Characteristics of Achievement Progressives in English[*]

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Kim, Ji-Hee & Lee, Yae-Sheik. (2022). Characteristics of achievement progressives in English. *The Linguistic Association of Korea Journal, 30*(2), 71-91. It is well attested in the Aktionsart literature that rarely can achievement predicates appear in the progressive. In particular contexts, however, they do occur in this form. This study addresses this phenomenon. To do so, it mainly attempts the following three tasks: first, it accounts for the (in)compatibility of the progressive with achievement verbs in terms of the augmentation of instantaneous achievement event structures; second, it provides a formal definition of the progressive operator for achievement predicate-based progressives; and third, based on these first two accounts, it contends that achievement progressives inherently deliver anticipation of future events as futurate progressives do. Furthermore, this study compares the subevent structures of achievement and futurate progressives. Those of the former are temporally contiguous and necessary for the attainment of their telic points, while those of the latter do not require such temporal contiguity and necessity.

Key Words: semantics of the achievement progressive, futurate progressive, mereological event structure, subevent, subinterval, Aktionsarten, culmination

1. Introduction

It is well attested (e.g., Vendler 1957) that the Aktionsarten of English predicates are of four types as the following examples show:

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(1) a. John believes in God. (state)
    b. John walked on the beach this morning. (activity)
    c. John recognized Aunt Jane immediately. (achievement)
    d. John painted a picture in an hour. (accomplishment)

Dowty (1986, pp. 42) provides the following definitions of these four Aktionsarten in English.

(2) a. A sentence ϕ is a stative iff it follows from the truth of ϕ at an interval I that ϕ is true at all subintervals of I.
    b. A sentence ϕ is an activity iff it follows from the truth of ϕ at an interval I that ϕ is true at all subintervals of I down to a certain size.
    c. A sentence ϕ is an accomplishment/achievement iff it follows from the truth of ϕ at an interval I that ϕ is false at all subintervals of I.

What the above Dowty's definitions tell us is that accomplishment and achievement sentences do not show any subinterval closure. This means, in turn, that they denote independent events with their culminations (e.g., Parsons, 1990) or telic events. They are inherently different in that the former are durative : the latter momentous or near instantaneous. Piñón (1997, pp. 276-284) makes a diagnosis of achievements with time-span adverbials as follows:

(3) a. Rebecca reached the summit in five hours (in a split second).
    b. Ainta recognized Peter in five minutes (in a fraction of a second).
    c. Mary arrived in an hour (in a moment).

In addition, Piñón states that achievements denote momentous eventualities, and they literally have no temporal extensions to be measured by the time-span adverbials mentioned above. They measure the times that the subjects took to go through the processess to the culminations; those in the parentheses specify the time or the moment of the transitions from the ends of the processes to the culminations. Since achievement sentences always denote telic events, it is natural that they have no partial completion as Piñón insists (1997, pp. 279):

(4) a. #Rebecca partly (partially, half, partway, halfway) reached the summit.

    b. #Anita partly (partially, half, partway, halfway) recognized Peter.

    c. #Astrid partly (partially, half, partway, halfway) won the race.

    d. #The patient partly (partially, half, partway, halfway) died.

In contrast, accomplishments are normally compatible with these adverbials as the following examples show:

(5) a. John partly (partially, half, partway, halfway) built the house.

    b. John partly (partially, half, partway, halfway) ate the apple.

In the Aktionsart literature including Rothstein (2004, pp. 42), the lack of achievement predicates in the progressive is taken as duly natural mainly due to their instantaneousness as the following examples show :

(6) a. #Dafna is spotting her mother at the party. (Rothstein, 2004, pp. 52)[1]

    b. #Bill is noticing that Mary has dyed her hair. (Rothstein, 2004, pp. 52)

However, if a little bit of modification is made, it would render it possible for them to participate in the progressive. Otherwise they would sound unnatural as in (6). This is exemplified by sentences like those of (7).

(7) a. The patient was dying when the operation was performed that save his life. (Dowty, 1979, pp. 137)

    b. The librarian is finding the book. (Dowty, 1979, pp. 61)

    c. John was falling asleep when Mary shook him. (Dowty, 1979, pp. 137)

    d. Fred and Susan are finally leaving. (Rothstein, 2004, pp. 36)

    e. The plane was landing when it exploded in midair(so it din't land). (Rothstein, 2004, pp. 39)

    f. Jane is just reaching the summit when there was an avalanche(so she didn't reach it). (Rothstein 2004, pp. 39)

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1) Even though Smith (1991, pp. 30) treated the verb 'spot' as an achievement verb. it can be taken as a semalfactive together with 'blink', 'nod', 'cough', 'knock', tap', 'peck','scratch', 'kick', and others in that only for the iterative reading can it be used in the progressive just like semalfective predicates. She explained that "Semalfactives are single-stage events with no result or outcome."

To account for the use of achievement verbs in the progressive, Verkyul (1989) suggests that achievements progressives are just "disguised" accomplishments. Mittwoch (1991) makes a similar explanation that achievements are aspectually shifted into an accomplishment reading by the operator of the progressive. In contrast, following Smith (1991)[2], Rothstein (2004, pp. 36) sees achievement progressives differently: achievements denote events which consist of preliminary stages or activities and telic points. Furthermore, the progressive operator augments the preliminary part to make achievements more durative just like accomplishments.

This paper is composed of the following sections: Section 2 compares achievement and accomplishment porogressives in terms of their internal temporal structures; Section 3 puts forth a mereological event structure to deal with the meanings of progressives; Section 4 provides a formal definition of the progressive operator mainly for achievement progressives. Lastly Section 5 concludes that achievement progressives are aspectually different from accomplishments, and they are similar with futurate progressives in terms of their aspectual characteristics.

2. Are Achievement and Accomplishment Progressives Alike?

As semanticists such as Verkyul (1989) and Mittwoch (1991) insist, is it true that achievement and accomplishment progressives[3] are aspectually alike? At first glance, they look alike, but they are, of course, different with each other in several respects. To begin with, achievement progressives such as those given in (7) have the so-called "slow-motion" reading, while accomplishment progressives have "normal" progressive readings. In addition, an achievement progressive denotes an interval during which some of subevents of the whole event in question happen. These subevents are necessary for the attainment of culmination of the whole event in that without any one of them, the culmination of the whole event would not be attainable. For example, plane landing is normally said to

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2) Smith (1991) viewed progressive achievements as capturing "detachable" preliminary stages of the achievement. Similar ideas can also be found in Kamp and Reyle (1993), and Kang and Lee (in preparation).

3) Achievement and accomplishment Progressives means progressives based on achievement and accomplishment predicates, respectively.

consist of four phases: the approach, the flare or round-out[4], the touchdown and the landing roll. The progressive of (7e) denotes an interval for one or two but not all the phases of the plane landing. The total sum of all the subevents of these phrases would result in the culmination. Actually, it is really hard to think of what such subevents look like and exactly identify them. In the case of dying, (7a) denotes some events of drastic decrease in blood pressure, falling into unconsciousness, and the like. It is worth to note that each of such subevents is durative enough to accomodate the progressive. That is, the "slow motion" reading of achievement progressives is relevant with an interval of time during which subevents or phases develop into culmination.

In contrast, an accomplishment progressive captures just a series of subevents that are heterogeneous. For example, the accomplishment progressives of (8) denote series of heterogeneous subevents of walking (to the beach), writing (a letter), and building (a house), respectively.

(8) a. John was walking to the beach this morning.
   b. John was writing a letter when I entered his office.
   c. John was building a house last year.

To be more specific about the heterogeneity of subevents which constitute the accomplishment in question, the whole event denoted by the accomplishment predicate 'walk to the beach' of (8a) consists at least of two parts[5]: one is the process of walking and the upshot or culmination of reaching the beach. The current interest is in the first part. It is a series of subevents which are permutations of taking two steps. These subevents are heterogeneous in a sense that they are not just events of taking two steps but involve change in location. Following Krifka (1989, pp. 91), this study treats the adverbial 'to the beach' as an incremental measure function. He presents the following graph to explain how such an incremental theme changes as the whole event goes on[6]:

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4) The FAA's Airplane Flying Handbook (2022, pp. 9-8) describes the flare as "a slow, smooth transition from a normal approach attitude to a landing attitude, gradually rounding out the flightpath to one that is parallel with, and within a very few inches of, the runway." (https:// www.faa.gov/ sites/faa.gov/files/regulations_policies/handbooks_manuals/aviation/airplane_handbook/10_afh_ch9.pdf)

5) Not a few scholars including Pustejovsky (1996) see the internal temporal structures of accomplishments this way. Moreover, Pustejovsky takes the culmination as "head" in the event structure of accomplishments.

6) w's on the axis of s stand for the spacial amounts of the incremental theme for each subevents e's.

(9)
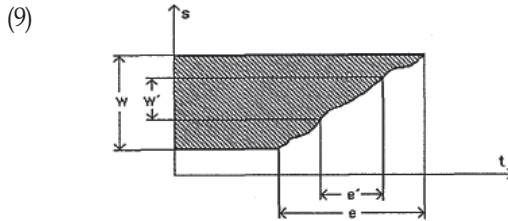
As the event in question goes on, the distance to the beach proportionally decreases. Similarly in the case of writing a letter, the letter plays the role of incremental theme, which is also proportionally completed as the writing event goes on. Given a letter generally consists of five parts of the heading, salutation, body, closing, and signature, the progressive of (8b) denotes an interval of some part(s) of writing these five parts of the letter. All those subevents are as heterogeneous as those of walking to the beach of (8a). As for the whole event of building a house, it is not difficult to see how heterogeneous its subevents are if it is the sum of such events of leveling the site for the house, of laying the cornerstones, of constructing the frame of the house, of installing windows, and the like. All these events can exist in their own right so that they are heterogeneous and independent.

In sum, main differences between achievement and accomplishment progressives are summarized as follows: first, what an achievement progressive denotes is an interval of subevents which are necessary for the attainment of the upshot or culmination of the whole event in question. In contrast, an accomplishment progressive denotes an interval of subevents which do not have to be necessary for the culmination of the whole event. Second, the interval of time denoted by an achievement progressives covers some of the subevents, which are temporally contiguous. On the contrary, the subevents of an accomplishment progressive do not enjoy the temporal contiguity. That it, they may be separate from each other. Third, the progressive operator for an achievement predicate makes a comparatively short backward temporal extension from the time point of the achievement in question. Such a short backward temporal extension is responsible for the "slow-motion" reading and that of the quick attainment of the culmination. In contrast, the progressive operator selectively takes some part of the process of the base accomplishment verb. Fourth, the subevents of an achievement progressives are more or

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Moreover, the axis t stands for the time dimension or the flow of time.

less homogeneous[7]), while those of an accomplishment progressive are heterogenous.

In short, such contiguity and heterogeneity distinguish achievement and accomplishment progressives. For the sake of the semantics of achievement progressives, these characteristics should be reflected in the formal definition of an achievement progressive below.

3. Mereological Event Structure

It is well-known that subinterval closure divides eventualities into two classes: one is stative, and the other is eventive. In the literature of Aktionsart, events are considered as individual entities of particular event types. Moreover, it is attested that countability is the one of the most prominent characteristics of individual entities[8]). To exemplify this, Kang and Lee (in preparation) presents the following sentences:

(10) a. John biked to the beach twice this morning.
  b. France and Germany have met three times since that EFAEURO 2016 fixture.
  c. When Germany wins the World Cup people always celebrate in the street.
  d. Germany won in the final game as a big surprise. Nobody had expected it.

The measurement adverbials of (10) measure the number of the events in question. Even the pronoun 'it' in (10d) refers back to its antecedent, the event of Germany's winning in the final. This means that the event is taken as a regular individual entity.

Progressives show a similar behavior to those of activities and statives in terms of modification by *in/for*-time adverbials as follows:

(11) a. John was reading a book for an hour/*in an hour.
  a′. John read a book in an hour.

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7) Whether subevents of achievement progressives are viewed as homogeneous or not is dependent on whether the subevents, which are secured by short backward extension in time, can be taken as predicated of by the property of the culmination in question. For example, if we agree that the property "land" can be predicated of the flare and the touchdown, these two subevents are homogeneous in terms of the property "land."

8) See Krifka (2021) for more discussion on the relationship between countability and individuation.

b. John walked on the beach for an hour/*in an hour.

b′. John walked to the beach in an hour.

c. John was asleep for an hour/*in an hour.

Predicates modified by *for*-time adverbials are by and large characterized of subinterval closure. That is, an hour sleep entails sleeps of shorter periods than an hour. Similarly, if an hour reading (of a book) is true, readings of shorter periods than an hour are also true. In this sense, the interval denoted by the progressive is homogeneous[9]. Such homogeneity is best captured by the following two properties:

(12) a. Distributivity

$\forall i, i′ \in I(T)[S(i) \wedge i′ \sqsubset i \rightarrow S(i′)]$, where $i′ \sqsubset i$ means that $i′$ is a proper subinterval of i.

b. Cumulativity

$\forall i, i′ \in I(T) [S(i) \wedge S(i′) \rightarrow S(i \oplus i′)]$, where $i \oplus i′$ means the sum of the two intervals i, and i′.

To the contrary, the accomplishments of (11a′, b′) do not show the subinterval closure, for an *in*-time adverbial specifies the whole temporal length until the end of the event in question. In other words, the events of different intervals are, of course, different events. So (13a) does not entail (13b) even though the two events are of the same type.

(13) a. John walked to the beach in 30 minutes.

b. John walked to the beach in 20 minutes.

(13a) is a 30-minute walking to the beach; (13b) a 20-minute walking to the beach. Subevents of shorter periods are, of course, not identical to the event of the whole interval. The following quantization requirement captures this idea.

(14) Quantization

P is quantized iff $\forall i, i′ [i \sqsubset i′ \wedge P(i′) \rightarrow \neg P(i)]$

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9) However, notice that the subevents covered by the interval are heterogeneous, as we have discussed above.

In sum, *for*-time and *in*-time adverbials are only compatible with predicates denoting states or atelic activities or processes and only with telic event-denoting predicates, respectively.

Interestingly, predicates such as 'read a book' are ambiguous because they have either the interpretation of accomplishment or that of activity, as the following examples show:

(15) a. John read a book in an hour. (accomplishment) (Dowty, 1986, pp. 39)
　　 b. John read a book for an hour. (activity)

The internal temporal structure of predicates like 'read a book' is composed at least of two subintervals: one corresponds to the process of reading it; the other to the instantaneous attainment of completion of the book reading. 'in an hour' measures the sum of the intervals of two neighboring subevents; 'for an hour' quantizes the reading activity to transform it into an hour reading event. The following examples show that the progressive behaves similarly to activity or process with regard to the use of *for*-time adverbials and that of frequency adverbials like 'twice'.

(16) a. John was reading the book *twice this morning.
　　 b. John was reading the book for an hour this morning.
　　 c. John was reading the book for an hour twice this morning.

The aspectual characteristics of the progressive can be summarized as follows: first it is a kind of aspect-shifter that transforms an event type into a state. In other words, the progressive is only compatible with event predicates of activity, process, achievement and accomplishment. In addition to that, the event predicates should denote events that are complex enough to consist of multiple subevents. Second, it captures temporal containment within the reference time in question (e.g. Partee, 1984). This means that the progressive denotes a subinterval of the reference time during which some subevents happen. Third, the interval of the progressive shows subinterval closure, allowing for modification by for-time adverbials.

Taking into consideration the above mentioned aspectual characteristics of the progressive, the semantics of the progressive has to make reference to at least the relations of subevent, temporal precedence, temporal inclusion, and overlap. For the sake of the semantics of the progressive, this study assumes a mereological event structure like

that of Landman (1991, pp. 196) as follows:

(17) < E, ≼, <, ⊑, ∝ >
    a. E is a non-empty set of events.
    b. ≼, a partial order, the relation of subevent
    c. ⊑, a partial order, the relation of temporal inclusion
    d. <, a strict partial order, the relation of temporal precedence
    f. ∝, the relation of temporal overlap.

(17b), which Landman (1991) treats as a "part of" relation, is the subevent relation in this study. Recognizing a part of an event, we perceive it as a part that exists in its own right. The current study calls it a subevent (of a larger event). Consider the following sentences:

(18) a. John waltzed/was waltzing for an hour with Susan at the party.
    b. John walked/was walking on the beach for an hour this morning.
    c. John drank/was drinking beer last night.
    d. John was building a house.

The activity denoted by (18a) can be taken as consisting of waltzing subevents, which correspond to permutations of taking three-step activities[10]. In the case of (18b), the interval of every subevent should be long enough to cover the activity of taking at least two steps. Similarly, subevents of the event of drinking beer should be long enough to cover some subevents of drinking a glass of beer. As discussed above, however, subevents of the event denoted by a creation predicate, such as 'build a house', are very different from those of events of activity predicates in a sense that subevents of the whole event of a creation predicate are all different from each other, and the whole event can be taken as an aggregate of such subevents.

In order to do justice to our intuition about subevents, the current study adopts from Kang and Lee (in preparation) the concept of subevent as follows:

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10) For more discussion on the subevents of the event of waltzing, see Dowty (1978, pp. 171).

(19) Subevent ($\leqslant$)[11]

$e' \leqslant e =_{def} e=Ex([P,S,T]) \wedge e' =Ex([P',S',T']) \wedge S' \sqsubseteq S \wedge T' \sqsubseteq T$
$\wedge P'(S') \gg P(S)$

Landman (1991) employs the above subevent relation for a "part-of" relation, which he sees it as primitive. In this study, it is further defined in terms of temporal inclusion, quasi causation and substance part-whole relationship by borrowing Kim (1991, pp. 643)'s idea about how to name an event. So the above definition means that if event e' is a subevent of event e ($e' \leqslant e$), the following conditions should be met: first, the participant(s) of e', S' is part of S, the participant(s) of e. Second, the interval of e', T' is contained within T, the interval of e. Third, event e', $P'(S')$ is a quasi causer of event e, $P(S)$.

Following Kang and Lee (in preparation), this paper also employs the notion of atomic subevent and builds up the semantics of the progressive not only for that of achievement progressives but also for other aspect types.

(20) Atomic Subevent ($\lesssim$)

$e' \lesssim e =_{def} e' \leqslant e \wedge \forall e''[e'' \leqslant e' \wedge e'' \leqslant e \rightarrow e' =e'']$

The relation of atomic subevent defined in (20) means that among the subevents of an event, atomic subevents are ones that do not have their own subevents. Such an atomic subevent notion is required to build up the semantics of the progressive in an adequate way.

4. Semantics of Achievement Progressives

4.1. Backward Temporal Extension of Achievements

As discussed above, the meaning of the progressive has to make reference to

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11) Kim (1991, pp. 643) named an event "Ex([P, S, T])", which means the exemplification of predicate P by substance S at time T. "$\gg$" stands for a quasi-causal relation between two events. This relation is not a pure causal relation, but a quasi one because in the case of $e' \gg e$, e' does not directly cause e, but in the aid of an enough number of relevant events, it can be viewed to cause the event e. It is worth to notice that this relation roughly corresponds to the Humean causal relation in that it requires temporal precedence, spatial contiguity and constant connectivity between the quasi causer and the causee.

subevents, and their intervals as well as the reference time in terms of Partee (1984). So the progressive denotes an subinterval of the reference time within which subevents are happening. Doing justice to such an intuition, Herweg (1991, pp. 991) puts forth the following definition of the progressive operator:

(21) a. 〚 Prog 〛: $\lambda F \lambda t \exists e[F(e) \wedge PROG(e, t)]$
　　b. $PROG(e, t) \Leftrightarrow \forall e,t[PROG(e, t) \rightarrow t \sqsubseteq \tau(e)]$[12]

Herweg's definition of the progressive operator is not enough to deal with achievement progressives in the following respects: first the argument of the progressive operator "Prog" has yet to constrained further. It is generally attested that achievement predicates do not occur in the progressive as we observed with the examples of (6). For the sake of convenience, they are repeated as (22) below.

(22) a. #Mary is spotting her friend at the party.
　　b. #Bill is noticing that Mary has dyed her hair.

The infelicitous use of achievement predicates in (22) can be explained in the following way: achievement predicates denote near instantaneous events. This, in turn, means that they are all atomic events which contain no meaningful subevents, and hence are not durative enough to serve as an argument of the progressive operator, "Prog." Specifically, the achievement of spotting something as in (22a) is a single stage of event obtained so instantaneously that hardly can we establish some preliminary or preparatory stage prior to the achievement as we can in the case of plane landing described by (7e). Similarly, in the case of (22b), it is also very hard to imagine some preliminary stage for the achievement of noticing the fact. That is why they cannot be used in the progressive as in (26)[13].

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12) The functor 'τ' can be defined as in Herweg (1991, pp. 988): $\tau: E \cup T \Rightarrow T$, where $\tau(t)= t$ for all t $\in T$. This functor plays a magic to merge events and time intervals into a set of intervals.

13) A similar account is found in Rothstein (2004, pp. 52). She explains the reason why they do sound pragmatically infelicitous in the following way: "But since these events are non-agentive events which "happen" to the subject participant unexpectedly, they do not have preparatory events which can be recognized as stages of an event culminating in a recognition. And since we do not expect such event stages to exist at all, asserting (or denying) that a particular event is an event stage of this kind is infelicitous."

From such a data observation, we can tell that the progressive operator takes as its argument predicates only if they are complex or consist of multiple subevents. In order to meet this requirement, this paper, following Kang and Lee (in preparation), modifies Herweg's definition of the progressive operator as follows:

(23) a. $⟦\text{Prog}⟧:\ \lambda F \lambda t \exists e[F(e)\ \wedge\ \text{PROG}(e,\ t)]/\ \forall F[\text{Complex}(F)]$
　　 b. $\text{PROG}(e,\ t)\ \Leftrightarrow\ \forall e,\ t[\text{PROG}(e,\ t)\ \rightarrow\ \exists t',\ t'',\ e',\ e''[e' \lesssim e \wedge e'' \lesssim e \wedge$
　　　　　　 $e' \nleqq e'' \wedge t' = \tau(e') \wedge t'' = \tau(e'') \wedge t', t'' \sqsubset t \wedge \neg(t \propto \text{Fin}(\tau(e)))]$

The notation '/' in (23a) is borrowed from Krifka(1989) to restrict the domain of F's to that of complex predicates which contain multiple atomic subevents. Otherwise, the progressive operator is undefined. In addition, it is also worth to notice that the semantic domain consists of normal objects, events, and time intervals. This is, within the theory of time and event proposed by this study, the truth conditions of the progressive make direct reference to those entities. That is, (23b) requires that a progressive sentence is true iff if event e is going on during the time period of t, there must be at least two atomic subevents of the event e and the reference time interval t does not overlap ($\propto$) the final time point of the interval of e, "Fin($\tau(e)$)". This means that the atomic subevents are situated somewhere in the middle of the reference time interval.[14] The definition given in (23) does justice to our intuition about progressives.

Now that the progressive operator is defined, let us to explain how achievement predicates can be licensed to occur in the progressive as in (7), which is repeated below as (24).

(24) a. The patient was dying when the operation was performed that save his life. (Dowty, 1979, pp. 137)
　　 b. The librarian is finding the book. (Dowty, 1979, pp. 61)
　　 c. John was falling asleep when Mary shook him. (Dowty, 1979, pp. 137)

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14) Smith (1991, pp. 83) visualized such containment within the interval as follows:
　　 a. We were walking to school. b. Composit temporal schema: **I** . .///. . **F**$_{\text{Nat}}$.
　　 Moreover, she explained the final endpoint within the composite temporal schema as follows:
　　 "More precisely, situation conveys the nature of the final endpoint, although the final endpoint is not visible in the sentence and may never occur. This is presented in the composit temporal schema (b), which contains information about viewpoint and situation type."

      d. Fred and Susan are finally leaving. (Rothstein, 2004, pp. 36)

      e. The plane was landing when it exploded in midair(so it didn't land). (Rothstein 2004, pp. 39)

      f. Jane is just reaching the summit when there was an avalanche(so she didn't reach it). (Rothstein 2004, pp. 39)

As shown in the definition of the progressive operator, it takes as its argument only complex predicates, which are upshots of atomic subevents. Given achievement predicates denote telic but near instantaneous events, it is self-explanatory that they are incompatible with the progressive. Then how can their occurrences in the progressive as in (24) be accounted for? For the account of the compatibility, following Zucchi (1998), this study adapts the idea of Kang and Lee (in preparation) that achievement predicates go through a special aspect shift that makes them "disguised" accomplishment ones in the following way:

(25) BTE (Backward Temporal Extension)

    a. BTE: $\lambda P, e[BTE(P)(e)]/\forall P[Achievement(P)]$

    b. $BTE(P) \Leftrightarrow \forall e, t[P(e)(t) \rightarrow \exists e',t'[e' \leqslant e \land t' = \tau(e') \land t' \infty t \land \neg \exists t''[t'' \sqsubset t' \land t < t'']$

BTE plays a role of augmenting the event structure of an achievement predicate to one very similar to that of an accomplishment. That is, near instantaneous events denoted by achievement predicates are fanned out or enlarged into some preceding subevent(s) by the aspect shift, BTE. The application of BTE to an achievement predicate results in the shift from a simplex predicate to a complex predicate, which is suitable for an argument of the progressive operator. For example, (24a) denotes some atomic subevents in progress (e.g., drastic decrease in bleed pressure), which can fall under the event of dying. Such an aspect shift seems to be constrained by our ontological knowledge of the achievement in question. It is required that there should be some room for an achievement to be enlarged to include some of its preceding subevents. If any, these subevents should be temporally contiguous and necessary for the upshots or attainments of the achievements in question. Otherwise, the backward extension of the interval is blocked and BTE cannot be applicable to the achievement predicate. Some of achievements cannot be augmented this way and result in their incompatibility with the progressive as examples like those of (22).

4.2. Comparison of Achievement and Futurate Progressives

The use of the progressive that we have discussed so far is the imperfective use describing an action in progress. Actually there is another use of the progressive, so-called "futurate progressive." The following are representatives of futurate progressives.

(26)[15] a. John is leaving town tomorrow.
　　　b. They are getting married next month.
　　　c. The Chelsea-Arsenal match is being played next Saturday.
　　　d. We are having fish for dinner.
　　　e. I'm inviting several people to a party.
　　　f. When are we going back to France?

Such futurate progressives are mainly to describe predetemined situations on the basis of past events (e.g., Goodman, 1973) or future event anticipated by virtue of a plan (e.g., Leech, 1987). In the case of (26a), it asserts an anticipation on the basis of relevant past situation that there will be a state in which John is not in the town or moved somewhere else tomorrow. Similarly, (26b) describes a state where they get married next month. In contrast, the following tenseless or future tense sentences describe futurity in different ways.

(27) a. John will leave town tomorrow.
　　　b. John leaves town tomorrow.

It is well attested by scholars including Dowty (1979) and Leech (1987) that (27a) expresses a future prediction based on a particular condition[16], whereas (27b) a certainty about a future situation. In contrast, (26a), a futurate progressive, implies planning but not certainty.

Let us think about what intervals futurate progressives denote. As insisted by Goodman (1973) and Leech (1987), the current study takes the view that futurate

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15) These examples are cited from Leech (1987, pp. 145).
16) Leech (1987, pp. 196-197) shows how particular conditions are expressed with following sentences: a. You will feel better **after a good night's sleep**. b. **If litmus paper is dipped in acid**, it will turn red. c. A lion will attack a human **only when hungry**. (our emphases)

progressives denote subintervals of intervals at which their upshots are resulted from an aggregate of past relevant events. Dowty (1979, pp. 158) takes the logical form [PROG(tomorrow(ϕ)] for a futurate progressive, and further specifies the semantics of [tomorrow (ϕ)] as follows:

(28) [tomorrow(ϕ)] is true at I iff (1) (ϕ) is true (in all histories containing I) at some interval I' such that I' is included within the day following the day that includes I, and (2) the truth of (ϕ) at I' is planned or predetermined by facts or events true at some time $t \leq I$.

Dowty (1979, pp. 158) presents the above truth condition schematically as follows:

(29)
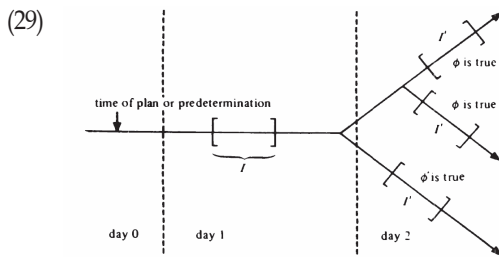
Furthermore, he depicts what the futurate progressive describes as follows:

(30)
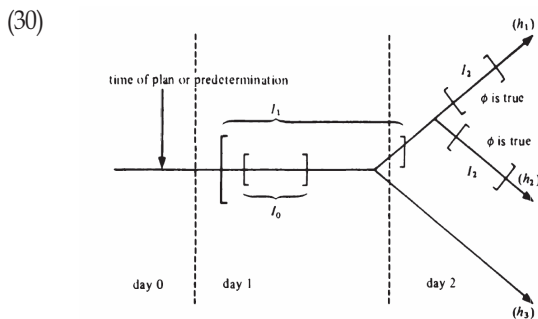
According to the above schema, if a sentence (ϕ) is a futurate progressive and it is true an interval I_0, there should be an interval I_1 such that I_1 includes I_0, and furthermore it may be possible to extend I_1 to I_2 at which the sentence (ϕ) is true.

Notice that the current study takes the progressive operator as a functor of which argument is a predicate denoting a type of event. In other words, it takes an eventive predicate and yields a time interval during which a particular event of the type is going on. For the semantics of the futurate progressive, this study suggests the following logical form different from Dowty (1979).

(31) a. If sentence (ϕ) corresponds to the logical form of P(e), its futurate progressive at an interval t has the following logical form: PL (Prog(P(e)(t))

b. PL (Prog(P(e)) : $\exists$e[P(e) $\wedge$ Future(PROG(e, t))]

c. Future(PROG(e, t)): $\exists$t′, e′[e′$\in$Pre-act (e)$\wedge$ t′= τ (e′) $\wedge$ t′< N

$\wedge$ t′$\sqsubset$t$\wedge$ $\neg$(t$\propto$Fin(τ (e)) $\wedge$ N< Fin(τ (e)))]

"PL" plays the role of "tomorrow" of (28) that places speaking time(N) prior to the time point for the end of the event. "Pre-act" denotes a set of events e′ such that they are precusors including the one of declaring the pursuance of event e. "Future" is a functor to take an interval denoting expression to return another interval denoting one such that the interval in question is placed after speaking time, N(i.e, now). All in all, operator "PL" enriches the meaning of a regular progressive defined in (23) with the information that the event in question will be achieved after speaking time and furthermore, that there has to be precusor events such as declaring the future pursuance of the event in question. If the temporal schema of the futurate progressive of (26a) is given as in Smith (1991), the schema will look as follows:

(32) a. John is leaving town tomorrow.

b. Composit Temporal Schema: *De′,.. τ (e″)•N, .. Ie*

(In the above schema, τ (e″)•N means that the interval of event e″ and speaking time N may overlap and *De′* and *Ie* stand for the interval for precursor events for leaving town and the initial time point of event e, leaving town in progress, respectively.)

In sum, the formalism given in (31) does justice to the reading of an futurate progressive proposed by Goodman (1973) and Leech (1987). That is, it captures anticipation of a future event on the basis of past events (e.g., Goodman, 1973) or by virtue of a plan (e.g., Leech, 1987) due to the requirements of the existence of Pre-acts and that of at least one atomic subevent prior to the event in question.

So much for futurate progressives; notice that achievement progressives are similar to futurate progressives in a sense that they both deliver anticipation of future events on the basis of their prior events. Let us be more specific about the prior events. The requirements of the existence of prior events for achievement progressives and of that for futurate progressives are quite different in the following two ways: first, the prior events for an achievement progressive are, as discussed above, all temporally contiguous and necessary for the achievement of the transition or change of state denoted by the base achievement predicate; those for a futurate progressive do not only have to be temporally adjacent with each other but also be necessary or constitutive to the event in question. Second, among the prior events, the achievement progressive requires Pre-acts such as declaring the pursuance of the event under consideration, whereas such a requirement has nothing to do with the achievement progressive. Despite these differences, they are alike in that they deliver a common connotation that something will happen in the near future. This connotation of futurity is gained by consideration of events prior to the event at issue.

5. Conclusion

The incompatibility of the progressive with achievement predicates are accounted for by showing that achievement predicates themselves denote an single stage event. In other words, they are not suitable for the progressive that requires durative predicates as its argument. This paper proposes a kind of aspect shift to transform a simplex achievement predicate into complex one, backwardly extending a near instantaneous event denoted by an achievement predicate to a complex event that would contain multiple atomic subevents. If such an aspect shift is applicable to an achievement predicate, it can occur in the progressive. Cognitively and pragmatically there being no room for such an aspect shift as with achievement predicates like 'spot' and 'notice', they are incompatible with the progressive.

In order to put forth a formalism to represent the meaning of achievement progressives, a theory of mereological event is proposed with a slight modification of that of Landman (1991). For the modification, the current study redefines Landman's primitive part-whole relation in terms of the relation of temporal inclusion and that of quasi causation between events.

Furthermore, the current study shows that achievement progressives inherently deliver anticipation of future events as if futurate progressives do. In spite of this commonality, they are different mainly due to the ways in which their prior subevents are arrayed and the fact that characteristics of prior subevents are quite different: prior subevents for the achievement progressive are all contiguous and constitutive to the event in question; those for the futurate progressive do not have to be either contiguous or constitutive, but a Pre-act such as declaring the plan or intention to achieve the culmination of the event under consideration.

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