinitival perfect in (39) and (41) does not arise when the intervening future-shifter occurs in the same clause as the infinitival perfect. I will leave it to future research to determine the nature of the intervention effect and whether its mitigation in (44) and (46a) is due to the infinitival perfect being licensed by a counterfactual operator or a covert subjunctive mood within the infinitive.

        Either way, these simultaneous and/or counterfactual interpretations associated with the infinitival perfect are parallel to the behavior of the preterit *past* in finite clauses, and unlike the semantics usually associated with perfect aspect. This is also consistent with the view expressed in (15ii) that the time-denoting aspect of past tense, rather than its past-shifting semantics, is essential to its status as a tense.

5.2   Sequence of tense triggered by the infinitival perfect
        Another way of using SOT to diagnose the status of the infinitival perfect as a variant of PAST tense is to show that it triggers SOT in finite clauses falling within its scope domain. Brugger and d'Angelo (1994) use this test to argue that the finite present perfect in Italian is ambiguous between two distinct interpretations; they treat one of these as a true past tense, and the other as a non-past-tense perfect aspect. The latter they take to involve an abstract formative TERM (indicating something like perfectiveness). Only the former (past tense) usage of the present perfect licenses a simultaneous interpretation of a past (imperfect) tense in a subordinate clausal complement. They cite a couple of other diagnostic tests distinguishing between the two interpretations of the perfect, which correlate reliably with the SOT-triggering test. Rather than citing their Italian examples and summarizing the somewhat complex interactions that they involve, I will simply construct contrasting examples in English that seem to behave similarly.
        In (47a), the English perfect conveys a true past-shifting interpretation, and licenses finite SOT in its complement; in (47b), on the other hand, the English perfect apparently does not behave like a past tense with respect to SOT licensing; the complement clause in (47b), unlike its counterpart in (47a), does not allow a simultaneous (SOT) reading.

(47)   a.   John has often believed/thought/said that he was unhappy.

b.   John has (now) realized/accepted that he was unhappy.
c.   John (had already) realized/accepted that he was unhappy.

Applying this test to the infinitival perfect, we see that it can behave like the preterit *past* and the past-shifting perfect in licensing SOT in a finite complement clause:

(48)   a.   John is believed/known/alleged to have claimed that he was unhappy.
        b.   John is believed to claim that he was unhappy.

Once again, the infinitival perfect behaves like the infinitive contains a past tense capable of triggering SOT (i.e. of licensing a past polarity item in a finite clausal complement), though in this respect it does not differ from the (past-shifting) reading of the present perfect in (47a).

6.   Tying up a loose end
        It remains to provide an account of the past-perfect-like interpretation of the infinitival perfect in examples like (27) and (30), repeated here:

(27)   He is rumored to have seen her [only once before] [when I met him].

(30)   John is believed to have already left when I met him.

The most natural move to make is to assume that the infinitival perfect polarity item is licensed by two past-shifting tenses within the infinitive. One way of thinking about this is to assume that one of these is a counterpart to a finite PAST, while the other is a counterpart to the past-shifting semantics normally associated with the perfect. Though, on this view, these past-shifting formatives are covert, their presence does not come for free; perhaps because of economy considerations, their presence must be licensed by an overt PAST polarity element (past in a finite clause, and perfect in an infinitive).
        This in turn raises the question whether all instances of the perfect, in finite and non-finite clauses alike, functions as a PAST polarity item (excluding cases where the perfect polarity item is licensed by TERM or by a subjunctive/counterfactual operator). This does seem to be a viable option, though it must be noted that, when the perfect occurs in its finite form, it never triggers a past-perfect interpretation analogous to what we find in (27) and (30). But this can be accounted for by the fact that finite clauses must contain either *past* or *present*,
which either licenses a past tense independently (*past*) or excludes it (*present*). These polarity items are absent from infinitives, so the nonfinite perfect is free to license two past-shifting tenses in examples like (27) and (30). Even in infinitives, this interpretation is accessible only when two temporal adjuncts are present, suggesting that economy considerations prevent the perfect polarity item from licensing more than one covert past-shifting tense unless the absence of a second past-shifting tense would cause the derivation to crash.

This implies that the past-shifting semantics associated with perfect aspect is really parallel to the past-shifting semantics associated with past tense, since both can be

7.   Conclusion
        In this article I have argued, in the spirit of Hoffman (1966), that the infinitival perfect may function like the finite preterit *past*. The particular instantiation of this idea adopted here is that the infinitival perfect, like the preterit past, is actually not a tense, but rather a PAST

polarity item, serving as the head of a time-denoting expression, rather than as a true past-shifting tense. The infinitival perfect can be licensed by a covert PAST residing inside or outside the infinitive. The upshot is that infinitival clauses must be assumed to contain at least one type of tense (namely, PAST), lending some support to the view that infinitives may contain other tenses as well (simultaneous/present or future-shifting). Infinitival clauses differ from finite clauses, however, in lacking an overt counterpart to finite *present*, which (as I have suggested) encodes the opposite polarity relation to that expressed by *past*. The latter element, rather than PRESENT tense *per se*, sometimes gives rise indirectly to indexical tense interpretations, when it occurs under the syntactic c-command domain of a higher PAST tense.

References

Abusch, D., 1988. Sequence of tense, intensionality, and scope. WCCFL 7, 1-14.

Boogaart, Ronny 1995. Towards a Theory of Discourse Aspectuality. Pier Marco Bertinetto, Valentina Bianchi, James Higginbotham, and Mario Squartini (eds.), *Temporal Reference, Aspect, and Actionality, vol. I, Semantic and Syntactic Perspectives*. Torino: Rosenberg and Sellier, 221-236.

Brugger, G. and M. D'Angelo. 1994. "Aspect and Tense at LF: The Italian Present Perfect." Ms., University of Vienna/University of Venice.

Enc, Murvet 1986. Towards a Referential Analysis of Temporal Expressions. *Linguistics and Philosophy* 9(4), 405-426.

Enç, M., 1987. Anchoring conditions for tense. Linguistic Inquiry 18, 633-657.

Hoffman, T. Ronald. 1966. "Past Tense Replacement and the Modal System." A. Oettinger (ed.), *Mathematical Linguistics and Automatic Translation*. Cambridge, Massachusetts: Harvard University, Harvard Computational Laboratory, VII-1-21. Reprinted in McCawley (1976), *Notes from the Linguistic Underground. (Syntax and Semantics*, 7.) New York: Academic Press, 85-100.

Kamp, Hans and Christian Rohrer: 1983, 'Tense in Texts', in R. Bäuerle et al. (eds.), *Meaning Use and Interpretation of Language*, Walter de Gruyter, Berlin, 250-269.

Klein, W., *Time in Language,* London and New York: Routledge, 1994

Nakamura, A., 1995. On some temporal constructions in Japanese and the theory of tense. Manuscript, University of California, Los Angeles.

Partee, B., Some Structural Analogies Between Tenses and Pronouns in English. *The Journal of Philosophy* 70 (1973)

Prior, A. (1967). *Past, Present and Future,* London: Oxford University Press.

Reichenbach, Hans (1947). *Elements of Symbolic Logic*. University of California Press, Berkeley, CA

Stowell, Tim (1982). The Tense of Infinitives. *Linguistic Inquiry* 13, 1982, 561-570.

Stowell, Tim (1995a). The Phrase Structure of Tense, in J. Rooryck and L. Zaring, eds.*, Phrase Structure and the Lexicon*, Kluwer Dordrecht, Dordrecht, pp. 277-291.

Stowell, Tim (1995b). What is the meaning of the present and past tenses? In: Bertinetto, P.-M., Bianchi, V., Squartini, M. (Eds.), *Temporal Reference: Aspect and Actionality Vol. 1: Semantic and Syntactic Perspectives*. Rosenberg & Sellier, Torino, pp. 381-396.

K. Zagona (1990) Times as Temporal Argument Structure. Manuscript, University of Washington, Seattle.