A Cognitive and Structural Approach to Describing Events

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Despite the long history of the study of tense and aspect phenomena, there remains little consensus among linguists who have the dual goals of providing an adequate account of the nuances of language specifics and providing a framework general enough to describe cross-linguistic universals and variation. Work done after Reichenbach (1947) has focused on semantic primitives that describe relationships between points in time—I maintain that to adequately describe event structure the level of description must focus one level lower—not on the relationships themselves, but on the structural elements that give rise to the relationships. The discussion centers on three morphological forms in two languages, English *have-en*, *be-ing* and Japanese *te-iru*. It illustrates how the structural approach presented can be used to accurately and efficiently accomplish both linguistic goals.*

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1. Introduction

Langacker (1987) presents the theory of Cognitive Grammar, a view of the study of language that is quite different than Generative Grammar which has dominated the field of linguistics for the last half-century. Langacker states a number of reasons why, in his opinion, Generative Grammar fails to adequately deal with natural language; most relate to the over-emphasis of form and discreteness, particularly in dealing with semantics. In his own words: "for a linguistic theory to be regarded as natural and illuminating, it must handle meaning organically rather than prosthetically," (Langacker, 1987, 12).

One area of language phenomena that has been notoriously difficult to handle elegantly is "tense and aspect". Even some pervasive and quite basic notions such as "past" and "perfect" cannot seem to be distilled into universal concepts that capture cross-linguistic forms; from language to language, there never seems to be an ideal one-to-one correspondence between concept, form and use and each term needs to be redefined within every linguistic context. Moreover, even within the same language, "tense and aspect" seldom behaves as we might like. For example, in English, the "past tense" is somewhat of a misnomer since "past tense" forms are used for more than placing events on a relative temporal scale; "If I went to the library tomorrow, I could also stop by Jane's house," clearly refers to events in the future despite its use of the "past tense". Two typical solutions to cases such as this are to i) propose underlyingly different, but homophonous forms or ii) propose a single meaning that spans more than one primitive concept. The former denies our intuitions that such forms are related semantically and historically, and

the latter sacrifices the cross-linguistic universality of the concepts in question, neither of which are desirable outcomes.

The difficulty in analyzing tense and aspect phenomena is largely due to the immensity what "tense and aspect" entails—not only temporal reference, perspective on events and cues for imagined realities, but also more subtle non-linguistic factors such as the attitude of the speaker, the relationship between speaker and listener, and the human cognitive perception of time and events. "Tense and aspect" is not the domain of verbs alone; the semantics of adverbs, nouns, and adjectives as well as verbal complement structures can all contribute to the overall semantic structure that linguistically approximates any event in reality. Moreover, "tense and aspect" choices can be determined by or be cues for register and / or discourse pragmatics (Binnick, 1991, 339-342). The breadth of the phenomenon spans the most fundamental generative boundaries: semantics, syntax, pragmatics, etc. Given the strong predisposition that twentieth century theoretical linguistics has exhibited towards discretely categorizing and modularizing linguistic phenomena, perhaps it is unsurprising that a comprehensive, cross-linguistically universal formalism of "tense and aspect" remains elusive.

The linguistic encoding and communication of events, however, is a ubiquitous and fundamental function of language, and we would benefit greatly from a more profound understanding of the cognitive mechanisms entailed. The framework of Cognitive Grammar may be more amenable to adequately describing event structure including "tense and aspect" for a number of reasons. Perhaps the most salient is that Cognitive Grammar rejects the traditional distinctions between areas of linguistic competency—all of phonology, morphology, syntax, pragmatics etc. are described in terms of symbolic relationships between areas of semantic

space. This feature alone has the power to simplify the analysis by eliminating the need to describe the interaction between "modules".

Due to the relative newness of cognitive approaches to language (Fauconnier, 1985; Langacker, 1987), there is not a broad literature devoted to the treatment of tense and aspect within frameworks such as Cognitive Grammar. Cutrer (1994), elaborating on the work of Dinsmore (1991), presents probably the most well developed analysis which focuses on descriptions of English and French. However, I maintain that Cutrer's analysis of event structure, along with those of Fauconnier, Langacker and Dinsmore, suffer from the same problem as generative accounts; their primitive concepts that describe events are at a level too high to be universally descriptive. That is they center on a description of structural relationships, not at the level of structural elements.

No "comprehensive, cross-linguistically universal formalism of tense and aspect" will be presented here and despite drawing on the fundamental assumptions and ideas forged by Fauconnier and Langacker, the formalism presented departs considerably from their own accounts. What *is* presented is an analysis of a constrained cross section of phenomena—"perfect" and "progressive" verbal forms—in two unrelated languages—English and Japanese—as an exercise to illustrate an approach to the study of event structure. Japanese is of particular interest because its *te-iru* form of the verb straddles the traditional boundary between "perfect" and "progressive" and has consequently been difficult to deal with within frameworks that propose "perfect" and "progressive" or even "perfective" and "imperfective" as fundamental oppositions.

Hopefully, this discussion will demonstrate that, in principle, a coherent formalism is tractable within this framework and hints at the form that it might

take. However, the analysis also stands on its own as well with the benefit that it provides a unified description that is simple, extendible cross-linguistically, and not only accounts for the exhibited semantic interpretations, but also accounts for the complex mappings seen in translation between the languages.

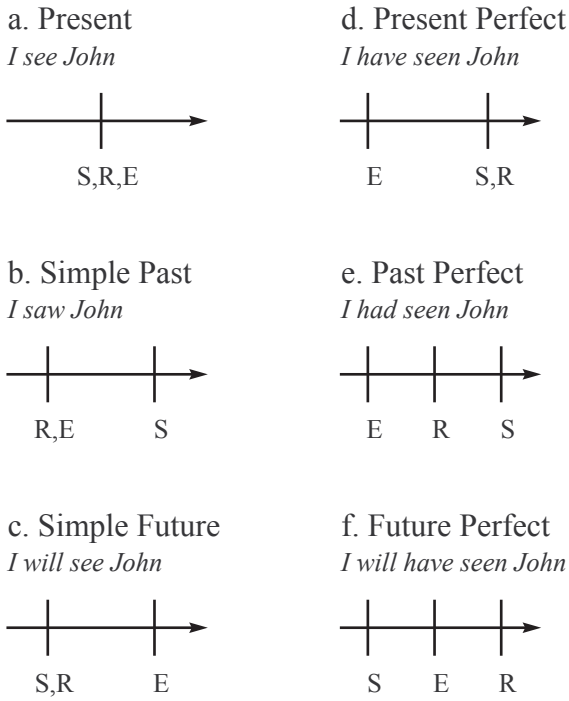
The structure of the discussion is as follows: Section 2 provides some theoretical background in the work in tense and aspect that has been prevalent in the last century. Section 3 outlines some of the fundamental assumptions and principles that guides the analysis presented. Section 4 describes the domain of the analysis; Section 5 presents the primary elements of the framework. Finally Sections 6 through 9 describe how the framework is applied to the morphological forms that constitute the domain of the analysis. Finally, Section 10 concludes.

2. Historical Context

The history of the study of "tense and aspect" extends as far back as the ancient Greeks who largely founded the formal study of language (Binnick, 1991). However, most twentieth century thought on the subject begins with Reichenbach (1947). In essence, Reichenbach's system centers on three points: the speaking point (S), the event (E), and the reference point (R). S, naturally, describes "now"—the time at which the utterance is made; E, on the other hand, marks the event that is expressed by the utterance. R has a dual function: to locate E temporally and to provide a "vantage point" from which E is to be perceived. When the points are placed on a timeline, the various possible configurations give rise to different possible semantic interpretations. Figure 1 diagrams how Reichenbach's system characterizes the English system of tense (including the perfect).

Reichenbach's system has been criticized, expanded on, and revised for more than fifty years and still remains prevalent in the literature (cf. Mittwoch, 1995). Reichenbach's longevity is probably due to the fact that the system that he put forward embodies some basic intuitions that humans have about the nature and function of tense and aspect. That is, universally, it seems we believe that "now"—the moment that something is said—plays a significant, and unique role. It is like an anchor to which all of event structure is ultimately tied, or perhaps a grounded support upon which event structure is built. No theory of tense and aspect ignores the role that the point of speaking plays in providing a reference for interpreting tense and aspect phenomena.

FIGURE 1. Reichenbach's Description of English Tense and Aspect



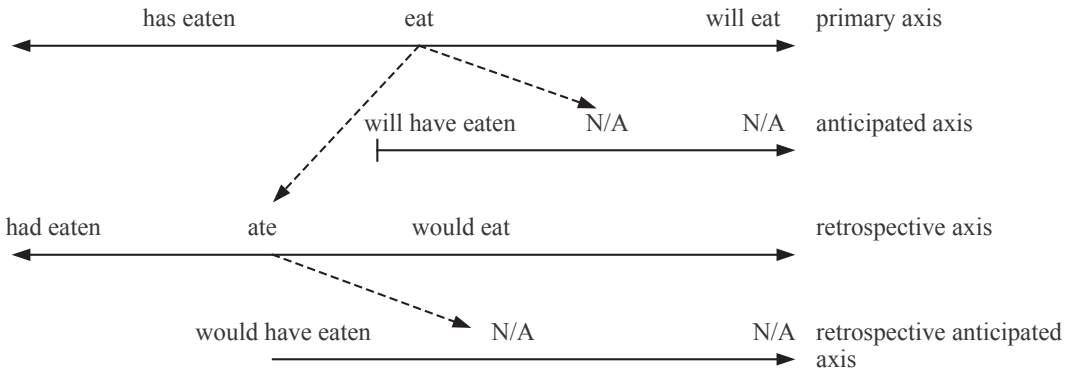
Furthermore, universally, it seems that the point in time at which something occurs is critical to interpreting an utterance, particularly for tense. As in Figure 1, the classical notions of past, present, and future are described by the relationship between S and E when located on an absolute time line. Finally, "perspective"(or "vantage point", "focus", "salience", etc.) always plays a role in interpreting event structure. For Reichenbach, this is embodied in R, which, for example characterizes the difference between the simple past (Figure 1b.) and the present perfect (Figure 1d.); in the latter, R and S are coindexed giving rise to the perception that the past event is somehow relevant in the present, whereas in the former, R is anchored in the past at the time of the event precipitating a strong impression of temporal location.

These latter two intuitions—that the time of the event and the perspective taken on the event are important—largely represent the classical distinction between "tense" and "aspect". Tense canonically locates an event in time, and aspect indicates how that event should be viewed. Although many tense-aspect systems are said to have forms that exhibit characteristics of both categories, this somewhat controversial theoretical division persists.

Arguably the next most influential examination of tense and aspect is that of Bull (1960). Bull, dissatisfied with the fact that Reichenbach's system could not deal with constructions with *would have-en*, introduced four primary "axes of orientation" which represent different reference points from which one could take an anterior or posterior viewpoint (Figure 2). Although, it does indeed account for *would have-en*, it was sharply criticized (as was Reichenbach's analysis) for being "too rich"; there are positions in Bull's diagram—those marked N/A in Figure

2—that do not seem to be used in English or other languages, but for which there are no in-principle reasons why they should not be.

FIGURE 2. Bull's Axes of Orientation



Theories of tense and aspect that have been proffered since Reichenbach and Bull can be broadly classified by their treatment of non-canonical usages of morphological forms. Non-canonical, contextual uses often pose significant problems for analyses. For example, what are we to do with the narrative use of the present tense to refer to the past in English? ("So, I'm on my way to work yesterday, when all of a sudden...") This usage of the"present tense" clearly does not conform to a strict definition of what the "present tense" is supposed to mean. Similarly, how do we characterize the use of the "past tense" in subjunctive clauses? ("If I went to work...") Are there two separate entities, or can the meanings of both "past" and "subjunctive" be somehow expressed in a unified manner?

One historical approach to these contextual usages has been to treat them parenthetically, as exceptions that need not be explained linguistically. An influential example is Comrie (1976, 1985) who argues that the semantics of tense and aspect forms must be judged without regard to contextual or pragmatic factors. Others have proposed that there are opposing tense-aspect systems, such as"narrative" vs.

"non-narrative" (Benveniste, 1959) or "referring" vs. "fictional" (Bache, 1986), for different discourse circumstances. This approach is consonant with the generativist tendency to exclude contextual and discourse effects from the domain of linguistic inquiry and so unsurprisingly, prominent theories advanced within the generativist framework are often of this type (Smith, 1991; Olsen, 1997).

More recently, along with the growing prominence of cognitive approaches to language (Fauconnier, 1985; Langacker, 1987, 1991), more holistic analyses have been presented that attempt to reintegrate the role of discourse and context in understanding tense and aspect systems (Dinsmore, 1991; Cutrer, 1994). Ultimately, if we are to gain a profound understanding of Language as an aspect of Cognition, this is the approach that must be taken; language interacts with experience and information that is non-linguistic on a fundamental level that cannot be excluded from our domain of study.

Another way in which modern theories of tense and aspect differ is in their focus; either on cross linguistic description, or language specific description. Smith (1991) and (Olsen, 1997) are typical of the former, and McCoard (1978), the latter. Both provide interesting analyses of their own focus, but at the expense of the other. For example, Olsen's characterization of the English perfect and progressive uses the universal features [±perfective] and [±imperfective]. Although these two features are sufficient to enumerate the English forms, they fail to encompass some of the subtleties that arise from the perfect and progressive particularly when used in conjunction with each other (*have been-ing*). This is Comrie's "persistent situation" which does not entail completion even though that is part of the canonical meaning of the perfect. Olsen claims that this is well accounted for by specifying *have been-ing* as being [+perfective, +imperfective].

Even though the conjunction of these two seemingly contradicting features intuitively describes the contradictory nature of the persistent situation, it does not offer insight into many details, such as why with some verbs a persistent situation interpretation is possible simply in the perfect form ("I have lived in Bloomington for three years" and "I have worked at this company for several years"). Olsen's analysis can provide an adequate account of the gross characteristics of a tense / aspect system, but fails to characterize many of the subtleties.

On the other hand, McCoard (1978) provides a comprehensive description of the English perfect that fails to generalize to analyses of other perfective forms cross-linguistically. He adopts the "extended now" interpretation of the perfect's semantics; succinctly stated, the "extended now" theory asserts that the perfect delineates a period of time from a past event to the point of speaking such that the distinction between "then" and "now" is irrelevant. However, one of the crucial arguments for the "extended now" is the fact that the English perfect does not allow the specification of the time of the past event. (*"I have eaten ostrich yesterday.") In this fact the English perfect is peculiar, and it is commonly noted that other languages can make such a specification, for example, Japanese (Tsujimura, 1996).

Despite the diversity of thought exhibited in the studies mentioned above, there is one overarching trend. All of Comrie (1976); McCoard (1978); Fauconnier (1985); Dinsmore (1991); Langacker (1991); Smith (1991); Cutrer (1994); Olsen (1997) present descriptions of tense and aspect that employ semantic features as primitives. This, I believe, loses an important aspect of Reichenbach's original insight. That is, Reichenbach's system is on the level of structure—the points S, E, and R are placed on a timeline by morphological forms. The act of doing so gives

rise to particular relationships between the points which in turn map to semantic interpretations. In Reichenbach's system, the linguistic universals—the primitives from which event structure is built—are points on an axis. This structural focus is likewise true of Bull.

By contrast, late 20th century thought centers on the *relationships* as primitives. Olsen's [±perfective] inherently implies a structure that, in Reichenbach's terms, requires that R be posterior to E. This is equally true of the cognitive approaches—Cutrer (1994) proposes several universal features—[PAST, PRESENT, FUTURE, IMPERFECTIVE, PERFECTIVE, PROGRESSIVE, PERFECT]—each of which is associated with a particular "mental spaces" structure that characterizes its contribution to a compositional structure (Fauconnier, 1985). However, again, each feature describes an inviolable relationship between its subelements.

Proposing relationships as primitives in event structure implies that event structure bearing linguistic entities do not have access to the lower level (S, R, and E, for Reichenbach). Not only is this inconveniently restrictive, it is implausible. This issue is central to the approach presented here and constitutes the largest departure it makes from the other theories that have been mentioned.

3. Fundamental Assumptions and Principles

The approach to tense and aspect described in this discussion differs quite significantly from others that have been prevalent in recent history. It is largely grounded in the assumptions of Cognitive Grammar as described by Langacker (1987, 1991), although it differs from both his and others' cognitive analyses of tense and aspect (Fauconnier, 1985; Dinsmore, 1991; Cutrer, 1994). Thus, it is

necessary to explicitly outline some of the guiding principles that have formed this viewpoint.

3.1. **Linguistic Non-relativism.** It goes without saying that linguistic analyses must be without linguistic bias; however, the history of the study of tense and aspect has been heavily influenced by the Ancient Greeks (Binnick, 1991, 3-26) and as Binnick (1991, 13) comments, "had the Greek verb had a different structure, the entire history of Western grammar might very well have been quite different." The literature continues to show a strong Indo-European bias; if no where else than in the choice of phenomena examined.

One of the consequences of this explicit reassertion of linguistic non-relativism is that hence forth, I consciously avoid the use of traditional terminology to the extent possible except in reference to historical usage. Labels such as "perfect" and "progressive", "perfective" and "imperfective" carry a great deal of theoretical baggage and have nearly as many definitions as proponents. Moreover, I believe that their attachment to morphological forms evokes properties at the wrong level of description. Verbal morphology consequently is named by the form—*have-en, be-ing, te-iru* etc.—and terminology that I must add will be explicitly defined as it is introduced.

3.2. **Unified Semantics.** A working assumption is that each morphological form has a single "meaning" where, for the purposes of this discussion, "meaning" takes the form of an event structure. Variation in interpretations or usages of the same morphological form should be the natural outcome of the interaction of the form's associated structure and other event-structure-bearing entities it unifies with. Although this is not unprecedented (cf. McClure, 1994; Shinzato, 1993), this

is a departure from much generativist thought which often posits homophony and polysemy—requiring that a difference in interpretation stem from a difference in underlying form.

Obviously, there are undeniable cases of homophony (English /tu/ for example); however, for reasons of parsimony, it seems necessary and appropriate to first systematically and rigourously rule out the possibility that there exists a unified semantics for a single morphological form.

3.3. **Integration of all Event Structure.** Consistent with the generativist school of linguistics, many analyses of tense and aspect downplay the role of adverbs, phrase structure, discourse, pragmatics, and context. Although it is often acknowledged that these are factors that come into play, their contributions are not formalized, and seldom is any attempt made to provide a mechanism by which non-verbal information affects event structure. This is one of the most appealing aspects of a cognitivist approach; it implicitly provides a mechanism by which linguistic and extra-linguistic entities can interact with each other. For Langacker (1987), semantics is the totality of human experience and language is a process of mapping forms (syntactic, phonological, etc.) from one area of that space to others. Consequently, the burden of explaining the interface between, say, semantics and syntax or discourse functions and word choice is lifted since they are simply treated as subspaces within an overarching domain and are subject to the same processes and possible relationships.

Even though the scope of this discussion does not expand much beyond verbal inflection, it has been developed with an eye towards ensuring that it remains general enough to admit the influence of other word categories, syntactic structures, and context.

3.4. **Perception vs. Language.** There is an ontological difference between human experience and the linguistic communication of that experience. This may seem patently obvious, but I don't believe that it is a division that is often respected in the study of event structure.

By way of analogy, take the phenomenon of "color". There is a physical reality of color described in terms of properties of light which bears little resemblance to the reality of color as perceived through the human visual system. The latter can be considered universal in that we know that there is very little variation in the range of visible light perceptible to humans, nor in their ability to distinguish levels of hue, saturation, and brightness. There is, however, considerable variation in how color is encoded linguistically. Languages differ in not only how many color categories they have, but also more subtly in the ranges of colors that are expressed by those categories. Despite this variation, there are still significant statistical universals—the development of color categories is not arbitrary. Most of these universals can be grounded in a perception. (Hardin and Maffi, 1997)

We can think of the perception of color as a continuous, cognitively universal range of semantic space, the dimensions of which can be described by the axes of hue, saturation, and brightness. The goal of color terms is to efficiently encode salient aspects of that space so that they can be linguistically expressed; this requires a language specific process of fuzzy discretization of color space into

linguistic categories. Thus color terms are not universal—but they are also not random; they are statistically governed by properties of perceptual salience.

These three tiers are pertinent to many modalities and areas of perception and it is likely that they extend to events as well; there is an objective, physical phenomenon of "time" as described by Einstein's Theory of Relativity. This bears little resemblance to the human perceptual experience of time which in turn is quite different from the linguistic realization of event structure. Essentially, we perceive an instantaneous "present" with events "past" extending metaphorically behind us and events having yet to pass extending forward into the "future". It is not unwarranted to claim that this perception of time is universal to human experience, as is, by extension, the perception of events in time. Together, they constitute another continuous, cognitively universal range of semantic space. The dimensionality of such an event space is several orders of magnitude higher than that of color space, so it is difficult to conceive of its boundaries or to characterize precisely what the axes of variation might be, but that fact does nothing to preclude its existence.

Despite the universality of our perception of time as "past", "present", and "future", that idealization is rarely encoded linguistically. As with color terms, languages are free to impose structure onto event space, defining whatever categories provide communicative efficiency. As with color terms, it seems likely that those categories will be statistically guided by properties of perceptual salience.

From this viewpoint, the process of expressing an experienced event is akin to the mathematical process of curve-fitting—finding the best approximation of reality that can describe and encode the experience efficiently. "Event-fitting", if you will, thus takes a state of affairs in the world and maps it to a structure that

best characterizes it given the tools made available within the language. Just as many different functions might appropriately describe a data set, different event structures built from the tools of different languages may appropriately describe the same reality, but on the surface might look quite different.

Most of our intuitions about tense and aspect seem to be informed by the perceptual reality, not the linguistic categorization of the perception. No one would deny that every normal human being can perceive the difference between an event that has been completed and one that is still in progress (the classical perfective / imperfective opposition). Moreover, the perceptual salience of such a distinction makes in probable that it will be grammaticalized. It does not, however, guarantee that that distinction will be grammaticalized, I would argue that proposing a universal feature [±perfective] is inappropriate. Indeed, as we shall see, Japanese is particularly difficult to describe elegantly in this manner.

Even though an infinite number of different functions could fit a data set, those functions are defined a common set of symbols—i.e. a mathematical system. Analogously, even though different languages might encode the same reality with quite different event-fitting functions, we should expect that the functions themselves are built from a common set of primitives. Within this framework, the pursuit of linguistic universals centers on these primitives. The description of language-specific tense and aspect systems centers on showing how the universal primitives have been assembled by each language to create event-structure-bearing entities ("functions") that in turn are used compositionally to "fit an event".

4. The Domain of the Analysis

A total of three morphological forms in two languages are examined here. They are summarized in Table 1[1]. These particular forms are puzzling because in translation, there are significant overlaps but no clear correspondences between them. For example, despite its similarity in form to *be-ing*, *te-iru* will require an English state, *be-ing*, or *have-en* construction.

Table 1. Form Summary

Language	**Form**	**Traditional Label**	**Example**
English	*be-ing*	progressive	The Enterprise **is** go**ing** to Earth
	have-en	perfect	The Enterprise **has** fir**ed** a photon torpedo.
Japanese	*te-iru*	progressive	Archer-wa hasi**te** **iru** Archer-TOP run-GER be-PRES 'Archer is running.'

The nature of the events that these constructions encode is of utmost importance and it is not immediately clear that they belong to a single semantic sphere; however, I would claim that states, and what is typically understood as the "perfect", and the "progressive" are strategies for expressing subspaces of an overarching universal semantic class of "homogeneous events".

4.1. **Homogeneous Events.** As mentioned in Section 3.4, it is important to emphasize the ontological difference between the perceptual reality of events and

[1] *te-iru* is much less called the Japanese "progressive" nowadays, particularly by linguists. However, pedagogically, it is still usually presented to students first (if not solely) as a progressive which is supported by its similarity in form to the English progressive; i.e. the combination of a form of "be" and the gerund of the verb.

their linguistic description. The suggestion of a class of homogeneous events is primarily a *perceptual class*, not a linguistic one. However, I would claim that it is a perceptual class that is universally grammaticalized in language, albeit in different ways. The various forms, *be-ing*, *have-en*, and *te-iru* are language-specific strategies for encoding aspects of this semantic domain.

The core of what it means to be "homogenous" is to suggest that over a given interval of time, the state of affairs in the world have not changed. This needs to be distinguished from concepts such as "dynamic" and "static" that are prevalent in the literature and refer to the semantic nature of the events themselves ("sitting" involves no change in position, although "running" does). Homogeneity refers to the *structure* of an event; an event is homogeneous if, for every point over the period described, the assertion of the utterance is true.

Cognitively, the contrast between homogenous and heterogenous—essentially, same vs. different—is salient from the lowest levels of perception. Whether in visual search (Gazzaniga et al., 1998, 136-142) or in auditory scene analysis (Bregman, 1990), that which is unchanging and that which changes is of utmost relevance. Moreover, humans are adept at recognizing meta-levels of change or non-change; a trivial example being the ability to perceive constant position vs. constant velocity vs. constant acceleration. It is not unjustified to suggest, then, that the same perceptual phenomenon plays an important role in the perception of time.

The question of whether homogeneity is universally *linguistically* relevant is ultimately an empirical question that needs to be explored. However, there are two primary linguistic justifications for hypothesizing that this is the case, at least for

English and Japanese: i) the state-like properties of the "perfect" and "progressive" have been noted by many authors (Comrie, 1976; Lyons, 1977; Jacobsen, 1982; Soga, 1983; Mufwene, 1984; Galton, 1984; Jacobsen, 1990; Binnick, 1991; Suzuki, 1996), and ii) the mappings between the forms exhibited in translation suggest more underlying similarity than their canonical definitions would permit.

Concerning i) consider the following quote from Binnick (1991, 184).

> "It is possible to regard what the progressive expresses in English as characterizing a volitional state. In the same way that someone *is tall*, they might *be* running. Once again there is a period of time during which the individual is in the state of being running. The only real difference between this and the state of being tall is that the individual is free to stop—or continue—being running, whereas one is not free (in the same way) to stop—or continue—being tall."

Other authors have made stronger claims to the stative property of *be-ing*. Mufwene (1984, 35) states:

> "what emerges from the [arguments] above is in particular the consistent meaning of the progressive as a stativizing aspect..."

Likewise Suzuki (1996) includes *be-ing* and *te-iru* in his definition of "state".

Observations of the state-like properties of *have-en* are rarer and made with less conviction, but exist nonetheless. (Binnick, 1991, 268) states:

> "At least some readings of the perfect would seem therefore to require treatment as referring to a state resulting from a previous event."

Comrie (1976, 56), as well, characterizes at least one interpretation of *have-en* as stative. He distinguishes between several interpretations but maintains that they all embody the concept of "current relevance" (or relevance with respect to another defined point in the case of other tensed forms) which effectively sets up an extended period of static time.

A simple diagnostic can illustrate the inherent similarity between these forms. For all of states, "progressive" interpretations, and "perfect" interpretations, the assertion of the verb is uniformly true for the interval which is defined by the construction. For example, in the English sentence, "I have already eaten", between the point of eating and the point of speaking, the assertion of the sentence is true[2]. It is in this sense that states, "progressives", and "perfects" are unchanging and stative-like. Thus to maintain a distance from already well defined definitions of "state" and "stativity", I adopt the term "homogeneous" to refer to this common property.

The second primary source of evidence that states, "progressives", and "perfects" express a common semantic domain comes from translation. Consider the surprising fact that the two English statements, "I am eating" and "I have eaten" are both translated into Japanese as *tabete ita*. For an English speaker *have-en* and *be-ing* seem to express mutually exclusive meanings and it is not immediately

[2]In reality, this may not hold to an arbitrary level of granularity , especially for "progressive" interpretations ("I was working all day." – probably the work was not uninterrupted). However, in this case these, "gaps" are trivial and not *linguistically* relevant even though they are certainly included in the understanding of the utterance. Moreover, part of the role of the morphological forms may be to inform the listener that the gaps are not relevant. For a more detailed discussion of "gappiness" see Binnick (1991, 186-187, 205-206).

clear why they would be conflated into one form in Japanese. Indeed, one widely proposed analysis of this fact hypothesizes a polysemous interpretation of *te-iru* (Soga, 1983; Aihara, 1992; Tsujimura, 1996). Others, Shinzato (1993); McClure (1994), and myself included, do not find this satisfying; a single morphological form that has not historically developed from two separate sources should have a single unified semantics. What the facts of *te-iru* strongly suggest is that there is a larger domain *within which* English makes categorical distinctions that Japanese does not.

Perhaps an illustrative analogy could make this clearer; consider English "be" and Japanese *aru* and *iru*, "be" inanimate and animate respectively. All belong to the domain of "existence", yet Japanese makes a grammatical distinction within that domain that is irrelevant in English. No one would suggest that there are cognitive differences between a Japanese speaker and an English speaker's ability to distinguish animacy in the real world—in that sense animacy is cognitively universal; however, it is clear that certainly with regards to "existence", animacy is not a universally grammaticalized concept. Likewise, I suggest that the ability to distinguish events that have been completed from events that are in progress (perfective vs. imperfective) is a cognitively universal phenomenon, but that it is not necessarily grammaticalized in all languages as it is in English.

In general, states, *have-en, be-ing* and *te-iru* constructions tend to correspond to each other in translation, but not by any strict mappings; often decisions need to be made on an event by event basis. Importantly, however, while the forms are relatively free to map to any forms that express events *within* the domain of homogeneous events, they seldom reach beyond it. A full accounting of translation correspondences addressed in this analysis appears in Table 2.

Within this discussion, it will be assumed that homogeneous events exist as described. Furthermore, it is assumed that each of the morphological constructions in Table 2 describes some region of the space encompassed by homogeneous events.

4.2. **Interpretations of the Morphological Forms.** To constrain this discussion, it has been necessary to examine *be-ing, have-en* and *te-iru* without exploring the full range of their interaction with other tense/aspect inflections (for example the English "past" *-ed*) which represents an interesting an enormous topic in and of itself. This is not problematic. The analysis presented here would not differ in a more complete exposition—as stated Section 3.2, a fundamental principle of this approach is that morphological forms contribute compositionally to event structure, but the structure that they contribute does not vary. This preliminary analysis is a piece that should theoretically fit seamlessly into a larger picture.

There are many different connotations / uses / interpretations that have been identified for each of the constructions in Table 1. Often they are treated as different meanings of the same morphemes giving rise to analyses that require homophony and polysemy. The identified interpretations of each form are summarized in Table 2.[3]

For English speakers, a.-c. should be quite familiar; examples of each in both languages appear in (1) through (3).

(1) Persistent Situation

E: I **have** liv**ed** in Bloomington for 3 years.

[3]The "habitual" is another interpretation of *be-ing* that has been observed (Leech, 1971; Binnick, 1991). Similarly, it has also been reported as an interpretation of *te-iru*. Both cases involve the iterativity of events which is beyond the scope of this discussion, but, I believe, elegantly accountable for within this framework.

J: Bloomington-de 3-nenkan sun**de** **iru**.
Bloomington-LOC 3-years live-**GER** **be**-PRES
"(I) have lived in Bloomington for 3 years."

(2) Experiential

E: I **have seen** "Enterprise" before.

J: Enterprise-o moo mi**te** **iru**.
Enterprise-OBJ already see-**GER** **be**-PRES
"(I) have seen Enterprise already."

(3) Perfect of Result

E: Enterprise **has** already start**ed**.

J: Enterprise-wa moo hazimat**te** **iru**.
Enterprise-TOP already start-**GER** **be**-PRES
"Enterprise has already started."

TABLE 2. Summary of Interpretations

Interpretation	**English**	**Japanese**
a. persistent situation	***have-en***	***te-iru***
b. experiential	***have-en***	***te-iru***
c. perfect of result	***have-en***	***te-iru***
d. continuous persistent situation*	***have-en + be-ing***	***te-iru***
e. state	*(verbal, adjectival state)*	***te-iru***
f. progressive	***be-ing***	***te-iru***
g. temporary state	***be-ing***	*??*
h. futurate	***be-ing***	*("non-past" - ru)*

*: this term coined by author

??: no good correspondent

in parentheses: correspondent that is not discussed in this analysis

Interestingly, *te-iru* subsumes the English *have-en + be-ing* construction as well. Examples appear in (4).

(4) Continuous Persistent Situation

E: I **have** be**en** watch**ing** "Enterprise" for hours.

J: nan-jikan-mo Enterprise-o mi**te** **iru**.
what-hour-too Enterprise-OBJ look-**GER** **be**-PRES
"(I) have been watching Enterprise for hours."

Perhaps most unintuitive for English speakers is the fact that often, *te-iru* expresses what would be a state in English (5), and also subsumes the use of *be-ing* to mean "progressive" (6).

(5) State

J: utyuujin-wa sin**de** **iru**.
alien-TOP die-**GER** **be**-PRES
"The alien is dead." (*"is dying")

(6) Progressive

E: Tucker **is** fix**ing** the engine.

J: Tucker-wa enjin-o naosi**te** **iru**.
Tucker-TOP engine-OBJ fix-**GER** **be**-PRES
"Tucker is fixing the engine."

However, *te-iru* does *not* encompass the futurate or temporary state interpretations of *be-ing* which are unique to English.

(7) Temporary State

E: Mayweather **is** be**ing** a jerk.

(8) Futurate

E: The landing party **is** tak**ing** off in the morning.

It is often the case that *te-iru* is ambiguous although sometimes certain verbs may force one or the other interpretation. Thus, without knowing the context, the Japanese example in (6) could be equally translated as "Tucker is fixing the engine," or "Tucker has fixed the engine." Sometimes adverbials such as *moo* "already", which appears in (2) and (3), are used to help disambiguate the interpretation.

What these examples show is how complicated the mappings between these morphological constructions and their associated interpretations can be. The challenge of this analysis is to demonstrate these mappings are the natural consequence of simple unified structures describing each of the three forms.

5. The Elements of the Analysis

5.1. **Event Structure Entities.** To be useful for understanding the nature of human language, any linguistic theory must have some elements that are equally and universally applicable to all languages. One of the major differences between this analysis and existing tense / aspect system—even those proposed within a cognitive framework (Cutrer, 1994; Dinsmore, 1991)—is with regard to this what is considered universal.

Cutrer (1994) presents perhaps the most well developed, cognitively motivated, theory of tense and aspect, but amongst her declaration of linguistically universal tense-aspect categories she includes both PROGRESSIVE and PERFECT. From her discussion, which focuses only on English and French, it is not immediately apparent how she would deal with the Japanese system, particularly *te-iru*, which straddles the boundary of these two mutually exclusive categories.

I suggest that despite the long history of analyzing tense and aspect system using concepts such as: "past", "present", "future", "perfect", "progressive", "imperfective", and "perfective", these are not *linguistically* universal categories. This is not to say that they are not *cognitively* universal concepts for they certainly are—regardless of the language, a native speaker will be able to construct an accurate time line of events within a discourse, understanding which events are completed, or still in progress etc. It may be that their cognitive relevance makes them likely candidates for grammaticalization; however, I would maintain that they embody relationships that are not the appropriate level for a linguistically universal description.

[past], as a feature, describes an inherent relationship between the point of speaking and another point, the event being described. It embodies an interpretation of the orientation of a temporal structure, not the structure itself. This is true of all of the concepts mentioned above; to suggest that they are the primitive elements that event structure is built from, is to deny the ability of event-structure-bearing entities to manipulate the points that define the relationships. By contrast, I maintain that to understand event structure we must examine *structural* details and how they combine to give rise to, *in their final, unified form*, relationships that embody a semantic interpretation.

Below are what I propose to be the building blocks sufficient to describe event-structure.

Frame: The "FRAME" of an event refers to the time scale on which an event is understood to occur through the semantics and the pragmatics of the utterance. We have an intuitive understanding of how long it takes to "eat a meal" vs. "snap your fingers" vs. "live a life" all of which denote different FRAMES. A FRAME

should be understood as being very dynamic and sensitive to individual words, argument structure, entire utterances, or event to discourse and pragmatic factors; we have a very different understanding of FRAMES in the two sentences, "I climbed the ladder," and "I climbed Everest," even though the only difference is the object of the verb.

An example of how the concept of FRAME is relevant to tense / aspect distinctions pragmatically can be seen in the following two scenarios: a) James is completing a four year degree at Indiana University and upon meeting a stranger at a conference says, "I live in Bloomington"; and b) James is completing a four year degree at Indiana University and upon running into a long-lost childhood friend while on vacation says, "I am living in Bloomington". It has been observed (Mufwene, 1984; Binnick, 1991), that the latter utterance, "I am living..." denotes a more transient situation. The basis for this alternation can be understood with respect to FRAMES; the fact that James has known the friend in b) for a much longer time defines a much larger FRAME in which their interaction occurs. The temporariness of James' stay in Bloomington becomes more relevant, perhaps mitigating the choice of *be-ing* to reflect the fact that he expects to leave Bloomington soon. However, the shortness of the acquaintanceship in a), sets up a FRAME is which James' impending move is not as relevant, thus biasing his word choice towards the simple present.

Within this discussion, the FRAME is defined quite loosely, providing the degree of flexibility required by its dynamic nature. It should be understood as an interval of time, the boundaries of which may or may not be defined to an arbitrary degree of specificity. Such vagueness is not a hinderance to the analysis since it is the

relative magnitude of the FRAME with reference to other structures contained therein that will be relevant, not the precision with which it is defined.

The explicit inclusion of the FRAME in the composition structures of events is one of the largest departures that this analysis takes from other approaches that have been mentioned; indeed, I am unaware of any other theory that formally and explicitly includes it and its affect on event structure. It is one way in which the role of context can be explicitly included in event structure. As we shall see, it has some very powerful consequences.

Point of Speaking: The "Point of Speaking" (POS) is universally included in every discussion of tense and aspect phenomena (Binnick, 1991). It is that ubiquitous boundary between what has passed and what is to come within which we temporally seem to exist, ever moving forward through time. The speech act is a salient marker with respect to which all other structure is anchored and defined. In the account presented here, the POS will be considered the only true "point". It is also distinguishable from other "points" in that in the event structure, it does not "do work", such as marking verbal substructure. It only serves as a point from which structure is interpreted. It goes without saying that there is only ever one POS given an event.

Interval: As one would imagine, an "interval" is a duration of time defined by a BEGIN and an END. It reflects the fact that events exist in time. As just mentioned, however, the POS is to be considered the only true "point". Thus the BEGIN and the END of intervals are considered intervals in and of themselves, whose own BEGIN and END are defined recursively by more intervals ad infinitum. This is intended to capture several facts:

- Theories of tense and aspect seem to treat the POS as something ontologically distinct from other reference points which themselves can often have internal structure and duration;
- Time is infinitely divisible and language often and easily makes use of this fact. For example, even verbs such as "sneeze" that are supposedly punctual can, under unusual circumstances (such as slow-motion), be forced to have a duration. Humans are cognitively adept at arbitrarily dilating or contracting time to suit their needs from moment to moment and utterance to utterance.
- Defining all points as intervals implicitly provides a method for dealing with verb internal structure. This internal structure is elaborated in Sections 5.2 and 5.3.
- Such intervals can indeed be recursive in language—cf: "I was starting to get ready to begin painting the picture"—in principle to an arbitrary depth.

In practice, tight intervals are often understood as points and it is useful to maintain the concept if for no other reason than to functionally allow the recursion of intervals to terminate. Thus, "points" constitute a special case of the class interval, in which, for the purposes of the event under consideration, the BEGIN and END of the interval are too close to be perceptually distinct. In this analysis, whether an interval is punctual or not depends on its relationship to the FRAME which provides relative scale. This phenomenon is cognitively grounded in most aspects of perception: the edges of roads visually merge as they approach the horizon, beeps occurring at increasing frequency eventually are perceived as a single tone, and pin-pricks that that are moved closer and closer are not perceptually

distinct past a certain threshold. To draw an analogy from the real numbers, the relative magnitude of the FRAME defines the degree of precision with which similarity is judged. Comparing numbers in the range of 0 to 1000, the difference between 1.21 and 1.22 is negligible, but probably not so if the range is only 1 to 2. Similarly, it is assumed that there is a perceptual threshold below which an interval's BEGIN and END become indistinguishable and it is treated as punctual.

Throughout the discussion, when it is necessary to refer to points and intervals, they will be labelled starting with the name of highest interval followed by the subinterval(s) separated by periods. Ex. NUCLEUS.BEGIN

Constraints: Each of these primitives, when being specified as part of an event structure, may have constraints on their placement with relation to each other. These constraints, as we shall see, can be specified by verbs, by verbal categories, adverbs, or even context.

By convention, these constraints will be typically expressed by relationships using the "greater than" (>), "less than" (<), and "equals" (=) signs, as well as 'tilde' ($\sim$) for negation; for example:

$$X > Y$$

If X and Y are punctual, this means that X is posterior to (comes after) Y. If X and Y are durative, this relationship would imply that Y is contained within X. In general, these relationships will *not* be considered commutative (X > Y is not the same as Y < X) for reasons that will be made clear. The equals sign will indicate the "coindexing" of two intervals.

In addition to the structural elements above, we will require two further properties that are defined below. Unlike the structural elements above, they are not

considered an exhaustive list of possible properties for a full analysis of event structure, but only those relevant to this discussion.

Homogeneity: As discussed at length in Section 4.1, this analysis makes the assumption that there exists a class of events—namely homogeneous events—that is cognitively and linguistically universal. Here, it is presumed that homogeneity is a binary property of intervals, although a complete discussion of what it means to be *non*-homogeneous vs. homogenous is beyond the scope of this presentation. With the exception of states, the basic verbal categories (described in the following section) are specified as non-homogenous.

Figure: Conceptualization of "perspective", "salience", or "orientation" have always played a role in theories of tense and aspect. Reichenbach (1947) uses the placement of R (cf: Figure 1, Bull (1960) used "point of view", and Cutrer (1994), elaborating on the work of Dinsmore (1991) and Fauconnier (1985), proposes a set of four "primitive notions": [FOCUS, BASE, EVENT, V-POINT]. This discussion will adopt Langacker's terminology to deal with "salience" in event structure. Of the relevant issues in "perspective" that he identifies, the "figure / ground" dichotomy is most germane to this analysis. In his words:

> "Impressionistically, the **figure** within a scene is a substructure perceived as 'standing out' from the remainder (the **ground**) and accorded special prominence as the pivotal entity around which the scene is organized or for which it provides a setting." (Langacker, 1987, 120)

A FIGURE may be inherent in a verbal category; it may also be specified in verbal inflection morphology. A FIGURE can include multiple independent elements of whatever type (intervals, the POS, constraints, properties); however, in any composite structure, there is only one FIGURE since a FIGURE can only be understood holistically with respect to the entire structure under consideration.

5.2. **Verbal Categories.** Before addressing the contributions that *be-ing, have-en* and *te-iru* bring to the event structure, it is necessary to address the inherent event structure of verbs themselves. Although classifications of verb types vary greatly depending on author and language, one of the most influential classification systems is that proposed by Vendler (1967). Vendler identifies four categories of verbs which appear in Table 3.

TABLE 3. Vendler's Aristotelian Categories

Verbal Category	**English Example**
i) State	live, know, understand
ii) Accomplishment	read a book, paint a picture, eat an apple
iii) Activity	run, fly, swim
iv) Achievement	arrive, reach (the top of something), fall asleep

Other classification systems are prevalent for other languages; for example Kindaichi (1950) presents an influential system for Japanese verbs based entirely on their behavior with *te-iru*. Each is presented with examples in Table 4.

There is a great deal of similarity in these two classification systems and Kindaichi's can be mapped to Vendler's (Jacobsen, 1982). Stative obviously maps to an Aristotelian State, activities resemble continuative verbs, achievements could

be thought of as instantaneous verbs, and accomplishments as either continuative or instantaneous verbs, depending on their argument structure. Type 4 verbs deserve considerable treatment themselves and are a complicated case (cf. Jacobsen (1992)); however, a overview of Type 4 verbs would be tangential to this discussion. For our purposes here, they will be included as a special case of achievements.

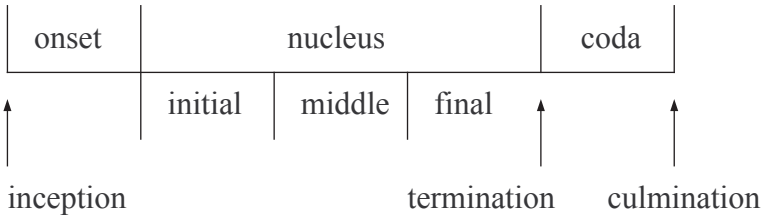
Ultimately, the analysis presented here does not crucially rely on the verbal categories proposed for any particular language. Therefore, since Vendler's categories have the most fine-grained distinctions and appear to be sufficient to describe the verbal categories observed in English and Japanese, for convenience, they are the ones that the following discussion will be built upon.

TABLE 4. Kindaichi's Categories

Verbal Category	**Japanese Example**			**effect of *te-iru***
i) Stative	eigo-ga	dekiru		do not take *te-iru*
	English-NOM	can-do-PRES		
	"(I) can speak English."			
ii) Continuative	kodomo-ga	asonde	iru	"progressive" in
	child-NOM	play-GER	be-PRES	unmarked case
	"The children are playing."			
iii) Instantaneous	inu-wa	sinde	iru	"perfect" in
	dog-TOP	die-GER	be-PRES	unmarked case
	"The dog is dead."			
iv) "Type 4"	miti-ga	magatte	iru	must take *te-iru*
	road-NOM	bend-GER	be-PRES	and become stative
	"The road bends."			

5.3. **Verb Internal Structure.** Freed (1976) extends the framework around verbal categories that Vendler proposed by elaborating on their internal structure, echoing a general consensus that there are "phases" associated with event structure. A summary diagram of her full verbal event structure as reported by Binnick (1991, 196) appears in Figure 3.

FIGURE 3. Freed's Full Verbal Structure



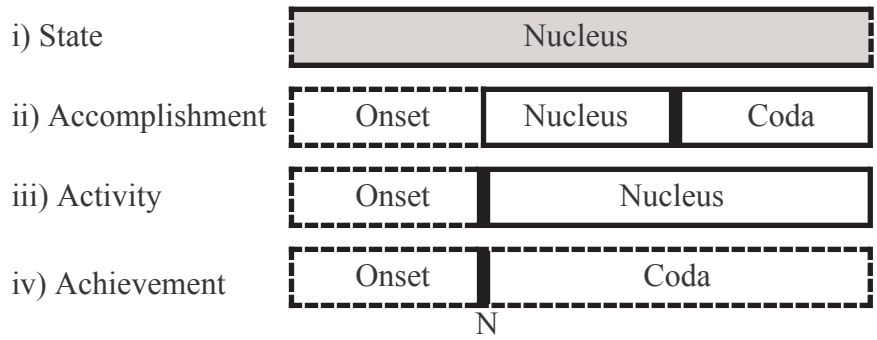
Each verb, according to Freed, is composed of a nucleus which represents the core of the event, and perhaps "onset" and "coda" phases depending upon the semantics of the verbal category and specific verbs themselves. Proposing this internal structure for verbs accounts for a wide variety of phenomena, particularly related to periphrastic verbal constructions with verbs such as "start" or "finish". Relevant illustrations of the consequences of this structure are presented below; however, for a full justification of Figure 3, the reader is referred to Freed (1976) or Binnick (1991).

Importantly, Vendler's Aristotelian categories look quite different from each other when characterized with respect to Freed's internal structure. The categories diagrammed with respect to the framework currently being developed appear in Figure 4. The nucleus subphases shown in Figure 3 will not play a role in this discussion, and so have been omitted.

By virtue of being an event, each verb category must consist of at least one interval, namely the nucleus. As states are by definition homogeneous, they are thus specified diagrammatically by shading the interval. The BEGIN and END of states are dotted as, according to Freed, they are optional; while it may be possible to identify a moment in time when "John loves Mary" begins or ceases to hold true, "I am tall" has no clearly defined start point and extends into the foreseeable future. In the present framework, this fact is characterized with respect to the FRAME. That is, the BEGIN and END of a state are declared as existing *outside* the FRAME. Thus, even if, as in the case of "James lives in Bloomington", we know that James arrived in Bloomington to complete a four year degree at Indiana University three years ago and will be leaving Bloomington a year from now, those points are not relevant to current FRAME and *for all intents and purposes* don't exist. The assertion of the state will hold true across the entirety of the FRAME. We can formalize this as a constraint on the interval:

NUCLEUS $>$ FRAME

FIGURE 4. Internal Structures of Vendler's Aristotelian Categories



States are the only verbs that inherently have this relationship to the FRAME; thus the opposite constraint that BEGIN and END exist within the FRAME will be taken as the unmarked case.

Note that the nucleus of achievements is punctual. Again, this can be understood with respect to the FRAME; as a range of numbers from 0 to 1000 makes the difference between 1.21 and 1.22 irrelevant, so too does a FRAME that is much larger than the nucleus. We can reflect this in the constraint as:

NUCLEUS $<<$ FRAME

The doubled sign indicates an increase in the order of magnitude of size difference between the interval and the FRAME such that the nucleus will be treated as punctual.

As with the BEGIN and END of states, onsets and codas are likewise optional according to Freed. The category type or the semantics of each verb may or may not allow them. They are required in order to account for interruptions; with onsets, the most transparent cases are seen with achievements. For example, "I started to sneeze" does not necessarily entail "I sneezed", whereas an accomplishment like "I started to paint" does entail "I painted". The former is considered to have been interrupted during the onset, whilst the latter, during the nucleus.

One difference codas can characterize is between constructions using "finish" and "stop"; "I stopped painting the picture" does not entail "I painted the picture" whereas "I finished painting the picture" does. As can be seen in Figure 4 a key difference between activities and accomplishments is the presence or absence of a coda. Appropriately, they exhibit different behavior with respect to entailments that make reference to the coda: if you "stop eating" (activity), it is true that

you “ate”, however if you “stop eating the muffin” (accomplishment), it is not necessarily true that you “ate the muffin”.

Onsets and codas and their relationship to the nucleus are dealt with organically in this framework. Since, NUCLEUS.BEGIN and NUCLEUS.END are intervals in their own right, onsets and codas appear when:

$\sim$(NUCLEUS.BEGIN $<<$ FRAME)

OR

$\sim$(NUCLEUS.END $<<$ FRAME)

As noted, activities must not have a coda and accomplishments must have a coda. We can specify this difference in the following two constraints.

Accomplishment: $\sim$(NUCLEUS.CODA.BEGIN =
NUCLEUS.CODA.END)

Activity: NUCLEUS.CODA.BEGIN = NUCLEUS.CODA.END

This helps illustrate the difference between what it means to be “punctual” vs. “coindexed”. “Punctual” refers to the case, such as the nucleus of achievements, when relative to the FRAME, the difference between BEGIN and END is not perceptible and becomes irrelevant. However, when the FRAME is contracted such as when the event is perceived as occurring in “slow-motion”, the nucleus of the achievement can be dilated such that the difference between BEGIN and END becomes apparent. By contrast, no degree of contraction of the FRAME will force two coindexed intervals to separate.

Similarly, specific verbs may require that there be no onset in their structure which is why in Figure 4 they are indicated as being optional. The verbal category remains underspecified concerning their presence.

Finally, note that the structures of accomplishments, activities, and achievements presented in Figure 4 all have bold vertical lines. These indicate the point at which the semantics of the verbal category places "salience" in the event structure—that is they indicate the categories' inherent FIGURE. It is the point in the structure from which the meaning of the event is to be interpreted. Examine, for example, the sentence in (9).

(9) Sportscaster: "He catches the ball and runs... and... he reaches the line!"

Here, although the verbs are all in the same form (the simple present), the phase transition points that they emphasize are different. The sportscaster only says "catches the ball" and "reaches the line" *after* the actions have occurred; however, the sportscaster says "run" as soon as the activity *begins*. This is due to the inherent FIGURE of the verb category.

5.4. **Unification of Event Structure.** Within this analysis, the addition of morphemes that contribute to the event structure of an utterance is best understood as the unification of a NEW structure to a BASE structure to produce a UNIFIED structure. Here, that typically means the addition of one of the structures proposed in the following sections for *have-en, be-ing* and *te-iru*, to one of the verbal category structures that appear in Figure 4. A full account would also include all event-structure-bearing entities using the same process.

Intellectually, the process of unification has three steps that are formalized below (they are not intended as an accurate description of cognitive processing):

(1) **Combine:** BASE + NEW

- **Principle:** constraints in NEW always take precedence over BASE

- **Rule:** if there are constraint conflicts, attempt to resolve them (Step 2); else unify the structures satisfying all constraints and update the FIGURE (Step 3).

(2) **Resolve Conflicts**

- **Rule:** if the semantics of the event in question are sufficiently flexible, allow the constraints of NEW to override those of BASE; else the unification fails and the combination is ungrammatical.

(3) **Update** FIGURE

- **Principle:** new information is cognitively salient
- **Rule:** the FIGURE of UNIFIED is comprised of those elements of the structure that constitute *new information*—that is, structures, constraints, and properties added or altered by the addition of NEW to BASE.

It is impossible to fully grasp how this process works to combine structures without looking at examples. Thus, after a brief summary, the discussion will finally turn to the specific forms, *te-iru, have-en*, and *be-ing*, to see how the elements of the analysis presented in this section can be productively applied to provide an elegant framework in which to understand how each form gives rise to the range of semantic interpretations it exhibits and how each form differs from the others.

5.5. **Summary of Elements of the Analysis.** This section first presented three primary classes of entities that play a role in the construction of event structure:

(1) **Structural Primitives** which are:

- **the** FRAME (contextual scale on which an event exists)
- **the** POS (point of speaking)

- **Intervals** (of which "points" are a special case)

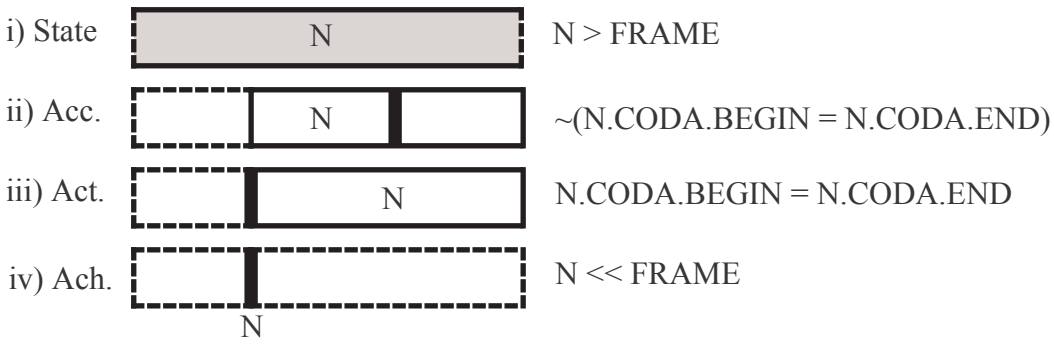
(2) **Structural Constraints** (placed on primitives)

(3) **Properties**

- **Homogeneity** (a property of intervals)
- FIGURE (a holistic property of event structure)

Second, it was shown how Vendler's Aristotelian categories are characterized in terms of the three elements above. The diagrams of those structures as well as their distinguishing constraints appears in Figure 5.

FIGURE 5. Base structures of Vendler's Aristotelian Categories



Finally, the basic steps of the unification of structures was presented:

(1) **Combine** (in favor of NEW)

(2) **Resolve Conflicts** (if possible; else ungrammatical)

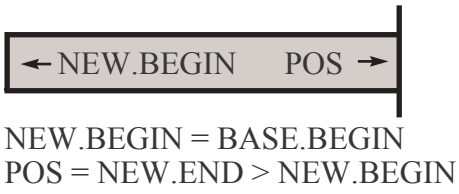
(3) **Update Figure** (based on additions and alterations made by NEW)

6. JAPANESE: *te-iru*

In terms of the framework outlined in Section 5, *te-iru* can be visualized as a non-punctual, homogeneous interval with the point of speaking (POS) coindexed with NEW.END. It has the additional constraint on unification that NEW.BEGIN

be coindexed with BASE.BEGIN. A diagrammatic representation of *te-iru* appears in Figure 6.

FIGURE 6. Diagram of *te-iru*



Let's first unify *te-iru* with an accomplishment like the example seen in (10).

(10) hon-o yonde iru
book-ACC read-GER be-PRES
"(I) am reading / have read the book."

Figure 7[4] shows the two structures to be unified. There are no contradictory constraints and so Step 2, "Resolve Conflicts", can be skipped. NEW.BEGIN simply attaches to BASE.BEGIN and a new homogeneous interval is establish from BASE.BEGIN to POS. However, notice that there are no constraints that specify the placement of NEW.END and POS with respect to BASE.END. Thus, there are two possible resultant structures, both of which appear is Figure 8. In both cases there are two new pieces of information: i) the establishment of the new homogeneous interval and ii) the placement of POS. Thus, as a result of Step 3, update FIGURE, the interval and POS are bolded in Figure 8.

[4]It will often be the case, since this discussion does not deal with periphrastic constructions, that codas and onsets will not be relevant and will usually appear as punctual to simplify the diagrams.

Since, in these structures, we are not concerned with the coda, the unification of *te-iru* with an activity occurs identically to unification with an accomplishment; either the POS will fall before or after BASE.END. This makes the correct prediction that accomplishments and activities behave identically with respect to *te-iru* (Kindaichi, 1950; Jacobsen, 1982; Tsujimura, 1996), a fact that undoubtedly lead Kindaichi (1950) to treat them as equal in his Japanese verbal categorization system.

Achievements, on the other hand, do not lead to the same range of possibilities. The unification of *te-iru* and the achievement structure appears in Figure 9. Because the nucleus of an achievement is punctual, there is only one possible unmarked resultant structure with the constraints on the new structure. It is essentially the same as that in Figure 8a. in which the POS falls after BASE.END.

FIGURE 7. Accomplishment + *te-iru*

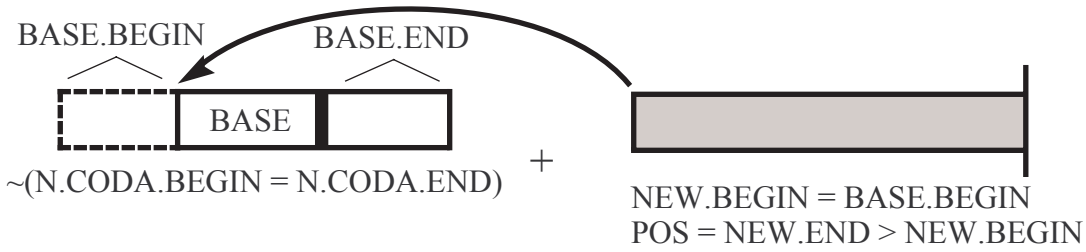
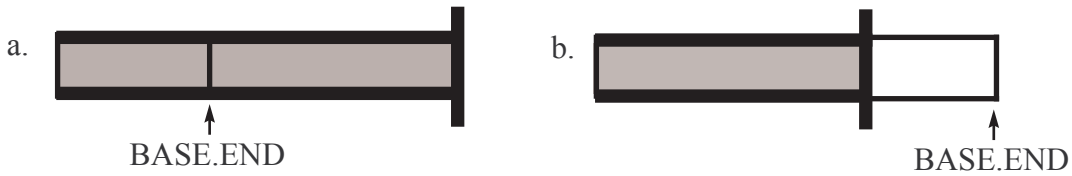


FIGURE 8. Two possible resultant structures of accomplishment + *te-iru*



Unification of *te-iru* with a state is impossible (Figure 10) simply because there is no BASE.BEGIN for NEW.BEGIN to be coindexed to. In Japanese, this is a constraint violation that cannot be resolved (Step 2). This correctly predicts that Japanese verbal states are ungrammatical in the *te-iru* form (Kindaichi, 1950; Jacobsen, 1982; Tsujimura, 1996).

So, regardless of the verbal category, with *te-iru*, there are only two possible structures that can be formed and mapped to a semantic space to give rise to the range of interpretations possible for *te-iru*. In Figure 8a. the POS occurs after the event is completed and marks the end of an interval over which the assertion of

FIGURE 9. Achievement + *te-iru*

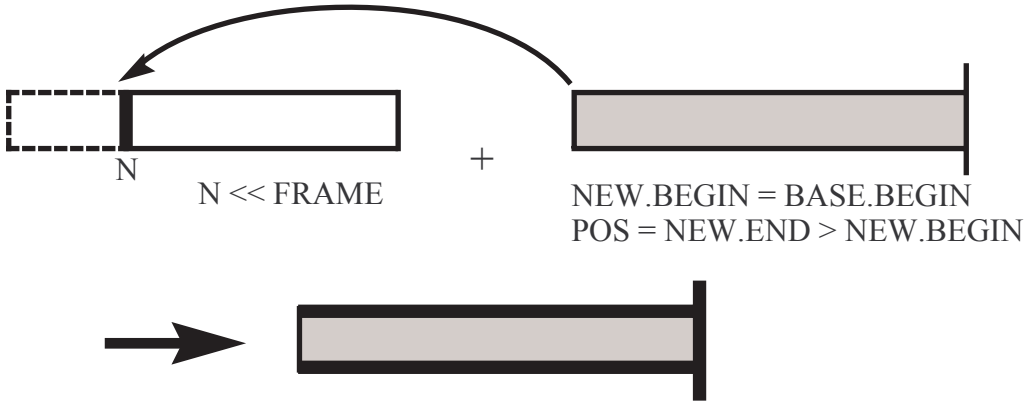
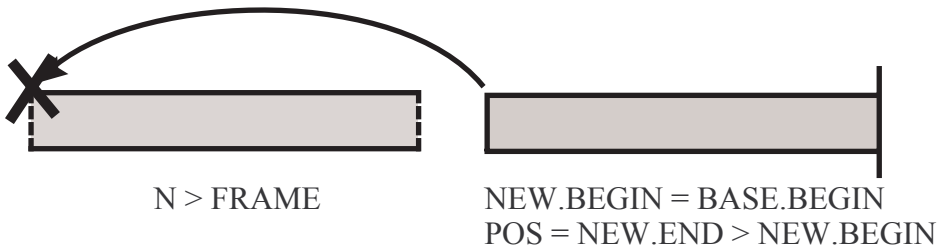


FIGURE 10. State + *te-iru*



the event is uniformly true. This captures many of the intuitions that have been cited as inherent to the meaning of "perfect" (Comrie, 1976). The anteriority of the event to the POS makes it clear that the event is "past" and is "perfective" (completed); this matches Reichenbach's characterization of E being placed before S on the time line. There also exists a homogenous—state-like—interval that extends from the past event to the POS. This not only captures Reichenbach's placement of R with S, but also constitutes a structural interpretation of the concept of "current relevance" (Comrie, 1976). Figure 8a. can be mapped to two of the "perfect" interpretations of *te-iru* in Table 2, the experiential (b.), and the perfect of result(c.). The relevant Japanese examples are reproduced below:

(2) Experiential

J: Enterprise-o moo mite iru
Enterprise-OBJ already see-GER be-PRES
"I have already seen Enterprise."

(3) Perfect of Result

J: Enterprise-wa moo hazimatte iru.
Enterprise-TOP already start-GER be-PRES
"Enterprise has already started."

The difference between the experiential and the perfect of result cannot be characterized by the structure in Figure 8b.; however, it can be considered a difference in FRAMES. That is, the FRAME of an "experiential" event is larger than that of a "perfect of result". In (2J) the previous viewing of "Enterprise" is probably understood as having occurred anywhere from a day to months beforehand. By contrast, in (8J) the commencement of the show is probably understood to have

occurred minutes before. As always, the specification of the FRAME is due to a wide variety factors including verbal semantics and pragmatic context.

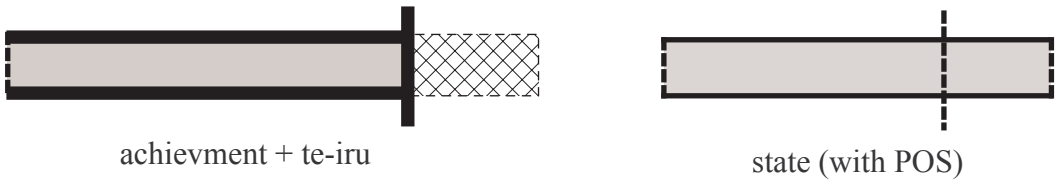
I would also argue that the Figure 8b. structure is responsible for the "state" interpretation (Table 2e.), an example of which is reproduced here.

(5) State

J: inu-ga sinde iru
dog-nom die-GER be-PRES
"The dog is dead."

The set of verbs that give rise to a state interpretation are analyzed as achievements, even though their English counterparts are often verbal states or adjectives. When the FRAME is contextually contracted such that BASE.BEGIN falls outside its boundaries, the *te-iru* structure allows the expression of a homogenous interval that will persist across the entirety of the FRAME (recall that the POS does not act as an end point of the assertion; it only defines the point that is relevant for interpretation of the event). This is a structure that looks very much like the definition of a verbal state, though it is not identical (Figure 11). In the process of "event-fitting" this is a "best fit" given the forms available in Japanese.

FIGURE 11. Comparison of achievement + *te-iru* and a state



The structure in Figure8b. gives rise to a quite different aspectual interpretation of the event. Because the POS falls within the nucleus, the event has not been completed unlike the interpretations that arise from 8a. The immediate consequence

of this fact should be clear; it allows *te-iru* to have the progressive interpretation (Table 2f.) as in the (reproduced) example in (6).

(6) Progressive

J: Tucker-wa enjin-o naosite iru.
Tucker-TOP engine-OBJ fix-GER be-PRES
"Tucker is fixing the engine."

As is consistent with our traditional concept of the progressive, a homogeneous interval is established and the POS—the point from which the event is to be viewed—is internal to the nucleus. Moreover, I maintain that because the unified interval is part of the FIGURE *and* is contained within BASE's nucleus, it is open to quantification, such as in the two final possible interpretations of *te-iru*: the persistent situation (Table 2a.) and the continuous persistent situation (Table 2d.), reproduced below.

(1) Persistent Situation

J: Bloomington-de 3-nenkan sunde iru.
Bloomington-LOC 3-years live-GER be-PRES
"(I) have lived in Bloomington for 3 years."

(5) Continuous Persistent Situation

J: nan-jikan-mo Enterprise-o mite iru.
what-hour-too Enterprise-OBJ see-GER be-PRES
"(I) have been watching Enterprise for hours."

Again, as with the progressive, the aspect of the event is internal—i.e. neither the "living in Bloomington" nor the "watching Enterprise" is interpreted as having been completed or even necessarily paused. Indeed, I would argue that at least for Japanese, the division between these three interpretations is a false one. It

is simply the case that the *te-iru* structure naturally allows a mapping to these three areas of semantic space.

6.1. **Summary.** Three facts have been established that account for the interpretations of *te-iru* shown in Table 2 and their distribution with Vendler's categories:

(1) States cannot be unified with *te-iru* because of an unresolvable constraint conflict.

(2) When accomplishments and activities are unified with *te-iru*, there are two possible structures: the POS may fall within or after the nucleus. The former gives rise to interpretations where the event is in progress (progressives, persistent situations), the latter, to interpretations where the event is completed (perfects). Both accomplishments and activities can have either interpretation, especially in combination with adverbs that force an interpretation other than the unmarked one given to individual words.

(3) Because achievements have a punctual nucleus, in unification with *te-iru*, there is only one possible resultant structure and only the associated interpretations are possible. I.e. they cannot give rise to a progressive or persistent situation interpretations.

7. English: *have-en*

Structurally, within this framework, English *have-en* looks much the same as Japanese *te-iru*. Indeed, it differs only in two respects: the coindexing of NEW.BEGIN and its relationship to the FRAME. A diagram of *have-en*'s structure and its constraints appears in Figure 12. Unlike *te-iru*, *have-en* does not have an absolute specification of the BASE point to which it attaches—it will be "attracted" to a point that is part of the FIGURE of BASE. Also, unlike *te-iru*, it has

a dilation effect on the FRAME such that if FRAME < BASE, it will be expanded until BASE.BEGIN is contained within FRAME. Recall that constraints are not commutative; the constraint affects FRAME and not BASE. This has an important consequence in the resolution of constraint conflicts.

FIGURE 12. Diagram of *have-en*

All four of the Aristotelian categories are compatible with *have-en* in English and so all can be unified. All the resultant structures from unification appear in Figure 13. As can be seen, even minor differences in constraints lead to quite different consequences. After combination (Step 1), only states have a constraint conflict that needs to be resolved (Step 2). The state specifies BASE > FRAME whereas *have-en* requires BASE.BEGIN to fall within the FRAME.

Ultimately any state, no matter how temporally expansive or gradually derived, has a BEGIN (and an END) even if that means dilating the FRAME to encompass eternity. This dilation is often facilitated with adverbials or phrases, like "always", "since..." or "for...". Compare the two examples in (11). Even though in both cases, BEGIN is ill defined, the FRAMES have unquestioningly been adjusted to include it. In the first case it has expanded to the approximate duration of an adult human life, in the second to the length of a geological age.

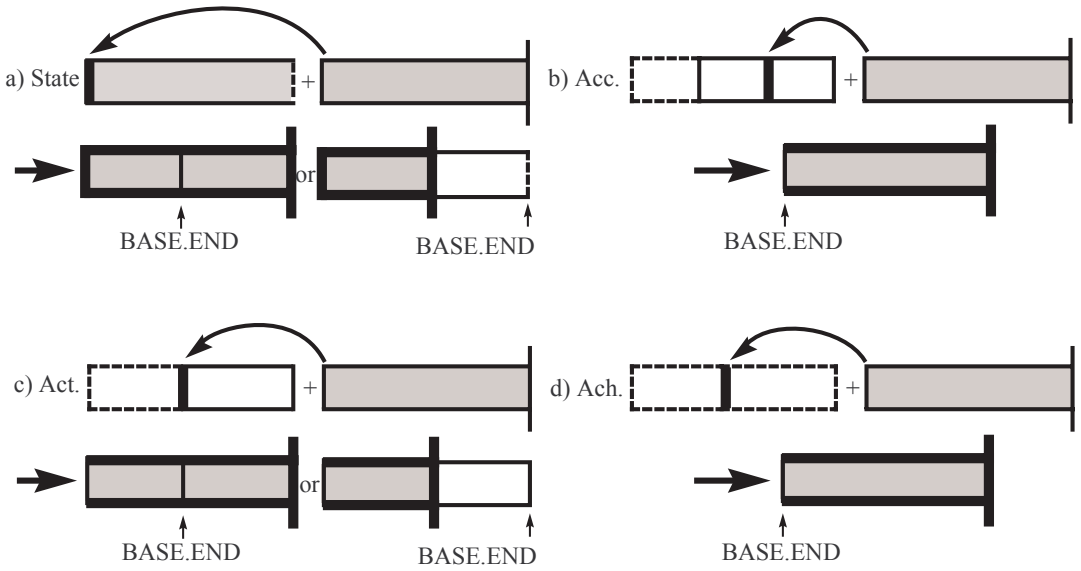
(11) a. I have been tall since my growth spurt in grade 9.

b. This mountain has existed for millions of years.

Notice that *have-en* remains underspecified with respect to the FRAME BASE.END. It is probably the case that "I" will continue to be tall indefinitely, and the mountain will continue to exist, but it could be that "I" is Japanese and is about to move to East Germany where they will no longer be considered tall. Likewise, (11b.) could be spoken by a project manager who has been given enormous task of moving the mountain to make an new island in the Sea of Japan; either way, HAVE-EN makes no demands on BASE.END.

Since it is always the case with states that the FRAME can be sufficiently dilated to include BASE.BEGIN, it will always be the case that the constraint conflict caused can be resolved. Moreover the dilation of the FRAME has the consequence of creating new information—i.e. BEGIN becomes part of the FIGURE. Remember that the process of unification outlined as three steps was meant as an easily

FIGURE 13. Unification of *have-en* and the Aristotelian Categories



comprehensible intellectual description, not a literal description of underlyingly serial cognitive processing. Thus, the alteration of the FIGURE before all the constraints have been satisfied should not cause consternation. Once BEGINis a part of the FIGURE, the rest of the constraints can be satisfied without hinderance.

In Figure 13, accomplishments and achievements have the same structure in which the POS defines an interval with BASE.END. Recall from our discussion of *te-iru* that this relationship gave rise to the "experiential" and "perfect of result" interpretations (b. and c. in Table 2) and that the difference between those two interpretations can be characterized by differences in the relative size of the FRAME. Aspectually, they are not very different—in both cases the event is anterior to the point of speaking. Thus we would expect accomplishments and achievements to give rise to these interpretations. States an activities, likewise, have a very similar possible structure in which BEGIN.END falls before the POS so they too, should have possible interpretations that include the experiential and perfect of result (albeit, manipulating the FRAME such to produce those interpretations requires some quite marked situations). That this is indeed the case is illustrated by the examples in (12 through (15) below.

(12) State

a. I have lived in Bloomington (before). (experiential)

b. Ok... I have been a woman, a man, a beggar, and a celebrity. What now? [spoken by a soul learning karmic lessons] (perfect of result)

(13) Accomplishment

a. I have eaten ostrich. (experiential)

b. Ok... I have done the dishes and the laundry. What now? (perfect of result)

(14) Activity

a. I have scuba-dived before. (experiential)

b. Ok... we've eaten, run, and swam. What now? [checking activities off a list in a timed game show] (perfect of result)

(15) Achievements

a. I have only sneezed once in my life. (experiential)

b. I have arrived! Let the party begin. (perfect of result)

In addition to the experiential and the perfect of result, states and activities have one more possible structure. They have a structural alternation similar to what we see in Japanese with *te-iru*—the POS may also fall within the nucleus, giving rise to an interpretation in which the event has not been completed—the persistent situation (Table 2a.). As with Japanese, the interval is within the nucleus and is in the FIGURE of the UNIFIED structure opening up the possibility of quantification. In fact, in English, a persistent situation *requires* quantification. The examples in (16) through (18) show the distribution we expect. Furthermore, notice that states are capable of a type of quantification activities are not—namely, with reference to UNIFIED.BEGIN. The fact that UNIFIED.BEGIN is in the FIGURE of a state+*have-en* structure because of the resolution of the FRAME conflict accounts for this fact. The activity, which did not have the same conflict, has a different FIGURE and thus different possibilities for quantification.

(16) State

a. * I have lived in Bloomington (and still live there).

b. I have lived in Bloomington for three years / until now / since 1999.

(17) Activity

a. * I have run (and am still running).

b. I have run for ten minutes / until now / * since 6pm.

(18) Accomplishment and Achievement

a. * I have run a mile for ten minutes.

b. * I have arrived for ten minutes.

An immediate question is why, if activities can result in structures that are virtually identical to those in Japanese, do they not have a "progressive" interpretation. The simple answer is that they do, although perhaps the way we canonically think of the "progressive". Certainly, the perspective taken is internal to an action that has not yet been completed, as is the case in the "progressive". As we shall see, this variation of activity+*have-en* structure is similar to activity+*be-ing*, and functionally, they may play quite similar roles in more complicated events. For example, consider the narratives in (19) vs. (20).

(19) a. So, I'm running along the river when all of a sudden...

b. So, I've run along the river for about five minutes when all of a sudden...

(20) a. So, I'm eating my apple when all of a sudden...

b. So, I've just eaten my apple when all of a sudden...

Using an activity+*have-en* in these scenarios shares more in common with a traditional "progressive" in that it indicates an activity *in progress*, than it does a traditional "perfect". That said, however, this progressive-like interpretation

is quite restrictive with *have-en* and it can only be obtained with particular categories in marked circumstances; furthermore, there is also another structure, *be-ing*, that can more consistently obtain the interpretation. Recall the notion of "event-fitting"—a language will attempt to express the an event as accurately as possible, given the tools at hand. For English, *be-ing* provides a better "fit" for providing an internal perspective on an event. In Japanese, the closest approximation is *te-iru* and so it fulfills the function. In English a degree of functional specialization comes into play. The primary use of *have-en* when the POS falls before BASE.END is to allow quantification—an option that is (as will be shown) not open to *be-ing* due to details of the FIGURE.

7.1. **Summary.** In this section, we have seen that the structure of *have-en* can be unified with any of Vendler's categories giving rise to the following facts:

(1) Experiential and perfect of result interpretations (distinguished only by the FRAME) are the result of a structure in which the POS falls after BASE.END and are obtainable with any of the four verbal categories.

(2) The persistent situation interpretation arises when POS falls before BASE.END and can only be obtained with states and activities. In these cases the interval can be quantified with a "for" phrase because the interval is part of the FIGURE and contained within the nucleus. Only with states can it also be quantified with a "since" phrase because UNIFIED.BEGIN is part of the FIGURE.

8. English: *be-ing*

Structurally, *be-ing* has the least to contribute of the forms that are analyzed here. In that sense, it is the simplest, although as its interactions with the Aristotelian categories give rise to a rich diversity of possibilities. The structure of *be-ing* as seen in this analysis is diagrammed in Figure 14.

Figure 14. Diagram of *be-ing*

BASE < FRAME
NEW.END = BASE.END
NEW.BEGIN = BASE.BEGIN
NEW.BEGIN < POS < NEW.END

The structure in Figure 14 differs from the others that we have seen in many ways. First, it does not establish a new interval. It only imposes homogeneity on an existing BASE. Second, the POS is not coindexed to any other point. It is only specified as being within the interval that NEW anchors itself to. It is similar to *have-en* in that the first constraint requires the BASE to be contained within the FRAME; however, the ordering of the relation means that it is the BASE, not the FRAME, that will be affected by this constraint.

In the unification of *be-ing* with the verbal categories (depicted in Figure 15), there are several things to note. The first is that the resultant structures are quite uniform—there are no structural alternatives, such as were seen with *te-iru* and *have-en*. Accomplishments and activities are identical, states differ with respect to their FIGURE, and achievements differ in that when an onset exists, the POS falls within BASE.ONSET, not BASE.

In the unification of *be-ing* with a state, as with *have-en*, there is a conflict between constraints on the relationship between the BASE and the FRAME. As noted, *be-ing*'s constraint is on the BASE, not FRAME, and so if the conflict is to be resolved, then the BASE must be contracted. The consequence of this is that for a state+*be-ing* structure to unify, the BEGIN and END points of the state must be flexible. Consider the examples in (21).

(21) a. John is being a jerk.

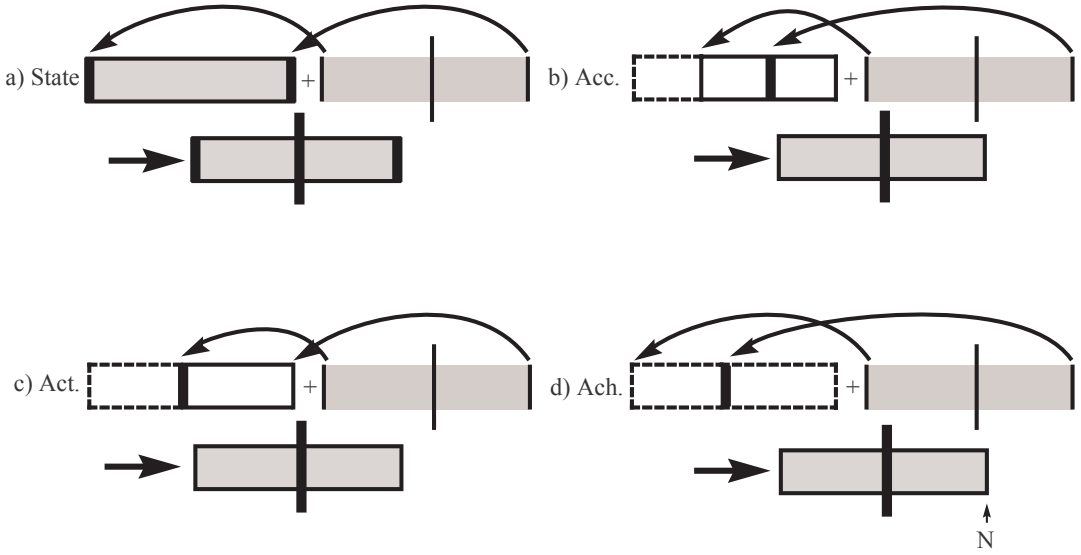
b. I am living in Bloomington.

c. * I am being tall.

d. * I am knowing all about it.

Those states that are considered to be under volitional control are grammatical in the *be-ing* form, whereas others are not. As with *have-en*, changing the relationship between the BASE and the FRAME constitutes new information. Thus,

FIGURE 15. Unification of *be-ing* with the Aristotelian Categories



BASE.BEGIN and BASE.END are part of the resultant FIGURE. Furthermore, since states are already homogenous events and *be-ing* establishes no other new intervals, the FIGURE is comprised of *only* BASE.BEGIN, BASE.END and POS—they are the focus for the interpretation of the event. This succinctly characterizes the "temporary state" interpretation (Table 2g) that is peculiar to *be-ing*. It also leads directly to the fact that a "temporary state" interpretation is only possible for states+*be-ing* and none of the other categories; while it is certainly implied that "I am eating the apple" has a BEGIN and *end*, they are not at all relevant to understanding the utterance.

By contrast, when accomplishments and activities are combined with *be-ing*, NEW.BEGIN and NEW.END attach to their already existing BASE counterparts without conflict. Thus those points are not in the UNIFIED FIGURE—it includes only the homogeneity of the interval and the placement of the POS within the BASE which in these two cases is the nucleus. This naturally gives rise to the canonical meaning of *be-ing*; to provide an internal perspective on an event in progress (i.e. the "progressive interpretation", Table 2f).

The unification of achievements with *be-ing* is not as straightforward as with accomplishments and activities. NEW.END is free to coindex BASE.END, however, the constraint that NEW.BEGIN must come before NEW.END (and the POS) cannot be achieved because the nucleus is punctual. However, if there is a durative onset preceding the nucleus of the achievement, then there is another possible interval for *be-ing* to co-opt. NEW.BEGIN can coindex BASE.ONSET.BEGIN and the interval BASE.ONSET becomes the one relevant to the interpretation of the event. This is why we understand the examples in (22) as referring to the lead up to the actual action of the event. Unlike, say an accomplishment + *be-ing*, "I am painting a

picture", which entails "I have painted", "I am falling asleep" does not entail "I have fallen asleep".

(22) a. I am falling asleep.

b. The plane is arriving.

c. She is reaching the summit.

There are, however, achievements that have been interpreted as lacking an onsets and as we would expect, this causes an unresolvable constraint conflict and ungrammaticality.

(23) a. * I am noticing the dollar on the ground.

b. * I am winning the lottery.

Notice that this analysis of *be-ing* has another added benefit—we do not need any fundamental changes to deal with variations in marked circumstances like "slow-motion". Indeed "slow-motion" is another possible solution to the achievement + *be-ing* constraint conflict; it is also possible to contract the FRAME until the nucleus of the achievement becomes durative at which point it will behave as any other accomplishment or activity.

Should the unmarked resolution of the unified achievement + *be-ing* event (where POS falls in BASE.ONSET) be considered an instantiation of the "progressive" interpretation (Table 2f)? The action of the event, embodied in the nucleus is not "in progress". In fact, the nucleus has yet to occur—the action of the event is in the future with respect to the POS. I would argue then, that achievements + *be-ing* are a case of the futurate (Table 2h). Indeed, I argue that in the same way

that a "slow-motion" context causes an achievement to behave like an accomplishment or activity, a FRAME shift in the opposite direction causes accomplishments and activities to behave like achievements.

It has been noted that the futurate interpretations of *be-ing* conveys a connotation of "planning" or "predetermination" (Binnick, 1991, 289); (Smith, 1991, 246). Freed (1976, 53) states concerning the onset of events: "[The onset] is a preparatory stage necessary before the nuclear activity of the event is actually initiated." Take the statement, "Pam was just about to start painting, when..."—examining the imagery that the example evokes, probably Pam has collected together the necessary supplies (paints, paint brushes, water, a canvas) and has perhaps changed clothes etc. However, it is not true that "Pam has painted". These other steps are, according to Freed, considered part of the onset. Phrases like "get ready to" refer to onset activities.

Likewise, when we consider the arrival of the plane in (22b.) we understand that the plane is in the air and has begun its descent. Probably, it has its landing gear down and is very near its destination and will likely reach it within minutes, yet it has not yet arrived. The initiatory events of the onset have begun, but the nucleus has not.

Freed further speculates that planning could be included in the onset; I would strengthen that speculation and assert that planning can expand the onset. If we add "on time" to (22b.), suddenly it is possible that the plane has extended its landing gear and will land in minutes, but it also could be that it's only halfway through its flight and could still be hours away. It still must have taken off.

Consider another achievement, "get married" as used in the examples in (24). (24a.) could be included with the familiar examples of *be-ing* achievements in (22).

Imagine sliding the POS backwards in time—to the beginning of the ceremony, to before the ceremony, to the night before the ceremony... to the moment after the engagement. There is no point at which the examples in (24) could not be the excited thoughts of the happy couple, nor is there any point at which (24) could not be referring to an event expected to occur in the future. Like the airplane, at each of the different temporal points in (24), we understand a different set of events that have lead up to that moment, but that are cumulative, beginning at a certain point (take-off or the engagement).

(24) a. We're getting married! [Excited thoughts of the bride during the ceremony]

b. We're getting married tomorrow.

c. We're getting married in June.

We can only come to the conclusion that all of the utterances in (24) share the same structure—the POS placed within BASE.ONSET—and that they differ only in the relative placement of the POS as determined by context and time qualifiers. When we look at *be-ing* accomplishments and activities on the other hand, we do not see the same smooth transition—there is a jump between progressive and futurate interpretations as in the examples in (25).

(25) a. Todd is running a marathon (right now).

b. Todd is running a marathon tomorrow.

The first example entails that Todd "has run", the second does not. They are quite separate interpretations. However, picture the structure of this event with respect to its FRAME. If context or other qualifiers expand the onset (BASE.BEGIN) by implying planning, expectation, or intent (someone asking why Todd is training,

for example), the FRAME will also dilate appropriately to compensate. The shift in (25) is accountable by a shift from:

FRAME > BASE

to

FRAME >> BASE

That is, the FRAME expands to the point where the nucleus becomes punctual. At that point, the accomplishment or activity becomes, for all intents and purposes, an achievement so will behave exactly like an achievement with respect to *be-ing*. The same is true of volitional states that have onsets for example in (26).

(26) I'm living in a residence for the fall, but moving to a house in the spring.

Finally, note that this entire scenario cannot occur with the *te-iru* structure whose constraints require the POS to fall after BASE.BEGIN. Thus, although we have seen how it is possible for *te-iru* to give rise to a progressive interpretation, we also have seen why it cannot give rise to a futurate interpretation as *be-ing* does.

8.1. **Summary.** In this section, we have seen that the unification facts of the *be-ing* structure with the Aristotelian Categories lead to the following facts:

(1) *Be-ing* and states are ungrammatical unless it is a volitional state. This allows the BASE points to be moved within the frame which has the consequence of including them in the UNIFIED structure's FIGURE. This precipitates a temporary state interpretation which is not available to any other category. Furthermore, volitional states which have flexible onsets can give rise to the futurate interpretation when the FRAME is sufficiently dilated

causing the nucleus to be come punctual and forcing the POS to fall within the onset.

(2) Accomplishments and activities behave identically with respect to *be-ing* and are interpreted as progressive if the POS falls within the nucleus; futurate if it falls within the onset (BASE.BEGIN).

(3) Achievements have a punctual nucleus, and consequently, can only be grammatical with *be-ing* if they also have a durative onset. They always give rise to a futurate interpretation.

9. English: Compositional Structures

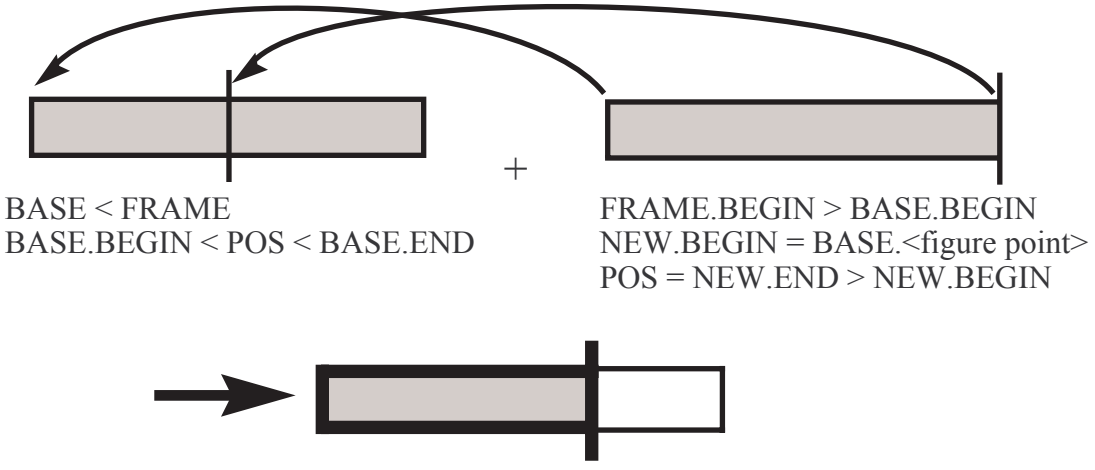
Obviously, the two forms, *be-ing* and *have-en* are not mutually exclusive; they can be used in combination, giving rise to the continuous persistent situation interpretation (Table 2d). In keeping with the fundamental assumptions of this analysis, the interpretations that are possible with *have-en* + *be-ing* should be a natural consequence of a compositional structure derived by unification of the structures that have already been proposed for both. Because the category + *be-ing* structures are so similar, there's really only one case that we need to consider. It is depicted in Figure 16.

There is already a POS specified by *be-ing* and since *have-en*'s constraints on its placement cause no conflicts, they naturally align. This establishes NEW.END at the POS which falls within BASE. There is, however, no FIGURE point (except for with states) to satisfy the coindexing of NEW.BEGIN. This is a conflict easily resolved by coindexing NEW.BEGIN to BASE.BEGIN. This constitutes new information which causes UNIFIED.BEGIN to be included in the figure.

Unification with states creates a different, subtle constraint conflict. *Be-ing* shifts BASE.END and BASE.BEGIN points within the frame. *have-en*'s BASE.BEGIN constraint adjusts the FRAME instead; thus BASE.END is released from its requirement to be within the frame (and it will not be in the unmarked case) and the relationship between the FRAME and BASE.BEGIN is altered (keeping it in the FIGURE).

In all cases, the establishment of an new interval between the two FIGURE points constitutes new information. Thus a grammatical category + *be-ing* + *have-en* structure is identical for every category, and so we should expect it to in all cases to give rise to exactly the same interpretation. With the exception of the FIGURE this structure is identical to the *te-iru* structure that gave rise to both the progressive and both persistent situation interpretations (Table 2a, d, and f). Again, I would argue that the persistent situation and continuous persistent situation interpretations are of a similar type—it is true that in both cases the event has not been completed and is in progress. The resultant structure

FIGURE 16. Unification of Aristotelian category + *be-ing* + *have-en*



in Figure 16 differs very little structurally from *be-ing*, except in its FIGURE, and that, I claim, is why we see a functional division between the two forms. *Have-en + be-ing* deemphasizes the role of the placement of POS within the BASE and thus the consequential internal perspective. At the same time it emphasizes the interval established between BASE.BEGIN and the POS. As before, when the POS falls within the nucleus of the verb, this latter fact opens up the possibility of quantifying the duration of that interval which is not possible with *be-ing*.

It is because of its semantic overlap with *be-ing* that *have-en* in this context has become functionally restricted—its only purpose in combination with *be-ing* is to provide quantifiability and is ungrammatical outside of a context (explicit or implied) in which it is doing just that. This is illustrated in (27) through (29).

(27) State

a. * I have been living in Bloomington.

b. I have been living in Bloomington for three years.

c. Q: Where have you been living (since I last saw you; since you got evicted)? A: I have been living in Bloomington.

(28) Accomplishment

a. * I have been painting the picture.

b. I have been painting the picture since one o'clock / for two hours.

c. Q: What have you been doing (all day)? A: I have been painting the picture.

(29) Activity

a. * I have been running.

b. I have been running for ten minutes / since the start of the race.

c. Q: Why are you out of breath? A: I have been running (until now, for the last while).

Achievements do not appear in the examples above for the simple reason that they are generally ungrammatical with *have-en* + *be-ing*[5]. Although there is no reason that the structure cannot unify as we would expect, we have just established that in English, the only purpose of *have-en* to be applied to a *be-ing* structure is to provide quantifiability. Quantification, however, requires the POS to fall within the nucleus of the verb; in an achievement + *be-ing* structure, it always falls within the onset. Similarly, we would also expect quantification to be incompatible with the futurate interpretation of *be-ing*.

(30) Futurate *be-ing*

a. * We have been getting married since June / for two months.

b. * She's been reaching the summit for two minutes.

c. * I have been been painting the picture tomorrow for two weeks.

d. * I have been working on the project next fall since last week.

Finally, observe that the two structures that result from *have-en* + state and *have-en* + *be-ing* + state, are virtually identical. Unsurprisingly, there is very little difference semantic difference between them and they are practically interchangeable. Although, considering the examples in (31) it may be that there is still a residual effect of "temporariness" in the *have-en* + *be-ing* constructions.

(31) a. I have lived in Bloomington all my life.

[5]There are ways that the conflict can be resolved, the least marked of which involves iterating the event or making it habitual. These cases are beyond the scope of this discussion

b. I have been living in Bloomington all my life.

c. I have worked at this company for over a year and tomorrow they're letting me go.

d. I have been working at this company for over a year and tomorrow they're letting me go.

Obviously, all of these sentences are perfectly acceptable, but it may be that the expansiveness of "all my life" makes (31a.) a little more likely than (31b.). Similarly, the impending termination may make (31d.) a little more likely than (31c.).

9.1. **Summary.** In this section we have seen that the *have-en* and *be-ing* structures that have been proposed in this analysis are compositional and result accurately in the range of interpretations that we expect. We can summarize these points below:

(1) Because of its coexistence with *be-ing*, *have-en* has a more functional role of allowing quantification of an interval. The UNIFIED structure's FIGURE allows both methods of quantification ("since", "for").

(2) Because the quantification of an interval can only occur if that interval is a nucleus, achievements and futurate *be-ing* constructions are ungrammatical in this form.

(3) The universality of the structure with respect to the categories results in a uniformity of interpretation: the continuous persistent situation (which is not structurally different from the persistent situation interpretation under this analysis).

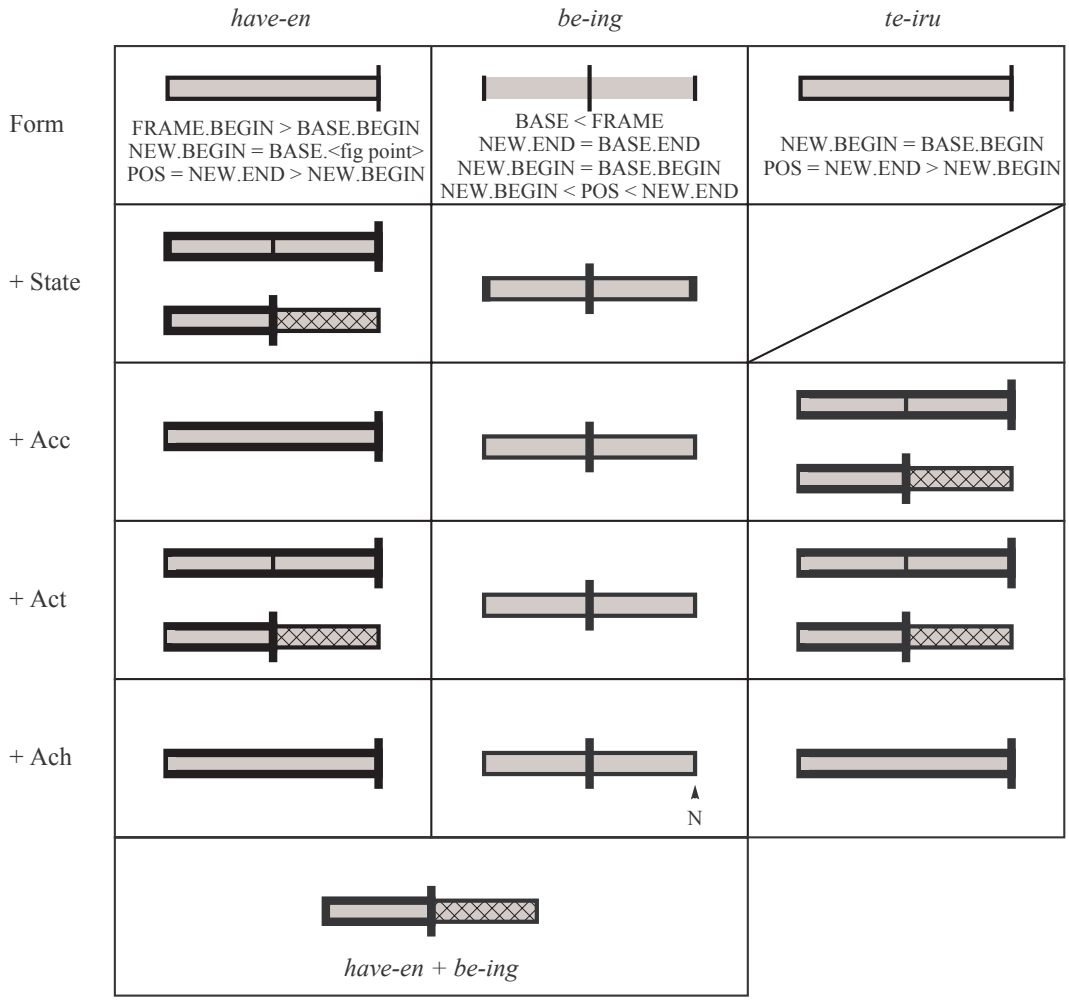
10. Conclusion

Through analyzing *have-en, be-ing*, and *te-iru*, this discussion has attempted to show the power of a structural, cognitively-based approach to the study of event structure to accomplish two linguistic goals. The first is to provide a framework of linguistic universals that is sufficient to form a description of any human language. To that end, a small set of universal elements—FRAME, POS, intervals, and constraints—have been posited. In addition to these structures, two universal properties, homogeneity and the FIGURE have been employed and a universal process of unification described. Importantly, each of these exist on a structural, rather than featural level of description of events. This, it has been argued, provides more descriptive power to accomplish the second goal.

The second goal is to accurately and adequately account for the language specific nuances associated with each morphological form and characterize the cross-linguistic similarities and differences in their possible interpretations. The notion of "event-fitting" was introduced to provide some insight into why such complex mappings are apparent when trying to compare morphological forms that give rise to the same interpretations of reality. That is, each language attempts to efficiently encode an area of continuous semantic space with the tools that it has at its disposal, attempting to achieve a "best fit". Given the presumption that these "tools" vary, the structures that constitute a "best fit" from language to language may look quite similar, giving rise to the same semantic interpretation, but may have arrived at that final form via quite different paths.

In English and Japanese, we saw how single structures, when combined with verbal categories, precipitate the range of phenomena exhibited. Moreover, it

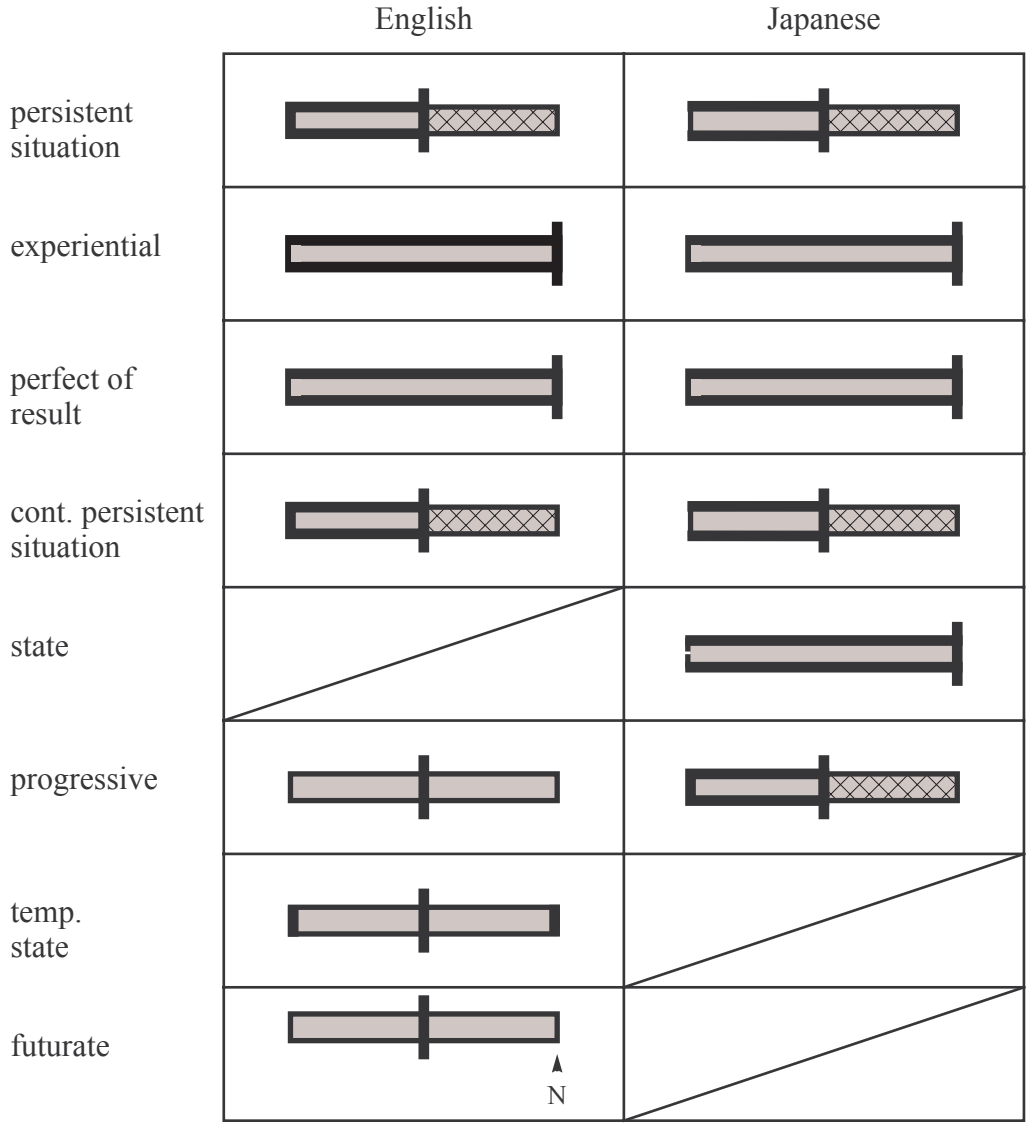
FIGURE 17. Summary of Possible Structures



is clear, when comparing these structures, why they do or do not map to the same area of semantic space. Figure 17 provides a summary of the possible final structures that can be produced by unifying *have-en*, *be-ing*, or *te-iru* with the Aristotelian Categories. Figure 18 shows which structures in Japanese and English produce the interpretations introduced in Table 2.

From even a cursory examination of Figure 18 it is clear that the structures cluster into two gross categories; these two categories could be characterized as

FIGURE 18. Summary of Interpretations and Structures



"perfective" and "imperfective", two relational features that are usually treated as primitive. In this analysis, they have emerged from the structures argued to characterize *have-en*, *be-ing*, and *te-iru* without having to define any of these forms as [±perfective, ±imperfective] in and of themselves. By the same token, there

are subtle variations on a lower level in the structures in Figure 18 that account for subtleties peculiar to the forms.

Even though the interactions give rise to exponentially more complicated interpretations and structures, the fact that this framework is founded on such a simple and limited set of primitives makes an extremely powerful and easily extensible to other languages and phenomena. Moreover, its ability to provide meaningful comparison between languages might make this approach attractive for computational tasks such as machine translation.

Clearly, this discussion does not provide a complete description; however, the directions in which it needs to be extended are apparent, and there is at least a hint at the form a full formalism might take.

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