A Unification-Based Model of Aspectual Type-Shifting

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Abstract

Coercion is an inferential process through which operator argument conflicts are resolved in favor of the meaning of the operator, as when frame adverbials impose inchoative readings upon state type predicates with which they are combined: *The ambulance was there in a few minutes*. De Swart 1998 represents such effects by means of implicit type shifting operators that intervene between operator and argument, ensuring that the argument is of the appropriate type for the operator. This model is compositional insofar as it preserves the integrity of the functor argument relationship, but the proposed mappings are mappings over sets of types, and as such reveal nothing about the contribution of the input lexical representation to the output representation, whether the output type is derived by coercion or by a morphosyntactically transparent type shifting mechanism, e.g., the English Progressive. To remedy this problem, I propose that aspectual type shifts are mappings from one Aktionsart representation to another, and that such mappings preserve input structure. This model employs two Aktionsart based operations, permutation and concatenation, to represent both implicit and explicit aspectual type shifts in English and French. In accordance with De Swart, I assume that coercion effects belong to linguistic interpretation, and are therefore uniformly traceable to clausal morphosyntax. For this reason, interpretations of Past and Present predications which cannot be predicted from the Aktionsart values of the entailed situation radicals, e.g., habitual, progressive, futurate and perfect readings of Present predications, are analyzed as coerced interpretations triggered by aspectual concord requirements of these tenses.

1. Introduction

In lexically driven approaches to syntax, content words restrict potential sisterhood relations by listing the types of expressions with which they can or must co occur. Such models have greatly refined our picture of the syntax semantics interface, but they make certain incorrect predictions. For example, while stative verbs do not license frequency adverbials, the sentence *She lived there twice* is highly interpretable: it describes two distinct episodes of residing in a given place. Such interpretations are produced by a reconciliation procedure whose mapping properties have generated a rich analytic tradition, encompassing works by Verkuyl 1972, 1993, Moens 1987, Moens & Steedman 1988, Jackendoff 1990, Pustejovsky 1991, Pustejovsky & Bouillon 1995, Kamp & Reyle 1993. This inferential process is known in the literature by several labels, including COERCION Moens & Steedman 1988, De Swart 1998 , IMPLICIT TYPE SHIFTING Talmy 1988 and EXTERNAL OVERRIDE Smith 1997:53 *et passim* . The first term has gained general currency, and so I will use it here. Coercion, according to De Swart 1998:360 , is "syntactically and

morphologically invisible: it is governed by implicit contextual reinterpretation mechanisms triggered by the need to resolve semantic conflicts".

Coercion phenomena find a natural account in models based on representational modularity, e.g., Jackendoff 1990, 1997, since in such models constraints on argument functor combinations do not reference syntactic categories like head. Jackendoff 1997:49 proposes that syntactically transparent composition, as represented by the lexical licensing approach, is in fact a default within a wider array of combinatory options, which he refers to collectively as ENRICHED COMPOSITION. Under enriched composition

> t he conceptual structure of a sentence may contain, in addition to the conceptual content of its LCSs lexical conceptual structures , other material that is not expressed lexically, but that must be present in conceptual structure ... in order to achieve well formedness in the composition of the LCSs into conceptual structure. ibid

When an entity in conceptual structure is not a suitable argument for a functor F, the process of composition interpolates a "coercing function" G to create instead the structure F G X , where X is a suitable argument for G, and G X is a suitable argument for F p. 53 . For example, in order to account for the fact that the NP *a beer* denotes a portion or variety of beer, we assume a coercing function which derives a count type from a mass type, making *beer* a suitable argument for the operator represented by the indefinite article. The interpolated function model successfully extricates two head properties that of being a syntactic head, i.e., determining the distributional properties of the phrasal projection, and that of being a semantic head, i.e., calling for an argument of a particular type Zwicky 1985, Croft 1996 . In other words, the indefinite article, while it does not determine the syntactic distribution of its phrasal projection, can nevertheless be said to license a nominal sister denoting a bounded entity. The type shifting functions which Jackendoff describes are not specific to nominal syntax, or even to coercion: the types figure in the semantics of both entities and events and the functions are used to describe both implicit type shifts and type shifts effected through the use of dedicated morphosyntax e.g., the partitive and plural constructions in English . De Swart 1998 , henceforth DS, uses this same general framework to describe the interaction of tense, grammatical aspect and Aktionsart during semantic composition. DS p. 348 represents sentential semantic structure as in 1 :

1 Tense Aspect* eventuality description

As shown in 1 , the model has a nested structure: tense operators scope aspectual operators, which in turn scope eventuality descriptions. Eventuality descriptions, which I will call SITUATION RADICALS, are predicate argument combinations; these can be assigned to a specific Aktionsart class, as the situation radical *She win the race* belongs to the class of achievements Vendler 1967, Dowty 1979, Van Valin & LaPolla 1997 . DS proposes a domain of eventualities comprising three basic types states, processes and events. Cross cutting categories are used to capture the fact that processes may be aligned grammatically either with states, on the basis of the subinterval property Dowty 1986 , or with events, on the basis of dynamicity.[1]

Aspectual operators map eventuality descriptions onto other eventuality descriptions see also Herweg 1991 . DS pp. 368 369 distinguishes two types of aspectual operators: TYPE SHIFTING operators called *shift constructions* by Michaelis 1998 and TYPE SENSITIVE operators, which Michaelis 1998 refers to as *concord constructions*. Type sensitive operators perform identity functions; they are used to represent grammatical concord relations, e.g., the relationship between the indefinite article *a* and a singular count term in English. Frame adverbials like *in ten minutes* are type sensitive aspectual operators: adverbials of this type require telic event radicals as input, and output an event of this same type. Type shifting operators are used to represent those morphosyntactic constructions which 'output' a type distinct from that of the input lexical item. For example, application of the English plural suffix maps a bounded type onto an unbounded type, where the former type is denoted by the nominal head. An example of a type shifting aspectual operator is the English Progressive construction: as shown by stativity diagnostics to be discussed in Section 3, Progressive sentences in English denote states. The 'input type', denoted by the participial complement, is by contrast a dynamic eventuality. Since both type sensitive and type shifting aspectual operators call for arguments of specific types, and since such requirements create the potential for semantic conflict between operator and argument, the DS model predicts correctly that both type sensitive and type shifting operators may perform coercion. For example, as shown by 2 , the type sensitive frame adverbial *in ten minutes* coerces an inchoative event reading of the stative situation radical *They be bored*. Example 3 shows that the type shifting Progressive operator coerces a dynamic reading of the stative situation radical *I live on Pearl Street* DS:363 :

2 They were bored in ten minutes.

3 I am living on Pearl Street.

While aspectual operators locate the situation type relative to reference time, tense operators locate reference time relative to speech time. Accordingly, aspectual theorists, e.g., Herweg 1991 , have assumed that tense operators apply regardless of aspectual class of the situation radical argument. However, as DS demonstrates, certain tense operators, in particular the French imperfective past *Imparfait* and perfective past *Passé Simple* or *Passé Composé* , display aspectual sensitivity: while the imperfective operator calls for a stative situation radical[2], the perfective operator calls for a perfective situation radical pp. 368 375 . As aspectual type selectors, these tenses perform coercion. For example, the stative verb *savoir* 'know' denotes a state in the 'concord condition' in which it receives imperfective past tense inflection as in *Je le savais* 'I knew it' , but an inchoative or episodic event in the 'conflict condition' in which it is inflected as a perfective past: *Je l'ai su* 'I understood it' . In all such cases, the argument is reinterpreted to meet the requirements of the functor. As in Jackendoff 1990, 1997, these reinterpretations are type shifting operators called COERCION OPERATORS by DS which intervene between functor and argument.

Coercion operators perform type shifts identical to those performed by aspectual operators, but differ from aspectual operators in two respects: a they lack reflexes in linguistic structure and b they are 'macro operators', each of which subsumes a number of context dependent semantic transitions DS:361 . For example, the macro operator C_{he}, which maps homogeneous situations onto events, corresponds to two contextually invoked transitions: from state to bounded state, on the one hand, and from state to inchoative event, on the other. Similarly, the macro operator C_{ds}, which maps dynamic situations onto states, subsumes several stativizing functions, including iteration and habituality p. 383 .[3] By using macro operators to represent coercion effects, DS captures the difference between semantic conflict and the various contextual effects which speakers achieve by inducing semantic conflict. The ultimate goal of the exercise is to ensure that the appropriate situation types enter the discourse model while preserving the integrity of the functor argument relationship. It is in this sense that DS claims to provide a "fully compositional analysis of aspect shift in French and English" p. 373 . But the aspectual transitions proposed are defined over sets of eventualities pp. 381 382 , and for this reason they reveal nothing about the internal constitution of the eventuality descriptions or the isomorphic properties of the mappings. The mappings apparently 'swap out' whatever properties of the input type conflict with those of the output type, and therefore they discard aspects of verb meaning which would otherwise play a role in semantic composition.

The cancellation of verbal information in fact appears necessary to the success of certain mappings, whose input and output types do not have overlapping representations. One such mapping involves the iteration operator ITER , which is said to derive a state that "describes an unbounded number of eventualities of the type described by the predicate" DS:383 . In what respect does an iterated accomplishment radical, e.g., *She greet the customers*, qualify as a state, i.e., an unbounded and internally homogeneous eventuality? In Aktionsart based classification, a situation consisting of a series of type identical subevents, e.g., bouncing a ball or jumping up and down, qualifies as a dynamic situation an activity in the Dowty Vendler framework. Similarly, the pairing of an event radical with a frequency adverbial like *many times* yields not a state but an iterated event. Why then should the operator ITER stativize, if in fact it does? The same question arises when we look at the habitual operator HAB, which DS describes as "mapping eventuality descriptions onto state descriptions" DS:383 . This analysis makes sense in light of the stative properties which habitual predications display. For example, habitual sentences denote situations which, like states, can extend to the present. This is shown by the fact that the conjoined past and present tense assertions in 4a are compatible, whereas those in 4b are not:

4 a. She smoked back then and I think she still does.
b. *They had an argument and I think they still do.

Habitual activity is also the default inference available to interpreters when they must reconcile perfective verbal Aktionsart with imperfective morphosyntax, as in 5a b :

5 a. She smokes.
b. She smoked when I met her.

In 5a the perfective situation radical *She smoke* is coded by means of a present tense predication a grammatical option not ordinarily available to event predications: **Look! She smokes*. Sentence 5b entails that the denoted situation obtained prior to a past reference time the time at which I met her again a hallmark of stative predications Vlach 1981, Herweg 1991 . If habitual events are states, as claimed by DS and others e.g., Langacker 1994 , then the facts in 4 5 fall out. However, this model of habituality begs two basic questions. First, why *should* habitual situations be stative? They do not qualify as such on the basis of their internal composition, which is isomorphic to that of iterated events. If habituality does not entail stativity, we must determine what the semantic link between

habitual situations and statives ones actually is. Second, what aspectual operators trigger the stative type shifts which lead, either directly or indirectly, to habitual readings? The only plausible sources of aspectual information in 5 are the tenses, and yet the English tenses appear to purely deictic categories.

Certainly, typological studies attest to the semantic sympathy that exists between present tense and habitual aspect see, e.g., Dahl 1995 and Bybee, Perkins & Pagliuca 1994:151 153 , but if habituality is an implication, aspectual or otherwise, of the present tense, past tense habitual predications remain unexplained. It appears circular to analyze past tense habitual predications like 5a as *ipso facto* perfective, and factually incorrect, since, as 4a shows, they denote extensible situations akin to states. Far from entailing perfective meaning, the past tense in fact appears to trigger certain *stative* type shifts. For example, the combination of a past tense event verb with a state selecting temporal adverb, e.g., *already*, leads to a 'present perfect' interpretation, as in *I already ate* Michaelis 1996 . And yet it is difficult to reconcile this apparent stativizing behavior with the fact that the past tense also plays a role in perfective coercion. For example, the past tense yields inchoative readings of state radicals in temporal discourse Dowty 1986 . If implicit type shifts are to represent linguistically licensed inferences, they must have morphosyntactic triggers. If tenses trigger aspectual coercions, then tenses must be aspectually sensitive operators. It remains to be determined, however, what aspectual requirements tense operators have. Such a determination will rely upon a careful examination of the coercion facts. However, as we have just seen, the behavior of the English past tense in particular is paradoxical, suggesting two antithetical patterns of aspectual concord.

When an aspectual type shift is performed by dedicated morphosyntax, the task of the analyst is somewhat easier, since the relevant aspectual meaning can be isolated syntagmatically from tense. Such constructions are often periphrastic, containing an auxiliary or semi auxiliary head which receives the tense inflection Klein 1992 . As in the case of implicit type shifting, however, the mapping is compositional only if the head and complement denotata share meaning. DS's analysis of English stativizing operators does not reveal the semantic overlap, and it therefore leaves certain puzzles unsolved. DS postulates two stativizing operators for English: the Progressive operator PROG and the Perfect operator PERF , the latter of which is used to model the meaning of Perfect form sentences like those in 6 :

6 a. The Eagle has landed.
b. I've been ill.

According to DS p. 354 , PERF maps an event into a state which results from that event. This analysis respects Aktionsart structure, since telic situation radicals entail resultant states, but it requires considerable refinement in light of examples like 6b . The situation radical expressed by 6b is not an event but a state, *I be ill*. It is not clear in what sense this stative situation radical can be said to have a consequent state. Like Perfect form sentences, Progressive sentences are said to denote states which are temporally situated relative to some other type of eventuality. The state denoted by the Progressive sentence *Mary was reading a book* is said to be "the state of the event of Mary reading a book being in progress" DS:355 . Since the extraction of a portion from a count entity, e.g., a chair, does not thereby create a mass, it is unclear why a proper subinterval of book reading should count as a state. All of the foregoing aspectual transitions lead us to ask the question: how did we get there from here? Since the eventuality descriptions related by the mappings are opaque, it is difficult to tell. The problem being raised here can perhaps best be understood by analogy to theories of lexical relations in general. If a lexical network were based entirely on suppletive relations, it would contain associations but no morphological generalizations; such generalizations rely upon shared word internal structure Bybee 1995 .

By the same token, if aspectual mappings were not constrained by word internal semantic structure they would be anomalous among operations which affect predicate argument structure: the scholarly consensus concerning verb morphosyntax is that verb meaning, and in particular Aktionsart class, matters. Many influential models of verbal argument structure have been based upon the idea due to Jackendoff 1972 that an argument's syntactic expression is determined by the location of that argument in the verb's event structure representation Foley & Van Valin 1984, Pinker 1989, Levin & Rappaport Hovav 1995, Wunderlich 1997 . Syntactic flexibility is accordingly modeled by operations upon event structure. Rappaport Hovav & Levin 1998 have recently proposed an incremental theory of such operations, in which new verb meanings are derived through the expansion of simple event structure templates into more complex ones. In the spirit of this work, I will propose a model of aspectual type shifting based upon the unification of Aktionsart templates. In this framework, aspectual mappings are not defined over members of the input and output Aktionsart classes any more so than lexical rules e.g., causative formation relate tokens of the two event types mediated by the rule. Instead, as in the transition networks of Moens & Steedman 1988 , aspectual mappings relate Aktionsart class representations via shared structure. The Aktionsart classes, as event type predicates, are interpretable in set theoretic terms, as described by DS pp. 381 382 , but our focus here will be upon their behavior as schemas rather than as predicates.

The model which I will outline is based upon a principle which I will call AKTIONSART PRESERVATION: in an aspectual mapping, the event structure representations of input and output types must unify; that is, these representations must be capable of being superimposed upon one another with no loss of information. Superimposition relations feed two operations upon Aktionsart structure: PERMUTATION and CONCATENATION. In accordance with Jackendoff's 1990 multi level model of lexical representation, I will represent Aktionsart classes both as causal structures predicate logic formulas from which participant role information is computed and temporal structures regular expressions from which topological inferences are computed. Permutation operations affect both causal and temporal structure; they ADD or SELECT a single component of Aktionsart representation. For example, a state radical can be shifted to an inchoative event by the addition of the operator BECOME to its representation. Concatenation operates upon temporal structure.

Following Bickel 1997 , I will use two event structure primitives, STATES ( ) and TRANSITIONS (, to describe temporal representations. In order to represent embedding relations in temporal structure I will introduce a complex component of temporal representation: EVENT CHAIN . An event chain consists of a series of state transition pairs, as in 7 . The 'Kleene plus' symbol in this formula is intended to represent the fact that an event chain necessarily contains a type identical onset and offset events and b at least one antipodal, type identical event. For example, the transitions in 7 can be taken to represent visits to a museum, with the intervening states representing, respectively, being in the museum and being home.

7

Event chains belong to the Aktionsart class of activities, or, more precisely, heterogeneous activities, e.g., *Sue pace back and forth*. Accordingly, the transitions in 7 can be taken to represent events of Sue walking to one side of the room and the contiguous states Sue's location following each passage across the room. A transition is necessarily defined relative to a prior or subsequent state. For this reason I will assume that all intervals which are contiguous to a transition event, including those which precede an onset transition and those which follow an offset transition, are states. Such states, which I will refer to as RESTS, are available for selection by the permutation operation, resulting in a stative output type. Because the selection operation can target any rest whether initial, final or intermediate it finds states within Aktionsart representations where none have been

presumed to exist. For this reason, I will show, the selection operation provides a compositional account of a wide variety of stative type shifts, including, respectively, those which result in prospective, progressive, perfect, and habitual/generic construals.

By describing aspectual type shifts as operations upon Aktionsart structure, I will argue, we can explain: 1 the relationship between input and output types in aspectual mappings effected both through coercion and verbal morphosyntax and 2 constraints upon the set of possible aspectual transitions. This paper will be structured as follows. In Section 2, I will set forth the two tier model of verbal Aktionsart outlined above, describe the relation of this model to the supercategories indexed by aspectual operators and explain the operations on Aktionsart structure which underlie aspectual type shifts. In Section 3, I will use the Aktionsart based framework to describe implicit and explicit type shifts performed by the Progressive and Perfect constructions in English. In Section 4, I will extend the Aktionsart based framework for aspectual mapping to tense operators, which I will likewise analyze as performing unification based event structure mappings. In this account, aspectual sensitivity is invoked not merely to explain morphosyntactic oppositions within systems of past time reference, but rather as a general theory of the tense aspect interface. Accordingly, I will argue that, contrary to recent claims, the present and past tenses of English are neither 'neutral' nor marked relative to their counterparts in other languages. Instead, these constructions, like their French analogs, index specific situation types. Such concord requirements reflect the fundamental role played by a specific class of speech acts REPORTS in aspectual categorization. In a concluding section, Section 5, I will suggest that the division of labor between coercion and explicit type shifting in a grammar reflects a tradeoff between the two halves of the Gricean quantity maxim, as described by Horn 1984 .

2. Aspect, Aktionsart and Aspectual Shift

2.1. Aspectual Ontology

How, and in what form, is aspectual information made available to morphosyntax? The mechanism is invocation, as described by Zwicky 1989, 1994 ; the categories invoked are aspectual types. While constructions which index aspectual categories may *be* aspectual constructions, they need not be: tense and evidential constructions, among others, typically invoke specific aspectual types. The aspectual types invoked by morphosyntactic constructions are identical to those denoted by verbs and their projections. As a consequence, aspectual information is represented in a uniform way throughout the grammar. This is not a traditional view. In the aspectual literature, it is generally assumed

that while verbs denote states and various event types e.g., processes and externally caused state changes , the grammatical aspects IMPERFECTIVE and PERFECTIVE reflect instead the narrator's 'attention to endpoints'. On this style of account, of which Smith 1997 and Comrie 1976 are representative, perfective marking is used to present a situation as having begun and ended within the relevant interval. Imperfective marking, by contrast, "presents part of a situation, with no information about its endpoints" Smith 1997:73 . This type of account is based upon a visual metaphor, in which the grammatical aspects are lenses of various powers through which speakers view the event schemas denoted by verbs. While this basic metaphor is well founded and revealing, it obscures the fact that aspectual presentation is a form of categorization. This point may be best understood by analogy to the domain of entities. While we could say, for example, that the speaker who pairs a mass noun with an indefinite article is 'attending to the boundaries of the substance', such an account would fail to capture a generalization: this speaker is presenting a mass as an individuated entity by using the syntactic structure otherwise projected by count nouns. By the same token, the speaker who combines an event verb with the morphosyntax typically projected by a state verb is presenting that event as an instance of the state category, just as the combination of perfective morphosyntax with a state verb entails that the state so presented is a type of event. If aspectual encoding is ad hoc categorization, then it is reasonable to conclude the event state distinction underlies semantic representation at both the lexical and morphosyntactic level.

What is the semantic basis of the event state distinction? According to Langacker 1987:258 , this distinction has a "primal character", because it is linked to a basic cognitive capacity: the ability to perceive change or stasis over time. It is generally agreed that while events contain distinct subevents and are bounded in time, states lack internal structure and are not bounded in time. In Langacker's words, "the covariant properties of change and bounding can be regarded as two sides of the same coin as can their opposites, constancy and open endedness " 1987:261 . Although this characterization is generally valid, it does not obviously extend to those events which partake of both imperfective and perfective properties. These events, which are generally referred to as either activities or processes, include running and reading. Like other event types, activities in English cannot be reported as ongoing at speech time by means of the simple present tense*: *Look! Sue reads*. While activities like reading contain distinct subevents e.g., page scanning and page turning , their endpoints are arbitrary. Unlike so called telic events, they can be protracted indefinitely through the iteration of their subevents; no subevent represents a logical stopping point, since activities do not culminate in any resultant state. While there are activities which have episodic construals, e.g., sleeping, sitting in a chair and holding

something in one's hand, these activities lack subevents; they are simply periods of stasis. I will refer to such activities as HOMOGENEOUS ACTIVITIES, to distinguish them from those activities which, like running and singing songs, have heterogeneous internal part structure when parsed into sufficiently small subintervals. Because some activities are in principle unbounded while others lack subevents, it appears that the two properties of change and boundedness, while jointly defining the class of telic events accomplishments and achievements , are only sufficient conditions upon eventhood and not necessary ones.

The property which unifies all event types is epistemological in nature: events are those situations whose existence cannot be verified on the basis of a momentaneous 'sample'. Let us illustrate this criterion by application to the least prototypical class of events activities, both heterogeneous and homogeneous. Verification of a heterogeneous event, e.g., running, requires several frames. Since running consists of successive leaps using alternating legs, witnessing a single leap is insufficient to verify an event of running. In the case of homogeneous activities like holding a broom, standing in a corner or sleeping, verification requires access to points of inception and termination, as well as several contiguous frames between those endpoints. Sleeping is distinct both from being comatose and from nodding off for a second, and staying at your sister's house is distinct both from popping in on your sister and living with her. While states like being tall have duration in the same way that the events of sleeping and standing in a corner do, states do not take time, since any subinterval of a state counts as an instance of that same state. The existence of a state can thus be confirmed on the basis of an atemporal sample. The same cannot be said of a STATE PHASE, e.g., *She was sick for three days* or *She was short as a child*: once the duration of a state is fixed, it is 'tracked' in the same manner that an activity would be. Unlike activities, however, state phases do not entail energy input. For example, one can try to sleep or lie on the floor, but one cannot try to be sick for three days or to be short as a child.[4]

The epistemic criterion described here is highly compatible with the picture of the event state distinction which emerges in the viewpoint based models of grammatical aspect discussed above: perfective aspect involves 'endpoint focus' because the assertion that an event exists entails confirmation that this event has begun or ceased, or both. Under the assumption that grammatical aspect and Aktionsart have uniform semantic representations, we expect that categories at the two levels will have such isomorphic characterizations. The epistemic characterization of the event state distinction also comports well with what we know about the differential behavior of events and states in temporal discourse Partee 1984, Dowty 1986, Herweg 1991 : while events are included within the reference intervals for which they are asserted, states include those reference

times. For this reason, a speaker who makes a stative assertion, e.g., *She was there at 3:00*, is not presumed to know whether the denoted situation also went on at a superinterval which includes the topical interval. By contrast, speakers who make perfective assertions, e.g., *She ran at lunchtime*, thereby signal that no such superinterval exists. That this implication is an entailment and not merely a quantity based implicature is shown by the ill formedness of the disjunction in 7 :

7 *She ran at lunchtime yesterday. In fact, she ran prior to that.

As Smith observes 1997: 171 , the perfective viewpoint for atelic situations "includes an arbitrary final endpoint" while the reference interval of a telic predication "includes a natural final endpoint".[5]

Figure 1 gives a hierarchical classification of the Aktionsart classes, as well as the conceptual bases of the distinctions:

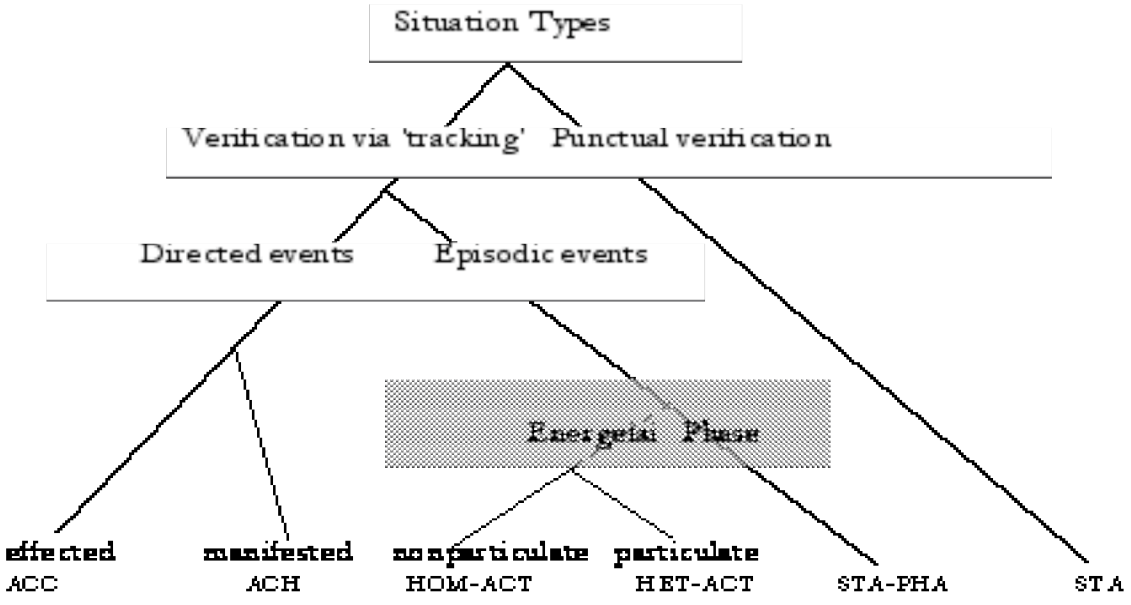

Figure 1. Hierarchical structure for the Aktionsart classes

In Figure 1, situations are divided into those which take place over time events and those which hold at a given point in time, states STA . Within the class of events, a division is made between those events which culminate in a specific resultant state directed events and those which do not episodic events . The class of directed events is divided into accomplishments ACH , effected changes of state, which involve a preparatory process, and

achievements ACH Achievements are state changes which come about rather than being brought about Dowty 1979, Van Valin & LaPolla 1997 . In the class of episodic events, we distinguish between *energeiai* and state phases STA PHA . The label *energeia* is used, following Aristotle, to refer to the class of actions which occur over a period of time but do not culminate Binnick 1991:142 143 . The category of *energeiai* includes internally homogeneous activities HOM ACT and activities which comprise iterated subevents HET ACT . State phases are states which begin and end within the reference interval and to which an explicit duration may be assigned, e.g., *I was depressed when I lived there* Herweg 1991 . In contrast to states, state phases have perfective behavioral properties. For example, they can be enumerated *Anna was ill for two weeks twice* and they cannot be reported by means of the simple present tense **Anna is ill for two hours* . . Like states, however, state phases require no energy expenditure for their maintenance.

2.2. The Logic of Aspectual Concord: An Illustration

All of the Aktionsart classes represented in Figure 1 play a role in one or more aspectual type shifts. For example, several of these types are invoked by aspectually sensitive adverbial expressions, including frequency, frame and durational adverbials. Examples 8 10 illustrate the aspectual requirements of these adverbials by giving, in each a sentence, an example of the concord condition and, in each b sentence, an example of the conflict condition, which triggers a coerced reading:

8 **Frequency adverbial**

a. I went outside twice today. concord

b. I was outside twice today. coercion

9 **Frame adverbial**

a. She fell asleep in a few seconds. concord

b. They were bored in a few seconds. coercion

10 **Durational adverbial**

a. She slept for two hours. concord

b. He was a decent person for three days. coercion

Frequency adverbials, exemplified in 8 , require perfective situation radicals as arguments. Why should this be? In accordance with Herweg 1991:976 , we can describe frequency

adverbials as enumerating applications of a characterizing predicate to an interval. As per Herweg's model, we interpret stative predications as properties of the intervals for which they are asserted to obtain: *P t* . Since *I be outside* is a strong subinterval predication, it can apply infinitely to the interval which is its argument; all subintervals of the argument interval have subparts as well. This is the source of the semantic conflict in 8b : application of the predicate to the interval is infinite and cannot be enumerated. This conflict triggers perfective coercion; the stative event radical receives an episodic construal.

The conflict exemplified in 9b involves a clash between the semantics of state radicals and the semantic requirements of frame adverbials. Frame adverbials are interpreted according to the logic of containment; the containment schema licenses upward entailment and downward compatibility relative to a scale. If, for example, I finished a particular task within ten minutes, I also finished it within 20 minutes. And if in fact I finished the task within five minutes, I could still truthfully assert that I had finished it in ten minutes. This pattern of reasoning is inverted in the case of assertions involving intervals of states and activities, which are upward rather than downward compatible. In the case of an activity predication, any transition contiguous state within the reference frame is potentially an intermediate state rather than a final one. By the same token, any interval during which a state holds could also be a subinterval of a larger interval at which that same state holds. For example, the sentence *He was in London yesterday* can always be interpreted in such a way that the state of his being in London is not circumscribed by and in fact contains the temporal boundaries denoted by *yesterday*. Frame adverbials by the logic of containment entail that the situation denoted is circumscribed by the expressed interval. For this reason, frame adverbials require telic event type arguments. This requirement is the basis of the semantic conflict in 9b . This conflict is resolved in favor of the telic type licensed by the frame adverbial; the state radical accordingly receives an inchoative reading. As expected, activity radicals also yield coerced telic readings when combined with frame adverbials. DS observes p. 359 that such type shifts may create either achievement or accomplishment construals, as in, e.g., *My radio program ran in less than four minutes today*. Here, the frame adverbial *in less than four minutes* denotes either the running time of the program or the time during which the program began to air following some other event say, a call to the radio station . In the Aktionsart based framework to be outlined below, these two readings involve distinct permutations of the input activity representation. Addition of an inchoative event to the input activity yields the accomplishment reading. The achievement reading, by contrast, results from selection: the event selected is the activity's onset, which likewise counts as an inchoative event.

Durational adverbials, exemplified in 10 , are not generally analyzed as type sensitive operators, but rather as type shifters. For example, DS p. 379 , analyzes durational adverbials as mapping homogeneous eventualities states and activities onto quantized eventualities. The problem with this view, as I see it, is this shift has no discernible consequences in the case of activity radicals, which begin and end within their reference intervals whether they are explicitly 'bounded' or not. I propose instead to treat durational adverbs as selecting for episodic situation radicals, i.e., activities and state phases. Because durational adverbials are number expressions, they generate upper bounding implicata which are subject to suspension, as in, e.g., *She slept for two hours yesterday, if not three hours* see fn. 5 . Examples of suspension should not, however, be taken as implicating that durational adverbials apply to *unbounded* situation radicals, since such situations do not have a finite extent. Mittwoch 1988:231 supplies a helpful analogy here: if we know that a line extends beyond the boundaries of a plastic window through which we are viewing it, we would not attempt to measure the line because we would only be measuring the window. On the present account, the conflict in 10b arises from the combination of a durational adverbial with a stative situation radical, e.g., *He be a decent person*. This conflict is resolved in favor of the semantic requirements of the operator: the state radical shifts to a state phase the event type which with it shares the most semantic structure. In the next section, we will examine the means by which semantic overlaps among the Aktionsart categories are represented.

2.3. The Two-Tier Model of Aktionsart Representation

Situation types are both topological structures and gestalts. They are topological structures because they occupy intervals in characteristic ways irrespective of the size of the interval. They are gestalts because each one indexes an idealized causative event. This idealized event, which has been described as a causative prototype Lakoff & Johnson 1980:69 71 , a contingency based event structure Moens & Steedman 1988:18 and a causal chain Smith 1997:21 22, Croft 1998 , involves direct manipulation of an entity by an agent, who brings about a perceptible change of state in that entity. The situation types are characterized with regard to the 'span' of the causal chain which they denote. For example, activities prototypically represent motor programs executed by agents while states prototypically represent effects. On this model, some events contain other events, and contiguous events have overlapping participants. These relations have syntactic consequences, since, for example, an undergoer argument will be such whether it is licensed by a trivalent causative verb or its stative endonym. Although verbs lexicalize portions of the causative chain, the meaning components which distinguish a given verb from another within its lexical field

have no direct syntactic relevance. For example, the accomplishment verbs *buy* and *sell* denote bidirectional transfer of goods and currency, respectively but their syntactic realizations do not distinguish them from verbs of unidirectional transfer, e.g., *give*. Semantic neutralization is a property of temporal representation as well. For example, as Dowty observes 1986:42 43 , achievements do not literally lack preparatory processes; it is simply that these processes, e.g., the stages leading up to dying or winning a race, cannot generally be tracked by humans. By the same token, states clearly begin and end; these transition events, however, do not figure in the pre production representation of a speaker who chooses to report a state Slobin 1996 .

2.3.1. Causal representation. Rappaport Hovav & Levin 1998 , henceforth RHL, capture the distinction between aspectual and frame specific features of verb meaning by proposing a set of fixed event structure templates with which verbs can combine. Verbs 'fill in' information represented by constants; the type of the constant determines the information that the verb will be required to provide. Table 1 presents an adaptation of RHL's inventory of event structure templates. In these templates, operators shown in small caps represent subevent connectives in the Jackendoff Dowty Vendler tradition, while variables represent participant roles. Constants are represented by the italicized material in angled brackets. I have augmented the RHL inventory of event templates in order to represent Aktionsart classes and event properties which, while having no direct relevance to verbal argument structure, figure prominently in aspectual type shifts. The class of state phases has been added and the class of processes split into two classes: homogeneous and heterogeneous activities. The state phase template, as shown, contains the operator HOLD. This operator combines with a stative situation type to yield a state which begins and ends. The homogeneous activity template, as shown, also contains the operator HOLD. In this template, however, HOLD takes two arguments, a state radical and an effector. The effector argument is also an argument of this state predication; this notation reflects the fact that the subject denotatum, although nonagentive, is responsible for the maintenance of the denoted state. The template for heterogeneous activities contains the operator REPEAT. This operator has the same valence and 'control' properties which HOLD has in the homogeneous activity template. The REPEAT operator captures the observation that heterogeneous activities, e.g., *skip*, consist of iterated type identical events. Since a heterogeneous activity is itself an event, a heterogeneous activity may 'fill in' the event variable in the heterogeneous activity template. The resulting event is an event chain, or, equivalently, a heterogeneous activity. As in RHL's original model, the

achievement template properly includes the state template, while the accomplishment template contains the templates for activities, achievements and states, respectively.

Aktionsart Class	*Causal Representation*
State	x <STATE> e.g., *seem*
State phase	HOLD x <STATE> e.g., *be sick for two days*
Homogeneous activity	x HOLD x <STATE> e.g., *sleep*
Heterogeneous activity	x REPEAT x <EVENT> e.g., *skip*
Achievement	BECOME x <STATE> e.g., *sink*
Accomplishment	x REPEAT x <EVENT> CAUSE BECOME y <STATE> e.g., *build*

Table 1. Causal representation (based on Rappaport Hovav & Levin 1998)

The RHL model is not unique in using Aktionsart class to predict the syntactic behavior of verbs, but it provides new insights into a traditionally vexing question: what are the constraints upon semantic derivations? Models which employ operations upon event structure, e.g., Gropen et al. 1991 and Wunderlich 1997, permute representations relatively freely in order to capture the semantic implications of argument structure alternations. RHL propose instead a single mechanism of semantic derivation, TEMPLATE AUGMENTATION: "Event structure templates may be freely augmented up to other possible templates in the basic inventory of event structure templates" p. 111 . The added structures are the subevents represented by operators, e.g., BECOME. Template augmentation involves the unification of Aktionsart representations. Unification can be described metaphorically as the stacking of transparencies upon which strings of characters are written. The transparencies can be stacked on top of one another in any order as long as all of the symbols on each slide show through. If two transparencies contain identical strings, e.g., AB, then information is neither lost nor gained by superimposition. Through template augmentation, an event structure template, e.g., the heterogeneous activity template, projects that event structure representation by which it is entailed the accomplishment template. Template augmentation thereby drives verbal valence augmentation at the syntactic level. For example, the verb *sweep* has both a monovalent activity pattern *She swept for hours* and a trivalent accomplishment pattern, in which it denotes causation of

motion *She swept the dust off the steps* ; the accomplishment template licenses both the direct object and locative oblique.

Template augmentation is a more constrained operation than unification, in two respects. First, augmentation allows only pairwise unifications. Second, augmentation is limited to the addition of a single subevent, as expressed by an operator and the arguments it projects. For example, although accomplishment and state templates overlap, creating an accomplishment template from a state template would entail the addition of two subevents: that headed by BECOME and that headed by CAUSE. One can, however, build an accomplishment representation from an activity representation: this entails the addition of a single subevent, represented by the operator CAUSE and its two situation type arguments, an activity radical and an achievement radical. The first argument unifies with the representation of the input type. In the very same way, one can build an accomplishment representation from an achievement representation: CAUSE and its activity radical argument count as a single subevent, or COMPONENT, of causal representation. [6] In this case, it is the second argument of CAUSE which unifies with the representation of the input type. We will assume that the two foregoing constraints are operative as well in aspectual mapping.

It is not surprising that an Aktionsart based model of argument projection also provides a model of aspectual type shifts. However, the two types of models target distinct aspects of the syntax semantics interface, and accordingly require some divergent mechanisms. While models of argument projection represent the effect of verbal semantics on syntax, models of aspectual type shifting represent the effect of syntax on verbal semantics. Since the latter type of model does not build syntactic structure, it is as likely to pare as to expand event structure representation. In fact, as we will see, both implicit and explicit type shifts involve such 'paring' operations, which we will refer to as SELECTION operations. Is template reduction incremental in the same way that template augmentation is? This is a question which we will approach in Section 2.4. However, we must first expand our concept of what constitutes an 'increment' of Aktionsart representation. The next section will demonstrate that subevents are not the only meaning units which are visible to Aktionsart based operations. As we will see, this set also includes the units of temporal representation.

2.3.2. Temporal representation. While causal representation describes relations among entities, the entities of temporal representation are the situation types themselves. Temporal representation captures the patterns of stasis and change which are characteristic of each situation type. Temporal representations do not, for example,

represent causal links between contiguous situations or agentive implications attaching to certain participants. Table 2 gives temporal representations for each of the six Aktionsart classes discussed above. These representations utilize the three situation type components described in Section 1. They are: STATES (□), TRANSITIONS (□, and EVENT CHAINS □. States are internally homogeneous situations which include no transitions i.e., temporal boundaries . For this reason, we say that states INCLUDE the intervals at which they hold Partee 1984, Herweg 1991 . Transitions are state change events, and as such are isomorphic to achievements. However, the category of transitions is not limited to those inchoative events which are lexicalized as achievement verbs, since it also includes the events of INCEPTION and CESSATION, which jointly define the endpoints of a situation. For example, the endpoints of sleeping, a homogeneous activity, are, respectively, the events of falling asleep and waking up. Unlike states, transitions cannot stand alone, nor can they be iterated without the mediation of a state; accordingly, the representations * □ and * □□ are ill formed Bickel 1997:126 . By contrast, the representation □□□ is well formed; it corresponds to both a state phase and a homogeneous activity recall that agentive properties are invisible to temporal representation . When the representation □□□ is iterated it corresponds to an event chain or heterogeneous activity □. The representation corresponding to heterogeneous activities contains the notation □□⁺, denoting one or more instances of particular state change, e.g., that of crossing the room in the example of pacing discussed in Section 1. While both heterogeneous activities and homogeneous activities can be protracted indefinitely, the mechanisms are different in each case. In the former case, expansion entails concatenation, while in the latter case expansion simply entails lack of change. Notice, however, that in neither case does expansion have any effect upon bounding: the initial and final transitions are present whatever intervenes between them. When a heterogeneous activity is embedded in an accomplishment representation, shown in Table 2 as □□□, its offset transition is superimposed upon the initial transition of the embedded achievement, □□. This reflects the observation that, for example, in an event of walking home, the threshold crossing transition is also the final step of the walk.

Aktionsart Class	*Temporal Representation*
State	□
State phase	□□□
Homogeneous activity	□□□

Heterogeneous activity	□□[□□]$^{+}$□
Achievement	□□
Accomplishment	□□□

Table 2. Temporal representation (based on Bickel 1997)

The constraint which rules out sequences of the form *□ and *□□ need not be stipulated, since one cannot logically conceive of an inchoative event which is unaccompanied by a resultant state. Notice, however, that in the temporal representations given in Table 2 resultant states are not consistently indicated. In particular, states which follow events of termination are missing from the representations. These states are not indicated because they can be 'read in' on the assumption that transitions are isomorphic to achievements. Notice, however, that ANTECEDENT states are equally crucial to the definition of transition, and our temporal representations lack these as well. Let us assume, therefore, that antecedent states, like consequent states, can be subsumed, along with periods of stasis between chained events, under the rubric of RESTS, as described in Section 1. The term *rest* is meant to be construed as it is in rhythmic representation: a pause between 'beats', or transitions. While in the foregoing remarks I have distinguished intermediate states from antecedent and consequent states, this distinction is not particularly meaningful: because events are located with respect to one another on a time line, all events potentially qualify as chained events and all states can be construed as intermediate states. This point will become particularly relevant when we consider chained events which represent habitual and generic situations.

2.4. Aspectual Type Shifts as Operations on Aktionsart Structure

2.4.1. Multiple Semantic Alliances. The Aktionsart classes, like phonemes, are subject to cross cutting categorizations that are not revealed by taxonomic representations like Figure 1. These cross cutting categorizations enable us to explain why, for example, states pattern with activities for some grammatical purposes and with achievements for others. Figure 2 represents relations of semantic overlap among the Aktionsart classes as a Venn diagram. In this diagram, the intersecting sets contain the semantic properties of each Aktionsart class.

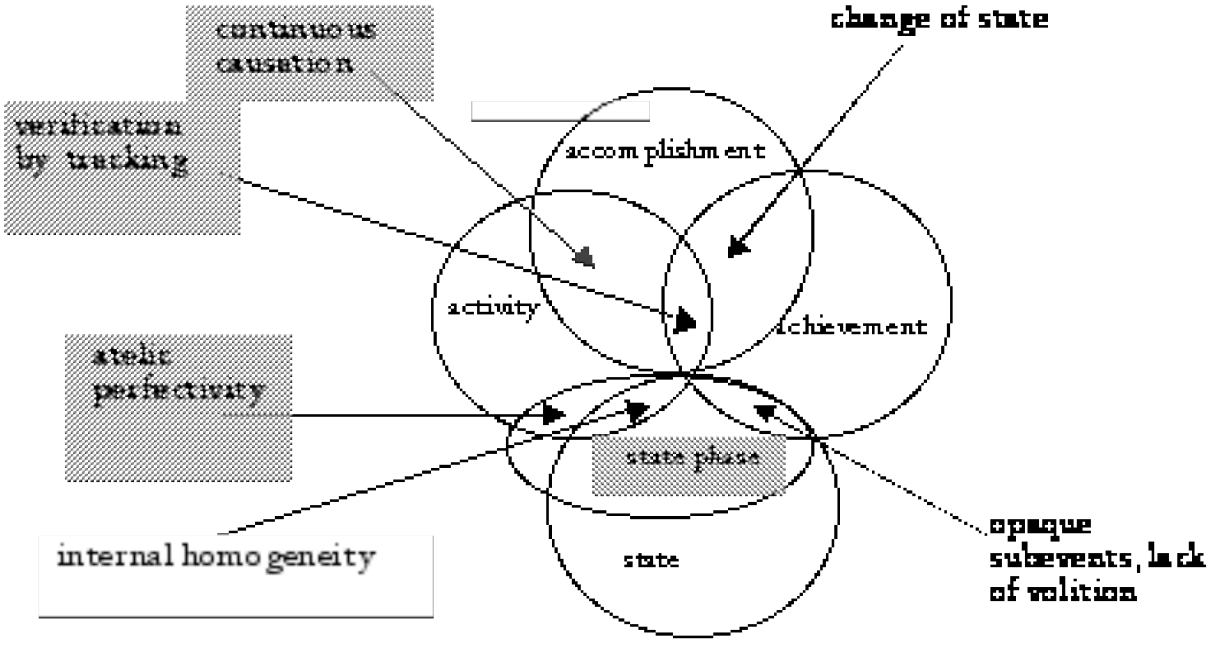

Figure 2. Semantic overlaps among the Aktionsart classes

The event state division is represented by the intersection of the three sets at the top of the diagram. As discussed in Section 2.1, activities, accomplishments and achievements all 'take time'; by contrast, states can be verified on the basis of a momentaneous temporal 'slice'. Our particular interest here, however, are the pairwise associations depicted in the diagram. The following list sketches the semantic basis of each overlap relation and its grammatical reflexes:

- **Activities and accomplishments** are situations which cease without energy input. This overlap is reflected in the inclusion of activity representations in accomplishment representations causal representation. A grammatical reflex of this semantic overlap is the following: as shown by diagnostics like imperative formation, activity and accomplishment sentences generally have agentive subjects, whereas verbs of the other Aktionsart classes do not Smith 1997:Ch. 1 .

- **Achievements and accomplishments** both entail the inception of a state, i.e., a result state. Causal representation captures this overlap relation by including achievement representations in accomplishment representations. Adverbial selection

reflects this semantic overlap: because they lack the cumulativity property, achievement and accomplishment predications are compatible with frame adverbials e.g., *in ten minutes* ; state and activity predications are not.

- **Achievements and states** both have patient subjects. This semantic overlap is the basis of shared grammatical patterns of various kinds: in contrast to accomplishments and activities, state and achievement verbs tend to be intransitive, fail agentivity diagnostics like imperative formation, and appear naturally in presentational constructions, e.g., verbs of the two classes welcome subjects having 'thetic' accentuation, e.g., *Your MOM is here, Your MOM left*.

- **States and activities** both license the subinterval entailment Bennett & Partee 1978 , although, as described by Dowty 1986:42 , activities have the subinterval property only down to intervals of a certain size; for example, a single leap does not count as an instance of running. Certain adverbial co occurrence restrictions reflect the fact that states and activities share the subinterval property: while *for* headed phrases of duration e.g., *for ten minutes* are compatible with state and activity predications, they are not compatible with telic predications.

- **Activities and state phases** are both atelic events. Both activities and state phases can be located within a present contiguous time span whose left boundary is expressed by a *since* adverbial, as in, e.g., *Someone has sat in my chair since I was here last*, *I've been at home since noon*. Perfect predications with telic complements are not generally welcome in this context: ??*He has died since noon* Michaelis 1998: 168 170 .

- **States and state phases** are both internally homogeneous situations which involve a nonagentive participant. These two types are lexicalized by a single set of verbs: there are no verbs which intrinsically denote state phases, Those verb argument combinations which do denote episodes of stasis denote homogeneous activities rather than states of any kind.

The grammatically relevant intersections described above provide the independent motivation for an incremental model of aspectual type shifting, since the classes which count as the same for certain grammatical processes also have minimally distinct representations. But the foregoing list does not exhaust the potential semantic associations among Aktionsart classes, and we are therefore inclined to ask whether aspectual type

shifts are *necessarily* incremental. A positive answer to this question would entail that the input and output Aktionsart representations mediated by any given aspectual mapping can differ by at most one component of causal or temporal representation. In order to investigate this question, we will look first at operations which PERMUTE Aktionsart structure and then at the CONCATENATION operation, which, as described earlier, maps an event radical to a series of type identical events, i.e., a heterogeneous activity. We will find that while all aspectual mappings involve the unification of two Aktionsart structures, as per the Principle of Aktionsart Preservation, the AMOUNT of shared structure is not uniformly relevant In the course of this investigation we will encounter a number of examples which appear be violations of Aktionsart Preservation. I will show that these examples are in fact INDIRECT TYPE SHIFTS, in which the input and output types are related by two mappings, each of which conserves Aktionsart structure.

2.4.2. Permutation. As described in Section 1, permutation operations add or select a single component of the input Aktionsart representation. Recall from Section 2.3 that the definition of component differs according to whether we are using causal or temporal representation. In causal representation, a component corresponds to an operator, e.g., HOLD, and the arguments it projects. In temporal representation, a component corresponds to a state, transition or event chain. As an example of addition, consider the transition from state to achievement. This type shift occurs implicitly when, for example, a frame adverbial is combined with a state radical, as in 9b , repeated here as 11 :

11 They were bored in a few seconds.

This type shift involves the addition of the operator BECOME, or, equivalently, a transition, to the causal or temporal representation of the state.[7] A further example of addition is the shift from achievement to accomplishment. This type shift underlies the coercion effect in 12 :

12 He finished dying and got carried off the stage.

In 12 , an achievement radical, *He die* , is construed as an accomplishment radical in order to satisfy the semantic requirements of the verb *finish*, which selects for complements denoting effected results. This type shift involves the addition of the operator REPEAT and its arguments, or, equivalently, an event chain □, to the representation of the achievement.

As an example of selection consider the explicit type shift performed by the copular resultative construction in English, exemplified in 13 :

13 a. The truck is loaded.
b. The soup is cooled.

The resultant state predications in 13 denote states, or more specifically those states which are embedded in the Aktionsart representations of their participial complements. These states are, respectively, that of the truck being full and that of the soup being cool. The stative type shift performed by the resultative construction involves selection of the state component in the causal or temporal representation of the lexical verb. Since both the accomplishment verb *load* and the achievement verb *cool* entail a resultant state, the application of selection conforms to Aktionsart Preservation. Notice, however, that the type shift exemplified in 13a is not incremental: states and accomplishments differ by more than a single component of Aktionsart representation, since the accomplishment entails two subevents which the state does not.

In fact, the accomplishment state mapping is one which selection frequently performs. Consider, for example, rest selection, as illustrated in 14 :

14 a. She's about to load the truck.
b. She will load the truck.

Both 14a and 14b exemplify type shifting constructions which, as is typical, express the two types that they mediate in their periphrastic forms: while the auxiliary head denotes a state, the infinitival complement denotes an event. Although both of these constructions are traditionally regarded as exponents of 'future tense', this label seems unrevealing, since it fails to capture the stative properties which both constructions exhibit, e.g., both constructions are used to express present tense reports. While the stative character of these and other future markers has traditionally resisted a compositional explanation, in the present framework their stativity is a straightforward product of selection. The selected component is an antecedent rest a state preceding the initial transition of the event chain embedded in the temporal representation of the input event radical.[8] This mapping, like that exemplified in 13 , is nonincremental. Therefore it appears that while addition operations are uniformly incremental, selection operations are not. However, all permutation operations rely upon shared structure: no component of the input Aktionsart

representation can be selected or augmented if that component is not common to both input and output types.

Occasionally, however, permutation operations appear to violate Aktionsart Preservation. I will now suggest that these violations are only apparent, since the relevant mappings are in fact mapping chains, as described by Moens & Steedman 1988: 21 22 : ordered pairs of mappings, the first of which feeds the second. I will refer to these chained mappings as INDIRECT TYPE SHIFTS since they involve the mediation of a third aspectual category. Indirect type shifts exist because semantic transitions, as equivalence relations, are transitive; that is, if A=B and B=C then it follows that A=C. Indirect type shifting will be invoked below in the analysis of the Progressive. The Progressive, as I will argue below, maps activity radicals onto state radicals. A consequence of this analysis is that coercion is involved in the interpretation of 15 :

15 She was winning the race when she got tripped.

For Dowty 1986:42 sentences like 15 suggest that achievements are not intrinsically punctual. I will suggest instead that the source of the durative implication in 15 is not the denoted achievement radical but rather an implicit type shift whose output type is an activity. This mapping, whether it is accomplished by addition or selection, appears to violate Aktionsart Preservation at the level of causal structure, since heterogeneous activity and achievement representations have no shared subevents. The facts of interpretation will suggest, however, that this mapping is an indirect one: Progressive form achievement predications like 15 denote activities entailed by the Aktionsart structure of a third category that of accomplishments. It is for this reason, I will argue, that Progressive form achievement verbs are construed as denoting effected rather than manifested results.

As an additional example of indirect type shifting, consider 16 :

16 a. I put the champagne in the freezer for a few minutes.
b. I fell asleep for a few minutes.

The examples in 16 illustrate a potentially ambiguous interaction between telic situation radicals and durational adverbials. Both 16a and 16b have a an event chain reading and b a stative reading, in which *for a few minutes* expresses the duration of the entailed resultant state the beer being in the refrigerator, my being asleep . Both readings involve coercion effects. The coercion trigger in each case is the durational expression. As described in Section 2.2, a durational expression is a type sensitive operator which requires

an episodic situation radical i.e., an activity or state phase as its argument. The coerced event chain reading is produced by concatenation, described in Section 2.4.3 below. The coerced stative reading is evidently produced by selection, but it would appear that this mapping violates Aktionsart Preservation, since it relates categories whose causal representations do not unify: accomplishments and state phases, in the case of 16a , and achievements and state phases, in the case of 16b . As in the case of 15 , however, the apparently problematic mapping is merely indirect. The mediating category in this case is the stative type. This type is both the output of a selection operation and the input to an addition operation. The output of the latter operation is the state phase type. Indirect mappings of this nature also play a role in the description of concatenation, as we will see in the next section.

2.4.3. Concatenation. The concatenation operation is roughly similar to the repetition operations assumed by a number of aspectual theorists Jackendoff 1997:51 52, Bickel 1997:117 119, DS: 361 362 , but there are crucial differences between concatenation, as envisaged here, and these antecedent notions. Like other mappings in the general class of repetition operations, concatenation applies to an event type i.e., dynamic situation radicals , and outputs a series of events which are type identical both to one another and to the input event. In addition, like other iteration operations, concatenation is used to represent both implicit and explicit type shifting, e.g., coerced readings triggered by frequency adverbials. The difference between concatenation and its predecessor notions lies in the nature of the output type. While repetition operations are typically assumed to output state types, concatenation instead outputs an event chain, which, as discussed above, qualifies as a heterogeneous activity rather than a state. The identification of event chains with heterogeneous activities is an independently motivated one, since, as has been widely observed, telic verbs with multiplex complement denotata receive activity readings. Note, for example, the contrast between the sentence *She ate mushrooms*, which asserts an activity, and the sentence *She ate a mushroom*, which asserts an accomplishment. Further, by rejecting the assumption that repeated events are *ipso facto* stative, we avoid the logical paradox alluded to in Section 1: situations which consist of multiple type identical subevents, e.g., pacing, qualify as dynamic situations rather than states; it is not obvious therefore why event radicals which otherwise qualify as unique events receive coerced repeated event interpretations in morphosyntactic contexts which call for state radicals. Two such contexts are illustrated in 5 , repeated here as 17 :

17 a. She smokes.

b. She smoked when I met her.

As discussed in Section 1, these examples illustrate morphosyntactic contexts which in some as yet undefined way call for stative situation types, and the inference of repeated/habitual action links input and output types. And yet if iteration entails stativity, it should always be possible to iterate one's way from an event to a state. In fact, it does not appear to be, and for this reason, otherwise valid models of imperfective meaning misjudge the interpretive facts. For example, Bickel 1997:119 postulates a that iteration, as triggered by plural arguments, introduces a wide scope state operator into Aktionsart representation and b that such operators are available for selection by imperfective operators. He illustrates this point with a French imperfective form sentence, given in 18 :

18 *Chefs, soldats, tous mouraient.*
"Commanders, soldiers, all died." =Bickel 1997 5

As indicated by the translation, Bickel assumes 18 to have an interpretation in which it "refers to the distributive nature of an irreversible event" ibid . Native speakers of French, however, reject this interpretation. For such speakers, this sentence has only a progressive interpretation also recognized by Bickel , in which complete annihilation of the battalion is pragmatically implied, although not entailed. If iteration were in fact sufficient to secure stativity, 18 would necessarily be ambiguous between this progressive reading in which the imperfective operator selects a stative phase prior to the inchoative event of collective death and a repeated event reading in which, according to Bickel, the imperfective operator selects the stative phase introduced by the plural marker via the repetition operator . Again, if contexts of stative coercion like 17 require iterated readings, why does iteration not entail stativity in contexts like 18 ? Further, as Smith observes 1997:51 , the syntactic behavior of habitual predications suggests that they are perfective: they can appear in imperatives, with agent oriented adverbials like *deliberately*, and in pseudo cleft constructions. The syntactic constructions in question do not in general appear capable of coercing perfective readings of stative predications: sentences like ??*What she did was prefer white wine* and ??*I persuaded her to prefer white wine* are awkward at best.

A possible solution to the paradox is suggested by Langacker 1994 : while iteration is sufficient for a stative construal, it does not *entail* a stative construal, since repeated events may be also be construed perfectively. But Langacker does not explain precisely *why* habitual predications invite stative construals. It cannot be, for example, that habitual predications, like states, necessarily denote unbounded situations, since, as Langacker

observes 1994:292 , habitual and generic predications can denote situations which hold "for either a bounded or an unbounded span of time, i.e., their validity has a temporal *scope*" emphasis in original . If habitual predications can be either perfective or imperfective, what then is the basis for distinguishing between iterated event sentences and habitual event sentences? According to Langacker, iterated events and habitual events have distinct implications for our theories of the world. He describes these implications using Goldsmith & Woisetschlaeger's 1982 distinction between STRUCTURAL and PHENOMENAL knowledge. Phenomenal knowledge is akin to awareness. Iterated event predications, like other kinds of episodic predications, express ACTUAL EVENTS those which impinge upon consciousness. Structural knowledge is akin to pattern recognition. Habitual sentences express STRUCTURAL EVENTS those which one can predict to recur on the basis of world knowledge. Structural events are also conveyed by GNOMIC sentences, e.g., *Oil floats on water* or *A periodontist treats gum disease*, and many aspectual theorists, including Krifka et al. 1995 , conflate habitual and gnomic sentences under the general rubric of GENERIC sentences. In accordance with Krifka et al. 1995 and Bybee, Perkins & Pagliuca 1994:152 , we will assume that the differences between habitual sentences which Krifka et al. refer to as *characterizing sentences* and gnomic sentences which Krifka et al. refer to as *reference to types* can be traced to characteristic properties of nominal reference. Nominals in gnomic sentences have attributive reference, leading to contingency readings. For example, one can paraphrase the sentence *Oil floats on water* by means of a conditional sentence: if there is something that counts as oil, it will float on whatever substance qualifies as water. Habitual sentences do not have contingency readings, since such sentences attribute properties to specific entities. However, both gnomic and habitual sentences express nonincidental facts. The question before us is whether the structural actual or, equivalently, generic episodic distinction is relevant for aspectual coding. There is evidence to suggest that it is not.

In a typological survey of the generic episodic distinction, Dahl 1995 reaches the conclusion that although languages use grammatical markers to distinguish between generic and episodic sentences, no language uses dedicated morphosyntax to express this distinction p. 425 . One can reach an even stronger conclusion when considering English and French data, since in these languages there does not appear to be *any* grammatical marking of the generic episodic distinction. Dahl has assumed that there is a single marker of genericity in each of the languages in his study, taking the present tense to be the 'generic marker' for English. As we know, however, generic statements are compatible with a number of other tense aspect combinations, including the simple past and past progressive: *Dogs chased cars in those days*, *During that summer parents were keeping their children*

indoors. Generic sentences appear to be recognized as such only on the basis of a mismatch between perfective verbal Aktionsart and the syntactic context in which that verb appears. For example, Bybee, Perkins & Pagliuca 1994 , in motivating a grammatical category of present habitual sentences, observe that "the difference between habitual and present stative resides entirely in the lexical meaning of the predicate: the present habitual reading of dynamic predicates covers many different instances of the same situation, while the present stative covers one continuous situation" p. 152 . It therefore appears appropriate to conclude that generic meaning is a specific type of coercion effect, achieved by combining an event chain radical with a state sensitive operator, whether aspect or tense.

The connection between genericity and stativity is an inferential one: an iterated, temporally stable situation which is also construed as including reference time whether past or present will invariably be construed as gnomic/habitual. From this correlation, however, we cannot conclude that genericity entails stativity, since perfective sentences can also express structural events. We cannot even conclude that iteration plus stativity equals generic meaning, since, for example, the French imperfective sentence in 18 lacks a generic reading. Rather, this correlation suggests that genericity is a contextual inference, and one which is based upon a semantic prototype. The generic episodic distinction is a contextual one in part because it hinges on inferences about the size of the relevant time scales. If the intervals separating the events are judged to be small, as in the case of *The light flashed*, the predication will be judged as episodic; if the relevant events are judged to be widely dispersed through time, as in *The Romans laid siege to Gallic cities*, the predication will be judged generic. Since, as Talmy 1988 has established, grammatical meanings are magnitude neutral, magnitude dependent semantic distinctions, like the generic episodic distinction, look much more like pragmatic inferences than grammatical categories. The generic episodic distinction is prototype based because generic meaning is multidimensional: the 'best' examples of generic sentences not only invoke large time scales but also qualify as states. Why should this be? When a situation is reported as including the reference time, as states are, nothing preempts the inference that this situation also holds at times prior to and subsequent to the reference time. An interpreter who is placed 'inside' a situation in this way is therefore free to conclude that the situation is a fact about the world rather than merely incidental, but this inference is simply a property of state predications the subinterval property.

In light of the foregoing considerations, I propose to treat habitual event radicals and iterated event radicals as indistinguishable at the level of Aktionsart structure: both qualify as heterogeneous activities. Accordingly, the concatenation operation takes us only part of the way toward a stative interpretation; it yields a heterogeneous activity. It is at

this juncture that perfective and habitual meanings are compatible. The permutation operation of selection provides the ultimate bridge to stative meaning: since iterated events contain intermediate rests, and since such rests qualify as states, those type shifts which require stative input types whether implicit or explicit are free to select intermediate rests.

Notice that the selection of intermediate rests does not undermine the claim that Aktionsart based operations target only a single component of Aktionsart representation. While the temporal representation of any given event chain will contain an indeterminate number of rests, this is of no consequence to selection, since *any* intermediate rest is sufficient to create the inclusion relationship characteristic of states: the state includes its reference time. Notice further that while an intermediate rest has no fixed size the stative predications *Mothers' Day falls on Sunday* and *My mother calls on Sunday* denote event chains whose intermediate rests are, respectively, a year and a week the same can be said of reference time, which is extensible in the manner of other deictic anchors, e.g., the adverbs *here* and *now*. Finally, notice that by equating intermediate rests with states we explain an otherwise puzzling property of present tense habitual predications. While it is generally said that present tense sentences report situations ongoing at speech time, the event radical denoted by a habitual predication need not literally overlap speech time. For example, a speaker can truthfully assert 17a whether or not the person described happens to be smoking at the moment of speech. Under the present analysis of present tense habitual sentences, this interpretive fact is explained: the situation which is treated as ongoing at speech time is not that denoted by the verb and its arguments; rather, it is a state which lies between any two occurrences of the type denoted by the event radical. That this currently ongoing state qualifies as an intermediate rest and not, for example, a FINAL rest is not literally verifiable at speech time, but the speaker appears willing to treat it as such, just as one may report a state as ongoing at speech time without direct sensory evidence, e.g., *My car is parked downstairs*.

By allowing rests to be selected in the same way that states are we expose the structure shared by input and output types. It remains to be seen, however, how this apparently compositional analysis can be cashed out in terms of Aktionsart Preservation. One ostensible violation of Aktionsart Preservation appears on closer inspection to conform to the principle as an indirect mapping. This example involves event chain predications which contain state radicals, e.g., *They were always good hosts*. While state radicals and heterogeneous event radicals do not share causal structure, these two categories can be related by means of an indirect mapping. The mediating category in this mapping is that of state phase, which in causal representation is incrementally related both

to the input category of states via the addition of HOLD and to the final output category of heterogeneous activities via the addition of REPEAT . Otherwise, concatenation shows straightforward conformity to Aktionsart Preservation, as when it maps achievement radicals, e.g., *She win the race*, into heterogeneous activity radicals, e.g., *She won the race year after year*. In this case, the input type unifies with the event type category projected by the operator REPEAT in the causal representation of the output type.

It stands to reason, however, that concatenation does not operate incrementally in temporal representation: as a multiplexing operation it is must replicate the entire input type, and for this reason the input and output types cannot differ by a single temporal component. It also stands to reason that concatenation, unlike permutation, is not limited in its scope to a single component of temporal representation: concatenation recognizes a given temporal representation as appropriate input only by finding its two delimiting transitions, irrespective of how many components of temporal representation intervene between those two poles. Concatenation is also unique among the Aktionsart based operations in that its input and output types may be identical concatenation can map heterogeneous activity radicals, e.g., *She pace* , to 'higher order' heterogeneous activity radicals consisting of chained events of that same activity, as in, e.g*., She paced whenever she felt nervous*. While the input activity is embedded in the causal representation of the output activity, it would be inaccurate to say that the former is a 'simplex' activity while the latter is 'compound', since the former is compound as well: it consists of the same subevents as the latter. The input and output radicals in this case appear to differ only in the duration of the rests which intervene between the subevents, and the computation of rest length is highly context dependent, as we have discussed.

3. Explicit Type Shifting

In this section, we will use the Aktionsart based model of aspectual mapping developed in Section 2 to describe implicit and explicit types shifts performed by two stativizing constructions of English, the Progressive and Perfect. Each of these constructions appears to perform the stativizing function in a compositional way: the auxiliary head denotes a state which is temporally related to the situation type denoted by the participial complement. In the case of the Progressive, the state and event times are said to overlap, whereas in the case of the Perfect the state expressed by the auxiliary head is typically identified with the resultant state entailed by the Aktionsart representation of the telic

complement see, e.g., Parsons 1990:Ch 12 . Further, it is clear that each construction combines the semantic values of head and complement, since the stative and perfective types exhibit their characteristic projection properties. The stative auxiliary head determines the syntactic behavior of the phrase, as evidenced by the fact that Progressive and Perfect predications pass stativity tests of the kind cited by Vlach 1981 and Michaelis 1998:Ch 1 . For example, past tense Progressive and Perfect predications, like simplex stative predications, are construed as including the reference time evoked by a perfective *when* clause:

19 a. She was fixing the window when I came in.
b. She had fixed the window when I came in.

Sentence 19a is interpreted as entailing window fixing activity prior to the time of my arrival, while 19b is interpreted as entailing inception of the resultant state prior to my arrival. In addition, as discussed by Mittwoch 1988 and Klein 1992 , the participial complement licenses adverbial expressions of the type characteristically selected by event radicals:

20 a. It looked like she was running the course through.
b. She's scaled El Capitan in under 24 hours.

Sentence 20a shows that the accomplishment radical *She run the course*, as it would if finite, combines with the completion denoting particle *through*. Similarly, as shown by 20b , the accomplishment radical *She scale El Capitan* combines with a frame adverbial as otherwise expected. Despite these seemingly transparent properties, however, the Progressive and Perfect constructions present puzzles for a theory of type shifting that have not been satisfactorily resolved. In particular, as suggested in Section 1, prior analysts, including DS, have failed to locate the denoted state in the Aktionsart representation of the input type. As argued in Section 2.4, a model of type shifting is compositional only if it is based upon the unification of input and output Aktionsart representations, since only in this instance is verbal meaning preserved. But Progressives and Perfects appear to perform their stativizing functions whether they receive state entailing input types or not. For example, both Progressive and Perfect predications may contain heterogeneous activity radicals, as in 21 :

21 a. You're talking to yourself.

b. I've talked to her on the phone.

The source of the states denoted by 21a b appears mysterious, since the causal representations of the relevant event radicals contain no state predicates. Further, even when the complement types do have state entailing Aktionsart representations, the location of that entailed state in temporal representation may not align with that of the output state. This situation is exemplified in 22a b :

22 a. She's making a cheese soufflé.
b. She's been asleep.

The accomplishment radical which 22a contains, *She make a cheese soufflé*, entails a final state existence of the soufflé . This state cannot unify with the representation of the output state, however, because its sequential implications are inappropriate to the construction: it is a final rather than medial state. Conversely, while the situation radical of 22b , *She be asleep*, is a state, this state must be construed as a STATE PHASE in order to yield an implication of cessation prior to speech time, and for this reason it cannot be identified with the output state type, a state of 'aftermath'. Faced with this problem, some analysts, e.g., Heny 1982:142 , have simply stipulated in such cases that the state denoted by *have* is equated with the FINAL MOMENT of the state denoted by the complement. However, there is no construct in the Aktionsart representation of this input type which could yield a 'final moment': the temporal representation of a state, as argued above, contains no transition points. It seems that a fully compositional analysis of the Progressive and Perfect will prove elusive until we bridge the gap between the input and output types. In the remainder of this section, I will argue that this can be achieved by revising existing assumptions about the relevant input types, broadening the role of coercion, and invoking each of the three Aktionsart based operations described in Section 2 in particular the selection of rests.

3.1. The Progressive

In a recent study of Progressive usage in the Switchboard Telephone Speech Corpus Godfrey et al. 1992 , Maraist 2001 finds that activity based Progressives account for half of all tokens sampled, while tokens containing telic event radicals referred to by Mittwoch 1988 as PARTITIVE usages account for only 26 percent of the tokens in the sample. While semantic theories of the Progressive cannot be directly tested against such numerical trends, a model which explains them is, *ceteris paribus*, preferable to one which does not.

Further, the trends suggest that theories of Progressive meaning, which in recent years have tended to address some version of Dowty's 1977, 1979 'imperfective paradox', must broaden their scope beyond the partitive usages which give rise to the paradox. In fact, as I will argue in the remainder of this section, an analysis which takes the nonpartitive usage as basic not only provides a compositional account of all type shifts performed by Progressive but also resolves the imperfective paradox.

I postulate that the Progressive construction, rather than selecting for the class of dynamic eventualities, as proposed by DS p. 355 *inter alia*, selects for a specific member of this class, the class of ACTIVITIES.[9] This view runs counter to an analytic trend, since, as mentioned, it is generally assumed that the semantics of the Progressive is intensional. This assumption is based upon the observation that when the Progressive operator scopes a telic event radical, the culmination of the event is projected rather than entailed. For example, a Progressive sentence containing a verb of creation, e.g., *She was knitting a vest*, entails nothing about the knitting event having reached its logical endpoint or about the existence of the vest. As DS describes this situation, "The progressive picks out a stage of a process/event which, if it does not continue in the real world, has a reasonable chance of continuing in some other possible world" p. 355 . Herein lies the imperfective paradox Dowty 1977, 1979 . A telic event does not exist as such if it does not culminate, since it cannot be recognized as a token of its type without having yielded the resultant state appropriate to that type. How then can we represent a portion of an event while preventing the relevant event variable from being existentially bound? It is as though we had to represent the semantics of a partitive nominal, e.g., *an engine from an old Volvo*, while ensuring that the entity designated by *an old Volvo* is not part of the discourse model. This would make little sense; we cannot extract a portion from a type whose existence is not taken for granted.

One possible solution to this problem is to propose, as DS does p. 355 , that the event exists in the discourse model but that it is "stripped" of its culmination point. It is not clear what this proposal would gain us, since, as stated, the existence of a telic event entails its culmination. DS's particular approach to the intensionality problem is to ensure through embedding that the event variable upon which the progressive operates is not added to the discourse model pp. 354 355 . This solution does not seem to generalize, however, because event variables representing activities as in, e.g., *She was talking with her friends are* existentially bound. How will the rule which constructs a discourse representation from a Progressive sentence know the difference between an event which should 'pop up' to main box of the representation and that which must not? The solution

adopted here to assume that the input event type is an event with no point of culmination circumvents such problems.[10]

Under the present proposal, the Progressive sentence *She is drawing a circle* denotes a state which is a subpart not of the accomplishment type *She draw a circle* but of the activity type which is entailed by the causal representation of the accomplishment type. Since this activity can be identified with the preparatory activity that circle drawing entails, circle drawing can in principle be distinguished from square drawing etc. within the narrow window afforded by the Progressive construal. Accordingly, identification of the input type does not require access to culmination points, either in this world or a possible world, nor does it require invocation of a telic 'source' event which must be suppressed or otherwise 'defused' prior to the updating of the discourse model.[11] This is so because, as discussed in Section 1, the aspectual mappings proposed here relate Aktionsart class representations rather than the situation variables which belong to those classes.

As discussed earlier, the Progressive provides an especially challenging test case for an Aktionsart based model of type shifting because the output state appears to have no source in the Aktionsart of the input event type: however large or small a portion is sampled, it remains a portion *of an event*. Langacker 1993:457 458 uses a visual analogy to explain this apparent paradox: "As we approach an object, there is a point beyond which any further approximation actually makes it harder to observe we are just too close to see it well. This happens for example when the defining boundaries of the object fall outside the viewing frame". While this analogy makes intuitive sense, its not obviously applicable to the process of semantic composition If, as we assume here, the Progressive selects for the activity type, the partitive paradox is restricted but not eliminated, since we must still determine whether the Aktionsart representations of activities contain states of the appropriate time, i.e., medial states. Recall that the class of activities is divided into two types, corresponding to differences in internal composition: heterogeneous activities, which contain repeated subevents, and homogeneous activities, which do not. Progressive sentences containing activity radicals of each type are exemplified in 23a b , respectively.

23 a. She was pacing.
b. She was sleeping.

I propose that the Aktionsart operation which underlies stativization in both 23a and 23b is selection. In the case of 23a , selection targets an intermediate rest in the temporal representation of the input activity, □□[□□ ⁺□ . This rest, as discussed earlier, is identified with an episode of 'standing still' between two motion events. In the case of 23b , selection

targets the state intervening between the onset and offset transitions in the temporal representation □□□ or, equivalently, the stative argument of the operator HOLD in the causal representation *x HOLD x <BE ASLEEP>* . Because the relevant selection operations target a medial state in temporal representation, we account for the fact that, as Dowty observes 1986:54 56 , the reference time of a Progressive sentence cannot be construed as the INITIAL subinterval of the time for which the atomic clause of the Progressive holds. That is, a Progressive sentence can be said to be truthful only after the activity denoted by the VP complement has gone on for some period. He suggests that this condition is responsible for the fact that Progressive sentences, unlike other stative sentences, do not have inceptive readings in temporal discourse, other than as reflections of a character's belated recognition of an activity already in progress, e.g., *Sarah looked down. Suddenly the water was rising*. While this condition might otherwise require a stipulation related to overlap of intervals, in the present framework it is a consequence of the selection operation.

Since the Progressive operator selects for an activity radical, the combination of the Progressive with a telic event radical, e.g., *She draw a circle*, will trigger coercion: the input accomplishment radical receives an activity construal. The mechanism of this coercion is the selection operation: the event chain □ is selected from the temporal representation of an accomplishment, □ □ □.Equivalently, the operator REPEAT and its event type argument are selected from the causal representation of the input accomplishment. This selection based type shift is independently motivated, since it finds a precedent in coercions performed by durational adverbials, which, as described in Section 2.2, select for episodic event radicals. For example, the accomplishment radical *She walk home* receives an activity construal in 24 :

24 She walked home for ten minutes and then decided to take the bus .

As in the coerced interpretation of the Progressive sentence *She was drawing a circle*, the activity denoted by 24 , walking, is entailed by the causal representation of the accomplishment radical *She walk home*. The Progressive will also trigger coercion when paired with an achievement radical, as in 25 :

25 She was winning the race.

This combination again yields a coerced processual interpretation of the achievement radical *She win the race*. Our intuitions suggest that Progressive form achievements like 25 denote a preparatory phase which is not entailed by the corresponding preterite form predication *She won the race* . Dowty 1986 describes achievement verbs as "those kinesis predicates which are not only typically of shorter duration than accomplishments, but also are not ordinarily understood as entailing a sequence of subevents, given our usual everyday criteria for identifying the events named by the predicate" p. 43 . The intuition that sentences like 25 stretch out the temporal profile of an achievement to reveal its subevents makes sense only if we recognize such sentences as instances of coercion. Since the Progressive selects an activity radical, the interpreter of a Progressive form achievement predication is induced to 'find' an activity phase within an event which would otherwise represent a momentaneous transition.

An achievement predication which entails the occurrence of a preparatory activity is for all intents and purposes an accomplishment. Accordingly, it is reasonable to ask what role the accomplishment representation plays in the interpretation of 24 . I propose that it mediates an indirect mapping whose ultimate output is an activity representation. By means of the addition operation, the achievement radical *She win the race* is expanded into an accomplishment radical: the operator REPEAT and its event type argument are added to causal representation. For temporal representation, this operation involves the addition of the event chain □ to the representation of an achievement, □□. The intermediate output type, an accomplishment radical, then undergoes selection of the event chain or repeated event predication preceding the transition event in temporal or causal representation. The output of this selection operation is an activity radical, which is then subject to stativization via selection of an intermediate rest, as described above. Since the accomplishment representation is the source of this activity, the indirect mapping at issue effectively neutralizes the achievement accomplishment distinction in favor of the latter category: the sentences *She was winning the race* and *She was fixing the fence* are identical so far as the contribution of the Progressive is concerned.

The analysis of Progressive form achievements offered here is a departure from standard accounts, since Progressive form achievements, like semelfactives, are typically viewed as having iterative readings, as in, e.g., *She was blinking* Herweg 1991, Langacker 1991, Bickel 1997 . The iterative reading is unproblematic in the present framework: as discussed, iterated events i.e., event chains are heterogeneous activities, and as such meet the semantic requirements of the Progressive operator. However, iterative readings of Progressive form achievement predications are generally required only insofar as the noniterated reading requires unusual background assumptions for example that a single

blink can be 'tracked' during its time of occurrence. Further, the interpretive potential represented by the iterative reading is not unique to Progressive sentences containing achievement radicals. Event radicals of all Aktionsart classes welcome event chain readings in Progressive sentences. For example, both 26a and 26b are subject to habitual interpretations, in which, respectively, the majority of students rode the express bus repeatedly for some period and the subject denotatum had a smoking habit during the time that the speaker met him.

26 a. Most of the students were taking the bus home.
b. He was smoking when I met him.

The existence of Progressive form habitual predications is not widely recognized and in certain cases explicitly denied DS: 372, Krifka et al. 1995:12 , but in the present framework the habitual readings of 26a b can be described in a straightforward fashion. Based upon the reasoning set out in Section 2.4.3, we will analyze habitual predications as event chain predications, i.e., heterogeneous activities. The Progressive can coerce heterogeneous activity readings via concatenation, although the Progressive operator itself need not be the source of an iterated event implication: certain adverbials, e.g., 'cyclic' time adverbials, also trigger concatenation, as in, e.g., *She took the express bus home each day*. Concatenation is therefore one of three Aktionsart operations used to secure the appropriate input type for the Progressive, the others being: direct mapping via selection as when an accomplishment representation is 'pared down' to an activity representation and indirect mapping via selection as when an achievement representation is shifted to an activity representation by means of an intervening accomplishment representation .

The analysis of the Progressive as an activity type selector yields a revealing account of a classic problem in the analysis of the Progressive: why are Progressive predications occasionally used as state reports? Progressive form state reports are exemplified in 27a c :

27 a. I'm liking your explanation.
b. He is remaining stable
c. We were living in Boulder

Native speakers frequently report that Progressive form state predications denote 'temporary states'. Temporary states, as I will now suggest, are homogeneous activities. The type shift which transforms a state into a homogeneous activity is an addition operation: in causal structure it involves the addition of the operation HOLD and its

arguments, a state predicate, which can be directly superimposed upon the representation of the input type, and an effector argument, which is co construed with the highest ranking argument of the stative predication in its scope. The added predicate represents the implication of continuous causation the output of energy toward maintenance of the state. While homogeneous activities are identical to state phases at the level of temporal structure, they differ from state phases at the level of causal structure: the subject denotata of homogeneous activity predications are necessarily construed as participants in a causal chain, whether they are agents, experiencers or themes which an agent has oriented or configured in a specific way. The examples in 28 illustrate the range of effector arguments which homogeneous activity predicates assign:

28 a. She's wearing a Fendi blazer.
c. She's sleeping.
d. Your socks are lying on the floor.

The examples in 28 are ordered to reflect decreasing degrees of agentivity. While someone who puts on a blazer can take it off at will, someone who achieves a state of sleep has much less control over cessation of the state. Further, while socks which are on the floor played no role in getting there, continuation of the state requires that they maintain a specific configuration: socks which are in a bundle are *located* on the floor but not *lying* on the floor. Because effector based implications separate homogeneous activities from state phases, we can explain why certain Progressive form statives, exemplified in 29 , are anomalous:

29 a. *His hair is being green this semester.
b. *The British Museum is containing the Parthenon Marbles right now.
c. *She is having a cold today.

All of the state radicals expressed in 29a c can be described as temporary states, but no one of them is readily construed as a homogeneous activity. Such a construal would require that the subject denotata in these sentences be seen as effectors. If these sentences have interpretations at all, they require very unusual background assumptions, e.g., that the British Museum is preventing the Parthenon Marbles from leaving. Therefore, participial complements in Progressive constructs denote not bounded states but activities.[12] The stative type has by the very fact of its combination with the Progressive come to denote that type which warrants the use of the Progressive.

3.2. The Perfect

The Perfect, although lacking the modal properties of the Progressive, places equally subtle conditions upon input type. These conditions are subject to mutually incompatible characterizations. DS, for example, describes the Perfect as "an extensional operator, which asserts the existence of both the event *e* and its consequent state *s*" and later asserts that it "operates on eventualities of any aspectual type" p. 354 . While recovery of a consequent state seems straightforward when we limit ourselves to examples like 30 , in which the event radical *We lose our lease* is telic, it appears much less straightforward when we consider examples like 31 32 :

30 We've lost our lease! radio ad for going out of business sale

31 We now live in a world where man **has walked on the moon**. Jim Lovell, *Apollo 13*

32 I'**ve already knocked**. said by one party guest to another outside the host's front door

Both 31 and 32 denote consequent states achievement of a technological milestone and imminent arrival of the host, respectively , but these states are contextually computed rather than entailed by the Aktionsart representation of the complement, an activity. Further, it is even less clear what the consequent state condition means for those Perfect tokens with imperfective complements, whether these are intrinsically stative, as in 33a , or derived states, as in 33b :

33 a. This project has been difficult.

b. I've been coming here since I was a kid.

The foregoing examples raise two questions: do type shifts performed by the Perfect obey Aktionsart Preservation and do they have a consistent input type? In what follows, I will provide a positive answer to both questions. I propose first to eliminate the 'consequent state' condition proposed by DS, on the grounds that such a state can be produced only when the input type is telic. Instead, I will argue, the Perfect selects states of two kinds: states which are entailed by causal structure and those which merely represent rests in temporal structure. Second, I will argue that, despite appearances to the contrary, the Perfect operator requires a perfective input type, and that ostensibly imperfective tokens like 33a b are in fact contexts of perfective coercion. Third, I will argue that the Perfect is

not a unitary type shifting operator, but a 'family' of three stativizing operators, each of which requires a distinct perfective input type and each of which places distinct conditions on the location of the output state relative to the input event in temporal representation. These operators correspond roughly to the resultative, existential and universal continuative meanings distinguished by McCawley 1971 . In Michaelis 1998:Ch 5 , these meanings are represented as in 34 36 . For each meaning, an example sentence is given in a , a prose description in b , and a semi formal semantic representation, based upon McCawley 1971 , in c :

34 **Resultative**

a. The persons responsible have been terminated.

b. 'A result of a unique past event obtains now.'

c. □!e: Event e □!t: t<now Endpoint e, t & 'e's result state holds now'

35 **Existential**

a. We've had this argument before.

b. 'One or more events of a given type culminated within a time span whose upper boundary is the present.'

c. □e: Event e □t: t<now Endpoint e,t & 'e is repeatable at present'

36 **Continuative**

a. We've been sitting in traffic for an hour.

b. 'A state obtained throughout an interval whose left boundary is the present.'

c. □!e: State phase e □!t Endpoint e,t & 't immediately precedes the present'

In 34c , 35c , and 36c , the traditionally recognized common denominator of 'current relevance' is seen as a semantico pragmatic variable whose values are distinct conventional implicata involving the present. These implicata are represented by the conjuncts in single quotes. In accordance with McCawley 1971 , I assume that the Perfect construction is ambiguous with respect to these meanings. As McCawley shows, Perfect predications can yield zeugmatic or 'crossed' readings in coordinate structures a standard test for ambiguity Zwicky & Sadock 1975 . For example, 37 could not be used to refer to a

situation in which Moe is currently out of work as a result of having been fired resultative reading while Harry is currently employed despite firings in the past existential reading .

37 Moe has been fired and so has Harry.

Garden path effects provide further support for the ambiguity analysis of the Perfect, as in 38 , a line attributed to Groucho Marx:

38 I've had a wonderful evening, but this wasn't it.

This remark is humorous because the contextually appropriate continuative reading must ultimately be rejected in favor of a far more remote existential reading. The fact that Perfect predications exhibit both crossed readings and garden path effects strongly suggests *pace* Brinton 1988 and Klein 1992 that the distinct Perfect readings described in 34 36 are not merely inferences from context, e.g., particular combinations of adverbial meaning and Aktionsart.[13] While adverbs like *before* and *twice* are hallmarks of existential meaning, the presence of a frame or frequency adverb is not a necessary condition upon the existential interpretation, since, for example, the existential predication in 39 does not contain an adverbial expression:

39 I've met the Governor.

By the same token, the presence of a stative complement is not sufficient to induce the continuative reading: sentence 40 contains a state radical and yet has a resultative reading e.g., the speaker now has immunity to German measles , a continuative reading the illness lasted at least until now and an existential reading e.g., the speaker is listing events which qualify as tokens of the 'illness episode' type :[14]

40 I've had the German measles

The distinct readings described in 34 36 can be represented in the present framework without recourse to conventional implicature. I propose instead three Perfect operators, PERF R PERF E and PERF C, each of which is subject to two types of conditions: MAPPING CONDITIONS, described in the a clauses of 41 43 , and REST IDENTITY CONDITIONS, described in the b clauses of 41 43 :

41 **PERF-R**

a. Mapping: Telic event □ state

b. Posterior rest: resultant state

42 **PERF-E**

a. Mapping: Event □ state

b. Posterior rest: medial state

43 **PERF-C**

a. Episode □ state

b. Posterior rest: initial transition is final transition of episode

As shown in 41a , the resultative Perfect PERF R requires a telic input type. The Aktionsart based operation which underlies this mapping is selection. As stipulated by the rest identity condition in 41b , selection targets a resultant state in the causal representation of the input type, an accomplishment or achievement radical. By identifying the state of aftermath with the resultant state of the input type we account for Klein's 1992:539 observation that the events expressed by resultative perfect sentences tend to be recent events. DS p. 354 captures this interpretive constraint by stipulating that "the result state starts right at the end of the event". This stipulation appears unnecessary here, because the resultant state is necessarily contiguous to the inchoative event in causal representation. In addition, condition 41b captures the 'unique event' condition represented in 34c by means of □!. If the output state is entailed by the causal representation of the input event, there can be only one causal event, since selection is defined over a single Aktionsart representation. Further, we account for the fact that atelic events can have resultant state implications in Perfect predications, as shown in 31 32 . These sentences have coerced interpretations. The Aktionsart based operation underlying this type shift is addition: the operator CAUSE and its arguments are superimposed upon the causal representations of the input activity radical. Because the causal representations of activity radicals do not include resultant states, adduction of the relevant resultant state will depend upon cultural scripts of various kinds, e.g., models of hailing conventions, as in 32 . Finally, this analysis captures the intuition, reported by Slobin 1992 and Li, Thompson & Thompson 1982 , that resultative Perfect predications have current relevance because they report resultant states that determine the course of *future* events. For example, 34a not only entails the proposition that the individuals in question are no

longer employed by the firm, but also invites the inference that more competent employees will be hired in their stead. Since resultant states are indistinguishable from posterior rests at the level of temporal representation, and since posterior rests are always construable as anterior rests vis à vis any event which follows, the selection of a resultant state from Aktionsart representation creates a Janus-like structure which links the causal event with a subsequent one.

As shown in 42a , the existential Perfect PERF E maps an event or, equivalently, a dynamic situation onto a state. The Aktionsart based operation which executes this mapping is selection of a posterior rest. The rest identity condition in 42b captures the interpretive constraint expressed as a conventional implicature in 35c : '*e* is repeatable at present'. McCawley 1981:82 describes this constraint as follows: "The speaker and addressee's shared knowledge does not rule out the continued occurrence of events of the kind in question". Evidence for this constraint is provided by appropriateness judgements. For example, 44 is appropriate only if the sale is still ongoing and the addressee is presumed to be capable of attending it prior to closing day:

44 Have you gotten to the Nordstrom sale?

A posterior rest qualifies as a medial rest if it holds during the interval which separates two type identical events. Since this rest holds at speech time, the second of these two events is projected rather than reported. That is, the input event must be one capable of concatenation. Thus, the state which follows a given visit to Nordstrom is never excluded from preceding another event of this same type. Because replication occurs in a *possible* world, even a unique event is construable as belonging to an event chain, as in 45 :

45 I've visited him once.

Because the rest following the visiting event also precedes any future event of the same type, 45 entails a minimal chain, consisting of two tokens of a given event type. Interpreters have considerable latitude in inferring the appropriate event type predicate, and therefore events which appear unique can typically be construed as repeatable ones. Consider, for example, 46 , which is *a priori* anomalous on an existential reading, since Janis's death cannot be replicated small caps indicate points of prosodic prominence :

46 Since WOODSTOCK, Janis has DIED.

However, 46 does have an existential reading if construed as evoking a propositional function of the form *x die* , where the range of the variable might be restricted to rock artists who appeared at Woodstock:

47 Since WOODSTOCK, JANIS has died, HENDRIX has died, Keith MOON has died, Paul BUTTERFIELD has died and JERRY has died.

This example demonstrates that a unique event can also qualify as a concatenated event via extrapolation of the appropriate open proposition.

As shown in 43 , PERF C maps an episode to a state. This analysis represents a departure from that given in 36b , in which continuative Perfect sentences assert the existence of a state phase. The input type in 43 , episode, includes both state phases and activities. However, we will preserve the present contiguity condition described in 36c : the output state is a posterior rest whose time of inception is identical to the final transition of the episode. This condition is designed to capture the difference between continuative and existential readings of Perfect sentences containing stative complements, as in 40 , repeated here as 48 :

48 I've had the German measles.

The continuative reading is that in which the illness has continued up to speech time; the existential reading simply requires one or more episodes of German measles in the past. Except for the 'present contiguity' condition, the continuative and existential readings would not differ, since both entail a coerced state phase reading of the state radical *I have the German measles*. As a consequence of the persistence entailment, the continuative Perfect selects for extensible situation types, including homogeneous and heterogeneous activities, as in 49 :

49 a. Public opinion has **fluctuated** all month.
b. City and county officials have **discussed** the issue for over a year.
c. I've **watched** you for a long time.
d. We've **waited** for this news a long time.

While native speakers whom I polled judged all of the sentences in 49 to be acceptable, they often suggested paraphrases containing Progressive form complements, e.g., *I've been watching you*. The more dynamic the activity radical, the less acceptable the corresponding

continuative Perfect predication appears to be: continuative Perfect predications containing agentive heterogeneous activity radicals, e.g., *The kids have played in the pool all day*, were most likely to be seen as requiring Perfect Progressive paraphrases. Such evidence suggests that the category of state phases has a privileged status with regard to the continuative Perfect. It is not obvious that this prototype effect can be explained on the basis of Aktionsart structure, since analogous constructions of French, to be discussed in Section 4.1, do not exhibit it. One line of explanation, which I will not pursue further here, involves a return to the assumption that the English continuative Perfect requires a state phase input. Under this assumption, the preference ranking described above could be treated as an index of 'coercion distance', since state phases share more Aktionsart structure with homogeneous activities than with heterogeneous activities.

Despite their prototypical nature, state phase Perfects present certain analytic problems. Because state predications license the subinterval entailment, the interpreter can never be assured that a state, like that of being ill in 48 , is wholly contained within the interval for which it is asserted to hold. For this reason, one might argue, a continuative Perfect sentence need not denote a state which follows a final transition. This argument fails to distinguish between cessation of the denoted state phase and cessation of the state from which that phase is drawn. In certain contexts, these two types of cessation coalesce, as in the following quote from the comic strip *Cathy*:

50 My nails **have been decent**. Today I bit them off. My skin **has been fine**. Today it broke out. My demeanor **has been poised and professional**. Today I spilled coffee on my hair, ripped my pantyhose, broke my purse strap, and sat on the floor of a 7 Eleven in my power suit and ate a bag of Cheetos *Cathy*, 11/24/92

In other contexts, the two forms of cessation diverge. For example, 51 does not entail that reptiles are now extinct:

51 Reptiles have existed since the Paleozoic era.

However, the perfective character of state phase predications prevents us from concluding that 51 denotes a state which overlaps speech time: it is the posterior rest, and not the contiguous state phase, which actually holds at speech time.

4. Aspectually Sensitive Tenses in French and English

The Aktionsart based model of type shifting provides a revealing analysis of the tense aspect interface in French and English. This model incorporates insights offered by DS in her treatment of French past tense. While the relevant forms have been misleadingly described as 'aspect markers', DS p. 368ff shows instead that they are situation type selectors. This treatment suggests a new way of viewing both the typological facts and the category of tense itself. If a past tense operator indexes a situation type, then there appears to be no reason in principle that a present tense operator could not as well. By the same token, if what has been identified as aspectual morphology in French is in fact type sensitive tense, there is no meaningful division between 'tense' languages and 'aspect' languages, and cognate tenses across languages have highly isomorphic representations. Such a framework will admit the existence of tenses which, like the Russian Past, do not index a specific aspectual class see Smith 1997:Ch. 10 , but will also require us to revise our view of what constitutes an aspectually neutral tense. While formal differentiation among the exponents of a given tense relation, e.g., past, in a given language, e.g., French, strongly suggests divergent patterns of aspectual concord, the true diagnostic of aspectual sensitivity is coercion: a form cannot be a coercion trigger without also being a type selector.

Therefore, whenever effects on verbal Aktionsart are attributable to a tense we have *a priori* evidence against aspectual neutrality. Theorists have often cited the wide combinatory potential of a given tense as evidence of semantic bleaching. But wide combinatory potential alone does not warrant this diagnosis, since some of the combinations distort verbal Aktionsart representations while others do not. If the tense is meaningless, these distortions have no source, nor can they be related to the concord condition. Nowhere are scholars more likely to reach this analytic dead end than in studies of the Present, which is variously described as expressing no specific temporal relation Bolinger 1947 , gnomic meaning Goldsmith & Woisetschlaeger 1982 , or "habitual/generic/stative meaning" Bybee, Perkins & Pagliuca 1994:152 . The Aktionsart based approach to type shifting provides analytic tools which allow us to approach anew the question of present tense meaning. Using this framework, I will argue that present tense predications inherently report states. While present tense event sentences have

distinct interpretive ranges in English and French, all readings of present tense event sentences arise from stative coercion. Like the Present, the English Past is often viewed as carrying no aspectual implications. DS p. 365 claims, for example, that it "inherits its aspectual character from the eventuality description it applies to". This analysis is difficult to reconcile with the range of coercion effects identified above, e.g., inchoative and resultant state selections. Such effects, I will argue, suggest that the English Past has event sensitive and state sensitive instantiations.

If tenses index aspectual types, on the present model it then follows that Aktionsart representations provide the input to tense operators. But we have not yet identified what features of Aktionsart representation matter to tenses, and we have not yet determined what tense operators actually *do* with Aktionsart representations. I propose to treat Past and Present tenses as operators which map the temporal representations of Aktionsart types onto ordered sets of times, which I will refer to as SAMPLING SETS. Sampling sets are ordered pairs of temporal components aligned, respectively, with the time of speaking and a time prior to the time of speaking, which is identified with the reference interval. The sampling sets for the Present and Past operators are given in Table 3. The temporal sequence of the components is the inverse of their linear sequence, with the rightmost component located at t_o.

Past tense		***Present tense***
Event	**State**	
<□, □>	<□, □>	□

Table 3. Sampling sets for Past and Present operators

The output of a given tense operator is the unified representation derived by combining the input Aktionsart representation with the sampling set for that tense operator. Because the Present has no time depth, its sampling sequence consists of a single temporal component, aligned with t_o. As discussed in Section 2.1, only a state can be verified on the basis of single time sample. Accordingly, the Present can unify only with a state representation. Unlike the Present, the Past allows 'backward projection' to a period which lies before speech time. This period is the reference or 'topic' time of the past tense predication, to which past time adverbials, e.g., *yesterday*, may refer Partee 1984, Klein 1992 . While the present moment always corresponds to a state, the anterior time may

correspond to either a transition or a state. If the anterior component is a state, the sampling sequence unifies with the temporal representation of a state, producing the output representation □□. The paired states in this output representation can but need not be the same state. What is crucial is simply that no transition intervenes between them. In other words, in order to qualify as a state predication, a past tense predication must denote a state which holds throughout the past interval. Context determines whether the denoted state also obtains at speech time. The defeasibility of the persistence implication is shown by the following contrast pair:

54 a. My former husband was Latvian
b. My late husband was Latvian.

While 54a has a reading in which the former husband is now deceased, and is therefore no longer Latvian, there is an equally plausible reading in which the former husband's ethnicity continues up through speech time, and is merely 'sampled' at topic time the time of the marriage. While 54b has only the former reading, it would be inappropriate to analyze it as a state phase predication simply because the relevant property no longer holds. The assertion in 54b , no less than that in 54a , relates the property of being Latvian to the time of the marriage. Since the speaker's late husband was presumably Latvian prior to the marriage, the denoted state outlasts the reference time, just as in 54a . It is in this sense that states are said to include their reference times Partee 1984 . Events, by contrast, are said to be included within their reference times. An indeterminate direction of inclusion is responsible for the ambiguity of 55 , discussed by Herweg 1991:384 :

55 Peter was in London yesterday.

Without context, we cannot determine whether the day long interval exhausts Peter's stay in London or merely samples from it. In the former case, the predication is perfective rather than stative: it denotes a state phase. In the proposed model, Perfective past tense predications are those derived via imposition of the sampling set <□, □> upon the input temporal representation, which is a state □ in 55 . On its state phase reading, therefore, 55 is an instance of coercion.

When the Perfective sampling set is applied to event type Aktionsart representations, the transition of the sampling set <□, □> aligns with the last transition in the input temporal representation. Table 4 shows the combined temporal representations

which result from application of the sampling set <□, □> to each of the five event types. The portions overlapped by <□, □> are shown in boldface:

State phase	□□**□□**
Homogeneous activity	□□**□□**
Heterogeneous activity	□□**[□□]⁺□□**
Achievement	**□□**
Accomplishment	□**□□**

Table 4. Outputs of application of <□, □> to event representations

The output structures shown in Table 4 provide an emergent definition of the operator CULMINATE, which Parsons 1990 uses to place the event's time of cessation within the reference time evoked by a past tense predication. When the Past operator is applied to one of the three ATELIC event types, the mapping involves *addition* of the state component contributed by the superimposed sampling sequence. The added state component follows the final transition entailed by the input temporal representation, and is interpreted as a rest. This rest is identified with the present state. When Past combines with one of the two TELIC types, achievements or accomplishments, the mapping involves *selection* of the sequence <□,□> within the input representation. Because the state component from the superimposed sampling sequence is identified with the resultant state of a telic radical, the model predicts that past tense telic predications will entail continuance of the state to the present. This is not an undesirable result, since as we have seen with respect to examples 16a b in Section 2.4.2 above, the entailment that an event's resultant state has ceased prior to now is achieved through an indirect mapping mediated by the state type. The state is derived via selection from a telic Aktionsart representation and then shifted to a state phase by the addition of a final transition.

Thus far we have said little about the implicit type shifts which tense operators trigger. As one might infer from the discussion of 55 , however, all structural correspondences i.e., overlaps between the sampling sequences of tense and input Aktionsart representations yield interpretable combinations of tense and aspect. Accordingly, we will use the unification mechanism to describe stative coercions performed by Past and Present and event coercions performed by the Past. Section 4.1 will

provide an account of these facts in French, while Section 4.2 will extend the account thus developed to analogous facts of English.

4.1. Past and Present in French

4.1.1. The Past. In typological studies, as in second language pedagogy, the English Progressive is often treated as an analog to imperfective markers like the French *Imparfait*. This analogy is both appropriate and inappropriate. As DS argues pp. 368ff the French Imperfective is a type sensitive Past, while the Progressive, as we have seen, is a type shifting aspectual operator which is compatible with any tense. While it is tempting to conclude that the past Progressive and Imperfective are synonyms, they are translation equivalents only in certain contexts. One such context is exemplified in 56 :

56 C'est quand je suis passé devant le magasin! Il y avait un type qui **faisait** une démonstration pour aguicher la clientèle.

"It's when I went past the store. A guy was **doing** a demonstration to rope in customers." Binet, *Les Bidochon* 8, p. 14

In 56 , the demonstration is presented as an event that had begun prior to the point at which the narrator passed the store. As in the Progressive form translation, the *Imparfait* form sentence in 56 tells us nothing about whether the demonstration was completed following the time frame established by the perfective form sentence preceding it. Situations reported in the *Imparfait*, like those reported in the Progressive, include reference time, and thus it is appropriate to conclude that both Imperfective and Progressive predications denote states. However, the Progressive and Imperfective constructions do not have identical constraints on input type; notice 57 :

57 Tiens, ils **avaient** des lacets, les préhistoriques?

"Huh! They had shoelaces, prehistoric people?" Binet, *Les Bidochon* 2, p. 30

If 57 were translated by a Progressive sentence, the result would be an anomalous English sentence: **They were having shoelaces.* The pattern of translation equivalents in 58 59 is explained when we assume that 56 is a case of coercion and 57 a case of concord. Both French and English derive states from events, but the two languages use distinct types of

grammatical mechanisms to do this a concord construction in French and a shift construction in English. In terms of the Aktionsart based model of tense developed above, the Imperfective superimposes the sampling set <□, □> on the Aktionsart representation which serves as its input.

I propose to model the implicit type shift in 56 using the same Aktionsart based operation triggered by the Progressive: selection of a medial rest. As we saw in our discussion of the Progressive in Section 3.1, this selection operation requires an activity radical as input. The meanings of accomplishment and achievement based Progressive predications were accordingly analyzed as involving an indirect type shift mediated by the heterogeneous activity type. In this indirect mapping, an event chain representation is either selected from or added to the telic input representation. I propose that this indirect mapping is involved as well in the interpretation of the Imperfective token in 56 : the accomplishment radical *Un type faire une démonstration* '*A guy do a demonstration*' receives an activity interpretation via selection of the heterogeneous event predicate preceding the inchoative event in causal representation. This activity representation is then shifted to a state representation via selection of a medial rest.

In analyzing the partitive interpretation of 56 as an activity based coercion triggered by the Imperfective operator, I follow DS p. 371 . I do not follow DS in assuming that "the *Imparfait* is felicitous ... if it applies to a non quantized, homogeneous description a state or process " p. 369 . If we assume this less restrictive input condition, we are forced to explain why, for example, 57 does not have the potential for a coerced activity reading. Further, since activity predications entail inception within their past reference times, we are forced to explain why 58 does not have a reading in which the searching event began *following* a past reference time:

58 Robert: Raymonde, enfin!
Raymonde: Je Je **cherchais** un coin tranquille. Excuse moi!

"Robert: Raymonde, really! Raymonde: I I was looking for a private spot. Excuse me!" Binet, *Les Bidochon* 6, p. 28

In the context preceding 58 , the character Raymonde has inadvertently interrupted her husband Robert and his friend during a pit stop in the woods. In Raymonde's production, the activity verb *chercher* 'look for' receives Imperfective inflection. The resulting construal is one in which the searching activity was going on *prior* to the point at which it was interrupted. As seen above with respect to examples 54 55 , inclusion of reference time

is an entailment pattern associated exclusively with state predications. This inclusion condition is captured by the Aktionsart based model of coercion, on which a state is selected from within the input activity representation. Searching comprises multiple subevents, e.g., movements from one place to another, and offsets between any two movement transitions represent states. Once such a state is selected from temporal representation, it can be combined with the sampling set of the Imperfective operator, <□, □>. The resulting combination entails existence of the rest state throughout the anterior interval. One of the times within the anterior interval is also the time at which the parties encountered one another; the searching event is accordingly understood to include the encounter event. This overlap relation could not be modeled except on the assumption that the output situation is internally homogeneous, and holds at all times during the overall time at which it goes on. Therefore, we conclude that the Imperfective operator selects for a stative input type.

Habitual and iterated events, as argued in Section 2.4.3 above, count as heterogeneous activities. As such, they are subject to Imperfective coercions identical to that exemplified in 58 . The examples in 59 60 demonstrate the interaction of the Imperfective operator with iterated event radicals:

59 Raymonde: Qu'est ce qu'ils te voulaient, ces deux messieurs?
Robert: On **s'échangeait** nos adresses!

"Raymonde: What did they want, those two gentlemen? Robert: We were exchanging addresses." Binet, *Les Bidochon* 2, p. 50

60 T'as pas remarqué les gestes que je te **faisais** pour te le dire discrètement?

"Didn't you notice the gestures I was making to you to try to let you know discretely?" Binet, *Les Bidochon* 8, p. 35

In 59 , the iterated event is the exchange of addresses among three people, an event which Raymonde observed only momentarily. By using the Imperfective form of *échanger* 'exchange' , the speaker takes the perspective of his addressee: he presents the situation as one which includes the time at which it was witnessed, thus leaving open whether or not the exchange was completed in fact it was not . This construal is of course the same one associated with the Imperfective predication in 58 : it involves selection of a medial rest within the temporal representation of the input event chain. In 60 , the denoted event

chain is a series of gestures. The use of an Imperfective predicate to describe this event again signals inclusion of reference time: the interval containing the series of gestures properly includes the time of a potential perception event, here expressed by a Perfective form of the verb *remarquer* 'notice'. As in 59, we capture this inclusion relation by identifying the denoted state with a medial rest within the temporal representation of the event chain. Since this medial state holds at all times during the past interval, it also holds at the time of any event projected to occur within this interval.

Notice that either of the iterated events in 59 60 could have been described by means of a Perfective predication. For example, one could alter the context in 59 so that Raymonde's inquiry concerned what Robert had just done. The response in that context would likely have taken the form of the Perfective *Passé Composé*: *On s'est échangé nos adresses*. The construals entailed by the Perfective versions are no less likely to involve iteration of subevents; the use of the Perfective merely entails that the entailed subevents were exhausted within the set of times preceding speech time; this offset transition is represented in the sampling set of the Perfective operator: <□, ▷|. The inescapable conclusion is that an iterated event is still an event. This same point can be made with respect to habitual assertions, which are also expressible by both Imperfective and Perfective sentences. Sentences 61 62 exemplify Imperfective habitual predications:

61 Quand je pense que tout le quartier te **surnommait** "le père tranquille" parceque tu **passais** tes journées à cultiver des géraniums.

"When I think that the whole neighborhood called you by the nickname 'Gentle Pops' because you spent your days cultivating geraniums!" Binet, *Les Bidochon* 5, p. 38

62 Ma femme m'a quitté parceque je **buvais** et Maman a dit que ça me **donnait** mauvaise haleine.

"My wife left me because I drank and Mother told me it was giving me bad breath." Binet, *Les Bidochon* 10, p. 43

The clauses containing the boldface verbs in 61 62 count as habitual predications because they describe events repeated at regular intervals over time. They count as state predications because they denote situations which overlap other situations in the text. Overlap is distinct from alignment. It would be implausible, for example, to analyze 61 as

entailing that the addressee was called by his nickname each time he planted geraniums, or to analyze 62 as entailing that speaker's wife left him during a drinking episode. Instead, rest selection derives states which are unordered with respect to similarly derived states and which hold throughout the past interval during which perfectively denoted events occur. Thus, for example, while interpreters will situate the reference time evoked by 61 between events of geranium planting and nickname use, since the rests selected from each event chain hold for the same past interval, they will infer nothing about the frequency ratio of one type of event to another. Similarly, the interpreter of 62 is induced to construct a state which holds between drinking binges, and includes the time of the wife's departure, but does not precede or follow a specific number of drinking episodes.

The mapping which yields a stative interpretation of 62 is indirect: the temporal representations of the activity radical *Je boire* 'I drink ' and the accomplishment radical *Ça me donner mauvaise haleine* 'It give me bad breath' undergo concatenation. The output event chain representation then undergoes rest selection. Since concatenation need not be followed by rest selection, we predict that habitual events can also be described by Perfective predications. This prediction is confirmed by examples like 63 , in which the boldfaced Perfective predications denote habitual events:

63 Mais pendant quinze ans j'ai cru que j'étais un superman, moi! J'en **ai parlé** autour de moi, je m'en **suis vanté** auprès des copains au boulot! Je vais avoir l'air de quoi, à présent?

"But for fifteen years I thought I was a superman! I talked about it to everyone around. I bragged about it to friends at work! What am I going to look like now?" Binet, *Les Bidochon* 13, p. 17 .

The character Robert utters 63 after having received a devastating review of his marital performance over the years. Because the Perfective tense imposes the sampling set <□, □>, it entails cessation of event iteration within the set of times preceding the time of speech: the last of the bragging events occurred at some point prior to now. Despite the fact that predications like 63 can be described as denoting 'bounded situations', it appears circular to explain the use of the Perfective in 63 by saying that it expresses an iterated event rather than a habitual one. Instead, 63 supports the observation made in 2.4.3 above: habitual predications need not be state predications. Bickford & Marlett 1988 make this same point in a study of mood and aspect in three Mixtec languages: "the mere habituality of a situation is not sufficient to place a verb in the Imperfective" p. 7 . After observing

that habitual predications in Mixtec can be reported by both Perfective and Imperfective predications, they conclude that "what makes most habitual situations Imperfective is not habituality *per se*, but the coincidence of some other time span such as the moment of speech with the habitual macrosituation, imposing an inside out perspective on it" p. 8 . In other words, it is focus upon an intermediate interval, rather than mere repeated occurrence, which causes a gnomic or habitual event to be coded as Imperfective. Thus I propose that the mechanism of stative coercion yields gnomic/habitual readings of event radicals in French under the same formal conditions which give rise to partitive i.e., 'Progressive style' readings of event radicals, exemplified in 56 . As argued above, an iterated event counts as a heterogeneous activity a series of grossly identical subevents. Although, as we have seen, episodic sentences and gnomic/habitual sentences have distinct epistemic implications, these distinction are not expressed in aspectual structure: iterated events count as such whether they are actual or structural.

While both habitual and partitive coercions involve the selection of a medial rest, the Imperfective operator triggers an additional implicit type shift which, while also involving rest selection, involves the selection of a final rather than medial rest. The rest in question follows the final transition in the temporal representation of an episodic event state phase or activity . Imperfective predications with coerced readings of this type have readings analogous to those of continuative Past Perfect predications in English:

64 Li Shaomin, 45 ans, possède la nationalité américaine depuis six ans mais **travaillait** depuis 1996 à l'université City de Hong Kong.

'Li Shaomin, 45, has held American citizenship since the age of six, but had worked since 1996 at the City University of Hong Kong.' *Agence France Presse* 5/17/01

The French passage in 64 conveys the cessation of an episode of working at a particular place prior to the past reference time, identified with the time of Li Shaomin's arrest. The French passage and its English translation use different mechanisms to locate this episode prior to the past reference time. The English translation uses a periphrastic construction which expresses a past in past relation, while the French passage uses a simple Past. In both cases, however, what is asserted to exist at the reference time is a state of aftermath. In English, this state is denoted by the head of an auxiliary periphrasis whose participial complement expresses the heterogeneous activity radical. In French, this state is read into the Aktionsart representation of the verb *travailler* 'work' . We will consider further

details of the latter mapping when we examine its present tense analog in the following section.

4.1.2. The Present. The Present, according to Bybee, Perkins & Pagliuca 1994:152 , "carries no explicit meaning at all; it refers to the default situation from which other tenses represent deviations". Because of its neutral semantics, they argue, the Present can "absorb the meaning inherent to normal social and physical phenomena, and this meaning if described and broken down explicitly, consists of habitual occurrence and behavior as well as ongoing states" ibid . The analysis appears to raise more questions than it answers. First, why should states be more "normal" than ongoing events? Second, why should a meaningless construction require a disjunctive definition, involving both ongoing states and habituals? But even leaving these concerns aside, it is apparent that one could not describe the aspectual constraints that the Present exhibits, or the coercion effects which it performs, if one did not view it as meaning something.

On the present account, as discussed, the Present is an aspectually sensitive tense operator which selects for the stative type. As in the case of the Past, aspectual concord is represented in superimpositional terms: the input temporal representation must unify with the sampling set < □ >. This constraint is based upon the shallow time depth of the present and the epistemological characterization of states given in Section 2 above: states are verifiable on the basis of a momentaneous sample. Coercion effects triggered by the Present, as aspectual mappings, are Aktionsart preserving, This means that if the Present does not receive a temporal representation of the appropriate type, concatenation and permutation operators will apply as needed to derive the required type. Since the Present shares its aspectual concord requirements with the Imperfective, we predict that the Present will trigger the same kinds of coercion effects attributed to the Imperfective in Section 4.1, namely: partitive and habitual coercions. This prediction is confirmed. Examples 65 66 illustrate partitive coercion, the implicit equivalent of the stative type shift performed by present tense Progressive sentences in English:

65 Faîtes pas attention, Mademoiselle. Il vous **taquine**!

"Don't pay any attention to him, miss. He's teasing you." Binet, *Les Bidochon* 2, p. 7 .

66 Eh bien, à present, je me sens mieux. Le morale **revient**.

"Well, now I feel better. My old morale is returning." Binet, *Les Bidochon* 8, p. 42

The interpretation of 65 involves an implicit type shift identical to that which underlies the interpretation of the Imperfective token in 59 : medial rest selection outputs a state representation. This state representation unifies with the sampling set of the Present. The stative coercion exemplified in 66 is the product of an indirect mapping identical to that involved in the interpretation of Progressive form achievement sentences discussed in 2.4.2: the application of selection involves the creation of an appropriate activity phase for a verb which does not lexically entail one. An addition operation is accordingly applied in order to augment the temporal representation of the achievement radical *Le moral revenir* 'Morale return ' up to that of an accomplishment radical. The augmented temporal representation is then subject to selection of the heterogeneous activity component, □. The output representation is then subject to medial rest selection, triggered by Present. Because the accomplishment type mediates between the input achievement representation and the stative output, 66 invites the same slow motion conceptualization as its Progressive translation does in English the return is not immediate, but has an onset phase. This construal is appropriate to the context: the speaker, having just broken a fast, is describing the gradual cessation of weakness.

The habitual construal, as we have seen, is produced by the same Aktionsart based mapping which underlies the partitive, or 'progressive type', construal: selection of a rest within the temporal representation of an event chain. Thus, the Present operator triggers habitual readings analogous to those triggered by the Imperfective. These are exemplified in 67 68 :

67 Ils **disent** neuf heures à tout le monde. Comme ça, si t'as pas la chance de passer dans les premiers, tu **attends** des heures!

"They tell everyone to come at nine. That way, if you don't have the luck to get in first, you wait for hours." Binet, *Les Bidochon* 7, p. 15

68 La pratique régulière du jogging **prolonge** la vie de deux à huit ans!

"Regular jogging prolongs life from two to eight years!" Binet, *Les Bidochon* 11, p. 36

The mapping in 67 is indirect, involving the mediation of the heterogeneous event category. For example, the accomplishment radical *Ils dire neuf heures à tout le monde* 'They tell everyone 9 o'clock' undergoes concatenation, yielding an event chain representation upon which medial rest selection can act.

Thus far we have seen that the French Present behaves identically to the Imperfective with regard to coercion potential: both constructions trigger partitive and habitual coercions. This is to be expected, as both constructions are state type selectors. Since Imperfective sentences, as shown in 65 , are also used to express meanings analogous to those expressed by continuative Perfect predications in English, we predict that Present sentences in French can be used in this way as well. This prediction is fulfilled, as shown in 69 71 :

69 Comme moi, alors! Sauf que moi, c'**est** une affaire réglée depuis quinze jours.

"Same here! Except in my case the thing surgery has been a done deal for fifteen days." Binet, *Les Bidochon* 7, p. 25

70 Raymonde: Ça commence à s'éclarcir!
Robert: C'est une chance! Depuis une heure qu'on **attend**!

"Raymonde: It the waiting room is beginning to clear out. Robert: That's a stroke of luck considering we've been waiting for an hour." Binet, *Les Bidochon* 7, p. 15

71 Ca fait dix minutes qu'elle nous **parle** de la moquette!
"That makes ten minutes that she's been telling us about the carpet." Binet, *Les Bidochon* 10, p. 17

Like the Imperfective, the Present shifts an episode type to a state type by selecting a rest following the offset transition in temporal representation. For example, in 69 , the state phase radical *C'être une affaire reglé depuis quinze jours* 'It be a settled matter for fifteen days' , is shifted to a state by selection of a rest following the final transition of the state phase. Like Imperfective sentences, and unlike Perfect sentences, Present sentences which express post phase states must contain adverbial expressions of duration, e.g., *depuis quinze jours* 'for fifteen days' . This constraint appears pragmatic in nature, since it serves to preempt what would otherwise be a three way ambiguity. Thus, as shown, 71' has the

partitive reading given in a and the habitual reading shown in b , but not the continuative reading given in c :

71' Elle nous **parle** de la moquette.
a. 'She is telling us about the carpet.'
b. 'She tells us about the carpet.'
c. ≠ 'She's been telling us about the carpet.'

Like Imperfective predications, Present predications in French lack resultative and existential Perfect interpretations. Instead, the periphrastic Past construction *Passé Composé* , which Waugh 1983 analyzes as ambiguously denoting Perfective and Perfect meanings, yields these readings in combination with event radicals. An example of an existential Perfect predication is given in 72 :

72 Le genre basané avec des biceps partout ne m'**a** jamais **impressionné**!

"The sun tanned type with biceps all over has never impressed me." Binet, *Les Bidochon* 8, p. 10

The fact that final rest selection operations are delegated to two distinct constructions in French lends support to the ambiguity analysis of the English Perfect given in Section 3, in which distinct input types correspond to distinct Perfect operators.

4.2. Past and Present in English

4.2.1. The Past. Our treatment of the English Past will be isomorphic to that of the French Perfective and Imperfective constructions. It is based upon the following premise: there are two homophonous Past tenses in English an Imperfective Past and a Perfective Past. This treatment will force us to posit a semantic opposition which has no morphosyntactic reflex, but the analytic framework invoked is a common one in ambiguity studies, which frequently motivate abstract constructs by appeal to formal differentiation in other languages Zwicky & Sadock 1975, Prince 1997 . The ambiguity based analysis of the English Past is supported by two fundamental observations. First, the English Past is not aspectually neutral. We know this because a Past predication may or may not inherit its Aktionsart representation from the situation radical it contains. Second, the English Past does not exhibit a single pattern of aspectual concord. We know this because the

implicit type shifts triggered by the Past operator do not yield a single output type. Examples 73 77 present the crucial data in the form of contrast pairs. The members of each pair are related by one of the Aktionsart based mappings described above. The members of each pair are formally identical, but the distinct contexts supplied cause their readings to diverge:

73 **State → Achievement**

a. She **remembered** where the money was hidden but no one else did .

b. She **remembered** where the money was hidden but only after some incentives were offered .

74 **State → State phase**

a. I glanced back at her but she didn't notice. She **looked** elated.

b. I told her the answer. She **looked** elated. Then frowned in consternation.

75 **Activity → State**

a. Sue decided to look dramatic that day. She **wore** a pink Chanel suit and an Hermès scarf.

b. I studied Sue's elegant outfit. She **wore** a pink Chanel suit and an Hermès scarf.

76 **Achievement → State**

a. Thick smoke **filled** the corridor. In a matter of minutes, we could no longer see the exit signs.

b. I opened my door and looked out. Thick smoke **filled** the corridor.

77 **Accomplishment → State**

a. They **recited** the mass in Latin.

b. At the time of the Second Vatican Council, they **recited** the mass in Latin.

In each of these examples, we will regard interpretations which diverge from situation radical Aktionsart values as evidence of a mismatch between the situation radical and the Past operator, while transparently projected predicate Aktionsart values will be regarded as evidence of aspectual concord between the Past operator and its argument. In 73a , the state radical *She remember where the money was hidden* has a stative interpretation. That is, there is semantic concord between this situation radical and the Past operator. In 73b , *remember* has a coerced inchoative interpretation via addition: the BECOME operator is added to the causal representation of the state radical. The examples in 74 are similar to those in 73 , except that a state phase rather than an inchoative interpretation appears in the coercion context 74b . The coerced construal in 74b involves augmentation of the Aktionsart representation of the state radical *She look elated*: the operator HOLD is added to its causal representation, while onset and offset transitions are added to its temporal representation. In 75a , the homogeneous activity radical *She wear a pink Chanel suit and an Hermès scarf* receives an episodic interpretation that reflects its inherent perfectivity: the scope of the predication includes Sue's donning and doffing the outfit. This scope is reflected in the inclusion of a transition in the sampling set imposed by the Perfective Past see Table 3 . In 75b , this same homogeneous activity radical receives a stative interpretation, in which the period of Sue's wearing the outfit includes the time at which the narrator took note of it. Since the reference time of the Past *qua* Imperfective Past countenances no transition, the scope of the resulting predication is highly constrained: it does not, for example, include the time at which Sue put on her outfit. The coerced stative interpretation in 75b is obtained by selection, which targets the stative argument of the operator HOLD in causal representation or, equivalently, the medial rest in temporal representation . In 76a , the achievement radical *Smoke fill the corridor* has a concord interpretation in which smoke diffuses through the corridor. In 76b , this same achievement radical has a coerced stative interpretation, in which the corridor is smoky at the point when the narrator made her observation. The aspectual mapping which underlies this coerced reading is selection. The output of selection is the state predication which follows the operator BECOME in the input causal representation.

The examples in 77 are slightly more complex than those in 73 76 because they involve an indirect mapping. In 77a , the accomplishment radical *They recite the mass in Latin* receives its default or, equivalently, concord interpretation: it denotes the execution of a pattern, where the NP *the mass* denotes an incremental theme in the sense of Dowty 1991. In 77b , this same event radical receives a stative construal: it denotes a situation which includes the time of the Second Vatican Council. We can presume, whether or not we have the relevant world knowledge, that this situation ended shortly after the

conclusion of the Second Vatican Council, but this presumption is the product of pragmatic inference. The stative construal in 77b is a coerced reading, which results from the application of selection to an event chain representation, produced by concatenation. Selection targets a medial rest in the temporal representation of this event chain. The stative construal of an iterated event entails a structural construal of that event. As we have seen, pragmatic conditions determine whether an iterated event is sufficiently structural to license a stative construal. Judgements of 'extensibility' will accordingly have a gradient character. For example, the situation type expressed by 78 is extensible if interpreted as structural, as in 79 , but only marginally so if not, as shown in 80 :

78 I saw a movie every weekend
79 I saw a movie every weekend when I was kid and in fact I still do.
80 ?I saw a movie every weekend over vacation and in fact I still do.

The otherwise paradoxical fact that a single tense form triggers antithetical type shifts is explained on the assumption that there are two distinct but homophonous Past constructions in English one which requires state radicals and another which calls for event radicals. While this solution is less economical than traditional approaches to the meaning of the English Past, it can be justified as offering improved data coverage. To see that this is so, let us compare it to two monosemic analyses that have been offered in the literature. In the first of these analyses, the Past has a single specific meaning. According to Bybee, Perkins & Pagliuca 1995:152 , the English Past "express es an explicit temporal relation, that the narrated events occurred before the moment of speech". In the second of these analyses, the English Past has a vague or defeasible meaning, which is fixed only by verbal Aktionsart. According to Smith 1997:170 171 , the English Past expresses the perfective viewpoint, in which the endpoints of the denoted situation are included in the reference frame: "A sentence with the perfective viewpoint presents a sentence with the endpoint properties of its situation type schema" p. 171 . Since the Aktionsart representations of states do not include endpoints, Past stative predications are "compatible with either a closed or open interpretation, depending on context" ibid .

Each of these analyses fails to account for certain kinds of stative Past sentences. The Bybee et al. analysis can account for perfective readings of state predications, whether these involve the addition of an inceptive phase, as in 73b , or both inceptive and terminal phases, as in 74b . However, this account cannot capture the inferential properties of stative Past sentences, in particular their extensibility to the present. Nor does it explain the means by which Past event sentences receive state readings, as in 73b , 76b , and 77b :

if Past sentences denote events they cannot also denote states. The Smith analysis can presumably account for perfective readings of state predications as contextual inferences and for cases of imperfective concord, since stative verbs specify no endpoints. But this analysis, like the Bybee et al. analysis, fails to explain why it is that Past sentences containing event radicals can have stative interpretations. The facts of imperfective coercion, and imperfective concord, appear to require the homophony analysis.

Once we assume that the English Past operator is aspectually sensitive, it becomes easier to explain the protean interpretive behaviors of state and activity sentences in narrative texts. Prior attempts to model these behaviors have had unwelcome consequences both for Aktionsart representation and for the formulation of temporal discourse interpretation principles. As we have seen, Past stative predications can have both inchoative and episodic readings in temporal discourse. Examples of these perfective readings are given in 73b and 74b , respectively. For both Dowty 1986 and Bickel 1997 these readings require fundamental changes in the semantic analysis of states. Bickel proposes 1997:124 that the Aktionsart representations of all state verbs contain inceptive phases. If the inceptive phase of a state is selected by perfective grammatical aspect, an inchoative reading results. If a terminal phase is introduced into the state's Aktionsart representation, as by a durational adverb, an episodic reading results. While this model provides a straightforward picture of the interaction between grammatical aspect and Aktionsart, it has one highly undesirable effect: it makes the Aktionsart representations of states and achievements identical. For his part, Dowty 1986 proposes to accommodate inchoative and episodic readings of state predications by assuming, contra Partee 1984 , *inter alia*, that state predications, like event predications, move reference time forward in temporal discourse. Inclusion becomes a contextual implication. For this reason, Dowty's rule for the interpretation of temporal discourse

> makes no mention of differences in aspectual class, and will therefore treat statives just the same as accomplishments and achievements in locating their reference times. But ... the inferences we draw in a narrative about which events or states overlap with others in the narrative is not really a consequence of the times sentences are *asserted* to be true, but rather also in part a consequence of the times at which we *assume* that states or events actually obtain or transpire in the real world, intervals of time which may in some cases be greater than the intervals of time for which they are simply asserted Dowty 1986:48

Dowty goes on to argue that since states have the subinterval and cumulativity properties, state predications may extend 'backwards' along the time line of the text to include previously invoked reference times. The problem, of course, is that a state which is included within its reference time is not a state but an event, and is coded as such in languages which formally differentiate Perfective and Imperfective Pasts. Thus, Dowty, like Bickel, has accounted for perfectively interpreted states by neutralizing the event state distinction. Because the event state distinction has robust linguistic reflexes, it is clear that we must find an alternative account of the relevant textual effects. The coercion based treatment of the Past appears to provide such an account. On this model, inchoative and episodic readings of state predications result from semantic conflict resolution: operations on Aktionsart structure ensure that the Perfective Past receives a situation radical denoting an event type. Because the Past construction has an alternate version which indexes the state type, we predict that imperfective coercions will also occur in texts, resulting in the extension of the denoted situation to times in the text prior to the current reference time. As shown by the narrative passage in 81 , this prediction is fulfilled:

81 Kent ... stepped out, so that he hung suspended in a dark green jungle of foliage over the yawning void. ... A vampire **flapped** systematically up and down the wall ... . G. Wolfe, *Storeys from the Old Hotel*, p. 141 .

In this passage, a heterogeneous activity radical, *A vampire flap up and down the wall*, receives a stative reading via medial rest selection. We characterize this reading as stative because the time of the flapping event includes the time of Kent's jump from the top of the wall the vampire was flapping prior to the point at which Kent stepped out. This reading would ordinarily require use of the Progressive construction, an explicit type shifting device. However, the author has chosen an implicit stativization device the Imperfective Past. Since the stative reading in question is derived by conflict resolution, there is no need to postulate an additional stative lexical entry for the verb *flap* based upon the usage in 81 . Nonce readings of verbs are simply that generated on the fly and having no effect upon lexical organization.

4.2.2. The Present. The coercion based model offers a new way of addressing a long standing puzzle concerning temporal reference in English: why isn't the English Present used for event reporting? Cooper 1986 argues that the English Present is "exotic" in requiring a higher degree of coincidence between speech and situation times than does present tense inflection in other languages: "the semantic location of the present in other

languages requires the discourse time to temporally overlap the event time rather than be identical with it" p. 29 . The current proposal locates the relevant typological variation elsewhere. Under this proposal, Present operators uniformly select state representations as we expect, given the logical relationship between time depth and the conditions of verification upon event reports. What makes the English Present idiosyncratic is that it is not a general purpose stativizer. Those type shifts which it fails to perform happen to be those which are effected by dedicated morphosyntax, viz. the Perfect and Progressive constructions. The emergence of these two constructions, via possessive and a locative periphrases, respectively, increased the overall transparency of the type shifting system in English, but contrary to what we might expect, these newly developed stativizers did not merely narrow the functional range of the Present. When the Perfect obtained a continuative meaning in Early Middle English, as exemplified in 82 , it in fact took over a function previously performed by the Past, as shown in 83 84 :

82 Ant ye, mine leove sustren, **habbeth** moni dei **icravet** on me after riwle.
'And you, my beloved sisters, have for many days desired a rule from me.'
Ancrene Wisse, c. 1220

83 A Ic wite **wonn** minra wraecsitha.
'Always I have suffered the torment of my exiles.' *The Wife's Lament*, c. 970

84 For that sothe **stod** a than writen hu hit is iwurthen.
'For that truth has remained always in writing, about how it happened.'
Layamon's *Brut*, c. 1200

Unlike the Perfect, whose current use conditions were largely in place by the 13th century Carey 1994 , the Progressive is a relatively recent innovation Joos 1964 . As of Shakespeare's time, the alternation between Present and Present Progressive was apparently conditioned only by metrical considerations Dorodnikh 1989:107 , as when the Present is used to convey Progressive meaning in Romeo's question *What light through yonder window breaks?*. According to Joos 1964:146 the Progressive attained its current usage only in the 19th century, when it came to be used in passive predications, e.g., *The lamps were being lighted*, as against the earlier middle form, *The lamps were lighting*. Again, however, it would be somewhat shortsighted to analyze this development as having occurred at the expense of the Present. This analysis seems to be what Bybee, Perkins & Pagliuca 1994:144 have in mind when they say that "the Progressive appears to have been

taking over some of the functions of the Present for several centuries". While, as discussed above, the English Present indeed differs from its French analog in failing to trigger partitive coercions, the English Imperfective Past differs from *its* French analog, the *Imparfait*, in the very same respect. The English Imperfective Past does coerce Progressive style readings of activity representation, as exemplified in 75b and 81 above. However, it does not trigger such readings when combined with TELIC event radicals. There is no *a priori* semantic constraint which would prevent it from doing so. Sentence 77b , repeated below as 85 , exemplifies a closely analogous stative coercion which the English Imperfective Past does in fact perform. In the present framework, this shift involves the selection of a medial rest in the temporal representation of an event chain:

85 At the time of the Second Vatican Council, they recited the mass in Latin.

The implicit type shift exemplified in 85 is indirect: the input accomplishment representation undergoes concatenation prior to the application of selection. Thus far, the Imperfective Past does not differ from the French *Imparfait*. But the *Imparfait* performs an additional, isomorphic operation which the English Perfective Past does not. As shown in 56 , repeated here as 86 , the *Imparfait* triggers an indirect shift which involves the selection of a medial rest within a heterogeneous activity representation that is the output of SELECTION rather than concatenation . The target of this initial selection operation is the accomplishment representation which corresponds to the situation radical *Un type faire une démonstration* 'A guy do a demonstration' :

86 C'est quand je suis passé devant le magasin! Il y avait un type qui **faisait** une démonstration pour aguicher la clientèle.

"It's when I went past the store. A guy was **doing** a demonstration to rope in customers." Binet, *Les Bidochon* 8, p. 14

If the English Imperfective Past triggered this same partitive coercion, sentence 87 below would have a reading in which the recitation of the mass had begun PRIOR to the speaker's entering the church:

87 When I entered the church, they recited the mass in Latin.

On this reading, the recitation event includes the past reference time evoked by the subordinate clause. This reading is entailed by the lack of a transition in the sampling set of the Imperfective Past. In fact, 87 has only the sequential reading entailed by the perfectivity of the input accomplishment radical *They recite the mass in Latin*. The fact that 87 lacks an 'overlap' reading does not undermine the claim, expressed in Section 2.4.3 above, that the episodic habitual distinction is irrelevant to grammatical encoding.: examples 75b and 81 show that activity representations are in fact treated as isomorphic to event chain representations for the purpose of medial rest selection. The missing reading does, of course, contribute to a mystery: why should the presence of a Progressive construction block some but not all implicit stative type shifts? Notice, however, that in posing the question in this fashion we are thinking of cross linguistic differences in coercion potential, rather than semantic differences among exponents of a given tense relation. At this point, explanation will involve appeal to the discourse pragmatic division of labor.

5. Conclusion: Coercion Potential and Gricean Explanation

On the Aktionsart based approach to type shifting outlined here, aspectual information is both grammatically integrated and uniformly represented. It is uniform because a single type of structure Aktionsart representation underlies both argument projection and morphosyntactic concord. It is integrated because Aktionsart representations are indexed by constructions which are neither strictly aspectual nor even strictly temporal: not only tense markers like the English Present but also evidential and modal constructions like the Turkish inferential Past, as described by Slobin & Aksu 1982, display Aktionsart based concord. If aspectual concord, rather than aspectual neutrality, is the default, we have cause to reexamine markedness analyses based upon privative oppositions between exponents of a given temporal relation, as well as typological frameworks which posit divisions among 'tense', 'aspect' and 'evidential' languages. If aspectual sensitivity is sufficient evidence of an aspectual category's grammatical relevance, we must ponder anew what it means for a given language to 'have' a given aspectual distinction. And even if we have narrowed the Whorfian gap between 'tense' and 'aspect' languages, we still face a host of questions raised by the Gricean paradigm, in particular that of direct versus indirect means.

It is plausible to propose that restrictions upon the range of coercion functions performed by a given construction are explicable according to Panini's Law: the specific, the particular construction, takes precedence over the general, the mechanism of coercion.

Where shift constructions are available to perform a given type shift, as are the Perfect and Progressive constructions in English, this type shift is less likely to be performed by a less specialized concord construction, e.g., the Present. We might therefore predict that shift constructions will extend their functional ranges at the expense of concord constructions. Of course, as we have seen, the facts do not fall out as neatly as one might expect given the above presumptions, and we have reason to believe they should not. According to the Principle of Contrast, as elaborated by Clark 1994 , *inter alia*, speakers innovate pragmatic extensions of synonymous forms. Thus, for example, English provides both compositional and noncompositional means of expressing future reference, as the modal future contrasts with the futurate present. The futurate present, which we analyzed above as an instance of coercion, is typically used to convey scheduled events. For this reason, the query in 88a sounds more natural than that in 88b :

88 a. What are you doing this weekend
b. What will you do this weekend?

While the coerced meaning conveyed by 88a might be analyzed as 'marked' relative to the compositionally derived meaning of the modal predication in 88b , there is nothing which requires an implicit type shift to have a narrower range of uses than an explicit one in the same semantic domain. For example, Past and Present Perfect predications are used interchangeably to express resultant states and appear to be largely stylistic variants in American English Slobin 1994 . The balancing of the functional burden carried by shift and concord constructions reflects the synchronic and diachronic compromises reached between the two countervailing forces of speaker based economy and hearer based explicitness. Because, as Horn 1984 observes, speakers may privilege either constraint in their linguistic choices, type shifting effected through implicit means is no more marked in principle than that effected through explicit means: the former is marked with respect to explicitness, while the latter is marked with respect to economy. This dialectic ensures that linguistic systems will tend toward an equitable distribution of the type shifting burden among shift and concord constructions.

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Endnotes

[1] For DS p. 351 , the category of events contains only those dynamic situations which have an intrinsic endpoint, i.e., telic situations. Following Herweg 1991 , I will use the term *event* more broadly to designate all dynamic situations, including processes i.e., activities , using the compound term *telic event* to designate those events which have intrinsic endpoints.

[2] DS in fact claims p. 369 that Imperfective sentences in French may denote either states or activities, and therefore that the Imperfective operator 'outputs' the more general class of homogeneous situations, rather than merely stative ones. In Section 4, I will argue against the claim that Imperfective sentences overlap with dynamic sentences and in favor of a more restrictive analysis in which the Imperfective operator selects only for stative situation radicals.

[3] There are certain inconsistencies in DS's implementation of the macro operator analysis. For example, although DS claims on p. 383 that the HAB habitual operator maps all eventualities, including stative ones, to stative eventualities, she has previously defined the macro operator C_{eh} as subsuming the HAB operator p. 382 . This appears to be a contradiction, since the macro operator C_{eh} allows only telic situations DS's class of events as input. Such problems do not in themselves invalidate the macro operator analysis.

[4] The category of state phase should not be confused with that of STAGE LEVEL PREDICATIONS, as described by Partee 1991 , *inter alia*. State level predications denote temporary states like being on sale, on fire or angry. Stage level predications, unlike state phases, have stative syntactic and interpretive behaviors, e.g., they are reportable by means of the simple Present in English e.g., *Tomatoes are on sale* and interpretable as including a past reference time, as in a :

a When I got to the supermarket, all the tomatoes were on sale.

[5] One could of course object to the claim that Past activity predications entail cessation, on the following grounds: the assertion *She ran at 3:00* entails only that she BEGAN running at 3:00. Such examples do not make the intended point, however, because they illustrate

contexts of coercion: the combination of a punctual adverbial, e.g., *at 3:00*, with a state or activity radical results in a coerced inchoative reading of the predication. This inchoative reading arises via selection of the initial transition event in the temporal representation of the activity. By contrast, when an activity radical is combined with a nonpunctual adverbial, cessation is in fact entailed, as in, e.g., *She ran this morning.* There is, however, another argument against the view that perfective activity predications entail terminal points. It goes as follows: Past tense activity predications cannot be said to entail cessation because they are upward compatible with regard to superintervals, as shown by cases of implicature suspension, e.g., *She ran for an hour yesterday, if not for two hours*. This argument also fails to go through. Such examples merely illustrate the extensibility of the reference interval; the entailment of cessation within the reference interval remains unchanged.

[6] In addition, certain augmentations are prohibited on the grounds that they do not correspond to attested argument structure alternations. For example, while the achievement and accomplishment templates overlap, Rappaport Hovav & Levin 1998:124 argue that achievement templates cannot be expanded into accomplishment templates, because achievements are "not conceptualized as externally caused". This seems an inappropriate assumption, since the achievement accomplishment mapping provides a straightforward account of the causative inchoative polysemy of verbs like *break* and *open*.

[7] The mapping which shifts states to state phases, while unproblematic at the level of causal structure, presents a problem for temporal representation. At the level of causal structure this mapping involves the addition of the operator HOLD, a single component of causal representation. This mapping conforms to the constraint on minimal transitions. At the level of temporal representation, however, this mapping violates the constraint on minimal transitions, since it involves the addition of TWO components of temporal representation: the onset and offset transitions. Bickel 1997:124 126 solves this problem by assuming that the temporal representations of states include an onset transition. Under this assumption, the shift to an episodic reading involves only the addition of a single terminal transition. Since, however, this solution neutralizes the grammatically relevant distinction between state and achievement representations, I do not adopt it here.

[8] Although the concept of rest does not have an explicit analog in causal representation, there is no reason other than notational economy that the causal representations of event

verbs could not be modified via coordination or some other means to include a a state constant expressing an antecedent state and b an inchoative operator expressing the inception of the relevant action.

[9] The account to be proposed here is similar in spirit to one proposed by Mittwoch 1988:229 231 . Both accounts reject an intensional model of the Progressive and both accounts view the Progressive as selecting for atelic types. However, the present account differs from the Mittwoch account in a number of respects. Mittwoch defines the Progressive operator as follows:

> PROG A is true in M relative to *w,i* iff *i* is superinterval of an interval *j* and A is true in M relative to *w,j* , where A is interpreted as an activity or state. p. 231

As formulated, this definition allows *j* and *i* to be coextensive intervals. It therefore includes so called "extended interval progressives", which denote an ongoing state or activity. Such tokens are distinguished from 'partitive' uses, in which the Progressive selects a proper subpart of a telic event. This account, however, conflicts with the logic of states: because the present is construed as a moment, it cannot accommodate an extended interval, as shown, for example, by the ill formedness of simple Present state phase tokens, e.g., **She believes you for a few minutes*. Further, because Mittwoch's definition does not map to a syntactic analysis, the account does not distinguish between the type denoted by the auxiliary head and that denoted by the participial complement. For this reason, it cannot obviously explain the fact that Progressive predications have the syntactic behaviors of state predications rather than, e.g., activity predications. In addition, Mittwoch's analysis does not account for the fact that, as described here, Progressive form states receive homogeneous activity construals. If, as Mittwoch's definition states, the Progressive operator selects for EITHER an activity or state radical, then there is no reason to expect Progressive form states to be interpreted as anything other than states. In fact, it follows from Mittwoch's definition that states are appropriately reported by means of the Progressive. We know this to be false because Progressive predications like the following are anomalous: **I am having a cold*.

[10] The proposed solution to the imperfective paradox is in the spirit of a proposal made by Parsons 1990, who also sees the Progressive as a stativizing construction. Parsons proposes 1990:171 that the event type denoted by the Progressive's VP complement is related to its time of occurrence by the operator Hold, which is used to relate states to their reference times, rather than the operator Cul 'culminate', which relates events to their reference times. Thus, for example, the sentence *Agatha was crossing the street* is given the logical translation in a. A paraphrase of a is given in b:

a ∃t t<now & ∃e crossing e & Subject e, Agatha & Object e, the street & Hold e, t

b "There exists a time *t* before now and an event *e*. The event is an event of crossing whose subject is Agatha and whose object is the street. This event holds at *t*.'

According to Parsons, this analysis "is immune to 'paradoxes' of the imperfective kind, since saying of an event that it holds at a given time does not imply that it culminates at that or any other time" ibid. As in the present account, the problem of constraining what counts as a subpart of a given event is left to the judgements of individual speakers, for whom stepping off the curve may or may not count as a subpart of the street crossing event. There are, however, significant differences between the Parsons account and the one offered here. First, the Parsons account requires existential binding of an event variable. This is problematic because, as discussed, a nonsubinterval telic event can be said to exist only insofar as it has culminated. It unclear how such an event could both exist and hold. If that event is expressed by a verb of creation, further problems ensue, since a Progressive sentence may pick out a preparatory phase during which no portion of the created object exists. For example, the sentence *She is drawing a circle* may refer to the activity of placing one's pen on paper. Nonetheless, existential binding of a transitive event entails existential binding of the object denotatum, and Parsons is forced to defend an analysis in which unassembled components of a given object count as instances of that object p. 175. Second, the analysis is designed solely to describe the effect of stativization upon events. It is difficult, therefore, to determine how it might be extended to account for coercion effects. Even if one did allow that a stative predication could 'count as' an event radical for the purpose of undergoing stativization, the account would nonetheless fail to explain why stative sentences receive activity readings when in Progressive form. Finally, the category

of events which 'hold' rather than culminate is not motivated outside of the Progressive, and therefore appears ad hoc.

[12] As we have seen, the activity class includes not only homogeneous activities of the *sleep* type but also events of the *run* type, consisting of iterated subevents. This division within the activity class leads us to predict that Progressive form statives may have readings otherwise associated with heterogeneous activity sentences. It would appear at first glance that Progressive form state sentences which express the accretion of a property have such readings, as in a c :

a I'm believing your story more and more.
b I'm seeing the picture with increasing clarity.
c I'm liking each song more than the last one.

The fact that the stative verbs in a c are paired with comparative adverbials, e.g., *more and more*, suggests that they have heterogeneous activity readings, since ordinarily only heterogeneous activities are compatible with such adverbials, as in *She ran faster and faster*. Adverbials denoting 'accretion' of a gradient property are incompatible with telic predications, as shown by the ill formedness of the sentence **She broke the glass faster and faster*. Significantly, such adverbials are also incompatible with state predications, as shown by the ill formedness of the sentence **She is a French professor more and more*, strongly suggesting the Progressive form state predications denote activities. On closer inspection, however, we find that the comparative adverbials in a c are not symptomatic of a construal imposed by the Progressive construction. The data suggest that these comparative adverbials invoke the heterogeneous activity type, and accordingly coerce event chain readings of state radicals, as in d

d I liked the plan more and more.

It could, of course, be argued that d constitutes a state sentence rather than an activity sentence, since it could as easily be presented in the simple Present, as in e :

e I like the plan more and more.

As I will argue below, however, the mere fact that a given situation radical can be combined with the Present tense does not show that it is a state, since the Present can coerce stative readings of otherwise perfective situation radicals. Under the account given here, the comparative adverbial *more and more* coerces a heterogeneous activity readings of the state radical *I like that plan* in both d and e . Sentence e differs from d only in that its derivation involves an additional coercion: the Present construction has triggered stative coercion via intermediate rest selection.

[13] See Michaelis 1998: 230 234 for extensive discussion of this issue.

[14] In his 1981 paper, McCawley retreats from a central contention of his 1971 paper that resultative and existential uses of the Perfect are semantically distinct on the basis of the observation that the two readings are indistinguishable under negation p. 84 . However, the two relevant readings of the Perfect have idiosyncratic syntactic reflexes, suggesting ambiguity rather than vagueness, as per Zwicky & Sadock's 'added material' diagnostic 1975: 12 14 . For example, the resultative reading is preempted in a number of syntactic contexts which welcome the existential reading, in particular focus presupposition constructions Michaelis 1998: 246 251 . Information questions are one such context: the *wh* question *Where have the police arrested the suspect?* has only an existential reading, which entails numerous arrests of this same suspect. This question cannot appropriately be used to elicit the unique time at which the police arrested a suspect now in custody the resultative reading .