

# Imperfectivity

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## 1. Introduction

Natural language sentences describe a variety of situations by using a limited set of grammatical devices to encode information about their properties. One relevant property of situations that often finds clear linguistic encoding is that of ongoingness – i.e. whether a situation is regarded as continuing to hold or ongoing at a given time. Consider the sentences in (1).

- (1) a. John was swimming swiftly.
- b. Janice is skipping in the front lawn.
- c. The Curiosity Rover is exploring the Gale Crater on Mars.
- d. Nancy liked collecting sea shells.
- e. New Haven is in Connecticut.
- f. Mary drinks a glass of water before dinner.
- g. Whales give birth to live young.

In each sentence, the described situation is understood as continuing throughout some past or present interval of time (determined by tense marking). In (1-a-c), the situations described are understood to be part of a dynamic event in progress that may last for a relatively short or longer period. In (1-d-e) the situations described are states (mental and physical respectively), while (1-f) describes a habit of an individual that is taken to hold by virtue of being regularly instantiated within some indefinite interval of time. Finally, (1-g) describes a property that characterizes a species or a kind in a relatively timeless way – and by necessity holds also at the time of utterance.

Crosslinguistically, one finds that events in progress, states of affairs, habits, dispositions, and generalizations are often described in many languages using the same grammatical device and such a device tends to be labeled as an “imperfective marker” for that language (Bybee et al 1994; Comrie 1976; Dahl 1985, 2000). In other languages, like English, the grammar distinguishes between a device that marks an event in progress (the English Progressive in (1-a-c)) and devices that are used to describe ongoing states of affairs, habits and generalizations (the Simple Present and the Simple Past in (1-d-g)). Finally, languages also have markers that signal iterativity and pluractionality – these may be used to convey plural reference in the domain of eventualities and sometimes give rise to imperfective-like readings.

In investigating imperfectivity as a category found in natural language, we will ask two basic questions: *First*, what does it mean for a sentence or a class of

sentences to “be imperfective”? In answering this question, we should provide a definition of imperfectivity that does not depend on what morphological devices are used to signal this category but rather characterizes the meaning in language-neutral terms. In §2, I suggest that such a definition is best found by examining the discourse-level temporal effects of sentences that have been said to have stative (as opposed to eventive) reference. This will lead me to define semantic imperfectivity as the presence of the subinterval property at the sentential level. That is, for a sentence to have imperfective reference amounts to the sentence denoting a predicate of intervals with the subinterval property. The *second* question to ask is, how do sentences in natural language “become imperfective”? That is, what is the role of grammatical devices (obligatory or optional) in signaling the presence of imperfectivity? Do such devices actively construct predicates with the subinterval property (imperfective predicates) or is the connection between imperfective marking and the subinterval property more indirect? These questions will be explored in §3 by looking at analyses that have been proposed for language-specific progressive and imperfective markers, with the expectation that they would be generalizable across languages. In §4, I will take a brief look at work on iterativity and pluractionality and determine if such markers are subsumable under the rubric of imperfective marking, given the definition of imperfectivity in terms of the subinterval property. §5 concludes.

## 2. The semantic notion of imperfectivity

Let us start with the well-known observation that natural language sentences differ with respect to how they are temporally interpreted in narrative discourse (Kamp 1979; Hinrichs 1981, 1986; Partee 1984; Dowty 1986, a.o). Sentences describing events are always understood to advance reference time while sentences describing states often do not effect such an advancement. For instance, the simple past conjuncts in the first sentence in (2-a) contain accomplishment verb phrases and are interpreted such that the event described later occurs later than the event described first. There is no such obligatory temporal advancement brought about by the later discourse in (2-a), in which the sentences contain stative verb phrases. Similarly, for (2-b), where the stative predicate in the second sentence does not “move” the narrative time forward.

- (2)    a.    He *went* to the window and *pulled aside* the soft drapes. It *was* a case-  
              ment window and both panels *were* cranked out to let in the night air.  
              The apartment *was* on the second floor. The window itself *was* a scant  
              five feet above the roof. (Hinrichs 1986: 67)
- b.    John *entered* the president’s office. The president *sat* behind a huge  
              desk. (Dowty 1986: 38)

Certain temporal constructions and interpretations also effect a similar pattern, as can be seen by the example discourses below. In (3-a), the use of progressive mark-

ing conveys that the event of smiling does not temporally follow the event of opening the door, but rather overlaps with it. In (3-b), an eventive interpretation imposed on an ostensibly stative sentence allows the sentence to effect advancement of reference time. In (3-c) a habitual interpretation of the simple past tense sentence (containing an achievement predicate) similarly conveys that the described habit (the bus schedule) overlaps with, rather than follows, the time of the event introduced by the prior sentence.

- (3) a. Mr Darby *slapped* his forehead, then *collected* himself and *opened* the door again. The brush man *was smiling* at him hesitantly. (Hinrichs 1986: 69)
- b. John *sat* in his chair going over the day's perplexing events again in his mind. Suddenly, he *was asleep*. (Dowty 1986: 38)
- c. John *woke up* with a start. He *glanced* at the alarm clock. The bus *came* at 730 on the dot. He *was* late.

What semantic properties associated with lexical stative, progressive-marked, and habitual sentences could give rise to these patterns of inference about temporal reference? It has been noted, most clearly in Dowty (1986), that these patterns can be explained using the basic insights of the interval semantics approach to aspectual classification (Taylor 1977, Dowty 1979). On this approach, stative predicates (i.e. verbs, verb phrases, sentences) are defined as those having the subinterval property (Bennett & Partee 1972). A predicate  $\phi$  is stative iff it follows from the truth of  $\phi$  at an interval  $I$  that  $\phi$  is true at all subintervals of  $I$ . Eventive predicates (accomplishments/achievements) are defined as those with the “anti-subinterval” property – i.e. a predicate  $\phi$  is eventive iff it follows from the truth of  $\phi$  at an interval  $I$  that  $\phi$  is false at all subintervals of  $I$ .<sup>1</sup>

Defining the aspectual character of expressions (at lexical, phrasal, or sentential level) by means of the (anti-)subinterval property predicts how the temporal reference of successive sentences in narrative discourse (stative or eventive) will be interpreted. Assume that, in the absence of explicit definite time adverbials, the reference interval  $r$  for interpreting a sentence  $S_i$  is taken to be the interval which immediately follows the reference interval for the previous sentence  $S_{i-1}$ . This is Dowty's Temporal Discourse Interpretation Principle (TDIP). Then, it follows from the “anti-subinterval” property that eventive sentences will be interpreted as not being true at intervals that overlap with a prior reference interval. Since the truth of such sentences at an interval requires their falsity at all subintervals, it follows that if an eventive sentence  $S_{ev}$  is asserted to be true at a reference interval  $r$ , it will be entailed that  $S_{ev}$  is false at all superintervals of  $r$ . In contrast, when a stative sentence  $S_{st}$  is asserted as being true at  $r$ , this assertion is consistent with the possibility of  $S_{st}$  being true at superintervals of  $r$ . Thus, whether a sentence can be interpreted as describing a situation that obtains at superintervals of the reference interval  $r$  is determined by whether the described situation may be understood to obtain at subintervals of  $r$ .

<sup>1</sup>Dowty (1986:42) phrases this slightly differently but the content is effectively the same.

As Dowty notes, in addition to sentences containing lexical stative predicates, progressive-marked sentences and sentences with habitual interpretation tend to be interpreted as stative, i.e. as overlapping with a priorly introduced reference time (as in (3-a) and (3-c)) precisely *because* they have the subinterval property. Here is how the reasoning works: Let  $\text{PROG}(\phi)$  be true at an interval  $I$  iff there is an interval  $I'$  s.t.  $I \subset I'$  and  $\phi$  is true at  $I$ . Then it is entailed that for any  $I'' \subset I$ ,  $\text{PROG}(\phi)$  is true of  $I''$ . That is, regardless of whether  $\phi$  has the subinterval property,  $\text{PROG}(\phi)$  always has the subinterval property (Dowty 1986: 44). One can make a similar case for habitual sentences, although neither Dowty nor anybody else offers a formal account. Let  $\text{HAB}(\phi)$  be true at an interval  $I$  iff there is an interval  $I'$  s.t.  $I \subseteq I'$  and  $\phi$  is true at every “relevant” subinterval of  $I'$ .<sup>2</sup> Then, it is entailed that for any  $I'' \subseteq I$ ,  $\text{HAB}(\phi)$  is true of  $I''$ . Again, regardless of whether  $\phi$  has the subinterval property,  $\text{HAB}(\phi)$ , on this kind of characterization of its meaning, is guaranteed to have the subinterval property.

Thus, in saying that lexical stative, progressive, and habitual sentences are stative, it is meant that they have the subinterval property, a constraint on their interpretation that may license further inferences about their relation to the reference time. The interpretive possibilities in narrative discourse for stative sentences directly follow from this semantic property and assumptions in the larger discourse context. The large literature that examines the semantics and pragmatics of temporal discourse and temporal anaphora has not been directly applied to answering questions about the semantics of grammatical aspect marking in natural languages. However, there is a simple way to make this connection and I will make it here. That is to assume that as a semantic notion, imperfectivity amounts to the presence of the subinterval property at the sentential level. In other words, sentences with imperfective aspectual reference denote temporal predicates with the subinterval property. Perfectivity is the presence of the anti-subinterval property at the sentential level. That is, sentences with perfective aspectual reference denote temporal predicates with the anti-subinterval property.<sup>3</sup> While this idea is not exactly new, there is no explicit statement of this claim that I have been able to locate in the literature on sentential aspect. There are two desirable consequences of explicitly equating the imperfective–perfective opposition with the presence of the subinterval/anti-subinterval property.

First, this characterization makes it entirely parallel to the telic–atelic opposition. This latter opposition, used with reference to lexical aspect or aktionsart, pertains to the reference of predicates of eventualities. The relevant property here is that of quantized reference in the domain of eventualities. A predicate of eventualities  $P$  is quantized iff whenever  $P$  applies to an eventuality  $e$ , it does not apply to

<sup>2</sup>For the time-being, I leave the notion of “relevance” undefined. I am also assuming an unpronounced operator  $\text{HAB}$ , an assumption that I will modify later in the paper, subsuming the contribution associated with  $\text{HAB}$  here under the more general aspectual operator  $\text{IMPF}$ . The discussion is in §3.

<sup>3</sup>It is possible that this needs to be weakened to the absence of the subinterval property with pragmatics strengthening effects under certain conditions but I will not explore this question in detail here.

any proper sub-event  $e'$  of  $e$ .<sup>4</sup> Atelic predicates are always non-quantized and typically have divisive reference. A predicate of eventualities  $P$  is said to have divisive reference iff whenever  $P$  applies to an eventuality  $e$ , it applies to all proper sub-events  $e'$  of  $e$ . If the telic-atelic opposition is stated in terms of quantized and divisive reference, then the parallelism between this opposition and the imperfective-perfective opposition (stated in terms of the (anti)subinterval property) becomes obvious. (Im)perfectivity is divisive/quantized reference in temporal predicates.<sup>5</sup>

The second desirable consequence of equating the imperfective-perfective opposition with the presence of the subinterval/anti-subinterval property is that it allows us to raise explicit questions about the semantic contribution of natural language grammatical devices that are labeled as marking categories like the imperfective, the perfective, or the progressive. There are at least three pertinent questions here regarding imperfective marking and the semantic operators that such marking might realize.

- (4)
  - a. Does the subinterval property obtain from the truth-conditional contribution of imperfective marking, and if so, how can this contribution be characterized most accurately?
  - b. Does imperfective marking presuppose subinterval reference, i.e. is it constrained to only combine with predicates that have subinterval reference?<sup>6</sup>
    - (i) If it does presuppose subinterval reference for the predicates it combines with, then what is its truth-conditional contribution?
    - (ii) What is the source of event-in-progress, habitual, generic and other readings of imperfective marking on the presuppositional view of the imperfective?
  - c. Is there a way in which the notion of the imperfective as a “viewpoint aspect” category can be reconciled with its definition in terms of the subinterval property?

The next section offers a perspective on the literature that investigates progressive and imperfective marking with the goal of answering the questions above.

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<sup>4</sup>This is a domain-specific version of the more general definition of quantized reference from Krifka 1989, 1998). Bach (1986) calls this the antisubdivisibility property of predicates, which is closer to the term antisubinterval property that I have used here.

<sup>5</sup>Champollion (2010) provides a characterization of the telic-atelic opposition in terms of the notion of “stratified subinterval reference”, which brings it even closer to the subinterval based characterization of (im)perfectivity.

<sup>6</sup>By this I mean the following: Should we think of imperfective marking to be similar to that of durative *for x time* adverbials, which are standardly taken to “diagnose” the atelicity of eventuality predicates rather than deriving the relevant interpretation?

### 3. Progressive/imperfective marking

Grammaticalized aspect marking devices such as imperfective and perfective markers are often described intuitively as distinguishing between how situations are presented: from the outside vs. the inside, as completed or as ongoing, as atomic or as internally differentiated. Such marking is thus said to be an indicator of the “view-point” or “perspective” of the speaker on the described situation (Comrie 1976, Smith 1991). There are three possible interpretations of such a perspectival view of the contribution of aspectual morphology. Binnick (2006, pp. 255–256) distinguishes between these interpretations when he classifies theories of grammatical aspect meaning into three types based on how they derive the intuitions (completed vs. ongoing etc.) about the effect of the imperfective and the perfective aspectual operators: Boundedness theories, Phasic theories, and Relational Aspect theories.

Boundedness theories take aspectual operators to make reference to temporal boundaries or edges of eventualities. For instance, Smith (1991) defines the distinction between the imperfective and the perfective in terms of whether they include the initial and/or the final bounds of the eventuality described in the sentence. Relatedly, aspectual categories have been defined in terms of mereological notions like whole and part (e.g. Verkuyl, 1972; Krifka, 1986, 1992; Filip, 1999) or event-structural notions of culmination or completedness (e.g. Dowty, 1979, Parsons, 1990). In Phasic theories of aspect, aspectual operators are taken to be predicate modifiers that map eventuality predicates of a given aspectual class to their phases or sub- eventualities, which may be of a different aspectual class, thus directly manipulating the telicity of predicates in their scope (Mourelatos, 1978; Vlach, 1981; Kamp & Rohrer, 1983; Kamp & Reyle 1993; Moens & Steedman, 1988; De Swart, 1998). Finally, in Relational Aspect theories, aspectual categories are said to express relations between a salient reference time and the time of the eventuality (Reichenbach, 1947, and later work inspired by the Reichenbachian approach (notably Klein, 1994)).<sup>7</sup> Although this last approach has been the one most frequently applied in exploring questions of tense and aspect in compositional semantics, mereology-based analyses of aspectual operators have also been proposed in understanding the contribution of progressive and imperfective morphology.

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<sup>7</sup>Reichenbach (1947) introduced the notion of “reference time” as relevant to the tense logic for natural language. This temporal parameter, distinct from the parameters of speech/utterance time and event time (the time at which a described eventuality is said to occur), is central to the interpretation of tensed sentences since it aids in determining the temporal reference of a sentence – the time that the sentence is about. The original Reichenbachian system involves three temporal points – speech time *S* (the time of utterance), event time *E* (the time at which the situation described in a sentence holds or occurs), and reference time *R* (the time which the sentential assertion is about). The relative locations of these points correspond to particular tense/aspect combinations that are grammaticalized in English. Later researchers tease apart the contribution of the tenses and the aspects via pairwise ordering between the temporal parameters (Hornstein, 1990; Klein, 1994). Klein (1994) presents a reformulation of the basic Reichenbachian theory whose major advance is an explicit characterization of the notion of reference time. On Klein’s interpretation, Reichenbach’s reference time is the time which the sentential assertion is about (in analogy with the notion of “topic” in other domains), and therefore, is rechristened as Topic Time (TT).

### 3.1. The progressive

On the relational approach, the contribution of progressive marking can be straightforwardly implemented. The English Present Progressive, according to Reichenbach, carries an indication that the event described by the sentence has some temporal extension (Reichenbach 1947: 28). The reference time and the speech time are understood to be properly contained within the temporal interval over which the event extends. This basic intuition about the contribution of progressive morphology is retained in the later literature with the first explicit definition being provided by Bennett & Partee 1972 (who follow Montague (1970)). Here  $I$  corresponds to the reference time while  $I'$  corresponds to the time over which the event extends.

- (5)  $[\text{PROG}\phi]$  is true at interval  $I$  iff there exists an interval  $I'$  such that  $I \subset I'$ ,  $I$  is not a final subinterval of  $I'$ , and  $\phi$  is true at  $I'$ .

The English Progressive is arguably the most well-investigated aspectual marker in the semantics literature, an investigation that is directly tied to what has been called the Imperfective Paradox. Dowty (1972, 1977, 1979) pointed this out as a problem with Bennett & Partee's formulation above and giving an account of this paradox has occupied central place in analyses of progressive meaning.

#### 3.1.1. The imperfective paradox

The basic observation is that whenever  $\phi$  is an activity predicate,  $[\text{PROG}\phi]$  entails  $\phi$  (as in (6-a-b)), but this entailment relation does not hold when  $\phi$  is an accomplishment predicate (as in (6-c-d)).<sup>8</sup>

- (6) a. John was pushing a cart.  
b.  $\rightarrow$  John pushed a cart.  
c. John was drawing a circle.  
d.  $\nrightarrow$  John drew a circle.

The requirement that  $\phi$  be true in the real world at a superinterval of any interval at which  $[\text{PROG}\phi]$  is true is thus too strong; intuitively a progressive sentence can be judged true even if the event described by the accomplishment predicate does not obtain in the real world. Dowty's solution is to introduce a modal component into the meaning of the progressive.  $\phi$  is required to be true at a superinterval of the progressive interval, not in the real world, but in a set of worlds called *inertia worlds*, "which are exactly like the given world up to the time in question and in which the future course of events after this time develops in ways most compatible with the past course of events." (Dowty 1979: 148-49).

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<sup>8</sup>Note that activity predicates, when construed as describing properties of intervals rather than eventualities, have the subinterval property (up to a relatively fine level of granularity) while accomplishment predicates have the anti-subinterval property.

- (7)  $\text{PROG}\phi$  is true at an interval  $I$  and world  $w$  iff there is an interval  $I'$  such that  $I'$  is a non-final subinterval of  $I$ , and for all  $w' \in \text{Inr}(\langle I, w \rangle)$ ,  $\phi$  is true at  $I'$  and  $w$ .

The later literature refines this modal treatment of the progressive by relativizing the modal component to the predicate in the scope of the progressive. This relativization has been effected in several ways but each of these modifications crucially introduces eventualities as spatiotemporal entities whose progression in time is considered relative to a suitably restricted set of possible worlds. The main problem that Dowty's account faces is pointed out by Vlach (1981).

- (8) Mary was crossing the street, when the truck hit her.

Dowty predicts that a sentence like (8) should be false since in every inertial world, the truck's trajectory relative to Mary is compatible with the past course of events in the actual world and therefore Mary's crossing the street is destined to be an unfinished endeavor. However, (8) would be (judged) true at an interval seconds before the truck hits Mary. The problem is, of course, that both Mary's crossing the street and the truck going on its path are following a natural course.

Landman (1992), in order to solve this and other problems having to do with possible interruptions of events, develops an analysis involving the notion of a **stage** of an event and continuation branches. **Stage-of** is a partial order on the domain of events where an event  $e$  can be taken to be a stage of an event  $e'$  iff  $e$  is a big-enough part of  $e'$  and shares enough with  $e'$  such that  $e'$  can be regarded as a more developed version of  $e$  (Landman 1992: 23). A progressive sentence built on a predicate  $P$  is true relative to an event  $e$  in world  $w$  whenever  $e$  is a stage of some  $e'$  of type  $P$  in the closest possible world where  $e$  continues to develop without interruptions. Thus, considering the closest world to the actual world in which the observed stage develops uninterrupted into a  $P$  event allows Landman to overcome Dowty's problem with inertia worlds.

Portner (1998) offers a direct refinement of Dowty's basic modal theory by integrating it with the Kratzerian approach to modal meaning. The observation that the truth of progressive sentences depends on a restricted set of circumstances, rather than world-wide course of events is captured by taking the modal operator to require a circumstantial modal base – i.e. we consider only those worlds in which some contextually specified propositions hold.<sup>9</sup> The observation that the truth of progressive sentences is sensitive to the predicate in the scope of the progressive marker is captured by introducing a “non-interruption ordering source”, which orders worlds in which the event continues uninterrupted are ranked higher than those in which it does not. Given this setup, a progressive sentence  $\text{PROG}\phi$  is judged true relative to an event  $e$  iff in every world  $w$  compatible with the circumstantial modal base in which the maximally possible number of propositions in the

<sup>9</sup>This is in contrast to assuming a totally realistic modal base, which is essentially what Dowty does when he considers all worlds that are exactly like the actual world until the interval under consideration.



non-interruption ordering source hold, there is an  $e'$ , with  $e$  as its sub-event, of type  $\phi$ .

There are other implementations of this basic “partitivity” intuition about the meaning of the progressive and I refer the reader to Portner (2013) for an overview. For instance, Krifka (1992: 47), working within a mereological framework, suggests that the progressive operator is an eventuality modifier that when applied to predicates of eventualities  $P$  returns the sets of sub-events of the events under  $P$ .

### 3.1.2. *Progressive marking and stative predicates*

Beyond the Imperfective Paradox, one central puzzle that any semantic analysis of progressive marking must deal with lies in the ways in which it interacts with stative predicates. Vendler (1967) makes the initial observation that stative predicates lack what he calls the “continuous tenses” making reference to verbs like *know* and *love*.

- (9)    a. ?John *is loving* his mother.  
      b. ?Mary *was knowing* the answer.

Taylor (1977: 206) proposes an explanation for this restriction: according to him, the function of the progressive is to indicate that a certain moment/interval falls within an interval over which the predicate is true but is not itself an interval at which the predicate is true. Since stative predicates are true at every moment (subinterval) of any interval at which they are true, the progressives inapplicable with such predicates. Dowty (1979: 173–174) brings up examples with stative predicates (like *lie*, *sit*, *stand*, *perch*) that are perfectly acceptable with progressive marking, though subject to a certain semantic restriction as evidenced in the contrast between (10-a-b) and (10-c-d).

- (10)    a. The socks *are lying* under the bed.  
      b. One corner of the piano *is resting* on the bottom step.  
      c. ?New Orleans *is lying* at the mouth of the Mississippi River.  
      d. ?That argument *is resting* on an invalid assumption.

Dowty observes that the English Progressive is acceptable with a stative predicate only when the situation denoted by the predicate is a contingent one, subject to change. More or less permanent situations, expressed by individual-level statives or by stage-level statives with immovable subjects cannot be appropriately described using the Progressive. In his words:

Consideration of many such examples leads to the conclusion that the progressive is acceptable with these [stative] verbs just to the degree that the subject denotes a moveable object, or to be more exact, an object that has recently moved, might be expected to move in the near future, or might possibly have moved in a slightly different situation. (Dowty 1979: 175)

This *temporal contingency* inference associated with the progressive has been noted also in some earlier and later literature (Leech 1970, Comrie 1976, Dowty 1979, Goldsmith and Woisetschlaeger 1982). Dowty (1979: 179-80) distinguishes between interval statives and object-level statives (where the former are treated as stage-level predicates), and suggests that the progressive is a specialized means for expressing stage-level predication. Variants of this intuition have been expressed in the later literature. For instance, Smith (1991: 20) suggests that when the progressive combines with (object-level) lexical stative predicates, states are presented as “dynamic situations”.

- (11) a. Susan is liking this play a great deal.  
b. Peter is believing in ghosts these days.

De Swart (1998: 362-363) implements this idea by restricting the domain of the English Progressive; she treats it as a function mapping dynamic predicates (event and process predicates) to stative predicates. Whenever the progressive is composed with a stative predicate, a coercion operator applies in order to shift the type of the input predicate in order to satisfy the selectional requirements of the Progressive. Resultantly, we get the “dynamicized” reinterpretation of the stative predicate.

Deo (2009, 2015) provides a semantic analysis of the progressive that derives the temporal contingency inference from the semantics of the progressive and Gricean implicatures arising from interaction with the simple present tense in English and imperfective marking in other languages. Because that analysis is part of a larger picture delineating the connection between the imperfective and progressive aspects and their language-specific instantiations, I discuss it separately in §3.3. Before doing so, however, I will describe the current status of our understanding of imperfective morphology.

### 3.2. Imperfective morphology

As pointed out in the introduction, imperfective marking is used cross linguistically in descriptions of events in progress, states of affairs, habits, dispositions, and generalizations. In languages without tense distinctions, the same morphology is compatible with both present and past reference, which is determined in context. Rendille (East Kshitic, Kenya) illustrates a prototypical example of the imperfective–perfective contrast. Modulo context, the verb form *chiirta* (12-a) can be used to refer to events in progress and habits, both in the present and in the past. It can also be used for future reference. The contrast is with the perfective form *chiirte* (12-b), which is typically restricted and used to refer to single completed events in the past.

- (12) a. *khadaabbe chiirta*  
letter.PL write.IMPF  
He writes letters.  
He is writing letters.

He wrote letters. (characterizing habitual)  
 He was writing letters.  
 He will write letters.

- b. *khadaabbe chiirte*  
 letter.PL write.PFV  
 He wrote letters. (eventive) (Dahl & Velupillai, 2005, p. 267)

Gujarati (Indo-Aryan, India) also exhibits a similar pattern in which a periphrastic construction conveys a general imperfective meaning, as seen in (13).<sup>10</sup>

- (13) a. *niśā* (atyāre) *roṭli* **banāv-e** **ch-e**  
 N.NOM.SG now bread.NOM.SG make-IMPF.3.SG PRES-3.SG  
*Niśā is making bread (right now).* *event-in-progress*
- b. *niśā* (roj) *roṭli* **banāv-e** **ch-e**  
 N.NOM everyday bread.NOM make-IMPF.3.SG PRES-3.SG  
*Niśā makes bread (everyday).* *characterizing*
- c. *niśā* *navsāri-mā* **rah-e** **ch-e**  
 N.NOM.SG Navsari-LOC live-IMPF.3.SG PRES-3.SG  
*Niśā lives in Navsari.* *continuous*

A natural question that emerges from this crosslinguistically robust pattern is: what, if any, is the unified semantic core associated with imperfective marking that gives rise to precisely this set of readings? Three ways of approaching this question have been proposed in the literature.

1. One might take imperfective marking to realize a semantic operator that directly derives the various readings as a function of its meaning, the semantic properties of the arguments it combines with and ways in which contextual information is retrieved. This is the approach taken in Newton (1979), Bonomi (1997), Cipria & Roberts (2000), Lenci & Bertinetto (2000), Deo (2009), and Arregui et al (2014), who all posit a universal quantifier in the meaning of the imperfective operator. Ferreira (2004, 2005) and del Prete (2013) suggest an alternative approach in which the imperfective receives a simple Reichenbachian characterization and the distinct readings are derived from the assumption of lexical cumulativity, by which both singular and plural eventualities are taken to be in the denotation of lexical verbs.
2. One may take imperfective marking to carry a presupposition that the predicates in its scope are atelic (parallel to the treatment given to *for* adverbials). When this presupposition is not satisfied directly by the predicate that the imperfective combines with, coercion operators are introduced that trigger

<sup>10</sup>The pattern is also familiar from Romance where the Imperfect forms (Imparfait in French, Imperfecto in Spanish, Imperfetto in Italian) as well as present tense forms exhibit this range of readings.

partitive or iterative reinterpretations corresponding to the event-in-progress or habitual/generic characterizing reading. This is the approach outlined by De Swart (1998).

3. One may assign imperfective marking no meaning at all and assume that the semantic load of deriving the event-in-progress or the characterizing readings is carried out by covert operators PROG or HAB/GEN. Imperfective marking is then taken to be the reflex of the presence of these covert operators in the syntactic structure. This is the approach taken in Hacquard (2006).

As suggested in §2, if we take imperfectivity to be the presence of the subinterval property at the sentential level, then imperfective marking can be associated with this property in the ways outlined in (4): (A) It may be that the truth-conditional component of imperfective marking derives predicates that have the subinterval property (this corresponds to the approaches in (1) above). (B) It may be that imperfective marking presupposes subinterval reference for the predicates it combines with and that is its only semantic contribution. The relevant readings arise as a result of coercion operations that are triggered when the input does not satisfy the subinterval presupposition. The approach in (2) above which takes at least some imperfective marking to select for atelic predicates, considers this possibility. (C) Finally, it may be that imperfective marking is simply a syntactic reflex of a range of null operators and requires no further semantic specification (approach 3 above).

It is worthwhile to note that research that focuses on the semantics of imperfective aspect (in its language-specific instantiations) tends to adopt the perspective in (1). It is clear that an appropriate unified analysis for imperfective marking that does not employ coercion or other syntactically covert operations will be, by Occam's razor, more parsimonious than alternatives that do. I turn to the two sorts of approaches articulated with this broader perspective on imperfective meaning.

### 3.2.1. *Quantificational accounts of imperfective marking*

I will use the term IMPF-as-universal analysis to characterize the type of analysis contained in accounts where IMPF-marking is associated with a universal quantifier. The general property that unifies these accounts is that the characterizing reading of IMPF-marking is attributed to the quantificational force inherent to the imperfective aspect. What makes this an attractive solution is that the semantic contribution usually attributed to covert operators like GEN or HAB, is located in an overt piece of morphology.

Bonomi (1995, 1997) is the first detailed compositional treatment of the imperfective aspect in terms of universal quantification over times/eventualities.<sup>11</sup> Bonomi's approach to aspect-determined quantification can be illustrated with his treatment of bare past tense habitual sentences in Italian such as (14-a).

<sup>11</sup>The first instance of an IMPF-as-universal analysis is in Newton (1979), which analyzes verbal aspect in Greek. According to him, the indication of "indefinite repetition" (the characterizing reading, in our terms) associated with the Greek Imperfective can be accounted for by taking the logical structure of sentences containing these forms to involve a universal quantifier over times.

- (14) a. Leo giocava a golf  
 Leo play-IMPF golf.  
 Leo used to play golf. (Bonomi 1997: 485 (ex. 28a))
- b.  $\llbracket \text{IMPF}(\text{Leo-play-golf}) \rrbracket = \lambda i. \forall i' [\subseteq (i', i) \wedge \text{Cont}(i') \rightarrow \exists e [\text{Leo-play-golf}(e) \wedge >< (i', e)]]$  (pp. 487)
- c.  $\exists i [\subseteq (i, \text{now}) \wedge \forall i' [\subseteq (i', i) \wedge \text{Cont}(i') \rightarrow \exists e [\text{Leo-play-golf}(e) \wedge >< (i', e)]]]$

The logical form of (14-a) (factoring out tense information) is given in (14-b), and the actual logical form of the sentence is in (14-c). (14-c) says that there exists an interval before now such that every *Contextually* relevant interval within this interval coincides ( $><$  to be understood in the sense of temporal overlap) with an eventuality of John playing golf. The characterizing reading for (14-a) arises because of the universal quantifier ranging over the *Contextually* relevant subintervals of the reference interval.

Delfitto & Bertinetto (1995) and Lenci & Bertinetto (2000) offer similar quantificational analyses. This notion of quantification over contextually relevant intervals makes the imperfective parallel to quantificational adverbs like *always* and *often* or *generally*, which are analyzed as involving selective quantification over events or situations (e.g. De Swart 1991, Heim 1990, Von Stechow 1994, Krifka et al 1995). Deo (2009) discusses some problems that arise out of this sort of treatment. These include the following:

(A) IMPF-marked sentences which contain an explicit restrictor, nevertheless, tolerate exceptions, unlike sentences containing a universal quantificational adverb like *always*. For instance, (15-b) asserts that every contextually relevant interval/situation (such as a situation in which John wanted to get some exercise) is one in which he plays golf. The sentence would come out false if some such interval/situation involves John going swimming or jogging. (15-a), on the other hand, is compatible with such a situation.<sup>12</sup>

- (15) a. John plays golf for exercise.  
 b. John always plays golf for exercise.

The difference is also observed in languages with overt imperfective marking, as seen with the Hindi examples in (16). (16-a) is compatible with John swimming or jogging in order to get exercise in addition to regularly playing golf while (16-b) does not tolerate such exceptions.

- (16) a. John vyāyām pāne=ke liye golf  
 John.NOM.SG exercise.NOM.SG get.INF=GEN for golf.NOM.SG

<sup>12</sup>It is this exception-tolerating behavior of bare habitual/generic sentences that has led researchers to posit a covert dyadic operator GEN, with the structure and type of quantificational adverbs in the logical form of non-quantified characterizing sentences (Heim 1982; Farkas & Sugioka 1983; Carlson 1989; and the references in Krifka et al 1995).

**khel-tā                      hai**  
 play-IMPF.M.SG PRES.3.SG  
 John plays golf in order to get exercise.

- b. John                      vyāyām                      pāne=ke                      liye hameśā  
 John.NOM.SG exercise.NOM.SG get.INF=GEN for always  
 golf                      **khel-tā**                      **hai**  
 golf.NOM.SG play-IMPF.M.SG PRES.3.SG  
 John always plays golf in order to get exercise.

It is not clear how an IMPF-as-universal account that seeks to replace GEN can tackle the exception tolerating behavior of IMPF-marked characterizing sentences. An obvious solution to this would be to weaken universal quantification to generic quantification of the sort contributed by GEN (e.g. Lenci & Bertinetto 2000); however that considerably weakens the explanatory force of the IMPF-as-universal analysis. (B) Imperfective-marked (or unmarked) characterizing sentences are understood intensionally, as expressing non-accidental, temporally unrestricted generalizations (although their manifestation might be temporally restricted). The lack of any intensional component reflecting the temporal continuation of the characterizing situation makes an extensional IMPF-as-universal account such as Bonomi's inadequate for characterizing the contribution of the imperfective. This problem is addressed in all later IMPF-as-universal accounts, in which the modal component is simultaneously employed for capturing the intensional nature of characterizations and the Imperfective Paradox (Lenci & Bertinetto 2000, Cipria & Roberts (2000), Deo (2009)). (C) Finally, the IMPF-as-universal analysis breaks down in the presence of explicit quantificational adverbs that do not have coinciding quantificational force (e.g. *seldom*, *often*) (see Lenci & Bertinetto 2000 and Menendez-Benito 2002). That is, in a language with imperfective marking, such marking occurs not only in translational equivalents of sentences like *John plays golf* and *John always plays golf*, but also in translating *John often/seldom/never/sometimes plays golf*. This problem is also explicitly addressed in Deo (2009) to which I now turn.

The analysis in Deo (2009) is designed to not only capture the range of readings associated with the progressive but also to identify the similarities and the differences between the imperfective and the progressive operators.<sup>13</sup> This analysis differs from prior IMPF-as-universal analyses with respect to how it characterizes the domain of quantification for the universal quantifier in the meanings of the imperfective/progressive aspects. Rather than construe the domain as a set of contextually relevant intervals or situations, the domain is taken to be a regular partition of an interval.<sup>14</sup> The partition-measure (the length of each member of the regular partition) is a free variable with a contextually determined value. The range of readings associated with imperfective and progressive marking derive from this variability.

<sup>13</sup>I present here the implementation of the basic analysis as given in Deo (2015), which contains minor improvements to the original analysis from Deo (2009).

<sup>14</sup>A regular partition is a set of collectively exhaustive, non-overlapping, equimeasured subsets of some set (in this case, some subset of the real number line.)

The basic idea is that the imperfective operator introduces a super-interval  $j$  of the reference-interval  $i$  and lets the predicate (which may denote a set of eventualities or times) distribute over the cells of a “small-enough” partition  $\mathcal{R}^c$  of this interval. A “small-enough” regular partition over any interval is a regular partition where the value of the partition measure does not exceed some contextual threshold as determined by the measure of the partitioned interval and properties of the event description. This meaning is formally given in (17). COINCIDENCE is defined in (18). This definition of COINCIDENCE considers the instantiation of predicates in inertial worlds rather than only the actual world, thus accounting for the Imperfective Paradox.

$$(17) \quad \text{IMPF: } \lambda P \lambda i \lambda w. \exists j [i \subseteq_{ini} j \wedge \forall k [k \in \mathcal{R}_j^c \rightarrow \text{COIN}(P, k, w)]]$$

$$(18) \quad \text{COIN}(P, i, w) = \begin{cases} \forall w' \in \text{Hist}_{i_{\text{inr}}}(w) : \exists e [P(e)(w') \wedge \tau(e) \circ i] & \text{if } P \subseteq \mathcal{E}^{\mathcal{E}} \\ P(i)(w) & \text{if } P \subseteq \mathcal{I} \text{ or } \mathcal{E}^{\mathcal{I}} \end{cases}$$

The characterizing and the event-in-progress readings of the imperfective depend on the context in which an imperfective sentence is uttered.

- (19)    *nīśā*            *pujā*                    **kar-e**                    **ch-e**  
           N.NOM.SG prayer.NOM.SG make-IMPF.3.SG PRES-3.SG  
           Nīśā prays/is praying.

For instance, a Gujarati sentence like (19) may deliver the characterizing reading if the question in the context concerns Nīśā’s daily rituals in the morning. In this case, the reference interval and the super-interval  $j$  introduced by the imperfective will be rather long relative to the typical duration of a praying event (which might last between 15 and 45 minutes). This gives rise to the characterizing reading. If the question in the context concerns where Nīśā is at speech time (because I need her to help with the cooking, for example), the reference interval and the super-interval  $j$  introduced by the imperfective will be rather short, giving rise to the event-in-progress reading.

The analysis accounts for the exception-tolerance behavior of bare imperfective marked sentences like the one in (16-a) since the predicate is not required to coincide with every contextually relevant interval within some larger interval but rather with every small-enough part of some larger interval. In other words, it is perfectly fine to say (the translational equivalent of) *John plays golf* even though some contextually relevant intervals are such that he jogs or swims rather than playing golf. This is because imperfective marking only requires that golf-playing by John be instantiated at every small-enough part of the larger interval – i.e. it is regularly instantiated. It also accounts for why imperfective marking is compatible with quantificational adverbs of differing quantificational force. The treatment for such adverbs assumes that they denote quantificational relations between pairs of predicates that hold at temporal intervals. The restrictor of quantificational adverbs may be implicit and pragmatically recoverable from context, or from a focus-determined partition of the sentential material (Rooth 1985, 1992; Von Stechow 1995). For in-

stance, *sometimes* in combination with the untensed sentence radical *John-play-golf* can be taken to denote a set of intervals such that *some* contextually relevant subintervals of each interval are intervals at which John plays golf. These temporal predicates can straightforwardly combine with imperfective marking and yield the correct readings.

The IMPF-as-universal analyses presented above all treat imperfective marking as introducing a universal quantifier over intervals and differ with respect to the nature of the quantifier domain. Another set of analyses implement the IMPF-as-universal intuition by letting the imperfective quantify over situations (in the sense of Kratzer 1989), where the domain of quantification is determined by an appropriate accessibility relation. Cipria & Roberts 2000 introduce a situation-based IMPF-as-universal analysis in determining the semantic contribution of the Spanish Imperfecto. Arregui et al (2014) further explore this approach in investigating cross-linguistic variation in imperfectivity. In order to get the habitual/generic reading to fall out from the semantics, this type of analysis takes the accessibility relation to provide the set of *characteristic sub-situations* of a situation. The notion of a *characteristic sub-situation* is almost identical in spirit to the notion of a *contextually relevant subinterval* that Bonomi (1997) invokes. It is not clear if this type of approach to the imperfective can successfully deal with exception-tolerance and interaction with explicit non-universal quantificational adverbs – both of which are problems for Bonomi’s analysis.

### 3.2.2. Plurality-based analyses of imperfective marking

A common assumption made about verbs in natural language is that they denote event predicates that apply to both singular and plural events. In a mereological framework (Krifka 1989, 1992 1998, Landman 2000), the sum of any two events is also an event – a plural event. Thus, a verb like *smile* will contain in its denotation, not only singular events of smiling (for instance, an event *e* in which Mary smiles, and an event *e'* in which Peter smiles) but also plural events (such as the sum event  $e + e'$  in which Peter and Mary smile). Kratzer (2007) calls this assumption *lexical cumulativity*.<sup>15</sup> The lexical cumulativity assumption has implications for how we might want to derive iterative or habitual interpretations of verbs in sentences like *John coughed for an hour* or *John drinks coffee*. The idea, due to Kratzer (2003, 2007), is that lexical cumulativity makes it possible for verbs to have iterative interpretations without the help of any operators or plural marking on verb arguments. For instance, sentences in the simple tenses with singular arguments nevertheless may describe plural events, as evidenced by the habitual interpretation for the answers in (20).

- (20) What does this intern do?
- a. She guards a parking lot.
  - b. He cooks for an elderly lady.

<sup>15</sup>The meanings of verbs are thus sets of events that are closed under the sum operation.



- c. She waters a garden.
- d. He watches a baby.
- e. She cleans an office building.

A sentence like *He cooks for an elderly lady*, by lexical cumulativity, allows reference to a plural sum event, which contains more than one singular event whose agent is the intern under discussion and whose theme is a certain elderly lady. Crucially, the singular indefinite object in each case in (20) is interpreted as taking wide scope over the event quantifier. There is no distributive interpretation where different elderly ladies are being cooked for in different events.

Plurality-based accounts of imperfective marking locate the source of the characterizing interpretation in lexical cumulativity. Ferreira (2004, 2005) introduces the idea that the event-in-progress and characterizing interpretations of imperfective marking have to do with event plurality – event-in-progress readings involve existential quantification over singular events while habitual readings involve quantification over plural events. The imperfective operator applies to a predicate of eventualities  $P$  and yields the set of intervals that are subintervals of the runtime of some  $P$  event – a standard Reichenbachian semantics.<sup>16</sup>

$$(21) \quad \llbracket Imp \rrbracket = \lambda P \lambda t. \exists e[t \subseteq \tau(e) \ \& \ P(e)]$$

Two abstract operators  $sg$  and  $pl$  may apply to eventuality predicates (VP-denotations) yielding predicates of singular events and strictly plural events respectively.<sup>17</sup> If  $\llbracket Imp \rrbracket$  applies to  $sg(\llbracket VP \rrbracket)$ , then the resulting predicate denotes the set of subintervals of the time of an atomic eventuality. This gives us the event-in-progress reading. On the other hand, if  $\llbracket Imp \rrbracket$  applies to a plural predicate –  $pl(\llbracket VP \rrbracket)$ , the predicate returned denotes the set of subintervals of the runtime of a plural eventuality. Thus, the characterizing reading amounts to event plurality and depends on the number properties of the predicate in the scope of the imperfective. Del Prete (2013) also offers a similar analysis, based in a branching situation framework, but where characterizing readings are derived from the assumption that such sentences assert the existence of plural events whose runtime contains the reference interval.

The strongest argument in support of a plurality-based approach, and against an IMPF-as-universal approach is the behavior of singular indefinite objects in characterizing sentences. The argument runs like this: Suppose that imperfective marking does introduce a universal quantifier in the logical form. Then it is expected that indefinites in the syntactic scope of this quantifier can be interpreted as covarying with it – i.e. a narrow scope reading for the indefinite should be possible. The observation, however, is that in several cases, such arguments fail to covary and only receive a wide scope reading. For instance, (22-a) should allow for a narrow scope reading in which every contextually relevant interval within some larger interval or

<sup>16</sup>The full analysis introduces the modal component from Portner (1998) in order to account for the intensional aspect of the meaning but the essence of the idea can be conveyed without this element.

<sup>17</sup>Ferreira (2005: 97) assumes that  $sg$  yields predicates of atomic events but it is not quite clear what such atomic events would be in the case of atelic activity verbs like *run* or *swim*.

every cell of a small-enough regular partition of an interval coincides with an event in which John smokes a (different) cigarette. However, we only get the wide scope reading in which the same cigarette is understood as being smoked over and over again. This “same-participant effect” indicates that the imperfective does not introduce a universal quantifier; rather the iterativity must be a result of the fact that a plural predicate of eventualities is present in the logical form.

- (22) a. ?John smokes a cigarette. (Ferreira 2005: 102)  
 b. ?Peter bakes a cake.  
 c. John babysits three boys. (Ferreira 2005: 106)  
 d. John reads a book.

(22-a), on the plurality-based approach asserts that there is a plural event overlapping with speech time, which is a smoking event, whose agentive participant is John, and whose theme participant is a unique cigarette – predicting the oddity of the sentence. The effect is pervasive with verbs that describe events of creation and consumption (e.g. (22-a-b)) but it also occurs with a larger class of verbs. (22-c-d) also strongly imply that the described habit involves the same three boys and the same book respectively. Notice that overt quantificational adverbs do not give rise to such obligatory wide-scope interpretations for indefinites.

- (23) a. John sometimes/often/always smokes a cigarette.  
 b. Peter sometimes/often/always bakes a cake.

Del Prete (2013), also arguing for a plurality-based analysis of the imperfective describes similar effects with the Italian Imperfetto. (24-a) sounds odd, according to him, on the habitual reading, because it conveys that the same book was read over and over again during a period of time, while (24-b) with overt quantificational adverbs is fully acceptable.

- (24) a. ?in quel period Gianni leggeva un libro di filosofia  
 During that period Gianni read(Imp, 3sg) a book of philosophy  
 During that period, Gianni used to read a Philosophy book (ex. 2b).  
 b. in quel period Gianni leggeva sempre/spesso un libro di  
 During that period Gianni read(Imp, 3sg) always/often a book of  
 filosofia  
 philosophy  
 During that period, Gianni would always/often read a Philosophy  
 book (ex. 8).

The same-participant effect, as it stands, is a challenge for IMPF-as-universal analyses and any complete account for imperfective meaning that adopts this approach must explain the restricted quantificational interactions that obtain with in-

definite arguments.<sup>18</sup> But it must be noted that the scopal behavior is not as constrained as plurality-based approaches would predict it to be. Consider the examples in (25). In (25-a-b), the PPs *in her purse* and *for breakfast* provide additional information (although it is unclear that they can be treated as contributing quantifiers) that favors narrow scope interpretation for the indefinite objects. No such additional information is needed to make the indefinite in (25-c) have the narrow scope reading – John does not have to carry the same gun. Finally, in (25-d), the indefinite appears in subject position. It is enough that there be four guards protecting the castle at any given time; they need not be the same ones.

- (25)    a. Mary keeps a granola bar in her purse.  
           b. John eats three eggs for breakfast.  
           c. Peter carries a gun.  
           d. Four guards protect this castle.

The plurality-based approach predicts that the sentences in (25) are only acceptable under the same-participant, wide scope reading for the indefinite arguments and therefore must explain the availability of narrow scope readings in these contexts.

Finally, by eliminating a strong quantifier from the meaning of imperfective marking and bare habitual/generic sentences in general, the plurality-based approach takes all characterizing interpretations to be reducible to plural interpretations. This is in contrast to how characterization and habituality have been treated in the literature – as involving strong quasi-universal quantification. While this may turn out to be the right analysis, as it stands, it appears to provide rather weak truth-conditions for habitual/generic sentences, since plurality does not impose any requirement on how the individual events in the sum event may be distributed in time.

### 3.2.3. Summary

There are two ways to derive the readings associated with imperfective marking as a function of the meaning of the imperfective operator and the semantic properties of its arguments. The first is to assume that the imperfective introduces a universal quantifier that lets the event predicate in its scope distribute over each entity in the domain of quantification. The second is to assume that the imperfective contributes only the basic semantics of inclusion but the readings depend on the number properties of the event predicates in its scope. Event-in-progress readings arise when the predicate contains singular events, and characterizing readings arise when the predicate contains plural events. Both approaches face clear challenges and a fully satisfactory account of imperfective meaning must resolve these, probably by syn-

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<sup>18</sup>The same-participant effect is not restricted to habitual sentences (whether with overt imperfective marking or without) but also appears with *for*-adverbs, which have been taken to introduce universal quantifiers over sub-intervals (Dowty 1979; Moltmann 1991). Deo & Piñango (2011) treat this interpretive pattern in *for*-adverbs as a general effect of the vagueness of the entities in the domain of the universal quantifier.

thesizing ingredients from both analyses.

In §2, I suggested that a form-neutral, purely semantic characterization of imperfectivity should be the presence of the subinterval property at the sentential level. On all analyses of the imperfective described here, the output of the progressive or the imperfective operator is a temporal predicate that has the subinterval property regardless of whether the predicate it applies to has the subinterval property.<sup>19</sup>

- (26) a. **Bonomi (1997) (and others like it):**  $\text{IMPF}(P)$  is true at any interval  $i$  iff an event of type  $P$  overlaps with every contextually relevant subinterval  $i'$  of  $i$ . Thus, if  $\text{IMPF}(P)$  is true at  $i$ , it is entailed that for any subinterval  $i'$  of  $i$ , an event of type  $P$  overlaps with every contextually relevant subinterval  $i''$  of  $i'$ .  $\text{IMPF}(P)$  has the subinterval property regardless of whether  $P$  has the subinterval property.
- b. **Deo (2009, 2015):**  $\text{IMPF}(P)$  is true at any interval  $i$  iff there is a forward-extending super-interval  $j$  of  $i$  such that  $P$  coincides with every cell  $k$  of a “small-enough” partition of  $j$ . Thus, if  $\text{IMPF}(P)$  is true at  $i$ , it is entailed that for any subinterval  $i'$  of  $i$ , there is a forward-extending super-interval  $j$  of  $i'$  such that  $P$  coincides with every cell  $k$  of a “small-enough” partition of  $j$ .  $\text{IMPF}(P)$  has the subinterval property regardless of whether  $P$  has the subinterval property.
- c. **Ferreira 2005:**  $\text{IMPF}(P)$  is true at  $i$  iff there is a singular or plural event of type  $P$  and the time of this event contains  $i$ . Thus, if  $\text{IMPF}(P)$  is true at  $i$ , it is entailed that for any subinterval  $i'$  of  $i$ , there is a singular or plural event of type  $P$  and the time of this event contains  $i'$ .  $\text{IMPF}(P)$  has the subinterval property regardless of whether  $P$  has the subinterval property.

An alternative way to think about the relation between the subinterval property and imperfective aspect could be to assume that the subinterval property (or divisive reference) must hold of the predicate that the imperfective combines with – i.e. the imperfective presupposes that the predicate  $P$  it applies to has the subinterval property and outputs a subinterval of some interval at which  $P$  holds. This is the question raised in (4-b). Such a meaning, which hasn’t been proposed explicitly yet by any one, although de Swart (1998) is close in spirit, would look like something in (27).<sup>20</sup>

$$(27) \quad \text{IMPF: } \lambda P \lambda i : \text{DIV}(P). \exists e [i \subset \tau(e) \ \& \ P(e)]$$

<sup>19</sup>The exception is for analyses based in situation semantics, where the imperfective outputs a predicate of situations with divisive reference.

<sup>20</sup> $\text{DIV}(P)$  simply means that  $P$  has divisive reference. A promising definition of divisive reference for eventuality predicates that is suitable for characterizing imperfective meaning is in terms of *stratified subinterval reference* along the temporal dimension (Champollion (2010)). The effect of the stratified subinterval reference condition is very close to that obtained from Deo’s regular partition-based proposal. Space and goal considerations prevent further development of this idea here.

(28) nišā            be roṭli            **banāv-e**            **ch-e**  
 N.NOM.SG two bread.NOM.SG make-IMPF.3.SG PRES-3.SG  
 Nišā *is making* two roṭis. *event-in-progress*  
 Nišā *makes* two rotis (for her lunch). *characterizing*

Deo (2009, 2015) takes a different perspective on the source of crosslinguistic variation. According to her, the difference between the progressive and the imperfective lies in whether the domain for the universal quantifier is a regular partition of the reference interval (in the case of the progressive) or a superinterval of the reference interval (in the case of the imperfective).

21

- b. PROG:  $\lambda P \lambda i \lambda w. \forall j [j \in \mathcal{R}_i^c \rightarrow \text{COIN} (P, j, w)]$

What motivates this choice of parameter for characterizing the distinction is the *temporal contingency* puzzle, discussed in §3.1.2. The observation is that in languages which have distinct progressive marking (e.g. Hindi, Turkish, Spanish), the use of the progressive with lexical stative predicates gives rise to an inference of temporal contingency – it implies that the situation described is temporary and subject to change.

- (30) a. Mary is living in San Francisco.  
 b. Susan is liking this play a great deal.  
 c. Peter is believing in ghosts these days.

In addition to lexical stative predicates, progressive marking also appears with eventive predicates and may give rise to a characterizing reading (with temporal contingency effects) – as in (31).<sup>22</sup>

- (31) a. Mary *was biking* to work until she bought a car. *Characterizing*  
 b. Mary *was baking* cookies to make ends meet. *Characterizing*

Deo argues that if progressive marking is taken to make the claim that the eventuality predicate is distributed over parts of the reference interval (rather than a super interval thereof), the temporal contingency inference can be derived as a pragmatic outcome of the interaction between exponents of the progressive and imperfective operators. The basic idea is as follows: Suppose that for some predicate  $P$ ,  $P$  is expected to obtain over an indefinite interval surrounding the reference interval (e.g. Mary is expected to live in San Francisco over an indefinite interval of time). Then the speaker should choose the imperfective marker rather than the progressive marker in conveying the proposition. By using the progressive, the speaker restricts their claim to the reference interval, implying that the situation may not hold beyond this interval.<sup>23</sup>

A plurality-based approach to the progressive and imperfective operators is unable to account for the temporal contingency puzzle in languages like English since the design of the analysis allows the two operators to vary only along the parameter of number. There is no further parameter that can be manipulated to distinguish between the English Progressive and the Romance Imperfect since both are taken to realize the number neutral *Imp* operator.

<sup>22</sup>This observation has been also made in Leech 1970, Comrie 1976, Dowty 1979, Goldsmith and Woisetschlaeger 1982 among others.

<sup>23</sup>This characterization of the difference between the progressive and the imperfective also has diachronic implications. It is able to explain why cross-linguistically, progressive marking develops into imperfective marking over time, while a shift in the opposite direction is not attested.

### 3.4. Counterfactual uses of imperfective marking

Yet another crosslinguistic generalization about imperfective marking is that such marking is often used in counterfactual statements. Consider the examples in (32) from Greek and (33) from Hindi.

- (32) a. an eperne           afto to siropi θa   y<sub>1</sub>ini                   kala  
if take.PST.IMP this syrup   FUT become.PST.IMP well.  
If he took this syrup, he would get well. (Iatridou 2000: 234)
- b. An ton aypause       θa   itan poli eftiχ<sub>1</sub>ismeni  
if him love.PST.IMP FUT was very happy.  
If she loved him ,she would be very happy. (Iatridou 2000: 255)
- (33) agar Yusuf   lambā ho-tā       to   us-ko   yeh naukṛī mil jā-tī  
if Yusuf.M tall   be-IMPF.M then he-DAT this job.F find go-IMPF.F  
If Yusuf had been tall, he would have gotten this job. (Bhatt 1997, repeated  
in Iatridou 2000: 258)

Iatridou (2000) observes that in any language in which the imperfective marker is distinct from a progressive marker, counterfactual meaning is always expressed by the imperfective marker and never by the progressive marker. In her words:

...if the sameness of form of the verb in ongoing events and in generics suffices to tempt us in the direction of reductionist accounts, then the sameness of form of the verb in generics and CFs [counterfactuals] should compel us much more. The reason is very simple: the languages in which ongoing events and generics share the same form are a subset of the languages in which generics and counterfactuals share the same form. (Iatridou 2000: 259)

Iatridou's explanation for this formal organization of linguistic systems is that imperfective aspect uniformly conveys that the temporal trace of the eventuality in the scope of the imperfective cannot be located with reference to the utterance time.

- (34) When the temporal coordinates of an eventuality are set with respect to the utterance time, aspectual morphology is real; the temporal coordinates of an eventuality are not set with respect to the utterance time, morphology is always Imp[erfective]. (Iatridou 2000: 262)

The idea is that neither in the case of habitual/generic characterizing statements nor in the case of counterfactuals can a specific eventuality be referenced whose temporal coordinates are locatable. It is this shared property that is signaled by imperfective morphology. This idea

Iatridou does not reconcile this use of the imperfective morphology with its presence in sentences describing events in progress. Any fully unified analysis of the imperfective must undertake this three-way reconciliation of form and meaning.

#### 4. Pluractionality and iterativity

Characterizing readings of imperfective markers often convey that there is an iteration of multiple events of a certain type in time, an effect that is also associated crosslinguistically with specialized devices for marking iteration and pluractionality. In this section, the question of whether such devices should be considered varieties of imperfective marking is considered. This possibility hinges on whether the presence of such devices can be reliably associated with the presence of the subinterval property at the sentential level – since that is the definition for imperfectivity assumed here.

Pluractionality, a term introduced by Newman (1980), is used to describe phenomena in which overt marking is employed to describe a multiplicity of events in space and time. Such marking may indicate event plurality as obtaining from repetition within a circumscribed spatio-temporal region, from distribution over time, or from realization by multiple participants. Cusic (1981) distinguishes between *event-internal* pluractional expressions, which allow the description of repeated events that are spatio-temporally contiguous, and *event-external* expressions, which are used in the description of repeated events that may occur discontinuously in space and time. The contrast is illustrated in (35) with examples from Yurok. The REPitive in (35-a) instantiates event-internal pluractionality – an event composed of multiple sub-events of cutting (so that the bread is sliced). (35-b), with an iterative marker (ITR), illustrates event-external pluractionality – events of getting a cold occur discontinuously and are spread over several winters.

- (35) a. **Tekwtek'**weses ku popsew!  
           cut.REP.IMP     ART bread  
           Cut up the bread! (Wood 2007: 153)
- b. Kipun kwegeskwes-ek  
           winter have.a.cold.ITR-1sg  
           In the wintertime, I have a cold. (Wood 2007: 146)

Pluractional marking of both kinds is robustly attested in the world's languages, and is especially common in the languages of Africa and the Americas. From our perspective, the question is whether such marking is closer to eventuality modification that derives eventuality predicates with certain number (and relatedly aspectual) properties or whether it gives rise to imperfective aspectual reference.

Henderson (to appear) presents a list of semantic parameters that distinguish between event-internal and event-external pluractionals based on a synthesis of prior literature (notably Cusic 1981, Wood 2007). By these parameters, event-



internal pluractionals seem to have the behavior and semantic effects of eventuality modifiers. For instance, unlike inflectional aspect markers, event-internal pluractionals tend to be sensitive to the aspectual properties of stems that they combine with (preferential combination with semelfactives and achievements). Sentences with an event-internal pluractional often fail to entail a minimally different sentence without the pluractional morphology suggesting that the eventuality descriptions in the two expressions might have different denotations. Event-internal pluractionals also fail to allow characterizing readings associated with imperfective aspect, while event-external pluractionals do.

We focus therefore on the class of event-external pluractional markers, which are potential candidates as “imperfectivizers”. Such marking may sometimes be used to describe habits and generalizations. Cusic (1981) makes reference to occasion-level pluractionality which involves the repetition of an event on separate occasions. Consider the infixal Iterative in Yurok, which Wood (2007) says is usually glossed as ‘regularly’ or ‘often’.

- (36) a. **negep-ek'** nepuy  
eat.ITR.1sg salmon  
I eat salmon all the time. (Wood 2007: 146)
- b. yok **legaayo'** ku mewihl  
here pass.ITR ART elk  
The elk come through here. (Wood 2007: 146)

Should such a marker be considered an imperfective marker in the language? Notice that the sentences above, translated in the simple present tense, do seem to have the subinterval property. However, there are uses in which the infixal Iterative makes reference to completed events. In (37), for instance, although there are repeated events, involving plural participants, the sentences appear to lack the subinterval property. If (37-a) is true on one of its readings at some interval *i* (say, the speaker made several payments within *i*), it does not follow that each *i'* in *i* is also an interval in which the speaker made several payments.

- (37) a. ma **negahchk-ek'**  
PST pay.ITR-1SG  
I paid to more than one person/I made several payments. (Wood 2007: 159)
- b. syegahlk-oy-ek'  
kick.ITR-PASS-1SG  
I was kicked by each of them, one at a time. (Wood 2007: 159)

The use of pluractional markers to describe iterated events over time does not necessarily correspond to the presence of the subinterval property – the sentence may be construed as perfective. Henderson (to appear) offers a case-study of Kaqchikel in which the iterative marker *-løj* appears with both incomplete (ICP) and complete

(COL) aspectual marking and gives rise to distinct interpretations.<sup>24</sup> Incomplete marking with *-løj*-marked verbs appears to signal habits in the present (38-a) while complete marking with *-løj*-marked verbs may give rise to past habitual (38-b) or episodic (38-c) readings.

- (38) a. La achin la' n-Ø-xub'an-aløj  
           that man there ICP-A3S-whistle-løj  
           That man is always whistling.
- b. Ojër kan x-ich'ar-aløj  
      before DIR CPL-A1S-split.wood-løj  
      I used to split wood.  
      SPEAKER COMMENT: like as a profession
- c. X-Ø-tz'am-aløj ri säqmolo'  
      CPL-A3S-take-PAS-løj the eggs  
      The eggs were taken over time  
      SPEAKER COMMENT: It's like you're selling eggs at the market and  
      they were sold a few at a time all afternoon until gone.

While much work takes pluractionals to be verb-level operators (Lasersohn 1995, van Geenhoven 2004, Laca (2006) in addition to the references already mentioned), there is research that suggests that at least some such markers are best analyzed as instantiating aspectual operators above the VP level. Iordachioaia and Soare (2015) make such a case for the Romanian supine nominalization. At this time, there is no close investigation of the relation between imperfective and pluractional marking. The availability of characterizing, habitual readings for pluractionals does not by itself indicate that such marking is imperfectivizing since the resulting predicate need not have the subinterval property. A detailed investigation of the interaction between pluractional marking and grammatical aspect marking in languages which contain both types of devices, together with the study of discourse-level effects of such marking (such as those described in §2) would be critical to determining whether and how imperfective (subinterval) reference might be effected via pluractional marking.

## 5. Concluding remarks

Imperfectivity amounts to the presence of the subinterval property, a semantic property that can be identified without necessary reference language-particular devices. This assumption allows us to understand the contribution of language-specific devices that are said to signal imperfective meaning. Such devices may have specific

<sup>24</sup>Henderson (p.c.) suggests that incomplete/complete marking likely signals imperfective/perfective aspect. He also notes that event-external pluractionals appear freely with both aspectual markers.

meanings (e.g. progressive markers) or they may be more general in nature. The range of uses of the general imperfective marking have led researchers to either search for the shared semantic core that gives rise to the distinct uses or to posit simpler meanings that, in conjunction with null operators, derive the desired range of uses. A fully unified analysis that can account for counterfactual, characterizing, and event-in-progress readings associated with imperfective marking does not yet exist and it is an open question if such an analysis is possible or desirable. Another open question is the connection between event-external pluractional markers and imperfective morphology and the relative contribution of these in languages where they may cooccur.

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