

ON THE SEMANTICS OF THE PERFECTIVE ASPECT*

The study of the temporal structure of events in natural language is of prime importance in linguistics. Though there has been recent progress on formal theories of events, these theories do not address certain syntactic and semantic properties peculiar to languages such as Hindi. This paper concentrates on properties related to perfectivity. It motivates a small number of semantic features for events and their objects, such as whether an object exists independently of an event, whether it is totally affected by the event, and so on. It then formalizes these features. It also shows how they can be formalized in an algebraic framework and applied in a categorial grammar to derive the properties of verbal and nominal predicates. The result is an integration of descriptive semantics with algebraic theories of objects and events.

1. INTRODUCTION

This paper studies the perfective aspect in Hindi. Interestingly in Hindi, the perfective aspect has additional semantic interpretations, which do not show up in languages such as English. I propose three additional semantic features that can account for the variations of the perfective in Hindi. I also show how these features may be embedded in an algebraic-categorial framework.

Tense and aspect are grammatical means that languages use to describe events. They are, therefore, crucial for our purposes. Tense concerns the temporal location of an event. Aspect refers to the way an event is viewed internally (Comrie 1976). Whereas tense helps locate one event with respect to another event. Sometimes, aspect is referred to as *situation internal time*, as in Smith (1992). Aspect can be classified broadly as the imperfective or the perfective. All languages that grammaticalize aspect distinguish between at least these two classes. The imperfective can be further classified as progressive (non-progressive), imperfective, and habitual. However, languages may or may not grammaticalize all available conceptual categories (Comrie 1981). The progressive aspect refers to an ongoing event as in (1) below.

- (1) John is walking in the park.

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This is true of periods during which the action of John's walking is taking place, and without any reference to the time when it started or the time it will end. Perfective aspect, on the other hand, presents an event as a whole, as in (2) below.

- (2) John walked in the park.

According to recent theories, the perfective aspect represents a single event as an unanalyzed whole, including its starting point and its end point (e.g., Comrie 1976; Smith 1992; Kamp and Reyle 1993). However, this need not be the case for the category called 'perfective' in many languages.

Consider (3) in Hindi and (4) in Japanese, each of which is traditionally analyzed as perfective. These sentences are normal in Hindi and Japanese, although what seems to be their direct translation to English is contradictory. As I explain below, the natural readings of these and similar sentences are difficult to account for on the basis of most extant theories of aspect. I call this phenomenon the *perfective paradox*.

- (3) māẽ ne aaj apnaa kek khaayaa aur baakii
 I ERG today mine cake eat-PERF and remaining
 kal khaaũgaa
 tomorrow eat-FUT
 'I ate my cake today and I will eat the remaining part tomorrow.'
- (4) watashi-wa keeki-o tabeta dakedo keeki-wa
 I-NOM cake ACC ate-PERF but cake-NOM
 mada nokotteiru
 still remains
 'I ate the cake but some of it still remains.'

The perfective aspect is considered quite uncontroversial. A sentence in the perfective is taken to describe an event which has reached an end. The interaction with Vendler's (1967) classification of situation types is straightforward. For example, the *two-component* theory proposed by Smith (1992) can accommodate various interpretations of the perfective. Smith points out that in many languages the perfective can be used for at least the non-stative situation types, namely achievements, activities, and accomplishments. Sometimes it can be used with states as well, as is the case in English. For achievements, the perfective is more natural than the imperfective and signifies the corresponding change of state. For activities, the perfective describes their cessation at any arbitrary point – that is how activities end. For accomplishments, the perfective is taken to emphasize the natural ending of the situation.

Unfortunately, this picture, though compelling, is not quite correct. Specifically, in several languages, notably Hindi, Chinese, and Japanese, the perfective form may be used with verbs that usually denote an accomplishment to mean that the described situation has reached an endpoint, but *not* necessarily the natural one that would signify the accomplishment. This has been argued in Singh (1990), Singh (1991), Smith (1992), and Ikegami (1981). I call this viewpoint the *neutral perfective* because, like the standard perfective, it presents an event as a whole. However, in contrast with the standard perfective, it does not require that the event be completed.

Intuitively, however, the data motivating the neutral perfective is hardly surprising. Accomplishments have features of both activities and achievements: they call for extended action and also have a natural endpoint. Clearly, the action done as part of an accomplishment may either be performed all the way or stopped at any point. In a language such as English, the use of a simple verb (SV) by default indicates that the natural endpoint is reached, but an additional description is required to state that the action was stopped at an arbitrary point. Such additional descriptions may, for example, be in the form of determiners (e.g., *some of the cake*). By contrast, some other languages have distinct forms to emphasize the natural and arbitrary endpoints, respectively. In Hindi, the perfective of simple verbs is used for arbitrary endpoints, and the so-called compound verbs (CV) for natural endpoints (this was first observed in Singh 1990). For example, the ungrammaticality of the second clause in (5), which contains the compound verb *khaa liyaa*, indicates that the natural endpoint of the event has been reached. In Japanese, the verb constellation includes the verb for ‘to finish’ to imply completion, as in (6). Here I discuss the neutral perfective with reference to Hindi, where the perfective is intimately connected with the phenomenon of compound verbs.

- (5) *māẽ ne kek khaa liyaa, jo bacaa hae wo
 I ERG cake eat take-PERF what remain is that
 raam khaayegaa
 Ram eat-FUT
 ‘I ate the cake and Ram will eat the rest.’
- (6) *watashi-wa keeki-o tabeteshimatta dakedo keeki-wa
 I-NOM cake-ACC ate-finish-PERF but cake-NOM
 mada nokotteiru
 still remains
 ‘I ate the cake but some of it still remains.’

A possible analysis, building on Smith (1992), goes as follows. The compound verb constellations can be used only to refer to the natural endpoints of event types. This entails completion for accomplishments and change of state for achievements. For arbitrary endpoints, only the simple verb can be used; therefore activities never occur with a compound verb constellation. The analysis works quite well (the details are in Singh 1990). However, there is one shortcoming. Such a framework does not allow us to distinguish between (7) and (8) below, since both of them are accomplishments. There is a clear meaning distinction in (7) between the simple verb form and the compound verb form. The perfective compound verb in (7) implies that both the cakes were eaten entirely; the simple verb form has no such implication. In (8), however, there is no distinction – neither presuppositional nor implicational – between the simple and compound verb forms: both imply that the entire mass of one and a half cakes was eaten.

- (7) laRke ne do kek khaaye/ khaa liye
 boy ERG two cake eat-PERF/ eat take-PERF
 ‘The boy ate two cakes (partly)/entirely.’
- (8) laRke ne deRh kek khaayaa/ khaa
 boy ERG one and a half cake eat-PERF/eat
 liyaa
 take-PERF
 ‘The boy ate one and a half cakes entirely.’

The approach of this paper takes care of the above data as well. It motivates three semantic features of nominal and verbal predicates, casts them in an algebraic framework, and uses them to distinguish among the perfectivity phenomena described above. Any analysis of the perfective aspect must also take care of data such as the above. In section 2, I discuss nominal and verbal predicates. In section 3, I discuss the three semantic properties necessary for the classification of verbal predicates. In section 4, I present a classification of verbal predicates and present data from different classes. In section 5, I discuss the relationship between perfectivity and negation and the difference between the neutral perfective and the progressive aspects. A summary of results is presented in section 6.

2. NOMINAL AND VERBAL PREDICATES

Vendler's original classification of situation types was applied to individual verbs. However, several more recent works have proposed that the entire verbal predicate, including in particular the object, be considered the unit of classification. These works include those by Verkuyl (1972), Carlson (1981), Krifka (1989, 1991), Hinrichs (1986), and Parsons (1990). This idea is related to, and is a generalization of, the traditional 'cumulative nominal' versus 'quantized nominal' dichotomy of Quine (1960).

Formally, this interplay between the nominal and verbal predicate operators can be captured in a number of ways. We follow the lattice theoretic approach to provide an explanation for these phenomena since it easily allows a change in the reference type of the nominal predicate to affect the temporal constitution of the entire construction. In this section, I apply the theory proposed by Krifka (1989, 1992), which I use as a basis for formalizing the features I introduce in the following sections. In this theory, events and objects are treated as elements in two different lattice structures. Many interesting properties of thematic relations between events and object then correlate with mathematical properties of sets of elements of the two different lattice structures. The lattice-theoretic analysis of events assumes *events* and *objects* to be two non-overlapping sorts of entities characterized by predicates E and O , respectively. The extensions of O and E have the structure of a join semilattice without a bottom element. Let \sqcup be the operation of join, \sqsubseteq be the corresponding relation of part, and \sqsubset be the relation of proper part.

In simple words, these operations can be illustrated as follows:

- $x \sqcup y$: the sum of x and y
- $x \sqsubseteq y$: x is a part of y (defined as $x \sqcup y = y$)
- $x \sqsubset y$: $x \sqsubseteq y$ and $x \neq y$

These operations are discussed in greater detail in section 4.2.2.

2.1. *Nominal Predicates*

It is important to distinguish between mass nouns and count nouns, on the one hand, and cumulative and quantized predicates, on the other. Count nouns are nouns like *apple* and *cake*, whose referents come in natural units and hence can be counted. Mass nouns are nouns like *water* and *wine*; their referents do not come in natural units. Since count nouns have the inherent property of countability, they can be combined with numbers, (e.g., *five apples*). Mass nouns lack the property of countability and thus cannot be combined with numbers (**five water*).

There are two interesting properties of predicates: cumulativity and quantization. Cumulative predicates may be formed out of mass nouns or count nouns. The semantics of cumulative and quantized reference is given in terms of the semantic operation \sqcup for joining two individuals to form a new individual. For example, both ‘beer’ and ‘apples’ are cumulative predicates since a quantity of beer combined with another quantity of beer is still beer, and adding more apples to apples yields apples again. On the other hand, ‘a glass of beer’ and ‘five apples’ are not cumulative, but quantized. Suppose there are two entities to which the predicate ‘a glass of beer’ applies. This predicate then cannot apply to their collection. And no proper part of ‘a glass of beer’ is ‘a glass of beer’, and no proper part of ‘five apples’ is ‘five apples’.

The above properties not only apply to nominal predicates, but also to verbal predicates. Cumulativity applies to atelic verbal predicates and quantization of telic predicates. For example, the join of two events of ‘walking in the park’ is also an event of ‘walking in the park’. However, no proper part of an event of ‘walking a mile’ is an event of ‘walking a mile’. The above properties as formalized by Krifka (1991) are given below.

1. *Cumulativity* is the property of atelic event types.
 $\forall P[\text{CUM}(P) \leftrightarrow \forall x, y[P(x) \wedge P(y) \rightarrow P(x \sqcup y)]]$
2. *Quantization* is the property of telic event types.
 $\forall P[\text{QUA}(P) \leftrightarrow \forall x, y[P(x) \wedge P(y) \rightarrow y \sqsupseteq x]]$

2.2. Verbal Predicates

For the reasons discussed above, it is clear that no sound account of telicity can apply to verbs by themselves. Verbal predicates must be considered to capture the right generalizations. I assume this in the rest of this paper. To a large extent, by a verbal predicate I will mean a verb associated with its patient NP. However, for certain cases the other argument positions are relevant as well. Also, for ease of locution, I will sometimes be sloppy and identify a verbal predicate with the sentence it occurs in.

A change in the reference type of nominals can affect the temporal constitution of the entire construction. In German, progressivity may be marked by a prepositional object construction – something like a partitive case marking on the patient (see Krifka 1992). Several researchers have shown that the reference type of the nominal predicate may affect the temporal constitution of the entire construction (Carlson 1981; Link 1987; Krifka 1989; Verkuyl 1993). For example, in German a ‘partitive-patient’ relation yields a progressive reading, as in (9):

- (9) an einem Fisch essen
 at a fish eat
 'be eating a fish'

On the other hand, there are also cases (as in Slavic languages) where a verbal predicate operator affects the meaning of the nominal predicate. For instance, perfectivity in Czech is compatible only with a quantized object. In (10) below the perfective is acceptable only with the quantized (definite) reading of the patient, though nouns like *vino* have both a definite and an indefinite reading.

- (10) Ota vypil vino
 Ota drank-PERF wine
 'Ota drank *wine/the wine.'

In Hindi, a 'partitive-patient' relation yields a neutral perfective reading. Like Slavic languages, Hindi does not have any articles to mark definite or indefinite NPs. This gives rise to two kinds of ambiguity. For one, bare NPs may be interpreted as indefinite or definite. For example, *vaain* can mean 'wine' or 'the wine'. Secondly, count nouns have two further kinds of ambiguity. For example, *seb* 'apple' can mean not only 'an apple', 'the apple', but also 'some mass of apple' or 'any part of an apple'. This ambiguity is one of the causes of the perfective paradox. Let us look again at (3) above, where the object *kek* is a definite. The fact that it is grammatical is a result of the interpretation of 'cake' as 'a part of the cake'. I do not go into the details or the definiteness effect of compound verbs here. Some good work on definiteness in Hindi can be found in Porterfield and Srivastav (1988) and in Mohanan and Mohanan (1994).

3. SEMANTIC FEATURES OF VERBAL PREDICATES

I now turn to a description and motivation of the semantic classification of verbal predicates. There has been a lot of work on complex predicates in Hindi. Butt (1993) provides a detailed examination of complex predicates in Hindi-Urdu. However, there has not been much work on classifying verbal predicates as such. This is true in the field as a whole and not just for Hindi.

Before I get into the details of my proposal, I should highlight the fact that the classification presented here is a *semantic* classification, which is well motivated on theoretical principles. There is a large number of different ways of classifying verbs in the literature. Frequently, these are syntactic, or have syntactic as well as semantic components. Usually, these classifications end up containing a large number of categories and subcategories.

This makes them difficult to use. When the categories are so numerous, they cannot assist in our finding and representing the right kinds of generalizations. Classifications are useful if they help sort out our data. They are potentially harmful if they drown us in detail and obscure the general picture.

A possible reason for the large-scale multiplication of categories in traditional classifications is that they accommodate syntactic variations. A vast set of syntactic variations can arise among verbs and verbal predicates that are semantically alike. But not every possible distinction is worth making a new class for. The categories I propose, by contrast, are such that each covers a large number of cases and can be formalized in an algebraic framework. My confidence in this classification arises from the purely empirical fact of the data it helps account for regarding the problems of perfectivity, definiteness, and specificity. The data pertaining the definiteness and specificity is presented in Singh (1994a) and Singh (1994b).

The proposed definitions are closely related to some intuitions about different properties that are relevant to linguistics. However, these are technical definitions. They do not, and do not need to, coincide with the associated informal concepts. What matters is that their truth or falsity in different cases can be judged relatively easily and that they can be used as part of a theory to more accurately predict the linguistic phenomena we are most interested in.

3.1. *Graduality*

Graduality is a basic and important property of verbal predicates. It has been proposed by various semanticists, and corresponds to the notion of ‘incremental theme’ discussed by Dowty (1991) and to Tenny’s (1987) notion of ‘measuring out’. Roughly, graduality seeks to capture the relationship between an event and parts of the object. Intuitively, graduality captures the composite property arising from the fact that event predicates have the three properties given below.

- *Uniqueness of object*: Each event applies to a unique object. A unique object could mean a unique aggregate object, such as a group of three apples or 1.5 liters of beer. The corresponding event in such a case could be any of ‘eat three apples’, ‘wash three apples’, ‘drink 1.5 liters of beer’, or ‘pour 1.5 liters of beer’. Note that some of these events can be repeated on the same object. For example, three given apples may be washed several times and the beer may be poured from one container to another many times. This property is called UNI-O.

$$\forall R[\text{UNI-O}(R) \leftrightarrow \forall e, x, x'[R(e, x) \wedge R(e, x') \rightarrow x = x']]$$

- *Mapping to objects*: Each event incrementally runs over its object. In other words, subevents of the given event apply to fragments of the given object. The same relationship holds between the corresponding subevents and subobjects as holds between the entire event and the entire object. Thus every part of the event of ‘eating an apple’ corresponds to the eating of a part of the apple. And, every part of ‘drinking a beer’ corresponds to drinking a part of the beer.

To clarify this further, consider the predicate ‘apprehend a thief’. This predicate lacks the given property, since the subevents of apprehending a thief do not incrementally involve the thief: the thief is apprehended all at once or not at all. This property is called MAP-O.

$$\forall R[\text{MAP-O}(R) \leftrightarrow \forall e, e', x[R(e, x) \wedge e' \sqsubseteq e \rightarrow \exists x'[x' \sqsubseteq x \wedge R(e', x')]]]$$

- *Mapping to events*: Each object is incrementally involved with the given event. In other words, if an object participates in an event, then parts of the object participate in subevents of the given event. This is exactly the converse of the previous property. This property is called MAP-E.

$$\forall R[\text{MAP-E}(R) \leftrightarrow \forall e, x, x'[R(e, x) \wedge x' \sqsubseteq x \rightarrow \exists e'[e' \sqsubseteq e \wedge R(e', x')]]]$$

The above definitions are designed to exclude certain composite forms of events. Consider the following.

(11) Bill baked a cake.

(12) Mary ground the coffee.

Sentence (11) describes an event that incrementally runs over its object, in the trivial sense: each subevent of baking a cake applies to the entire cake, which is a trivial subobject of itself. However, proper parts of the cake do not correspond to subevents of baking. In (12), though each part of the coffee is ground, not each part of grinding is the grinding of some part of the coffee, thus violating the property MAP-E.

Using these primitive notions we can now define another useful relation, namely, *graduality*.

- *Graduality*: Graduality of a thematic relation means that the object is subjected to the event in a gradual manner. For example, ‘writing a letter’ or ‘eating an apple’ affect their objects gradually. But ‘see a cat’ or ‘find a watch’ affect their objects in a nongradual manner.

$$\forall R[\text{GRAD}(R) \leftrightarrow \text{UNI-O}(R) \wedge \text{MAP-O}(R) \wedge \text{MAP-E}(R)]$$

3.2. Total Affectedness

Many verbal predicates involve affecting their objects. However, a feature that proves particularly important is whether they affect their patient totally. This feature distinguishes between total affectedness, on the one hand, and partial or zero affectedness, on the other.

The affectedness in question concerns changes to the intrinsic or physical structure of the given object. Thus the predicate in (13) has this feature, whereas the predicates in (14) and (15) do not.

(13) Amu ate a banana.

(14) Amu peeled a banana.

(15) Amu bought a banana.

There are clearly properties of the banana that change, and possibly significantly, when it is peeled. And it begins to participate in a different owner–owned relationship when it is bought or sold. But those change do not entail total affectedness in the relevant sense.

Thus, the intuition about total affectedness is that (a) all parts of the given object must participate, and (b) no object (or its part) can be involved more than once. Condition (b) really means that the participation is one of affectedness, since otherwise an object could participate multiple times in similar events. In this way, (14) violates condition (a). (15) violates condition (b) since a banana may be bought more than once. Only (13) meets both conditions. This property is called AFF-O. Formally, total affectedness is modeled as the conjunction of two properties, UNI-E and MAP-E.

- *Uniqueness of events* relates every object to a single event. For example, for a particular apple there can be only one event of eating it.

$$\forall R[\text{UNI-E}(R) \leftrightarrow \exists e, e', x[R(e, x) \wedge R(e', x) \rightarrow e = e']]$$

- *Affectedness of the patient*: The thematic relation R totally affects its object if and only if every part of the given object maps to a part of the event and the entire object participates in R for no more than one event. In other words, the given object is totally affected if it is affected (so that it cannot be involved in more than one event) and totally involved (so that every part of it is affected). Consequently, the patient in ‘eat an orange’ is AFF-O, whereas the patient in ‘peel an orange’ or ‘wash an orange’ is not, as not every part of the orange has to be washed or peeled. Also, ‘read a book’ is not AFF-O, as a book can be read more than once.

$$\forall R[\text{AFF-O}(R) \leftrightarrow \text{UNI-E}(R) \wedge \text{MAP-E}(R)]$$

3.3. *Independent Existence*

Most verbal predicates presuppose the existence of their objects. However, some cause their object to come into existence. The feature of independent existence proves particularly important to the proposed analyses. Sentence (16) mentions a cake that is brought into existence by the given event, whereas (17) talks about a cake that already existed.

(16) Avi baked a cake.

(17) Avi ate a cake.

This distinction is not purely one of the events being different in the world. The same physical event could be described in two ways, one of which suggests independent existence of its object whereas the other does not:

(18) Mala made ice.

(19) Mala froze some water.

The interaction of this feature with intensional concepts is particularly interesting. Sentence (20) involves a preexisting object, whereas (21) involves an object that is physically preexisting, but not intensionally so. On the relevant reading, the person Bill found was a person, but not Bill's friend, prior to the event.

(20) Bill found a key.

(21) Bill found a friend.

I model the feature of independent existence by postulating a relation of creation in the formal theory. An event satisfies independent existence of its object if it does not create the object. I call this property IEO.

- *Create*: A primitive relation, called CREATE, is postulated between events and objects. Thus, CREATE(e, x) holds if and only if e is an event, x is an object, and x is created in e .
- *Independent existence*: A thematic relation has the property of imposing independent existence on a participant if and only if any object that participates in an event through that thematic relation exists independently of the event.

$$\forall R[\text{IEO}(R) \leftrightarrow \exists e, x[R(e, x) \rightarrow \neg \text{CREATE}(e, x)]]$$

Interestingly, we were unable to find any predicates that lacked the properties of independent existence and graduality. That is, predicates that

create objects happen slowly, not instantaneously. Such predicates must also be totally affected. Intuitively it seems that patients that are not totally affected by an event cannot be created by it.

4. CLASSIFICATION OF VERBAL PREDICATES

In this section, properties of thematic relations are being used to classify verbal predicates. For each class, I indicate whether a partitive–completive distinction (as discussed by example in section 2) corresponds to the use of SVs and CVs, respectively. Thus a predicate where the SV has a reading that does not imply that the entire object is being referred to is called partitive. I present the results of considering several verbal predicates in Hindi in both their SV and CV forms. Some of these are reported in Tables 1 to 4. The summary of all four classes is presented in Table 5.

4.1. *Class of Instantaneous Predicates*

The first category consists of predicates, such as ‘win a race’ and ‘break a cup’, that lack the property of graduality. Consider (22)–(25) below. Both the SV form and the CV form indicate completion of the event in question.

- (22) us ne res jiiiti
 he ERG race win-PERF
 ‘He won a race.’
- (23) us ne res jiiit lii
 he ERG race win take-PERF
 ‘He won the race.’
- (24) us ne aaj galtii se pyaalaa toRaa
 he ERG today mistake by cup break-PERF
 (* puuraa nahīi toRaa)
 (but not all of it)
 ‘He broke a cup today by mistake.’
- (25) us ne aaj galtii se pyaalaa toR diyaa
 he ERG today mistake by cup break give-PERF
 ‘He broke the cup today by mistake.’

- (26) us ne aaj galtii se taalaa toRaa
 he ERG today mistake by lock break-PERF
 (par puuraa nahiĩ toRaa)
 (but not all of it)
 ‘He broke a lock today by mistake.’
- (27) us ne aaj galtii se taalaa toR diyaa
 he ERG today mistake by lock break give-PERF
 ‘He broke the lock today (entirely) by mistake.’

For the class of instantaneous predicates, neither the affectedness of the patient nor its independent existence seem to matter for the partitive reading of SVs. Both SVs and CVs in the perfective aspect indicate that the described action was completed. CVs do add a variety of other subtle meanings, e.g., intentions of the actor, positive or negative attitude, and so on, but I do not go into those here. Also, while the patient of the predicate ‘win a race’ is not concrete, the patient of ‘break a cup’ is. In both these cases, however, the SV itself indicates that the action was completed.

Table 1. Perfectivity and completion for instantaneous predicates

Verb	Patient
<i>puuchnaa</i> ‘ASK’	question
<i>toRnaa</i> ‘BREAK’	cup
<i>laanaa</i> ‘BRING’	book
<i>khariidnaa</i> ‘BUY’	house
<i>band karnaa</i> ‘CLOSE’	door
<i>DhūūDhnaa</i> ‘FIND’	key
<i>Taangnaa</i> ‘HANG’	picture
<i>khonaa</i> ‘LOSE’	key
<i>kholnaa</i> ‘OPEN’	door
<i>uThaanaa</i> ‘PICK UP’	book
<i>pæhcaanna</i> ‘RECOGNIZE’	boy
<i>bhejnaa</i> ‘SEND’	note
<i>phæknaa</i> ‘THROW’	ball
<i>jiitnaa</i> ‘WIN’	race

To exemplify the basic distinction between gradual and non-gradual verbal predicates and their effect on the partitive reading, consider the predicates ‘break a cup’ and ‘break a lock’. The action of breaking a cup does not involve any distinct actions that lead to the breaking of the cup. However, in the case of breaking a lock, distinct actions are required, which

make it gradual in nature. Therefore, the predicate ‘break a lock’ is gradual and has the partitive reading in the SV form of the perfective.

The above examples indicate that predicates that lack graduality do not have any aspectual distinction corresponding to the part – complete relation of gradual patients. Intuitively, it seems quite natural that this class does not have a partitive reading, since the inherent meaning of the predicate refers to the instant that a particular action was completed. For example, consider the case of ‘win a race’. This predicate applies only to the instant when the race is won. It does not hold true of times that precede the winning moment. Therefore, the neutral perfective aspect and verbal predicates belonging to this class are incompatible by their very nature.

The formal analysis for this class is analogous to that of gradually creating predicates. We discuss the formalization in section 4.3.

4.2. *Class of Gradually Modifying Predicates*

Consider the following sentences, where both predicates have the property of graduality.

- (28) us ne ciTThii paRhii par puurii nahii
 he ERG letter read-PERF but complete NEG
 kii
 do-PERF

‘He read a letter but did not complete it.’

- (29) *miiraa ne bahut acchii caay banaaii par
 Mira ERG very good tea make-PERF but
 puurii nahii banaaii
 completely NEG make-PERF

‘Mira made very good tea but did not make it completely.’

Whereas the sentence with the verbal predicate ‘read a letter’ can be followed by a clause that negates it, this is not possible for predicates like ‘make tea’. To account for these cases, I propose to further classify the class of gradual event predicates based on the notion of *total affectedness*. Total affectedness refers to the change a patient undergoes as a result of an action.

So, for example, whereas eating an apple affects the apple in its physical structure, the acts of removing a shirt or reading a letter do not change their patients in any way.

The second major class of predicates has the properties of graduality, total affectedness of the patient, and its independent existence. Predicates belonging to this class have a partitive reading in the neutral perfective

Table 2. Perfectivity and completion for gradually modifying predicates

Verb	Patient
<i>jalaanaa</i> 'BURN'	stick
<i>rangnaa</i> 'DYE'	cardigan
<i>khaanaa</i> 'EAT'	apple
<i>miTaanaa</i> 'ERASE'	sketch
<i>piinjnaa</i> 'FLUFF'	pillow
<i>pighaalnaa</i> 'MELT'	ice
<i>kaaTnaa</i> 'REAP'	crop
<i>piinaa</i> 'SMOKE'	cigarette
<i>nicoRnaa</i> 'SQUEEZE'	lemon

aspect. This is because these predicates have a distinct patient, which already exists and must be affected totally. However, since these predicates are gradual, it is possible that the action not go all the way and cease at some arbitrary point. This yields the partitive reading when an SV is used.

4.2.1. *Mass Nouns*

So far we have only discussed predicates with count noun objects. Consider the following examples, which have objects headed by a mass noun.

- (30) us ne biiyar pii
 he ERG beer drink-PERF
 'He drank beer.' (cumulative reading)
- (31) us ne biiyar pii lii
 he ERG beer drink take-PERF
 'He drank the beer.' (some salient amount)
- (32) us ne do gilaas biiyar pii
 he ERG two glasses beer drink-PERF
 'He drank two glasses of beer.' (completive reading)
- (33) us ne do gilaas biiyar pii lii
 he ERG two glasses beer drink take-PERF
 'He drank the two glasses of beer.' (completive reading)

These examples show that Hindi treats explicitly quantized mass nominals in a special way. The quantization of count nouns is not a crucial factor in the partitive – completive distinction – both explicitly quantized and non-quantized count nouns interact similarly with CVs. But if the mass noun is not quantized and a SV is used, it implies that the object in question is

some unspecified amount, as in (30). The use of a CV with a nonquantized mass noun implies that the object is some amount of beer specified in the discourse. (31) shows that, even when the patient is not explicitly quantized, the CV form transfers the property of quantization to the nominal. Therefore, the interpretation of (31) is that of the subject having drunk some salient quantity of beer.

In the case of quantized mass nouns there is no distinction between the SV and CV forms – both would imply a completive reading. However, there is a distinction between the two forms in terms of definiteness. With the SV form in (32) the implication is that some unspecified two glasses of beer were drunk. Therefore, this clause could not have a negated subordinate clause, as in (34). The example shows that the perfective has a completive reading. This contrasts with the fact that with count nouns we do not have a completive reading.

The CV form in (33) implies that the object nominal is definite. It seems that CV forms have more than one function, and that these functions are ordered hierarchically: the most important function of CV forms is that they mark completion. In cases where this function is preempted, be it because the SV form itself implies completion of the event as in (32) and (33), or because we do not have a gradual relationship as in (35) and (36) and in (22) and (23), the CVs mark the object as definite (as opposed to indefinite in the SV construction).

- (34) us ne do gilaas biiyar pii
 he ERG two glasses beer drink-PERF
 (* par puurii nahiĩ pii)
 (but entire NEG drink-PERF)

‘He drank two glasses of beer (* but did not drink all of it).’

It is also possible to have an NP with a count head noun behave as a mass noun. For example, a count noun like ‘apple’ can be used with a number word like ‘one and a half,’ yielding a non-natural unit of one and a half apples. In a case like this, the NP refers to the mass of one and a half apples rather than the count of an apple and a half apple.

- (35) us ne deRh seb khaaye
 he ERG one-and-a-half apples eat-PERF
 (* par puurii nahiĩ khaaye)
 (but entire NEG eat-PERF)

‘He ate one-and-a-half apples (* but did not eat all of them).’

- (36) us ne deRh seb khaa liye
 he ERG one-and-a-half apples eat take-PERF
 (* par puurii nahīī khaaye)
 (but entire NEG eat-PERF)
 ‘He ate the one-and-a-half apples (* but did not eat all of them).’

Here there is no aspectual distinction between the SV and CV versions. Even though the head noun is a count noun, by giving it a ‘non-discrete’ determiner, we make it behave like a quantized mass noun. It was noted by Quine (1960) that count nouns can have a mass noun interpretation. For example, the mass noun interpretation of ‘apple’ denotes the matter that the apples consist of. That is, ‘one-and-a-half apples’ is treated like ‘one gallon of wine’. And consequently, the CV–SV distinction does not apply to such constructions as a partitive–completive marker. In all cases where CVs do not signal completion, they mark the object as definite. This is elaborated in Singh (1994b). (36) implies that some definite mass of one and a half apples is eaten, whereas (35) implies that some indefinite mass of one and a half apples was eaten.

4.2.2. *Count Nouns*

In the case of explicitly quantized count nouns as in (37), the preferred verb form is the CV as in (38). What is interesting about these examples is that (38) has the interpretation that the agent has eaten all five apples entirely, whereas the interpretation of (37) could be that the agent ate a part of each of the five apples.

- (37) amu ne pāāc seb khaaye
 Amu ERG five apples eat-PERF
 ‘Amu ate five apples.’ (not necessarily entirely, but each of the apples was affected)
- (38) amu ne pāāc seb khaa liye
 Amu ERG five apples eat take-PERF
 ‘Amu ate five apples.’ (entirely)

The distinction between the perfective and the neutral perfective can be captured in a number of ways. Here this distinction is captured by introducing an operator TOT on thematic relations. Essentially, the TOT operator yields another kind of thematic relation for us to work with. The usual version of the relation, θ , captures the partitive reading, whereas the new version of the relation, $TOT(\theta)$, captures the completive reading.

To account for this data, I postulate two subsorts of the object sort O : O_i and O_m . O_i is the domain of individuals and O_m is the domain of matter. The members of O_i are individuals, i.e., entities which have atomic parts. By contrast, the members of O_m are pieces of matter, i.e., entities which are not required to have atomic parts. Intuitively, x is an atomic part of y if x is a part of y , and x has no proper parts of its own.

$$(39) \quad x \sqsubseteq_A y \leftrightarrow x \sqsubseteq y \wedge \forall z[z = x]$$

We also have (a) the corresponding join operators, \sqcup_i and \sqcup_m , which are idempotent, commutative, and associative, and (b) the corresponding part-of relations, \sqsubseteq_i and \sqsubseteq_m . The sorts O_i and O_m are closed under their join operators. That is, the join of two individuals is an individual and the join of two pieces of matter is another piece of matter.

The key idea is to relate individuals to the matter that constitutes them. Since individuals are formally distinct from the matter of which they are composed, one obvious way, following Link (1983), is to postulate a function that takes an individual and yields its constituent matter. Let this function be h . Then, $h: O_i \rightarrow O_m$, i.e., this function is defined for all individuals. For example, if a is an apple, then $h(a)$ is the apple-substance it consists of. The function h should be a homomorphism, i.e., $h(x \sqcup_i y) = h(x) \sqcup_m h(y)$. For example, the matter of two apples a and b is the sum of the matter of a and the matter of b . The definition of function h can be extended to all objects. For objects of sort O_m , it is naturally defined as the identity function, which is trivially a homomorphism. This simplifies the definition of TOT.

I assume that the thematic relations are defined differently for individuals and for matter. Let θ denote a thematic role of interest. It is the patient relation in most examples considered so far. θ_m is the version of θ defined for members of O_m . This version is taken as primary here, and the others are defined in terms of it. The following property is required of θ_m .

$$(40) \quad \theta_m(e, x) \leftrightarrow \forall x'[x' \sqsubseteq x \rightarrow \exists e'[e' \sqsubseteq e \wedge \theta_m(e', x')]] \wedge \exists e'[e' \sqsubseteq e \rightarrow \exists x'[x' \sqsubseteq x \wedge \theta_m(e', x')]]$$

In order to better understand this, let θ stand for *PAT*, the patient relation; let x be some beer; and let e be the event of drinking it. Then the above property implies that x is drunk in the event e if and only if, for every part of the beer, there was a subevent of drinking it, and for every subevent of drinking the beer, a part of the beer was drunk. That is, in this case, θ has the properties of MAP-O and MAP-E.

Ordinarily, one version of θ would be sufficient for the members of O_i as well. However, as I have argued so far, a single version of θ would not

suffice for languages with the neutral perfective. θ_i may be defined in terms of θ_m and the *atomic part* relation, \sqsubseteq_A , to account for examples like (37). We can define θ_i as follows:

$$(41) \quad \theta_i(e, x) \leftrightarrow \forall x'[x' \sqsubseteq_A x \rightarrow \exists x'', e'[x'' \sqsubseteq h(x') \wedge e' \sqsubseteq e \wedge \theta_m(e', x'')]] \\ \wedge \forall e'[e' \sqsubseteq e \rightarrow \exists x'[x' \sqsubseteq h(x) \wedge \theta_m(e', x')]]$$

That is, e stands in the θ_i relation to x if and only if the following two conditions hold:

- Every atomic part of x (i.e., x') is at least *partly* subjected to a subevent of e (i.e., e'). In other words, some part of the matter of x' is subjected to e' .
- For every subevent e' of e there is some part of the matter of x (i.e., x') which is subjected to e' .

A thematic relation θ , when applied to an object x that is matter, is equivalent to θ_m . When applied to an individual, it is equivalent to θ_i . That is, we have the following rules expressing these sortal restrictions:

$$(42) \quad \theta(e, x) \wedge x \in O_m \leftrightarrow \theta_m(e, x)$$

$$(43) \quad \theta(e, x) \wedge x \in O_i \leftrightarrow \theta_i(e, x).$$

A CV construction, in general, changes a thematic relation, θ , to a *total* relation. That is, as described above, it requires the relation to involve the whole of the given object. Since CVs are constructed out of SVs by appending another verb to them, this can be captured by introducing an operator on thematic relations, TOT, that takes a thematic relation and produces the total version of it. This operator can be defined as follows.

$$(44) \quad \text{TOT}(\theta)(e, x) \leftrightarrow \theta(e, x) \wedge \forall x'[x' \sqsubseteq h(x) \rightarrow \exists e'[e' \sqsubseteq e \wedge \theta(e', x')]] \\ \wedge \forall e'[e' \sqsubseteq e \rightarrow \exists x'[x' \sqsubseteq h(x) \wedge \theta(e', x')]]$$

Notice that $\text{TOT}(\theta)(e, x) \wedge \theta(e, x)$ is equivalent to $\text{TOT}(\theta)(e, x)$. This observation is used in the semantics of compound verbs given below.

$$(45) \quad \text{liye 'take'}; (S/NP/NP)/(S/NP/NP); \\ \lambda S \lambda x \lambda y \lambda e [\text{TOT}(\text{PAT})(e, x) \wedge S(x)(y)(e)]$$

When the thematic role is applied to quantities of matter, nothing changes. $\text{TOT}(\theta_m) = \theta_m$. That is, the total version of θ when applied to matter is the same as θ itself, since θ_m involves all the matter in its argument anyway. Therefore, the CV does not contribute to the completive reading for matter – the reading is completive even with an SV. In all cases, however, the CV also marks other features of its object, in particular, definiteness. But

when the thematic role is applied to individuals, TOT does have the impact we desire. In general, $TOT(\theta_i)(e, x) \neq \theta_i(e, x)$. However, $TOT(\theta_i)(e, x) = \theta_m(e, h(x))$.

The distinction between the neutral perfective and the ordinary perfective and the role of CVs is exemplified in Figures (1) and (2), which present the derivations of the Hindi (37) above and (38), respectively. *PAT* can be expanded to its full definition in the last step of each of these derivations. The readings described above are clear from the last line. In the rest of this section. I will take it for granted that *PAT* can be expanded whenever desired. However, I will use *PAT* itself in its unexpanded form.

4.3. Class of Gradually Creating Predicates

Verbal predicates of this class are gradual and totally affect their patients. However, these predicates lack the property of independent existence of the patient. Interestingly, the property of independent existence of the object is important only for the class of verbal predicates that are gradual and in which the patient is affected totally. For example, in (46) below the patient ‘ice’ must exist prior to the event of melting. (47) is an example of this

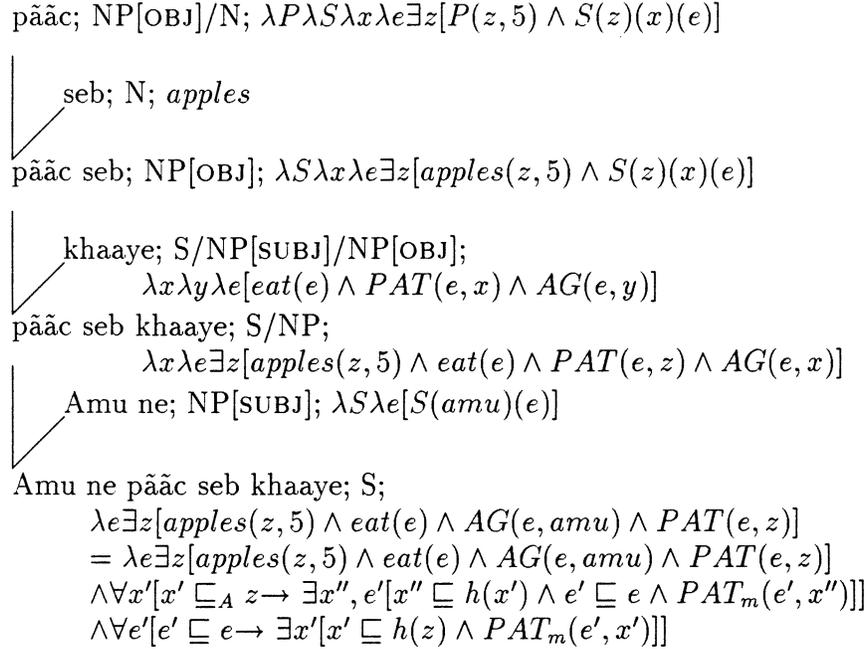


Figure 1. An example of a neutral perfective.

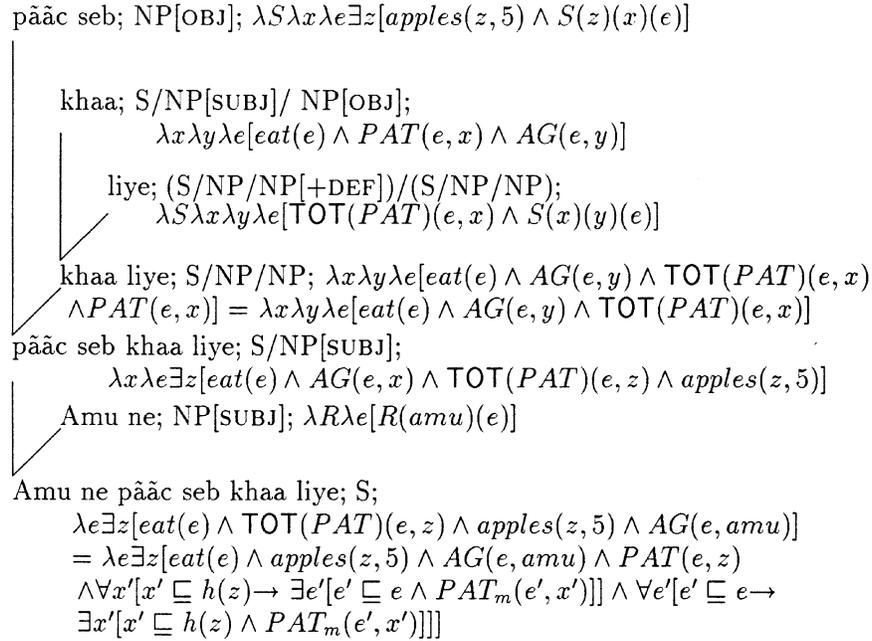


Figure 2. An example of a compound verb.

class. Here the patient ‘ice’ comes into existence as a result of the event of making it. Therefore, it lacks independent existence.

- (46) miiraa ne baraf pighaalii par puurii
 Mira ERG ice melt-CAU-PERF but completely
 nahii pighaalii
 NEG melt-CAU-PERF

‘Mira melted the ice but did not melt it completely.’

- (47) *miiraa ne baraf banaaii par puurii nahii
 Mira ERG ice make-PERF but completely NEG
 banaaii
 make-PERF

‘Mira made the ice but did not make it completely.’

Predicates belonging to the class of gradually creating predicates do not have any partitive–completive distinction. Both the SV and the CV in the perfective aspect imply that the event was completed.

Formally, this information is encoded in the lexical entries themselves. Thus the lexical entry for the verb *wash* requires that the patient be affected

Table 3. Perfectivity and completion for gradually creating predicates

Verb	Patient
<i>banaanaa</i> ‘BAKE’	bread
<i>gũũdnaa</i> ‘KNEAD’	dough
<i>bunnaa</i> ‘KNIT’	cardigan
<i>rangnaa</i> ‘PAINT’	picture
<i>bijinaa</i> ‘SOW’	crop
<i>dhonaa</i> ‘WASH’	shirt
<i>likhnaa</i> ‘WRITE’	letter

totally. An example derivation for this is given in Figure 3. The interpretation of the SV here corresponds to the totally interpretation of CVs in the class of gradually modifying predicates. The case of CVs in this class would yield the same interpretation as the SV. Formally, this follows trivially from the fact that $\text{TOT}(\text{TOT}(\theta)) = \text{TOT}(\theta)$. The predicates belonging to the instantaneous class are handled in the same way. Thus the verb entry for the verb ‘win’ would be analogous to that of ‘wash’ presented in Figure 3.

The distinction between gradually modifying and gradually creating predicates is not strict. Predicates belonging to the creating class also have an interpretation similar to that of predicates in the modifying class. Consider the example of ‘knitting a cardigan’. At the start of the event of knitting a cardigan, all we have is some yarn and an instrument for knitting. The patient looks nowhere close to the anticipated end product. As the event

$$\begin{array}{l}
 \text{pãã seb; NP[OBJ]; } \lambda S \lambda x \lambda e \exists z [\text{apples}(z, 5) \wedge S(z)(x)(e)] \\
 \left\{ \begin{array}{l}
 \text{dhooe; S/NP/NP; } \lambda x \lambda y \lambda e [\text{wash}(e) \wedge \text{AG}(e, y) \wedge \text{TOT}(\text{PAT})(e, x) \\
 \wedge \text{PAT}(e, x)] = \lambda x \lambda y \lambda e [\text{wash}(e) \wedge \text{AG}(e, y) \wedge \text{TOT}(\text{PAT})(e, x)] \\
 \text{pãã seb dhooe; S/NP[SUBJ];} \\
 \lambda x \lambda e \exists z [\text{wash}(e) \wedge \text{AG}(e, x) \wedge \text{TOT}(\text{PAT})(e, z) \wedge \text{apples}(z, 5)] \\
 \text{Amu ne; NP[SUBJ]; } \lambda R \lambda e [R(\text{amu})(e)]
 \end{array} \right. \\
 \text{Amu ne pãã seb dhooe; S;} \\
 \lambda e \exists z [\text{wash}(e) \wedge \text{TOT}(\text{PAT})(e, z) \wedge \text{apples}(z, 5) \wedge \text{AG}(e, \text{amu})] \\
 = \lambda e \exists z [\text{eat}(e) \wedge \text{apples}(z, 5) \wedge \text{AG}(e, \text{amu}) \wedge \text{PAT}(e, z) \\
 \wedge \forall x' [x' \sqsubseteq h(z) \rightarrow \exists e' [e' \sqsubseteq e \wedge \text{PAT}_m(e', x')]] \wedge \forall e' [e' \sqsubseteq e \rightarrow \\
 \exists x' [x' \sqsubseteq h(z) \wedge \text{PAT}_m(e', x')]]]
 \end{array}$$

Figure 3. An example of the completive reading in simple verbs.

of knitting a cardigan progresses, the patient begins to look more and more like a cardigan. At some undetermined point, we might be able to refer to it as a cardigan. From that point onward we can obtain the partitive reading using the neutral perfective aspect. However, it is not easy to specify a precise threshold upon crossing of which an unfinished object may be referred to as if it were the completed object.

Consider also the example of drawing a circle. A circle does not exist before the drawing of that particular circle. Suppose now that we have drawn a quarter of a circle – it looks like an arc, so we cannot say that it is a circle. But having drawn, say for instance, three quarters of a circle, we can get the partitive reading in the neutral perfective aspect as in (48).

- (48) miiraa ne sleT par cakkar banaayaa par puuraa
 Mira ERG slate on circle make-PERF but completely
 nahii banaayaa
 NEG make-PERF
 ‘Mira drew a circle on the slate but did not complete it.’

4.4. *Class of Unmodifying Predicates*

Predicates belonging to this class have the property of graduality and independent existence of the patient, but the patient is not totally affected by the event. An example of this class is given in (49).

- (49) us ne ciTThii paRhii par puurii nahii kii
 he ERG letter read-PERF but complete NEG de-PERF
 ‘He read a letter but did not complete it.’

This class of verbal predicates includes predicates like ‘peel an orange’ and ‘paint a door’ where only the surface of the patient is affected. The definition of graduality requires that the properties of UNI-O, MAP-O, and MAP-E must hold. For predicates like ‘peel an orange’, the property of MAP-E applies only with respect to a *set dimension*. For example, we know independent of the grammar that ‘peel’ applies only to the outer surface of its patient. Thus the property MAP-E applies only w.r.t. the outer surface. The property of MAP-E applies similarly to the predicate ‘paint a door’. In the case of predicates like ‘cut a tree’ the set dimension is any traverse section of the tree. Cutting a tree does not involve cutting each and every part of the tree.

Table 4. Perfectivity and completion for unmodifying predicates

Verb	Patient
<i>jild caRhaanaa</i> 'BIND'	report
<i>toRnaa</i> 'BREAK'	lock
<i>Dhaknaa</i> 'COVER'	wall
<i>Taapnaa</i> 'CROSS'	road
<i>kaaTnaa</i> 'CUT'	tree
<i>sukhaanaa</i> 'DRY'	dish
<i>Thiik karna</i> 'FIX'	program
<i>sunanaa</i> 'HEAR'	story
<i>ice karna</i> 'ICE'	cake
<i>laadnaa</i> 'LOAD'	hay
<i>rangnaa</i> 'PAINT'	door
<i>chiilnaa</i> 'PEEL'	orange
<i>camkaanaa</i> 'POLISH'	tabletop
<i>paRhnaa</i> 'READ'	book
<i>utaarna</i> 'REMOVE'	shirt
<i>belnaa</i> 'ROLL'	bread
<i>bikherna</i> 'SCATTER'	seeds
<i>khuracnaa</i> 'SCRATCH'	back
<i>ragaRnaa</i> 'SMOOTH'	plank
<i>kaaTnaa</i> 'SPICE'	wires
<i>bikherna</i> 'SPREAD'	rug
<i>dhona</i> 'WASH'	dish
<i>põchnaa</i> 'WIPE'	dish

- (50) miiraa ne santaraa chiilaa par puuraa nahii
 Mira ERG orange peel but completely NEG
 chiilaa
 peel-PERF

'Mira peeled an orange but did not peel it completely.'

- (51) miiraa ne darwaazaa rangaa par puuraa nahii
 Mira ERG door paint but completely NEG
 rangaa
 paint-PERF

'Mira painted the door but did not paint it completely.'

Not all predicates belonging to the unmodifying class depict this notion of graduality. Consider the example 'wash a shirt'. The washing of a shirt requires that for every part of washing a shirt there is a part of the shirt being washed.

In addition to these predicates there are cases where one cannot tell just by looking at the predicate whether it is gradual or non-gradual. An

example of such predicates is ‘fix a computer program’. It is possible that a bug requires that various things be done for the program to be fixed. Then the predicate is gradual and belongs to the unmodifying class. On the other hand, it is also possible that all that fixing the program requires is inserting a missing right parenthesis. Then the predicate is non-gradual or instantaneous. A sentence like (52) would be ambiguous. The listener does not get any indication as to whether the program had one or more bugs, and neither does he know whether the program has been fixed completely or not. The use of a CV would specify that the program has been fixed completely (as in (53)).

(52) naye programar ne program Thiik kiyaa
 new programmer ERG program fix do-PERF
 ‘The new programmer fixed the program.’

(53) naye programar ne program Thiik kar diyaa
 new programmer ERG program fix do give-PERF
 ‘The new programmer fixed the program (entirely).’

This class of predicates too depicts the partitive–completive distinction, as exemplified by (50) and (51). Formally, the distinction between SVs and CVs is captured exactly as in the class of gradually modifying predicates.

5. OTHER CONSIDERATIONS

5.1. *Perfectivity and Negation*

It is well known that CVs do not occur in negative sentences, e.g., (54); an SV must always be used, e.g., (55) (Hook 1974). No satisfactory explanations for this are currently available. However, viewing CVs as markers of completion helps in understanding this phenomenon. Since CVs are used to focus on the completion, the use of negation is pragmatically not felicitous.

(54) *us ne tasviir nahĩĩ banaa dii
 she ERG picture NEG make give-PERF
 ‘She did not make the picture.’

(55) us ne tasviir nahĩĩ banaaii
 she ERG picture NEG make-PERF
 ‘She did not make the picture.’

Negation may be used with the gradually creating class of predicates. Consider the case of (55): negation may be used for either of the following two interpretations. In both cases an SV suffices, because neither suggests completion of the event.

- (55) a. She did not start making the picture or
 b. She started making the picture but it was not completed.

Predicates belonging to the class of instantaneous events may not be negated when the verbal form is a CV. Consider (56) and (57) below. While the SV form is acceptable, the CV form is not.

- (56) *us ne res nahĩĩ jĩit lii
 she ERG race NEG win take-PERF

‘She did not win the race.’

- (57) us ne res nahĩĩ jĩitii
 she ERG race NEG win-PERF

‘She did not win the race.’

It is possible to have a negated subordinate clause following a perfective clause in some cases, e.g., (58).

- (58) miiraa ne kamiiz Taangii par wo Taangii nahĩĩ
 Mira ERG shirt hang-PERF but it hang NEG

‘Mira tried to hang a shirt but could not.’

Though the subordinate clause negates a clause in the perfective, the only acceptable interpretation here is that the agent ‘tried’ to hang a shirt, but could not hang it. This interpretation is not available for all predicates belonging to this class. For example (59), corresponding to (22), is not grammatical. I do not discuss these sentences further.

- (59) *us ne res jĩitii par jĩitii nahĩĩ
 he ERG race win-PERF but win-PERF NEG

‘He won a race but did not win it.’

5.2. *Neutral Perfective versus Progressive*

It might seem from the discussion above that the neutral perfective reading for objects (as given in sentences with SVs) coincides with the progressive reading of the corresponding events, as is the case in German. However, this is not the case here. A part of the meaning of the progressive is given in terms of an operator PROG (Krifka 1991). According to Bennett

and Partee (1973), in interval semantics, the minimal requirement of the progressive says that $\text{PROG}(\alpha)$ is true of event e' iff it is a part of an α -event, e .

$$\text{PROG}\alpha = \lambda e' \exists e [\alpha(e) \wedge e' \sqsubseteq e]$$

Consider once again (37), about the eating of five apples. This sentence is true only if parts of each of the five apples are eaten. Thus if only parts of four of the five apples were eaten, (37) would not be true. The corresponding progressive in (60), on the other hand, would be true if any part of any apple was being eaten, as long as the intention of eating all five apples holds. In general, the progressive is true of all subevents of the eating event, e.g., of the subevent in which only one apple has been bitten into; the neutral perfective is *not* true of just any such subevent, but only of those subevents in which parts of all five apples are eaten. For example, (60) is true only if every apple of the group of five apples has been at least partially affected. In a scenario where someone is sitting at a table with five apples and eats parts of four apples, a viewer could felicitously use (60) but not (37). Thus the neutral perfective and the progressive are distinct.

- (60) amu pããc seb khaa rahaa thaa
 amu five apples eat PROG AUX-PAST
 ‘Amu was eating five apples.’

The partitive reading seems atelic but is not. This is because the eating of five apples in (37) has a natural final endpoint, namely that of biting into the fifth apple. It must be noted, however, that this endpoint is not unique, as it would be in ordinary telic events. For example, the agent of the eating in (37) may take a second bite from some or all of the five apples. The neutral perfective reading will still be true, because the five apples have still not been eaten entirely. As long as there are some parts of the five apples left, one can continue to eat them. Thus the partitive has features of both telic and atelic events.

6. CONCLUSIONS

We saw in the foregoing how in Hindi SVs can yield partitive reading, whereas the corresponding CVs yield completive readings. Unlike the standard perfective, the neutral perfective does not require that its object participate entirely. And unlike the progressive, it suggests completion.

It appears that the neutral perfective aspect and, consequently, the perfective paradox result from (a) the lack of articles and (b) the ambiguity that arises due to the various interpretations of bare NPs coupled with the

Table 5. Classification of verbal predicates for perfectivity: summary of results

Class	Example	GRAD	AFF-O	IEO	SV-CV distinction?
Instantaneous	win a race	–			–
Gradually modifying	eat a cake	+	+	+	+
Gradually creating	knit a cardigan	+	+	–	–/+
Unmodifying	read a letter	+	–		+

possibility that telic event types may not be completed. Table 5 summarizes our results for different classes of verbs; as explained in section 4, the other combinations of features are not instantiated in Hindi.

The main contribution of this paper has been in identifying the category of *neutral perfective*, which arises in a number of languages. This analysis supports the hypothesis of Dahl (1985) that languages vary in how they delimit the perfective aspect. Hindi perfectives do not have the totality implication as suggested by Comrie and Smith; rather, they have a weak interpretation similar to that reported by Dahl, where totality is not implied. I believe that this paper goes beyond Dahl (1985) in being able to distinguish these interpretations based on simple syntactic criteria. Potential enhancements include the incorporation of other phenomena, such as definiteness, and other languages, such as Japanese and the Slavic languages.

REFERENCES

- Bennett, M. and Barbara H. Partee: 1973, *Toward the Logic of Tense and Aspect in English*, Indiana Linguistic Club, Bloomington.
- Butt, Miriam J.: 1993, *The Structure of Complex Predicates in Urdu*, Ph.D. dissertation, Stanford University, Stanford, Cal.
- Carlson, Greg: 1981, 'Aspect and Quantification', in P. J. Tedeschi and A. Zaenen (eds.), *Syntax and Semantics, Vol. 14: Tense and Aspect*, Academic Press, New York, pp. 31–64.
- Comrie, Bernard: 1976, *Aspect*, Cambridge University Press, Cambridge.
- Comrie, Bernard: 1981, *Language Universals and Linguistic Typology*, Basil Blackwell, Oxford.
- Dahl, Östen: 1985, *Tense and Aspect Systems*, Basil Blackwell, Oxford.
- Dowty, David: 1991, 'Thematic Proto-Roles and Argument Selection', *Language* 67(3), 547–619.
- Hinrichs, Erhard: 1986, *A Compositional Semantics for Aktionsarten and NP Reference in English*, Ph.D. dissertation, Ohio State University, Columbus.
- Hook, Peter E.: 1974, *The Compound Verb in Hindi*, The Michigan Series in South and Southeast Asian Languages and Linguistics, No. 1, University of Michigan Press, Ann Arbor.
- Ikegami, Yoshihiko: 1981, 'Activity – Accomplishment – Achievement: A Language That Can't Say "I Burned It, But It Didn't Burn" and One That Can', Technical Report t74–87, Linguistic Agency, University of Trier, Germany.

- Kamp, Hans and Uwe Reyle: 1993, *From Discourse to Logic*, Kluwer, Dordrecht.
- Krifka, Manfred: 1989, 'Nominal Reference, Temporal Constitution and Quantification in Event Semantics', in R. Bartsch, J. van Benthem and P. van Emde Boas (eds.), *Semantics and Contextual Expressions*, Foris, Dordrecht.
- Krifka, Manfred: 1992, 'Thematic Relations as Links between Nominal Reference and Temporal Constitution', in J. Sag and A. Szabolcsi (eds.), *Lexical Matters*, The University of Chicago Press, Chicago, pp. 29–53.
- Link, Godehard: 1983, 'The Logical Analysis of Plurals and Mass Terms', in R. Bäuerle, Chr. Schwarze, and A. van Stechow (eds.), *Meaning, Use and Interpretation of Language*, de Gruyter, Berlin, pp. 302–323.
- Link, Godehard: 1987, 'Algebraic Semantics for Event Structures', Technical Report, Seminar für Philosophie, Logik und Wissenschaftstheorie, Munich University, Germany.
- Mohanan, K. P. and Tara Monhanan: 1994, 'Issues in Word Order in South Asian Languages: Enriched Phrase Structure or Multidimensionality', in M. Butt, T. H. King and G. Ramchand (eds.), *Theoretical Perspectives on Word Order in South Asian Languages*, CSLI, Stanford, pp. 153–185.
- Parsons, Terence: 1990, *Events in the Semantics of English*, MIT Press, Cambridge Mass.
- Porterfield, Leslie and Veneeta Srivastav: 1988, '(In)definiteness in the Absence of Articles: Evidence from Hindi and Indonesian', in *Proceedings of the West Coast Conference on Formal Linguistics*, pp. 265–276.
- Quine, Willard van Orman: 1960, *Word and Object*, MIT Press, Cambridge, Mass.
- Singh, Mona: 1990, 'The Aspectual Content of Compound Verbs', in Y. No and M. Libucha (eds.), *Proceedings of the Eastern States Conference on Linguistics*, Ohio State University, Columbus, pp. 260–272.
- Singh, Mona: 1991, 'The Perfective Paradox: How to Eat Your Cake and Have It Too', in L. Sutton et al. (eds.), *Proceedings of the Berkeley Linguistic Society*, Berkeley, Cal., pp. 469–479.
- Singh, Mona: 1994a, *Perfectivity, Definiteness, and Specificity: A Classification of Verbal Predicates in Hindi*, Ph.D. dissertation, University of Texas at Austin.
- Singh, Mona: 1994b, 'Thematic Roles, Word Order, and Definiteness', in M. Butt, T. H. King and G. Ramchand (eds.), *Theoretical Perspectives on Word Order in South Asian Languages*, CSLI, Stanford, pp. 217–235.
- Smith, Carlota S.: 1992, *The Parameter of Aspect*, Reidel, Dordrecht.
- Tenny, Carol: 1987, *Grammaticalizing Aspect and Affectedness*, Ph.D. dissertation, MIT.
- Vendler, Zeno: 1967, *Linguistics in Philosophy*, Cornell University Press, Ithaca, N.Y.
- Verkuyl, Henk: 1972, *On the Compositional Nature of Aspects*, Reidel, Dordrecht.
- Verkuyl, Henk: 1993, *A Theory of Aspectuality*, Cambridge University Press, Cambridge.

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