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## **Situation Aspect as a Universal Aspect: Implications for Artificial Languages<sup>\*</sup>**

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### **Abstract**

Aspect, as one of the elements of verb mechanics, has been overlooked by many language designers. This paper argues that an artificial language, designed as a universal language for international communication, should incorporate the “universal” component of aspect found cross-linguistically in natural languages. In doing so, the paper develops a two-level model of situation aspect in which situation aspect is modelled as verb classes at the lexical level and as situation types at the sentential level. With a framework consisting of a lexicon, a layered clause structure and a set of mapping rules, the model is developed and tested using an English corpus and a Chinese corpus.

Keywords: artificial language, situation aspect, universality

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## 1. Artificial Languages and the Universality of Situation Aspect

By ARTIFICIAL LANGUAGES we refer to planned or constructed languages (conlangs) that are deliberately invented and designed by people (rather than occurring relatively spontaneously over time), spoken by people, and spoken to people (as distinct from man-to-machine programming languages). During the past three or four centuries, hundreds of artificial languages have been constructed<sup>1</sup>. Nevertheless, most of these languages have never been used by anyone other than their inventors. The most successful artificial language is, perhaps, Esperanto. It is hardly surprising, therefore, that when talking about artificial languages people immediately think of Esperanto, or more recently, Unish, which are both designed as international auxiliary language (IALs) for global communication.

An artificial language, in comparison with a natural language, is supposed to be simpler. It should also be easier to learn and use. While simplicity is indeed a virtue of a desirable IAL, an artificial language with a simple design is not necessarily easy to learn, as not all of the problems with an artificial language can be foreseen before it is put into use (Caviness 1999). Simplicity should entail stability and continuity. If an artificial language does not express the properties of stability and continuity, users may have to spend their whole life learning and relearning the language. Achieving stability and continuity requires language designers to draw on and take into account the universals of natural languages at the design stage (Davis 2002). Yet stability and continuity are rarely achieved. Ido is not simple or easy to learn at all (Caviness 1999). Esperanto, in over one century's natural development of the language, has extended beyond

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<sup>1</sup> Kennaway (2002) lists 293 such artificial languages. If logical languages, number languages, and symbolic languages, etc, are also included as artificial languages in a broad sense, there are close to 1,000 artificial languages (Kim 2001: 72).

the original design Zamenhof proposed in 1887 (Gledhill 2001). Part of the reason for the failure to achieve stability and continuity might be that the artificial languages need to change because their initial design excluded a basic feature of natural languages which users of the artificial language eventually incorporated. To indicate gender, for example, Zamenhof chose to make the root words masculine and derive the feminine equivalents using a special suffix. Over the years users have rejected this unequal treatment of the two genders so that they have coined at least two *ad hoc* masculine suffixes in practice (Chandler 1997). Artificial languages must learn from natural languages if they are to achieve stability and continuity, for as Harrison (1992) argues:

- (1) The grammar of the IAL should be a streamlined distillation of those features which are nearly universal in the world's major languages. A constructed language with a grammar which is totally different from the grammar of any natural language might be a useful experimental tool but is not a worthy candidate for the role of IAL.

It is with this in mind that we will develop a model of situation aspect, which is found universally in natural languages. In doing so, we will also be promoting simplicity in the production of IALS, as simplicity also entails regularity (Jendraschek 2002: 69). Popular accounts of Esperanto describe Esperanto as relying on “the sixteen short rules, which may be written comfortably on one sheet of note-paper” (Eddy 2002). These rules easily leave the false impression that this language has a minimal grammar, but in fact, Esperanto has a complex system not only of etymology and word formation, but also of syntax and phraseology (Gledhill 2001). Typically, the 16 rules “only tell you how to say things without explaining what it is you’re actually saying, nor what all the grammatical terms mean, nor indeed why you need to say things this way at all”. The explana-

tion of these things takes up 185 pages of *Teach Yourself Esperanto* instead of “one sheet of notepaper”. The number of rules is not necessarily the governor of regularity<sup>2</sup>. What really counts is that the interactions between linguistic elements should be rule-based. In this paper, we will seek to elaborate the rules governing the composition of situation aspect.

As one of the elements of verb mechanics, aspect has been undervalued by many language designers (Harrison 1996). While artificial languages are all marked for tense, only a couple of them are also marked for aspect (e.g., An’dorian, Diom, Lrahran, Saakka, and Txegli). Unish, for example, marks only tense but not aspect. While Esperanto marks both tense and aspect, its aspect markers are not semantically pure, and thus the aspectual meanings they express are uncertain. For example, Esperanto marks the inchoative with *-ig^*-, unfortunately this affix also has some other meaning; the affix *-ad-* can sometimes denote the iterative meaning, the prefix *ek-* can indicate an aspect of commencement and/or brevity (Harrison 1996, Gledhill 2001).

Tense and aspect are two equally important linguistic categories, which are related yet distinct. While tense and aspect are both temporal notions, they are different in nature. Tense is deictic in that it indicates the TEMPORAL LOCATION of a situation, i.e., its occurrence in relation to a specific reference time. Aspect, in contrast, is non-deictic in that it is related to the TEMPORAL SHAPE of a situation, i.e., its internal temporal structure and ways of presentation, independent of its temporal location (Xiao 2002). It is desirable, therefore, for artificial languages to adequately mark distinctions of both tense and aspect.

In this paper, we will take Smith’s (1997) two-component aspect theory as our starting point to discuss the universality of aspect. Ac-

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<sup>2</sup> There is a tradeoff between the number of rules and clarity. Striking a good balance between the two is essential in the design of an artificial language.

According to Smith (1997), the aspectual meaning of a sentence is the synthetic result of SITUATION ASPECT and VIEWPOINT ASPECT. The former refers to the intrinsic aspectual properties of IDEALIZED SITUATIONS, while the latter refers to the speaker's choice of a temporal perspective from which a situation is presented. The two are independent yet interacting components of two-component aspect theory. We will extend Smith's (1997) aspect theory to develop a two-level model of situation aspect in which situation aspect is modelled as VERB CLASSES at the lexical level and as SITUATION TYPES at the sentential level. Situation types are the composite result of the rule-based interaction between verb classes and complements, arguments, peripheral adjuncts and viewpoint aspect at the lexical, core-sentence, and full-sentence levels.

Situation aspect is basically a semantic concept. The basis for natural language semantics is "the conceptual system that emerges from everyday human experience" (Sweetser 1990: 1). As such, one must refer to "viewing", "conceiving", and "conceptualising" in speaking of aspect (Matthews 1990: 10-11). Consequently, as we shall see in sections 4-7, situation aspect shows a great similarity cross-linguistically at both lexical and sentential levels (Peterson 1997). Viewpoint aspect, on the other hand, varies significantly between languages, because it is primarily a grammatical concept, and grammars vary across languages (Xiao 2002). For example, while an aspect language like Chinese draws productive and overt distinctions between perfective and imperfective viewpoints, German has no overt viewpoint aspect markers (Schilder 1997). Neither does English have a productive morphological distinction between these (Siewierska 1991: 120); rather English "relies on other grammatical and semantic phenomena, like tense, to encode this aspectual distinction" (Frawley 1992: 296). In this sense, the difference between situation aspect and viewpoint aspect lies in the fact that the former

is language independent and the latter is language dependent<sup>3</sup>.

Situation aspect is a universal of natural languages and as such it is a feature that artificial languages are likely to encode. However, in order to do so an adequate, universal model of situation aspect is required. In this paper, we will develop a rule-based two-level model of situation aspect<sup>4</sup>.

## 2. The Motivation for our Two-level Approach to Situation Aspect

Our two-level approach to modelling situation aspect was motivated by the deficiencies found in Vendler (1967) and Smith (1997). Vendler (1967) proposes a four-fold division of verbs into STATES, ACTIVITIES, ACCOMPLISHMENTS and ACHIEVEMENTS, as shown in Table 1.

(2) Table 1: Vendler's quadripartite classification

Verb class	[±dyn]	[±dur]	[±telic]	Examples
STA	–	+	–	know, love, believe
ACT	+	+	–	run, walk, push a cart
ACC	+	+	+	run a mile, walk to school
ACH	+	–	+	find, lose, reach, win

<sup>3</sup> Zhang (1995: 41), on the basis of a contrast between English, Chinese and German, finds that verb categories in the three languages express the same basic situations. However, the interplay between verb categories and other “grammatical categories” leads to aspectual distinction. Likewise, Bybee, Perkins and Pagliuca (1994: 300) observe that gram-types like perfectives demonstrate “many language specific differences”.

<sup>4</sup> As viewpoint aspect is language specific, it will not be covered in this paper. Readers should refer to Harrison (1996) for a basic inventory of viewpoints.

The Vendlerian taxonomy basically works at the lexical level (Verkuyl 1993: 33). But as can be seen from Table 1, it also involves whole predicates rather than verbs alone. As such, Vendler has to put *run* and *walk* under the category of activity and put *run a mile* and *walk to school* under the category of accomplishment. With the three traditional parameters, double entry is inevitable, thus making the lexicon unnecessarily large<sup>5</sup>. Furthermore, this verb-based approach not only obscures the fact that we are talking about a single verb (Lys & Mommer 1986: 216), it is also inadequate as an account of the temporal meanings arising from the nominal features of internal arguments, delimiting mechanisms and viewpoint aspect (c.f., section 6).

(3) Table 2: Smith's (1997) situation types

Situation	[±dyn]	[±dur]	[±telic]	Examples
STA	–	+	* <sup>6</sup>	know the answer, love Mary
ACT	+	+	–	laugh, stroll in the park
ACC	+	+	+	build a house, walk to school
SEM	+	–	–	tap, knock
ACH	+	–	+	win the race, reach the top

In contrast to Vendler's verb-based approach, Smith (1997) fo-

<sup>5</sup> This problem can be overcome by the introduction of the notion of "neutral context" (section 5) and two new parameters (section 4).

<sup>6</sup> Smith (1991: 30, 1997: 20) does not assign any telicity value to states because she thinks a final endpoint is irrelevant to this situation type. But as shall become apparent later in section 6.3., states may also have a FINAL TEMPORAL ENDPOINT when they are bounded by delimiting mechanisms.

cuses her aspectual classification directly on idealized situations at the sentential level. Table 2 is Smith's reconstruction of Vendler's aspectual classification.

Apparently, Smith's reconstruction does not differ much from Vendler's presentation. The only noticeable difference is that SEMELFACTIVES (SEM) are separated from Vendler's activities to reflect the distinction between achievements and accomplishments. Conceptually, however, Smith's reconstruction is indeed significant. As noted earlier, a striking feature of Vendler (1967) is that he confined his partition to the lexical level, as "what he really did is to propose ontological categories" (Verkuyl 1993: 33). In contrast, Smith (1997) is aware of the compositional nature of situation aspect, therefore her aspectual classification is not concerned with verbs; rather it focuses on situations at the sentential level. Smith (1997: 54-55) also suggests a set of rules to govern the interaction between verbs and arguments in the composition of situation aspect. However, as she has not established an aspectual classification of verbs at the lexical level, these rules cannot be applied easily, if at all. As Lys & Mommer (1986: 218) argue, "Unless a system of verb classification is also set forth, many generalizations will be missed."

The deficiencies inherent in Vendler (1967) and Smith (1997) explain the two-level approach to modelling situation aspect in this paper. The Vendlerian approach works well at the lexical level, but not at the sentential level. Conversely the approach of Smith works well at the sentential level but not at the lexical level. Our two-level approach to situation aspect seeks to bridge this gap, operating at both the lexical and the sentential levels.

### **3. Our Methodology and Corpora**

Previous studies of aspect have largely been conducted without recourse to attested language data. They have, rather, been based on



a handful of confected examples which, if not intuitively unacceptable, are atypical of attested language use (Xiao 2002). Furthermore, they have not, to date, been tested with corpus data. Yet corpora have a role to play both in developing and testing such theories. Hence we decided to undertake a corpus-based approach to modelling situation aspect.

The Chinese corpus used in this paper, the Weekly Corpus, was built with texts current in China in 1995, totalling 138,694 Chinese characters (Xiao 2002). While the corpus is small, one need not necessarily apologize for using a small corpus in the right circumstances, as size is not all-important (Leech 1991: 8-29). The size of the corpus needed to explore a research question is dependent on the frequency and distribution of linguistic features under consideration in that corpus (McEnery & Wilson 1996: 66); small corpora may contain bountiful examples of frequent features. As aspect is a frequent feature of the Chinese language, the Chinese corpus used in our study yielded more than enough examples for our purpose. The English corpus used in this paper is FLOB, a one-million-word balanced corpus of present-day British English compiled at Freiburg University in 1991 (Hundt, Sand & Siemund 1998). This corpus also yielded enough examples of aspect marking for our purpose. Our aim in using the corpora was to establish the components of our model (sections 5 and 7) and provide a basis for the quantification of aspect classifiers (section 4) and rules governing the composition of situation aspect (section 6).

#### **4. The Classifier System for Situation Aspect**

The first step in modelling situation aspect is to establish a classifier system (Vendler 1967, Smith 1997, Verkuyl 1993). The selection of classifiers, however, needs to be undertaken with regard to a defensible rationale. This paper claims that the relevant distinguish-

ing features should not only make a clear distinction between various types of verbs and situations, they must also facilitate the explanation of the interaction between situation aspect and viewpoint aspect. In doing so, this paper will build upon the three established classifiers, namely the binary features of [ $\pm$ DYNAMIC], [ $\pm$ DURATIVE] and [ $\pm$ TELIC] (Comrie 1976, Smith 1997, Olsen 1994). However, two new features [ $\pm$ RESULT] and [ $\pm$ BOUNDED] (hereafter referred to as [ $\pm$ bnd]) will be introduced to complete our classifier system.

The feature of [ $\pm$ dynamic] is generally given priority over other parameters to serve as the central criterion for the initial level distinction of situation aspect (Smith 1997: 19, Brinton 1988: 57). One of the syntactic tests that have been extensively adopted to determine dynamicity is the progressive test proposed by Vendler (1967). While the reliability of the progressive test in English is sometimes questioned (Leech 1971: 1-27, Comrie 1976: 37f), the intuition underlying Vendler's observation is correct<sup>7</sup>, though Vendler's observation should be expressed in a different way: "stative verbs do not need a progressive auxiliary in contexts where other verbs do" (Moens 1987: 136). The progressive test is quite reliable in Chinese. Of the 88 instances where the progressive appears in the Weekly corpus, 86 denote dynamic situations and two are special cases of state situations (c.f., section 5), which are "more event-like" and "more akin to things that *happen*" (Carlson 1977: 448). [ $\pm$ Durative] is a second fundamental distinction for aspectual classification. It should be noted that durativity is a mental concept, therefore duration is relative and can be any specified temporal length. With a punctual reference time, durative situations either have an inceptive reading or are unacceptable (Xiao 2002). In Chinese, the most reliable test for durativity is the collocation test with the durative aspect marker *-zhe*. For example, of the 238 instances

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<sup>7</sup> Refer to section 5 for an explanation for the felicitous co-occurrence of some state verbs with the English progressive.

of the durative *-zhe* found in the Weekly corpus, only 2 involve semelfactives, which actually behave like activities when denoting multiple events (c.f., section 5).

It should be noted that telicity is defined here differently from previous studies. In this paper, the feature of [ $\pm$ telic] is associated with the presence or absence of a FINAL SPATIAL ENDPOINT. Ever since Vendler (1967: 101), the compatibility test with *for/in*-adverbials has been in operation as a diagnostic for the telicity value. The test also works well in Chinese. All of the 13 instances of *in*-PPs found in the Weekly corpus indicate the [+telic] value of the situations concerned.

In this paper a verb is assigned the value of [+result] if its meaning includes a reference to a changing point at which the final spatial endpoint denoted by the verb starts holding. While achievement verbs and accomplishment verbs both have a final spatial endpoint, they differ in that the former further indicates the success of achieving that endpoint but the latter does not. Both verb classes INVOLVE a result, but they do so in different ways. While achievements ENCODE a result themselves, accomplishments only IMPLY a result and the implied result has to be made explicit by the NP or PP arguments of verbs, as in (4a). Once these arguments are optionally absent, they no longer have any natural final spatial endpoint and can only allow atelic readings, as in (4b). In contrast, [+result] verbs always have a telic reading whether or not there is an additional argument indicating a final spatial endpoint. This fact also lends evidence that achievement verbs encode a result. Compare (5a) and (5b). It can be seen that telic verbs do not necessarily encode a result.

- (4) a. She [. . .] ate nine ham rolls (*in*/\**for* 10 minutes)<sup>8</sup>.  
(FLOB)

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<sup>8</sup> The *in*-PPs or *for*-PPs in the parentheses do not appear in the original texts. They are included here as a test to show the telicity value of a situation. The asterisk indicates that an expression is unacceptable.

- b. Bullseye [. . .] ate like a horse (\*in/for an hour). (FLOB)
- (5) a. He won the World Match-play title (in/\*for a minute).  
(FLOB)
- b. Dan won (in/\*for a minute). (FLOB)

As [+result] verbs include a reference to the successful achievement of the encoded final spatial endpoint, situations denoted by these verbs cannot be contradicted by a conjoined second clause. As such, the contradiction test can be used to determine the [ $\pm$ result] value.

Traditionally, endpoints have been understood as temporal notions. Initial and final endpoints are two points on the time axis which indicate the beginning and the ending of a situation respectively. Later some linguists began to interpret endpoints in terms of space. Van Voorst (1988), for example, argues that

- (6) Instead of considering endpoints in time, we can interpret them as objects in reality that are used to identify these endpoints. This implies that the temporal analysis of events is replaced by an analysis using spatial notions. (van Voorst 1988: 27)

Tenny (1994: 26) also argues that telicity and boundedness are “the same thing in two different domains: the spatial and the temporal.” They are the same thing in that they are both final endpoints; and they are different in that they apply to different domains. A temporal endpoint is different from a spatial endpoint. As Lyons (1977: 718) observes, “Spatial expressions are more basic, grammatically and semantically than various kinds of non-spatial expressions.” Spatial delimitedness always implies temporal boundedness, but the reverse is not true. In this paper, the feature [ $\pm$ bounded] refers to the presence or absence of a natural FINAL TEMPORAL END-

POINT, and the feature [ $\pm$ telic] is related to a natural final spatial endpoint.

It should be noted that just as [+result] always implies [+telic], [+telic] also implies [+bounded]. In other words, [-result] may mean either [+telic] or [-telic]; and similarly, [-telic] may mean either [+bounded] or [-bounded]. The three endpoint-related features are hierarchically structured, with [ $\pm$ result] at the top and [ $\pm$ bounded] at the bottom.

Having discussed two newly defined distinguishing features and three established classifiers, it is now appropriate to discuss verb classes (section 5) and situation types (section 7) separately; and with the mapping rules to be proposed (section 6), the roles played by individual sentential elements will be made clear in the composition of situation aspect.

## 5. The Lexical Level: Verb Classes Re-defined

In this paper, verbs are classified in their NEUTRAL CONTEXTS, a concept similar to Moens' (1987: 131) "basic proposition" or Lys & Mommer's (1986: 218) "frame". The context is deemed neutral when everything has been excluded that might change the aspectual value of a verb. In English, for example, a neutral context is a simple clause in which (a) the verb is in the past tense, (b) the object is syntactically and semantically a singular countable noun and should only be present if it is obligatory, i.e., with a necessarily transitive verb, and (c) viewpoint aspect must be simple (Lys & Mommer 1986: 218). In Chinese, a neutral context is similar except that there is no tense requirement and a perfective viewpoint aspect is preferable. These restrictions are imposed to avoid the possible influences of other sentential elements (e.g., arguments, adjuncts and viewpoint aspect) on verbs.

There are 32 combinations of the five binary features discussed

above (section 4). However, this does not mean that there are 32 verb classes, because combinations of conflicting features can be easily ruled out. As noted in section 4, the three endpoint-related binary features are hierarchically structured. Therefore, feature combinations containing both [+result] and [–telic], or both [+telic] and [–bounded], or [+result] and [–bounded] are ruled out. As the achievement of an encoded result is always punctual, the feature combinations containing both [+result] and [+durative] are invalid. If a situation is instantaneous or has a final spatial endpoint, it is understandable that the situation is [+dynamic], thus the combinations with both [–dynamic] and [–durative], or with both [–dynamic] and [+telic], can also be excluded. Of the 9 remaining combinations, three patterns are unattested as basic verb classes in neutral contexts, though two of them are good as derived situation types at the sentential level<sup>9</sup> (c.f., section 7). It is also interesting to note that while on the one hand, the feature combination of [+dynamic], [+durative], [–bounded], [–telic] and [–result] can be instantiated either as activities or as STAGE-LEVEL STATES (SLSs), on the other hand, the feature combination of [–dynamic], [+durative], [–bounded], [–telic] and [–result] can be instantiated either as INDIVIDUAL-LEVEL STATES (ILSs) or as SLSs. Therefore it is no coincidence that SLSs have sometimes been considered as a transitional class between states and activities (Carlson 1981).

The six attested verb classes identified in this paper are activities (ACTs) vs. semelfactives (SEMs), accomplishments (ACCs) vs. achievements (ACHs), and individual-level states (ILSs) vs. stage-level states (SLSs). Table 3 is a feature matrix of these verb classes. Since semelfactives are prone to shift between single-event and mul-

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<sup>9</sup> A third feature pattern, namely, the combination of [+dynamic], [–durative], [+bounded], [+telic] and [–result], is unattested even at the sentential level. As the delimiting mechanisms only provide a final temporal endpoint rather than a final spatial endpoint, they can only change the boundedness value but not the telicity value of a situation.

multiple-event readings (Comrie 1976), their final temporal endpoints can be easily overridden and thus they have the feature of [ $\pm$ bounded]. SLS verbs have the feature of [ $\pm$ dynamic] because these states verbs are "generally dynamic" (Olsen 1994) and "more event-like" (Carlson 1977).

(7) Table 3: Feature matrix system of verb classes

Class	[ $\pm$ dyn]	[ $\pm$ dur]	[ $\pm$ bnd]	[ $\pm$ telic]	[ $\pm$ result]
ACTs	+	+	-	-	-
SEMs	+	-	$\pm$	-	-
ACCs	+	+	+	+	-
ACHs	+	-	+	+	+
ILSs	-	+	-	-	-
SLSs	$\pm$	+	-	-	-

The dichotomous treatment of states we propose in this paper is not only well justified, it is more explanatory of the behaviours of states. With the ILS/SLS distinction, the event-like properties of some states can be accounted for easily. As has been recognized in the literature, state verbs are not normally compatible with the progressive (c.f., section 4), because they tend to describe more permanent, or "timeless" (Carlson 1977: 446) characteristics of an individual; but when they do occur in these contexts, they "name the characteristics closely associated with various kinds of behaviours" (Brinton 1988: 40). In other words, they describe STAGES of an individual, which are considered as temporary or contingent in nature (Leech 1971: 16, Comrie 1976: 36, Lyons 1977: 717). Compare (8a) and (8b). The verb constellation in (8a) is predicated of the individual Max himself, and the state described is related to his inherent dispositions or properties, without which the individual would not be Max. On the other hand, the verb constellation in (8b) is predicated of stages of the individual Max, that is, his current actions or

behaviours, thus (8b) can be interpreted as *Max made a fool of himself* at a particular occasion<sup>10</sup>. The quality predicated by stage-level predicates can be removed without changing the essential quality of the individual. As stages of an individual are more temporary than the individual's dispositions, (8b) takes the progressive to refer to a particular stage of the individual Max<sup>11</sup>.

- (8) a. Max is a fool.  
 b. Max is being a fool. (Carlson 1977: 448)

In sum, the six verb classes constitute the lexicon of our aspect model. While this section has focused on the establishment of a feature matrix of verb classes, this gives an account of situation aspect at the lexical level. However, as this paper has a two-level focus, it is necessary to focus on the interaction between the lexical and the sentential levels.

## 6. The Rules for the Three-level Interaction

In this section, we will propose 12 rules for the three-level composition of situation aspect. The three levels of syntactic structures we propose here correspond to Van Valin's (2002) LAYERED CLAUSE STRUCTURE (LCS) in Role and Reference Grammar: NUCLEUS, CORE and CLAUSE. The lexical level interaction deals with predicates. The core-sentence level interaction deals with predicates and arguments. The full-sentence level interaction deals with predicates, arguments, peripheral adjuncts and viewpoint aspect. Section 6.1 is concerned with the interaction at the lexical level (Rules 1-2) and

<sup>10</sup> Carlson (1981: 36) notes that *be NP* taking the progressive can be systematically interpreted as *act like (or so as to be) NP*.

<sup>11</sup> The temporary nature of stages is in line with the nature of the progressive. As Leech (1971: 14) observes, "the most important function of the progressive aspect is to refer to temporary situations, activities, or goes-on."



will examine the roles of resultative verb complements (RVCs) and verb reduplication in Chinese as well. Section 6.2 will discuss the effects of NP and PP arguments on situation types at the core sentential level (Rules 3-6). In our model, NP arguments have the nominal feature of [+count] or [-count]<sup>12</sup>, and PP arguments are either PPs<sub>[Locative]</sub>, PPs<sub>[Directional]</sub> or PP<sub>[Goal]</sub>. Section 6.3 will discuss elements that contribute to situation types at the full sentential level (Rules 7-12), including durative adverbials specifying time frames (*for*-PPs, *from...to*), quantity NPs, the progressive, as well as *de* resultative structure and *ba/bei* constructions in Chinese.

### 6.1. The Composition at the Lexical Level

The following two rules are hypothesized by us to apply to the interaction at the lexical level:

(9) Rule 1

Verb<sub>[-telic/±bounded]</sub> + RVCs ⇒ Derived Verb<sub>[+result/+telic]</sub>

(10) Rule 2

Verb<sub>[-telic/±bounded]</sub> + reduplicant ⇒ Derived Verb<sub>[±bounded]</sub>

Rule 1 illustrates the effect of RESULTATIVE VERB COMPLEMENTS (RVCs) on situation aspect. As Brinton (1988: 168) observes, these complements “typically express a telic notion” and “may add the concept of a goal or an endpoint to durative situations which otherwise have no necessary terminus”. RVCs refer to verb complements that indicate the resultant state or phase of the situation denoted by their preceding verbs in resultative compounds. There are three

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<sup>12</sup> The nominal features of [±count] are related to NP arguments. [+count] NPs should be understood as singular or specific plural countable, while [-count] NPs include mass nouns and bare plurals. The [±count] distinction is similar to Smith’s (1997) count/mass opposition or Verkuyl’s (1993) [±SQA].

types RVCs, namely, completive (RVCCs), result-state (RVCSs) and directional (RVCDs). When these complements are added to [–telic] or even [–bounded] verbs, derived compound verbs become [+telic] and [+result] because the final spatial endpoints or results indicated by complements are attached to them<sup>13</sup>. In the Weekly corpus, 1,741 instances of RVCs were found, of which 45 are RVCCs, 864 are RVCSs and 832 are RVCDs.

For the purpose of testing, the *in*-PP test and the contradiction test are used (c.f., section 4). Examination of the corpus data shows that no matter what telicity and boundedness values basic verbs have, their derived compounds are all [+telic] and [+result], i.e., they are achievement verbs.

In English there are no completive RVCs, and result-states RVCs can be either adjectives (e.g., *pushed the door OPEN*) or resultative particles (e.g., *pull the cart OVER*). To test the reliability of rule 1 in English, situations with adjectival result-state RVCs serve the purpose. Eleven situations of this type were found in FLOB<sup>14</sup>, and rule 1 passed the *in*-PP test and the contradiction test with all of them. Consider the following examples:

- (11) a. Marie pulled her hand **free** (*in*/\*for 5 minutes).  
 (FLOB)  
 b. Marie pulled her hand (*for*/\*in 5 minutes).  
 \*c. Marie pulled her hand **free**, but she did not succeed.
- (12) a. He snorted his nostrils **clear** (*in*/\*for 1 minute). (FLOB)  
 b. He snorted his nostrils (*for*/\*in 1 minute).  
 \*c. He snorted his nostrils **clear**, but his nostrils were still not clear.

<sup>13</sup> Derived compound verbs need not to be included in the lexicon because they are the result of the rule-based interaction between basic verb classes and RVCs.

<sup>14</sup> Situations like *thought the accusation unfair* and *made her life insufferable* are irrelevant and are thus not counted.

The verb *pull* in (11) is [-telic] and [-bounded] while *snort* in (12) is [-telic] and [ $\pm$ bounded]. But when RVCs *free* and *clear* are added, both of them are turned into derived compound verbs that are [+telic] and [+result] in nature. That is, RVCs function to change activity or semelfactive verbs into achievement verbs. That's why (11a) and (12a) would be infelicitous if *for*-adverbials were used. Similarly, as the derived compound verbs encode a result, they cannot be contradicted by a conjoined clause, as shown in (11c) and (12c).

Now let us consider verb reduplication in Chinese. Because of intrinsic semantic constraints, only verbs with the features of [+dynamic] and [-result] can be reduplicated to denote a delimitative meaning (Xiao 2002). Verb reduplication not only provides a perspective from which to view a situation perfectly, it also provides a temporal boundary to the situation denoted by a reduplicated verb and changes its boundedness value from minus to plus. For the feature of a final temporal endpoint, the *in/for*-adverbial test for a final spatial endpoint is not relevant (Yang 1995). Rather, the co-occurrence test with *-le* will be used, because *-le* demonstrates a strong preference for [+bounded] situations (Xiao 2002). There are 38 instances of verb reduplication in the Weekly corpus (36 activities and 2 semelfactives). Only 9 are ACTUALIZED SITUATIONS which can take *-le*<sup>15</sup>, but the verbs in all of these sentences must be reduplicated, even though the aspect marker *-le* can be optionally suppressed.

## 6.2. The Composition at the Core-sentence Level

While INTERNAL ARGUMENTS such as direct objects and directional complements typically affect situation type, the question of

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<sup>15</sup> It should be noted that verb reduplications is not confined to actualized situations (Xiao 2002).

whether or not EXTERNAL ARGUMENTS of subject NPs also contribute to situation aspect is controversial. Dowty (1979), Verkuyl (1989) and Brinton (1988), for example, claim that external arguments have the same effect on situation type as internal arguments while Tenny (1994) and others argue that they do not. The rules governing the interaction between verbs and NP arguments can be expressed as follows:

(13) Rule 3

$$\text{NP+Verb}_{[+/-\text{telic}]} \Rightarrow \text{Situation}_{[+/-\text{telic}]}$$

(14) Rule 4

$$\text{NP +Verb}_{[-\text{telic}]} + \text{NP} \Rightarrow \text{Situation}_{[-\text{telic}]}$$

(15) Rule 5

$$\text{NP +Verb}_{[+\text{telic}]}^{16} + \text{NP}_{[+/-\text{count}]} \Rightarrow \text{Situation}_{[+/-\text{telic}]}$$

These rules reflect the contribution of NP arguments to the composition of situation aspect. The unspecified NPs can hold the value of either [+count] or [-count]. Rule 3 shows that verbs are the sole determinant of situation types when internal arguments are optionally absent. Rules 4 and 5 show that with [-telic] verbs, NP arguments do not affect situation types while with [+telic] verbs (including derived compound verbs), the telicity values of situations at the core sentence level are determined by the nominal feature of NPs.

We tested these rules using the data from the Weekly and FLOB corpora. As the corpora are only annotated with part-of-speech information but not with such semantic features as telicity and nominal values, a large-scale test proved impractical. Therefore, a segment of around 2,000 tokens was taken from FLOB (FLOB A19)

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<sup>16</sup> To put it exactly, only accomplishment verbs are relevant, because achievement verbs encode a result which is not affected by arguments.

and further processed by hand to allow us to undertake this analysis. As the first step of processing, all clauses without verbs (e.g., *Just like that*), with stative verbs (e.g., *We're no fools*)<sup>17</sup> and parenthesis (e.g., *said Keith*) were removed; then all complex clauses were converted into simple clauses which were further annotated with semantic features such as telicity values for verbs and nominal values for NPs. As a result, 135 semantically annotated simple clauses were obtained as a testbed, as shown in Table 4.

(16) Table 4: Situation types in FLOB A19

Sentence patterns	[+telic]	[-telic]	Total
1. NP <sub>[+count]</sub> +Verb <sub>[+telic]</sub>	21	0	21
2. NP <sub>[+count]</sub> +Verb <sub>[-telic]</sub>	0	20	20
3. NP <sub>[-count]</sub> +Verb <sub>[+telic]</sub>	3	0	3
4. NP <sub>[-count]</sub> +Verb <sub>[-telic]</sub>	0	2	2
5. NP <sub>[+count]</sub> +Verb <sub>[+telic]</sub> + NP <sub>[+count]</sub>	43	0	43
6. NP <sub>[-count]</sub> +Verb <sub>[+telic]</sub> + NP <sub>[+count]</sub>	4	0	4
7. NP <sub>[+count]</sub> +Verb <sub>[+telic]</sub> + NP <sub>[-count]</sub>	0	6	6
8. NP <sub>[+count]</sub> +Verb <sub>[-telic]</sub> + NP <sub>[+count]</sub>	3	27	30
9. NP <sub>[-count]</sub> +Verb <sub>[-telic]</sub> + NP <sub>[+count]</sub>	0	3	3
10. NP <sub>[+count]</sub> +Verb <sub>[-telic]</sub> + NP <sub>[-count]</sub>	0	3	3
<b>Total</b>	<b>74</b>	<b>61</b>	<b>135</b>

<sup>17</sup> Stative verbs are supposed to be irrelevant to a final spatial endpoint (Verkuyl 1989: 79, Tenny 1994: 13).

It can be seen from the table that the types of situations denoted by clauses with the pattern of *NP+Verb* are solely determined by verbs, specifically, 24 situations with [+telic] verbs (rows 1 and 3) are all telic whereas 22 situations with [-telic] verbs (rows 2 and 4) are all atelic, irrespective of the nominal features of their external arguments of subject NPs. In clauses with the pattern of *NP+Verb+NP*, situation types are a composite result of verbs and their internal arguments. With [-telic] verbs, atelic situations come as a result irrespective of the nominal features of internal arguments. Therefore, 33 out of 36 clauses with [-telic] verbs (rows 8-10) denote atelic situations, the remaining three denote telic situations simply because they take a  $PP_{[goal]}$ , which provides a final spatial endpoint (see discussions of rule 6). With [+telic] verbs, internal arguments also play a role. Therefore, 47 clauses with [+count] object NPs (rows 5-6) all denote telic situations whereas 6 clauses with [-count] object NPs (row 7) are all atelic ones.

It is interesting to note that the nominal features of internal indirect arguments may also affect situation types (Moens 1987: 151). For example:

- (17) a. Henry went through **torture** (for/\*in 7 hours) to conjure up some giggles. (FLOB)  
 b. Henry went through **the revolving door** (in/\*for 2 minutes).

The *in/for*PP tests show that (17a) is an atelic situation while (17b) is telic. The aspectual characterizations differ because the NP in the first instance is [-count] whereas that in the second is [+count].

Our data clearly shows that external arguments do not contribute to situation aspect, because “external arguments cannot measure out the event” (Tenny 1994: 62). But in order for this view to be tenable, one should be able to account for the contrast between the following

atypical nonetheless valid examples<sup>18</sup>:

- (18) a. **Brandy** evaporated from these barrels for 50 years.  
 b. **A gallon of brandy** evaporated from these barrels in 50 years.

The apparently confusing contrast between (18a) and (18b) is caused by different interpretations of the *for*-PP as English uses this device to express both intention and duration (Moens & Steedman 1988: 21). Tenny (1994: 6) notes that the relevant interpretation of *for an hour*, when used as a test for telicity values, is that in which the event continues for an hour's duration but does not necessarily stop after one hour. In (18a), the *for*-PP is clearly different, meaning *during the past 50 years*. Even if the nominal features of subject NPs do affect situation types, (18a) should be compatible with an *in*-PP, because the subject NP, though a mass noun, is [+count]. Mass nouns or bare plurals may not necessarily be [-count]. Sometimes they can have a definite referent (existential reading) rather than an indefinite referent (generic reading) (Carlson 1977, Dowty 1979). Consider the following examples:

- (19) a. **Tyrants** ruled Wallachia for 250 years. (Dowty 1979: 83)  
 b. **Elephants** are quite easily trained. (Dowty 1979: 84)

In (19a), some particular tyrants, not tyrants in general, are clearly referred to, even though the NP is a bare plural. This is in contrast with the bare plural *elephants* in (19b), which has to be

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<sup>18</sup> We would like to thank Jim Miller for these examples. Note that the following analysis applies to Dowty's (1979: 63) examples also:

- (1) Tourists discovered that quaint little village for years.  
 (2) Water leaked through John's ceiling for six months.

taken as referring to elephants in general rather than a particular group of elephants (Dowty 1979: 84). By the same token, the mass noun *brandy* in (19a) necessarily has an existential reading. It has a definite referent, namely, the brandy in *these barrels* and thus is [+count].

In Chinese, the effect of NP arguments is more subtle, because a [–count] NP in Chinese always appears in its bare form, but this does not mean that a bare noun is always [–count]. To test the reliability of rules 3-5 in Chinese, a segment of 5,826 characters (File 9560101) was selected from the Weekly corpus for further processing. The test result is given in Table 5.

In the table, rows 1-3 show that when internal arguments are optionally absent, verbs alone determine situation types, irrespective of the nominal features of external arguments. Rows 4-5 show that with [+telic] verbs (or more precisely, accomplishment verbs), situation types depend upon the nominal features of internal arguments. Rows 6-7 show that [–telic] verbs always result in atelic situations, irrespective of the nominal features of internal arguments. This is different from the corresponding pattern in English because Chinese does not have PPs<sub>[goal]</sub> (see discussions of rule 6). When RVCs are used, basic verbs are turned into derived achievements at the lexical level (c.f., section 6.1). The absence of external arguments in the pattern in row 8 indicates that whether subject NPs are [+count] or [–count], they do not affect situation types.



(20) Table 5: Situation types in the Weekly corpus File 9560101

Sentence patterns	[+telic]	[-telic]	Total
1. NP <sub>[+count]</sub> +Verb <sub>[+telic]</sub>	7	0	7
2. NP <sub>[+count]</sub> +Verb <sub>[-telic]</sub>	0	24	24
3. NP <sub>[-count]</sub> +Verb <sub>[-telic]</sub>	0	1	1
4. NP <sub>[+count]</sub> +Verb <sub>[+telic]</sub> <sup>+</sup> NP <sub>[+count]</sub>	72	0	72
5. NP <sub>[+count]</sub> +Verb <sub>[+telic]</sub> <sup>+</sup> NP <sub>[-count]</sub>	0	1	1
6. NP <sub>[+count]</sub> +Verb <sub>[-telic]</sub> <sup>+</sup> NP <sub>[+count]</sub>	0	6	6
7. NP <sub>[+count]</sub> +Verb <sub>[-telic]</sub> <sup>+</sup> NP <sub>[-count]</sub>	0	2	2
8. Verb <sub>[+telic]</sub> <sup>+</sup> NP <sub>[+count]</sub>	3	0	3
Total	82	34	116

As noted above, a situation with a [-telic] verb in English is normally atelic, but the situation changes if there is a prepositional phrase specifying a GOAL or final spatial endpoint. A PP-argument used in the spatial dimension has the value of [Locative], as in (22b), [Directional], as in (22c), or [Goal], as in (22a) (c.f., Smith 1997). Only PPs<sub>[Goal]</sub> change the telicity value of situations with [-telic] verbs from minus into plus. PPs<sub>[Locative]</sub> and PPs<sub>[Directional]</sub> do not have such an effect. The role of PPs<sub>[Goal]</sub> can be expressed as

(21) Rule 6

$$\text{NP} + \text{Verb}_{[-\text{telic}]} + \text{PP}_{[\text{Goal}]} \Rightarrow \text{Situation}_{[+\text{telic}]}$$

Compare the following examples in (16):

(22) a. He got up and walked **to the door** (\*for/in 10 minutes).  
(FLOB)

- b. Then we walked side and side **along the wall**. (FLOB)  
 c. She walked briskly **towards Upper Street** (for/\*in 10 minutes). (FLOB)

- (23) a. She **disappeared** to the kitchen. (FLOB)  
 b. He **strolled** to the door. (FLOB)

The in/for-adverbial tests show that (22a) is telic while (22b) and (22c) are atelic. These sentences all have the same [–telic] verb *walk*, and the only difference lies in the features of their PP-arguments. Evidently, it is the PP<sub>[goal]</sub> that has contributed to the [+telic] value of (22a). A commonly recognized PP<sub>[goal]</sub> is *to*-PP (c.f., Vendler 1967, Smith 1997). To test the reliability of rule 6, collocations of motion verbs with *to*-PPs in FLOB were examined<sup>19</sup>. There are 134 such instances in the FLOB corpus, and it was found that each of them can take an *in*-PP felicitously, whether the verb is [+telic] (as in 23a) or [–telic] (as in 23b). This provides evidence that rule 6 is valid in English. Interestingly, some directional adverbials have an effect similar to that of PPs<sub>[goal]</sub> in that they also change the telicity value of a situation, as shown in (24):

- (24) She walked **home/downstairs** (in/\*for five minutes). (Brinton 1988: 51)

In Chinese, however, there are only PPs<sub>[Locative]</sub> (e.g., *zai* “in”) and PPs<sub>[Directional]</sub> (e.g., *wang* “toward”), since goals are normally indicated by RVCs (e.g., *dao* “to”). Therefore rule 6 does not apply to Chinese.

<sup>19</sup> Only motion verbs are relevant because only these verbs in collocation with *to*-PPs can be taken strictly in the spatial dimension. To make the data manageable, only motion verbs in past tense are counted.

### 6.3. The Composition at the Full-sentence Level

The telicity and boundedness values of core-sentence-level situations may also be changed by peripheral adjuncts and viewpoint aspect at the full-sentence level. The roles of contributing elements can be expressed as follows:

(25) Rule 7

Core-sentence<sub>[-bnd]</sub> + for-PP/from...to  $\Rightarrow$  Full-sentence<sub>[+bnd]</sub>

(26) Rule 8<sup>20</sup>

Core-sentence<sub>[+telic]</sub> + for/from...to-PP  $\Rightarrow$  Full sentence<sub>[-telic]</sub>

(27) Rule 9

Core-sentence<sub>[±bnd]</sub>+Quantity NPs  $\Rightarrow$  Full-sentence<sub>[+bnd]</sub>

(28) Rule 10

Core-sentence<sub>[+telic]</sub>+Progressive  $\Rightarrow$  Full-sentence<sub>[-telic]</sub>

Rules 7 and 8 show that the temporal adverbials like *for*-PPs and *from...to* play the dual roles (i) to specify a final temporal endpoint for a [-bounded] situation and (ii) to strip a telic situation of its final spatial endpoint if the endpoint falls beyond the specified time frame. These two rules were tested against the two corpora used in this paper. The distribution of *for/from...to*-PPs is given in Table 6.

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<sup>20</sup> This rule only applies to some accomplishments. See discussions later in this section.

(29) Table 6: Distribution of for/from...to-PPs in the corpora

		ILS	SLS	ACT	SEM	ACC	ACH	Total
<i>for-</i> PP	F	38	19	99	1	8	37	202
	W	3	2	61	4	5	17	92
<i>from</i> <i>...to</i>	F	7	3	10	0	0	0	20
	W	0	1	3	0	0	2	6

(F for FLOB, W for Weekly)

On the one hand, as rule 7 shows, *for/from* . . . *to*-PPs function to provide a specific time frame. Therefore all basic situation types with the feature values of [-bounded] and [-telic]—73 states, 173 activities and 5 semelfactives—are turned into temporally bounded situation types at the full sentence level.

- (30) a. He was chairman from '81 to '85. (FLOB)  
 b. They were silent for a while. (FLOB)  
 c. Lian-le                    zhengzheng    yi-nian,  
    practice-le        whole            a-year  
    Yang-Bingming kuai            chushi-le. (Weekly)  
    Yang-3Sg soon finish            apprenticeshi-le  
    “Having practiced for a whole year, Yang was soon to  
    finish his apprenticeship.”  
 d. Da-le    wo        liang        heilai (heiye). (Weekly)  
    beat-le me    two        nights  
    “(They) beat me for two nights.”
- (31) They wrote from eight-thirty in the morning till twelve,  
 and again from four till six. (FLOB)
- (32) I stood and read the menu for a while, discovering it served  
 mainly hamburgers. (FLOB)

In (30a) and (30b), for example, *He was chairman* and *They were silent* are an open-ended ILS and SLS respectively, but *from '81 to '85* and *for a while* bounds them temporally and turns them into a BOUNDED ILS and a BOUNDED SLS respectively. Similarly in (30c) and (30d), *lian* “practice” and *da* “beat” are temporally unbounded, but when *for*-PPs are used, they have a temporal boundary and become a BOUNDED ACTIVITY and a BOUNDED SEMELFACTIVE. On the other hand, as rule 8 shows, when an accomplishment takes a *for/from. . . to*-PP, its final spatial endpoint is stripped if the endpoint goes beyond the specified time frame. In (31), for example, the discourse suggests that the writing event is an accomplishment, but the *from. . . to* expressions bound the telic situation before its final spatial endpoint is achieved. In other words, the writing event is not accomplished within the specified time frames and is thus turned into a bounded activity at the full sentence level. However, rule 8 only applies to SOME accomplishments. For repeatable accomplishments whose final spatial endpoint falls within the specified time frame, *for/from. . . to*-PPs do not remove their final spatial endpoint but rather render them an iterative reading. In our corpora, there are 13 accomplishments taking *for/from. . . to*-PPs, but rule 8 only applies in 6 instances (2 in English and 4 in Chinese). The others are still telic situations with iterative readings at the full sentence level. For example, in (32), the conjoined second clause indicates that the menu-reading event was accomplished, though it is not clear whether it was repeated within the specified time frame.

The hypothesis that a *for*-PP may function to trigger a situation type shift from accomplishment to activity at the full-sentence level explains the felicitous cooccurrence of some core-sentence-level accomplishments with both *in*-PPs and *for*-PPs as observed by Dowty (1979: 61):

- (33) a. He read a book *for/in* an hour. (Dowty 1979: 61)  
 b. She combed her hair *for/in* five minutes. (Dowty 1979: 61)

Rule 9 shows that quantity NPs have the same delimiting effect as *for/from. . . to*-PPs. The frequencies of quantity NPs<sup>21</sup> found in the corpora are given in Table 7.

(34) Table 7: Distribution of quantity NPs in the corpora

Corpus	ACT	SEM	ACC	ACH	Total
FLOB	25	8	22	26	81
Weekly	23	10	15	7	55

For accomplishments and achievements, their boundedness value will not change when they are repeated for a specified number of times.

- (35) a. She read it **once**. (FLOB)  
 b. She read it **three times**.

- (36) a. Rovers lost the ball **twice**. (FLOB)  
 b. Rovers lost the ball **5 times**.

- (37) a. I stabbed her about **six times**. (FLOB)  
 b. Na      hanzi              zuoyou      xunshi-le  
     that    man                  round      look-le  
     **yi-fan**,                  disheng      shuo. (Weekly)  
     one CLASSIFIER      low-voice    said  
     ‘‘That man looked around, and said in a low voice.’’

For example, (35a) and (36a) have a temporal boundary as definite as, though not the same as (35b) and (36b). Therefore, 70 situations of these two types are irrelevant to rule 9 and thus can be excluded from testing. On examination, it is found that all of the re-

<sup>21</sup> Only quantity NPs indicating a definite number of iteration are counted; therefore, expressions like *more than once*, *twice a week* and *several (many) times* are excluded.

maining situations, namely, 48 activities and 18 semelfactives, have a temporal boundary at the full sentence level. As semelfactives shift between single event and multiple event readings (c.f., section 5), they can be either [+bounded] or [-bounded]. The event of *stabbing* as in (37a), for example, can occur just once or go on and on. But when it is delimited by the quantity NP *six times*, it has a definite temporal boundary as expected. The activity *xunshi* “to look around” as in (37b) is intrinsically [-bounded]. But when it is delimited by the quantity NP *yi-fan* “once”, a temporal boundary is attached to it and the activity becomes temporally bounded. The effect of quantity NPs is more obvious in Chinese, because the aspect marker *-le* is sensitive to a final endpoint (c.f., section 6.1). This contrasts strikingly with the simple aspect in English. For example, if the quantity NP *six times* in (37a) is removed, the English sentence is still felicitous; but if the quantity NP *yi-fan* “once” in the Chinese example in (37b) is removed, the sentence becomes unacceptable.

Rule 10 indicates that viewpoint aspect also participates in the composition process at the full sentence level. There are 88 instances of the progressive *zai* in the Weekly corpus, which serve as the basis for test. The progressive *zai* only occurs with dynamic situations (c.f., section 4), as can be seen in Table 8:

(38) Table 8: Distribution of the progressive in the Weekly corpus

Frequency	Situation types					Total
	SLS	ACT	SEM	ACC	ACH	
	2	73	2	7	4	88

As the progressive only changes the telicity value from plus to minus, atelic situations are irrelevant. Of the 88 situations taking the progressive *zai* in the Chinese corpus, 11 are [+telic] at the core sentence level. But when they are presented with the progressive aspect,

the final spatial endpoints of these situations are all excluded. Therefore, the progressive functions to trigger a situation type shift and coerce a telic situation into a derived activity at the full sentence level. The progressive in English has the same effect, as Comrie (1976: 47) suggests, “it is possible to state explicitly that the terminal point was never reached, as in ‘Mary was singing a song when she died’.”

Chinese is rich in delimiting devices. In addition to those discussed above, *de* resultative structures and the constructions of *ba/bei* also function to delimit situations (Yang 1995: 78), which can be expressed as:

(39) Rule 11

Core-sentence<sub>[-result]</sub> + *de*-construction  $\Rightarrow$  Full-sentence<sub>[+result]</sub>

(40) Rule 12

Core-sentence<sub>[-result]</sub> + *ba/bei*-construction  $\Rightarrow$  Full-sentence<sub>[+result]</sub>

The structure of *verb+de+complement* can denote either resultativeness or manner. Only resultative *de*-constructions are relevant here. A total of 41 such instances were found in the Weekly corpus, of which 9 are SLSs, 22 are ACTs, 9 are SEMs and 1 is ACC. All of the verb classes involved in resultative *de*-constructions have the features of [+dynamic] and [-result]. This is as expected. ILS verbs cannot occur in this structure because *de* denotes the result state caused by an action; achievement verbs cannot occur with *de* because they already encode a result themselves. At the full sentence level, all of the 41 [-result] verbs occurring in resultative *de*-structures produce situations with a result attached to them, thus they can take *in*-PPs felicitously and cannot be contradicted.

In Chinese, *ba* is an object modifier that preposes a direct object to the pre-verbal position, and *bei* represents the passive construction. Sentences with *ba/bei* structures always denote delimited situations



with the implication of successful achievement of a result. In this sense, *ba/bei* constructions have a function similar to that of RVCs. There are 116 instances of *ba* structures and 255 instances of *bei* structures in the Weekly corpus, which are distributed as shown in Table 9.

(41) Table 9: *ba/bei* constructions in the Weekly corpus

<i>ba/bei</i>	ACT (-de)	ACT (+de)	SEM (-de)	SEM (+de)	ACC	ACH	Total
<i>ba</i>	5	6	2	2	10	91	116
<i>bei</i>	44	3	2	4	15	187	225

As achievements and situations taking resultative *de* (marked +*de* in the table) already encode a result, 99 instances of *ba* and 194 instances of *bei* can be excluded for test. As situations encoding a result cannot be contradicted by a conjoined clause, the contradiction test was used. The test shows that none of the remaining 17 situations with *ba* and 61 situations with *bei* can be contradicted.

## 7. Sentential Level: Situation Types

The discussions in the previous section show that verbs, for sentences in which they occur, determine a range of possible situation types that sentences may have. The specific situation type of a full sentence comes as a result of the interaction between verbs and complements, arguments, peripheral adjuncts and viewpoint aspect.

Cross-linguistically, Chinese and English have the same six basic types of situations: activities, semelfactives, accomplishments, achievements, ILSs and SLSs. Basic situation types share the same feature values with verb classes of the same name (see section 5). Except for accomplishments, all of the others have various derived situation types which vary from their basic types with respect to

their durativity or boundedness value<sup>22</sup>. The salient features of these situation types are summarized in Table 10.

(42) Table 10: Feature matrix system of situation types

Situation type		[±dyn]	[±dur]	[±bnd]	[±telic]	[±result]
ILS	bas	–	+	–	–	–
	der	–	+	+	–	–
SLS	bas	±	+	–	–	–
	der	±	+	+	–	–
ACC		+	+	+	+	–
ACT	bas	+	+	–	–	–
	der	+	+	± <sup>23</sup>	–	–
SEM	bas	+	–	±	–	–
	der	+	+	±	–	–
ACH	bas	+	–	+	+	+
	der	+	+	+	+	+

bas: basic, der: derived

It should be noted that the situation types discussed here are the final result of composition at the full-sentence level. When basic states and activities are temporally bounded by delimiting mechanisms, bounded states and bounded activities are the result. Derived activities can also be obtained from basic accomplishments delimited by *for/from*. . . *to*-PPs or the progressive. Accomplishments do not have a derived situation type. Basic semelfactives have a single-event reading; when they occur with quantity NPs or durative

<sup>22</sup> Because the derived situation type of accomplishment has exactly the same feature values as their basic types (c.f., 35a and 35b), these two are not differentiated.

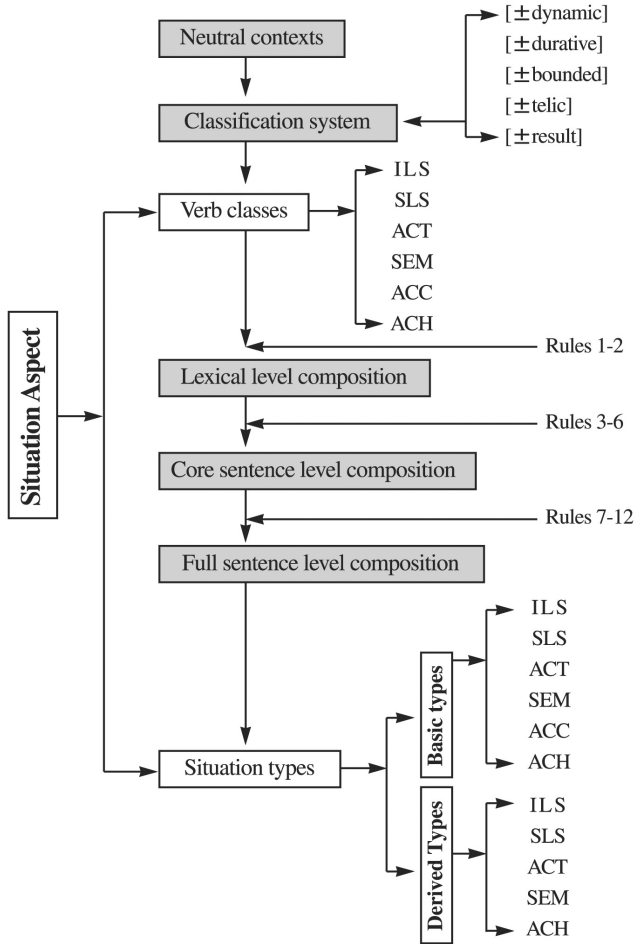
<sup>23</sup> Derived activities have the value of [±bounded] because they represent a complicated category. When basic activities are delimited by specific time frame, they are [+bounded]; when accomplishment verbs take [–count] NPs or the progressive, the derived activities are [–durative].

temporal adverbials, or when they take the progressive or durative aspect, they become derived ITERATIVE SEMELFACTIVES. When achievement verbs take plural [+count] NPs or quantity NPs, derived ITERATIVE ACHIEVEMENTS are the result.

## **8. Conclusion**

Artificial languages may profit from incorporating the universals of natural languages. By doing so an artificial language may be more subtle and consistent. Situation aspect is a universal component of aspect theory. In this paper, we developed a regular model of situation aspect in natural languages, as illustrated in Figure 1. Our model, we believe, not only contributes to a better understanding of natural languages, it is also of assistance in the creation of artificial languages.

(43) Figure 1: Situation aspect in natural languages



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