The Semantic Ingredients of Imperfectivity in Progressives, Habituals, and Counterfactuals

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Abstract This paper develops a unified analysis for the meaning of imperfective aspect that covers progressives, habituals, and counterfactuals, aiming at an understanding of two cross-linguistically frequent syncretisms: one between progressives and habituals, and one between habituals and counterfactuals. I first discuss progressive and habitual readings in detail, identifying mereological, temporal and modal ingredients in both interpretations. My claim is that the temporal and modal ingredients are the same, and I propose to differentiate these readings in terms of verbal plurality: progressives are about singular events, and habituals are about plural events. I then extend the analysis to stative predicates, which I analyze as uncountable mass-like verbal predicates, noticing that imperfective statives tend to be formally similar to imperfective habituals. This paves the way to an analysis of the role of habitual morphology in counterfactuals. I argue that the imperfective operator is attached to a modal/stative predicate in these constructions, and that counterfactuals are about world states holding at the utterance time.

1 Introduction

Imperfective aspect has been associated with two types of interpretation or readings (see, for instance, Comrie 1976). On the one hand, there is a progressive reading, according to which a certain event is going on at some reference time. This is exemplified by the English periphrastic *be+V-ing* construction:

(1)   John is smoking a cigarette.

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On the other hand, there is a habitual reading, which conveys successive, non-accidental occurrences of a certain event type. This is can be illustrated by English eventive predicates in the simple present:

(2)   John smokes.

It is a well-known fact that many languages use the same verbal forms to convey both progressive and habitual readings. The examples below are from Greek and Italian:

(3)   eperne   to farmako
        take-past-imp the medicine
        'He was taking the medicine/He used to take the medicine.'

(4)   Gianni fumava.
        Gianni smoked-imp
        'Gianni was smoking/Gianni used to smoke.'

This sameness of form has led many researchers to develop unifying analyses that seek to find a common core underlying these readings and assign it to the lexical entry of an aspectual, imperfective operator (see Bonomi 1997, Cipria and Roberts 2000, del Prete 2013, Deo 2009, Ferreira 2004, 2005b, among others).

   A second, lesser-known cross-linguistic fact about imperfective aspect is that it is commonly found in counterfactual constructions of many languages. This fact has been pointed out and analyzed by Sabine Iatridou (Iatridou 2000, 2010), as part of her study of the grammatical ingredients of counterfactual constructions (CFs). What is particularly surprising, and this was one of Iatridou's points, is that imperfective marking in CFs seems to be "fake", i.e., it does not convey what it does outside CF contexts, as shown below (from Iatridou 2010, p. 6):

(5)   An pandrevotan   mia prigipisa, tha esoze   tin eteria
        if marry-pst/-imp a   princess, FUT save-pst-imp his firm
        'if he married a princess, he would save his company'

As Iatridou remarked, the crucial point here is that these examples "are not interpreted as progressive or habitual/generic. The events talked about are understood as culminated, i.e. as if they were marked with the perfective" (Iatridou 2010, p. 6).

   Equally surprising is the fact that in languages in which progressives and habituals are marked differently, CFs pattern with the latter, not the former, as shown by the Hindi examples below (from Bhatt and Pancheva 2005, p. 2):

(6)   *-taa* habitual marker as counterfactual marker: OK

        agar Mona yahā: aa-tii,   to   me us-ke-saath fot.o khichvaa-taa
        if   Mona.f here come-Hab then I   her-with   photo draw.caus-Hab
        'If Mona had come here, I would have had a picture taken with her.'

(7)   *rahaa* progressive marker as counterfactual marker: not OK

        agar Mona yahā: aa   rahii hai   to Sona-bhii aa-egii
        if   Mona.f here come Prog.f be.Prs then Sona.f-also come-Fut.f
        'If Mona is coming here, then Sona also will.'
        *'If Mona came here (which she won't), then Sona also would.'

In Iatridou's words: "I have not been able to find a language where CFs and progressives are formally alike with generics/habituals marked differently" (Iatridou 2010, p.6).

This generalization had not been taken into consideration in previous unifying approaches, although it should have been, since, as Iatridou herself remarks, the languages in which habituals and counterfactuals are marked alike constitute a superset of the languages in which progressives and habituals are marked alike. If sameness of form is a legitimate motivation for a unifying approach in the first case, she adds, it would be even more so in the second.

The goal of this paper is to develop a unified analysis for the meaning of imperfective aspect that covers progressives, habituals, and counterfactuals, and to explain both syncretisms presented above, namely, the one between progressives and habituals, and the one between habituals and counterfactuals. Moreover, I seek to explain the apparent lack of some of the hallmarks of imperfectivity, including its apparently "fakeness" in CFs, as a byproduct of the interaction between a unified imperfective operator and the surrounding material in the syntactic structure of imperfective sentences.

The paper is organized as follows: In Sect. 2, I discuss progressive and habitual readings in detail, identifying mereological, temporal and modal ingredients in both interpretations. I claim that the temporal and modal ingredients are the same and propose to differentiate these readings in terms of verbal plurality: progressives are about singular events, and habituals are about plural events. I then extend the analysis to stative predicates, which I analyze as uncountable mass-like verbal predicates. I point out that imperfective statives tend to be formally similar to imperfective habituals, and show how my system can account for this generalization. A parallel is established to a generalization made by Chierchia (1998) with respect to nominal quantifiers: there are quantifiers for mass and plural nouns that exclude singulars, but there are no quantifiers for mass and singular nouns that exclude plurals. The imperfective operator being a quantifier over events, the expectation is that there should be no such operator that accepts statives and singular event predicates, excluding plural ones. I also propose an explanation for why imperfective morphology seems to lack its typical ingredients when it appears on stative predicates. This paves the way to the analysis of the role of habitual morphology in counterfactuals in Sect. 3. I argue that the imperfective operator is attached to a modal/stative predicate in CF constructions, and that CF modals are about world states holding at the utterance time. Since I am assuming that CFs are constructions in which Imp is attached to a stative predicate, CF Imps should never pattern with progressives, explaining Iatridou's generalization. I also suggest that perfective morphology is excluded from CFs, due to a crosslinguistic ban on present perfectives. Section 4 summarizes the main ideas put forward in the paper.

2 Progressive and habitual imperfectives

This section is devoted to similarities and differences between progressive and habitual readings traditionally associated with imperfective morphology. It is proposed that imperfective operators are built by combining three types of semantic ingredients: mereological, temporal, and modal. It is argued that progressive and habitual readings share the same temporal and modal ingredients, but differ in their mereological profiles, with the former being about singular events and the latter about plural events. We also discuss how imperfective operators interact with stative predicates and adverbs of quantification.

2.1 The Mereological ingredients of imperfectivity

As will be discussed more formally in the next section, imperfectivity is related to ongoingness. Thus, if (8) is true, then right at the utterance time (contributed by the present tense) John should be in the process of smoking a cigarette.

(8)   John is smoking a cigarette.

Things are somewhat different with habitual sentences:

(9)   John smokes.

For (9) to be true, John does not have to be smoking right at the utterance time. Rather, at a first approximation (and ignoring modal issues for the moment), what the truth of (9) seems to require is an ongoing sequence of events of John smoking that started in the past and is expected to continue in the future. In other words, John should have smoked at least once in the past and is expected to do so again in the future. I will capitalize on this intuition and propose that as far as ongoingness is concerned, there is no contrast between progressive and habitual readings. Rather, I claim that the difference between these readings has to do with event plurality: progressive readings involve quantification over singular events, whereas habitual readings involve quantification over plural events.[1] In what follows I spell out the mereological notions underlying this claim.

The idea of taking event plurality as a semantic ingredient of habituality is not new. It appears briefly in Krifka et al (1995, pp. 39-40) as part of a discussion about indefinites in habitual sentences. The oddness of sentences such as (10) is attributed to the fact that they involve quantification over "sum situations".

(10)   Mary smokes a cigarette.

According to the authors, the presence of a singular indefinite would convey the unusual scenario of Mary smoking the same cigarette over and over again. Even more relevant to the present paper is Kratzer's (2003; 2007) extensive discussion of verbal plurality. Although Kratzer does not propose a lexical entry for the habitual operator, her discussion of examples similar to (10) explicitly associates habituals and event plurality, and provides the necessary ingredients for a compositional implementation. What follows can be seen as an attempt at integrating her ideas into a more general theory of imperfectivity.

Let us start by assuming that the domain of events contains pluralities, and that plural events are mereological sums having other events as their proper parts. Still following Kratzer (2003, 2007), let us assume that lexical eventive predicates are cumulative (closed under sum formation) and that VP denotations can have plural events as their members.

I also assume that all eventive predicates – accomplishments, activities, and achievements – are countable and have minimal elements in their denotations. In this respect we depart from Bach (1986), who takes atelic predicates (statives and activities) to be the verbal counterpart of mass nouns, and telic predicates (accomplishments and achievements) to be the verbal counterpart of count nouns. We acknowledge the fact that activities (such as *run* or *smoke*) are homogeneous in the sense that if John ran from 8 to 10, what he did during that time, say from 9:15 to 9:45, can also be described as *running*. However, Rothstein (2004) discusses count nouns such as *fence, line, sequence, twig*, which seem to be homoge-

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[1] At this point, I restrict my attention to events and eventive predicates. States and stative predicates will be discussed in Sect. 2.5.

neous in a similar sense: a straight line, for instance, can be divided into smaller pieces that can also be described as *lines*. According to her, what is peculiar about these count nouns is that their atomicity – the criterion for what counts as an atom – is context dependent. In this regard they differ from other count nouns, such as *dog*, which are naturally atomic.

Although I will leave many issues related to this topic open, the line I will pursue here is that activities are countable, but not naturally atomic, whereas accomplishments are both countable and naturally atomic. It should be clear that this does not mean that subparts of an event of John smoking, for instance, cannot also be considered events of John smoking under any criterion. What it does mean is that *at a certain given context*, an activity and some proper part of it will not both be members of a VP denotation. Thus, in a situation in which John started smoking at 8:05 and finished at 8:15, took a nap, and started smoking again at 9:00, finishing at 9:10, one would say that he smoked twice, referring to these two 10-minute events, and ignoring, for counting purposes, their sub-events. For concreteness, we will assume here that the atoms in an activity VP denotation can be identified as maximal temporally convex stretches of some type of underlying action, such as inhaling/exhaling smoke in the case of smoking or moving one's legs in a certain way in the case of running.[2]

Having assumed this much as background, we now postulate two abstract operators – *sg* and *pl* – whose meanings are intersective, extracting certain elements from a predicate denotation based on some mereological criteria. The *sg* operator takes a set of events and returns a subset with its minimal elements:

(11) $sg = \lambda P.\lambda e.\, min(e, P)$
$min(e, P) \iff P(e) \,\&\, \neg\exists e' < e : P(e')$

The *pl* operator takes a set P and extracts the homogeneous sums in P. These are the sums that can be partitioned into non-overlapping proper parts that are also in P:[3]

(12) $pl = \lambda P.\lambda e.\, sum(e, P)$
$sum(e, P) \iff P(e) \,\&\, \exists e_1, e_2, ..., e_n < e : P(e_1) \,\&\, P(e_2) \,\&\, ... \,\&\, P(e_n) \,\&$
$\bigotimes(e_1, e_2, ..., e_n) \,\&\, e = e_1 \oplus e_2 \oplus ... \oplus e_n$[4]

As an initial illustration, consider a scenario in which only three events – e_1, e_2, e_3 – of John smoking have happened. In this case, we would have the following denotations for the bare VP *John smoke-* and its singular and plural versions: [5]

(13) $[\![VP]\!] = \{e_1,\, e_2,\, e_3,\, e_1 \oplus e_2,\, e_2 \oplus e_3,\, e_1 \oplus e_3,\, e_1 \oplus e_2 \oplus e_3\}$
$sg([\![VP]\!]) = \{e_1,\, e_2,\, e_3\}$
$pl([\![VP]\!]) = \{e_1 \oplus e_2,\, e_2 \oplus e_3,\, e_1 \oplus e_3,\, e_1 \oplus e_2 \oplus e_3\}$

Going back to imperfective readings, and putting aside temporal and modal ingredients, the idea is that given a predicate P of events, progressive readings express the existence of a "singular" P-event, whereas habitual readings express the existence of a "plural" P-event:

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[2] For detailed discussion of related issues, see Rothstein (2004) and references therein

[3] This definition is very similar to what Kratzer (2007) proposed for capturing the iterative reading associated with certain uses of *for* adverbials, and is also, I believe, in the spirit of her discussion of habitual sentences.

[4] The expression $\bigotimes(e_1, e_2, ..., e_n)$ means that the events $e_1, e_2, ..., e_n$ are pairwise disjoint (non-overlapping).

[5] For easy of exposition, I use sets instead of their characteristic functions in these examples.

(14)   *Progressive reading*
        $... \exists e : ... sg(P)(e) ...$

(15)   *Habitual reading*
        $... \exists e : ... pl(P)(e) ...$

We can now see why VPs containing singular indefinites, such as in *John smokes a cigarette*, give rise to the 'same-participant-effect' in habitual readings, as noted by Krifka et al (1995) and Kratzer (2003, 2007):

(16) $[\![\text{VP}]\!] = \lambda e. \exists x : cigarette(x) \ \& \ smoke(e, j, x)$

Since singular indefinites introduce variables over atomic individuals, every event plurality in the denotation of the resulting VP – (pl($[\![\text{VP}]\!]$) – will be a sum of events of John smoking a cigarette. Moreover, the event sum itself will be an event of John smoking a cigarette. Assuming that formulae such as $smoke(e,x,y)$ always imply that x and y are the maximal individuals filling the respective thematic roles (agent and patient in this example) in e, we can conclude that John must have smoked the same cigarette at every part of e.[6] Interestingly, similar results carry over to cases involving cardinal indefinites, as in (17), constructed after a related example with a singular indefinite due to Kratzer:

(17)   Mary babysits five children.

The crucial point in this case is that each one of the five children needs to be babysat by Mary more than once. To see how we arrive at this result, consider first the denotation of the bare VP:

(18) $[\![\text{VP}]\!] = \lambda e. \exists X : |X| = 5 \ \& \ children(X) \ \& \ babysit(e, m, X)$

Imagine that there are five children that Mary has babysat only once (each). Let e be the sum of these five babysitting events (e_1, e_2, e_3, e_4, e_5). Notice now that e is in the denotation of the bare VP, but its proper parts are not, since they are not events of Mary babysitting five children. As a result, e will not be in the denotation of the pluralized VP (pl($[\![\text{VP}]\!]$). The only way for an event of Mary babysitting five children to be partitioned into proper parts that are also events of Mary babysitting five children is if Mary babysits each of the children more than once. This is what (17) requires.[7,8]

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[6] Thanks to a *NALS* reviewer for clarifying the role of this maximality assumption in the derivation of the 'same-participant-effect'.

[7] Here too, as in the case of singular indefinites above, we assume that formulae such as $babysit(e,x,y)$ always imply that x and y are the maximal individuals filling the respective thematic roles in e.

[8] Things are different when cardinal DPs appear in progressive sentences:

(i)   John is writing four papers.

As predicted by our proposal, this sentence can convey the existence of a single (minimal) ongoing sequence of four paper-writing events. As will become clearer when we discuss the modal ingredients of imperfectivity, some assumptions about John's intentions need to be established for the sentence to be felicitous and true. For instance, imagine that last semester, John made his academic plans for the present semester very clear by telling everybody that he would write four papers. We are now at the middle of the semester; John has already written two papers, is about to start the third, and still intends to write the fourth paper before the end of the semester. In this scenario, in which the writing of each paper is clearly part of a bigger, multi-part project, the progressive sounds fine. The same would apply to cases with plural definites, as in the sentence below, uttered when John has already reviewed two of the papers and is expected to review the other two:

(ii)   John is reviewing the papers he wrote last semester.

Notice that things become different when bare plurals replace the singular indefinite:

(19)   Mary smokes cigarettes.

This sentence is compatible with scenarios in which Mary smokes different cigarettes at different occasions. This is possible because events of Mary smoking cigarettes can be partitioned into proper parts that are themselves also events of Mary smoking cigarettes, even if no cigarette is smoked more than once.[9]

2.2 The Temporal Ingredients of Imperfectivity

The core temporal ingredient of imperfectivity is ongoingness. It is connected to the idea of presenting an event as being in progress at a certain time interval. It contrasts with perfectivity, which is connected to the idea of presenting an event as completed and located within a certain time interval. The contrast can be illustrated with the following pair of sentences:

(20)   John was smoking a cigarette (when I met him).

(21)   John smoked a cigarette (yesterday).

Both sentences describe events of John smoking a cigarette, and both seem to be about the past. However, they differ in an important respect: the sentence with the progressive presents the event of John smoking a cigarette as ongoing at a particular point in the past, whereas the sentence with the simple past presents the event of John smoking a cigarette as completed and located within a larger past interval (yesterday).

To start formalizing these intuitions, let us assume that verb phrases (VPs) are syntactically dominated by aspectual phrases (AspPs), which in turn are dominated by tense phrases (TPs), as in the following simplified clausal skeleton:

(22) $[_{TP}$ T $[_{AspP}$ Asp $[_{VP} \ldots V \ldots]\,]\,]$

Bare VPs are predicates of events, and therefore denote (characteristic functions of) sets of events.

(23) $[\![$John smoke- a cigarette$]\!]$ = $\lambda e.\ e$ is an event of John smoking a cigarette

Asp heads denote aspectual operators. These operators turn predicates of events into predicates of time intervals. They bind the event variable and introduce a *reference* or *topic interval* related to the running time of the event described by the verb phrase (Klein (1994), Kratzer (1998)). Perfective (Pfv) and Imperfective (Imp) are two such operators. As far as the temporal ingredients of a sentence is concerned, the only difference between them is that the former requires the event time to be included in the reference time, whereas the latter requires the reference time to be included in the event time, as shown below (definitions taken from Kratzer (1998)):

(24) $[\![$Pfv$]\!]$ = $\lambda P.\ \lambda i.\ \exists e : \tau(e) \subset i$ & $P(e)$

For discussion of progressive sentences with quantified DPs, see Hallman (2009).

[9] The progressive counterparts of this type of sentence will be discussed in Sect. 2.6. At that point, I will also discuss cases of progressive sentences such as *John is writing good papers*, which seem to involve event plurality, and compare them with minimally different habitual sentences such as *John writes good papers*.

(25) $[\![\mathrm{Imp}]\!] = \lambda P.\, \lambda i.\, \exists e : i \subseteq \tau(e)\ \&\ P(e)$

As for the reference interval, we can assume that it is related to the speech time by a Tense head, which can be taken to denote a contextually salient time interval (Partee 1973, Heim 1994).

(26)   Present and Past tenses (g is an assignment function)

a. $[\![\mathrm{pres}_i]\!]^g = \begin{cases} g(i) & \text{if } g(i) = \text{speech time} \\ \mathit{undefined} & \text{otherwise} \end{cases}$

b. $[\![\mathrm{past}_i]\!]^g = \begin{cases} g(i) & \text{if } g(i) < \text{speech time} \\ \mathit{undefined} & \text{otherwise} \end{cases}$

Assuming now that the progressive morphology (*be+V-ing*) is the spell-out of the Imp operator, and that the English Simple Past (V-ed) on eventive verbs can be the spell-out of a Past T head plus a Pfv operator, we get the following truth conditions for our sentences (obtained via Functional Application):

(27)   John smoked a cigarette.
        [$_{TP}$ Past$_1$ [$_{AspP}$ Pfv [$_{VP}$ John smoke a cigarette]]]
        'An event of John smoking a cigarette is included in a salient past interval.'

(28)   John was smoking a cigarette.
        [$_{TP}$ Past$_1$ [$_{AspP}$ Imp [$_{VP}$ John smoke a cigarette]]]
        'An event of John smoking a cigarette was going on at a salient past interval.'

What about habitual sentences, such as (29), which we assumed to express the existence of a plurality of events of John smoking?

(29)   John smokes.

Events, singular or plural, are located in time. To accommodate plural events, we assume that time intervals can also be singular or plural, and that the following holds (τ being a function mapping events to the interval corresponding to their running time, as in Krifka (1998)):

(30) $\tau(e \oplus e') = \tau(e) \oplus \tau(e')$

Thus, the running time of a plural event is a plural interval. Once we assume the existence of plural intervals, we need to redefine relations between time intervals in order to take pluralities into account. Crucial for our purposes in this paper is the *inclusion relation*, which we define as follows:

(31)   *Inclusion*
        An interval *i* is included ($\subseteq$) in an interval *i'* *iff* the left boundary of *i'* precedes the left boundary of *i* and the right boundary of *i* precedes the right boundary of *i'*.

The left/right boundary of an interval can be viewed as the time point that precedes/follows every other point belonging to the interval. Thus, we have the following results:

(32)   —-[$_{i1}$—-[$_{i2}$–]—-]—-> $i_2 \subseteq i_1$

(33)   —-[$_{i1}$—-]–[$_{i3}$–]–[$_{i2}$—-]-> $i_3 \subseteq i_1 \oplus i_2$

Notice that an interval i can be included in a plural interval j, even if i and j do not have any time points in common.

Back to imperfectivity, the core notion is that both progressive and habitual readings are derived from a single aspectual operator (Imp) that introduces temporal inclusion:

(34) $Imp = \lambda P. \, \lambda i. \, \exists e : i \subseteq \tau(e) \, \& \, P(e)$

When Imp combines (via function composition) with the singular operator that we introduced in the previous section, we get the progressive reading. When it combines with the plural operator, we get the habitual reading.

(35) $[\![Imp_{sg}]\!] = Imp \circ SG = \lambda P. \, Imp(SG(P))$
    $Imp_{sg} = \lambda P. \, \lambda i. \, \exists e : i \subseteq \tau(e) \, \& \, min(e, P)$

(36) $[\![Imp_{pl}]\!] = Imp \circ PL = \lambda P. \, Imp(PL(P))$
    $Imp_{pl} = \lambda P. \, \lambda i. \, \exists e : i \subseteq \tau(e) \, \& \, sum(e, P)$

As an illustration, consider the following Italian sentence, which is ambiguous between a progressive and a habitual reading:

(37)   Gianni fuma.
    Gianni smokes
    'Gianni smokes' or 'Gianni is smoking'

(38)   a.   [$_{TP}$ Pres$_1$ [$_{AspP}$ Imp$_{sg}$ [$_{VP}$ Gianni fuma]]]
    b.   [$_{TP}$ Pres$_1$ [$_{AspP}$ Imp$_{pl}$ [$_{VP}$ Gianni fuma]]]

The idea is that Imp_{sg} requires a singular, unique event of Gianni smoking to be going on at the utterance time for the sentence to be true. This is the progressive reading (minus modality). With Imp_{pl}, a plurality of events of Gianni smoking must be going on at the utterance time. In this case, Gianni does not have to be smoking right at the utterance time. He should have smoked at least once in the past and should smoke again in the future. This is the habitual reading (minus modality).

More precisely, this type of example is what Ferreira (2004, 2005b) called a 'simple habitual'. It differs from habitual sentences formed with the help of a (possibly silent) operator, as in *John (always, usually) smokes, when he drinks*. In the latter cases, which will be discussed in Sect. 2.6, we have proportional restricted quantification over events. With simple habituals, however, it is not clear at all what could play the role of the restrictor of the (implicit) quantifier. Indeed, a sentence like *John smokes* can be uttered without the intention to link situations of John smoking to any other kind of situation, and a hearer does not feel compelled or invited to accommodate any kind of situation either. This makes an existential analysis along the lines being proposed in this paper particularly attractive, because it allows us to dispense with *ad hoc* tripartite structures. Moreover, the interaction of habituals with singular and cardinal indefinites as discussed before comes out naturally.[10] These points, I

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[10] It is important to note that although the presence of an overt adverbial quantifier and a restrictive *when*-clause makes the clearest case for tripartite structures, other linguistic/contextual material can support these readings too. The following examples, which were provided by a *NALS* reviewer, make the point:

(i)   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.

believe, constitute a considerable advantage of this type of analysis over alternatives based on universal/proportional quantification.[11]

The proposal presented above also provides a new way of looking at crosslinguistic variation in this area.[12] We have just seen that verbal forms such as the Italian simple present are ambiguous between progressive and habitual readings. However, for many other verbal forms, only progressive or only habitual readings are available. My proposal is that in these instances we have number-sensitive Imp operators, selecting for singular or plural VPs. This is the case of Portuguese and English simple present forms, which only give rise to habitual readings:

(39)   João fuma/John smokes.

(40) $[_{TP} \text{Pres}_1 \, [_{AspP} \text{Imp}_{pl} \, [_{VP} \text{John smokes}]]]$

The idea here is that we have a specialized version of Imp that only combines with the plural operator *pl*, making the progressive reading unavailable.

Natural languages also instantiate specialized versions of Imp selecting only for singular VPs, making the habitual reading unavailable. This is the case of the progressive marker in Hindi (Bhatt and Pancheva 2005):

(41)   Yusuf   skuul jaa rahaa   hai
        Yusuf.m school go Prog.MSg be.Prs.Sg
        'Yusuf is going to school.'

(42) $[_{TP} \text{Pres}_1 \, [_{AspP} \text{Imp}_{sg} \, [_{VP} \text{Yusuf go to school}]]]$

Notice that imperfective operators take event-denoting VPs as their first argument and introduce existential quantification over events into the truth conditions of a sentence. In this respect they are like nominal determiners, which take an individual-denoting NP as an argument and introduce quantification over individuals into the truth conditions of a sentence.

Notice that the meaning of these sentences would be only minimally affected by the presence of a pre-verbal adverbial quantifier such as *always*. This clearly contrasts with simple habituals (cf. *John smokes* vs. *John always smokes*). Therefore, I will assume (see section 2.4 for details) that the examples above contain an implicit quantifier that scopes above the indefinite/cardinal NPs, giving rise to the (rough) paraphrases below, and avoiding the 'same-participant effect':

(ii)   a.   Every event of Mary going out overlaps with an event of her keeping a granola bar in her purse.
        b.   Every event of John having breakfast overlaps with an event of him eating three eggs.
        c.   Every event in which Peter participates is an event in which he carries a gun.
        d.   Every event with this castle in it relates to an event of four guards protecting the castle.

A similar reasoning applies to cases with durative adverbials, such as *for an hour*, as in the following examples (also provided by the *NALS* reviewer):

(iii)   a.   John jogs for an hour.
        b.   Mary practices the piano for an hour.

As we will discuss in Sect. 2.4, the *Imp_pl* operator scopes above the implicit adverbial quantifier in all these cases.

[11] As proposed, for instance, in Bonomi (1997), Cipria and Roberts (2000), Lenci and Bertinetto (2000), Deo (2009), Arregui et al (2014).

[12] Deo (2009, 2014) offers a cross-linguistic perspective within a 'Imp as a universal quantifier' approach, according to which the difference between progressive and non-progressive imperfectives lies in whether the domain for the universal quantifier is a regular partition of the reference interval (progressives) or of a superinterval of the reference interval (non-progressive).

Viewed from this angle, Imp would be particularly close to indefinite determiners. I suggest that this number sensitivity is similar to the one attested with nominal determiners.

Indeed, an interesting parallel can be established here with respect to the number sensitivity we proposed for Imps across languages and the number sensitivity that exists among nominal indefinites. For instance, the English indefinite determiner *some* is not sensitive to number and can combine with both singular and plural NPs (*some boy/some boys*). This is parallel to what happens with *Imp* in the Italian simple present. On the other hand, the indefinite determiner *alcuni* in Italian only combines with plural NPs (**alcuno uomo/alcuni uomini*).[13] This is parallel to the Imp in the English or Portuguese simple present. Finally, the English indefinite determiner *a/an* only combines with singular NPs (*a boy/*a boys*) and is parallel to the Hindi Imp *rahaa* seen above.[14] Later on, we will push this parallel even further when we discuss mass-like predicates in connection to stative VPs.

2.3 The Modal ingredients of imperfectivity

In the last two sections, due to our focus on issues concerning mereological and temporal semantics, an important component in the meaning of imperfective sentences was neglected. Both progressive and habitual readings have been claimed to comprise a modal component, confining the existence of the event described by the sentence to a limited set of possible worlds that does not necessarily include the world of utterance. In this section, we review the relevant facts and supplement the meaning of imperfective operators with modal ingredients. We begin with progressives, and then proceed to habituals, arguing that they instantiate the same type of modality.

2.3.1 Progressives and modality

We start with progressive readings derived with the help of the Imp operator below, which introduces existential quantification over events.

(43) $[\![\text{Imp}_{sg}]\!] = \lambda P.\ \lambda i.\ \exists e : i \subseteq \tau(e)\ \&\ P(e)\ \&\ min(e,P)$

According to this lexical entry, a sentence of the form $[\text{ T Imp}_{sg}\text{ VP}]$ entails the occurrence of an event of the type described by the VP. However, as has been acknowledged in the literature since the seventies, this does not seem correct, as attested by examples such as (44) and (45) below:[15]

(44)   John was building a house.

(45)   John was crossing the street.

Sentence (44) can be true even if John never finished (or will never finish) building a house. What seems to be required is that he was in the process of building one. Similar remarks can be made about (45). It can be true if John started walking toward the other side of the street, but due to, for instance, a bus hitting him, never actually made it. Thus, it seems

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[13]   More precisely, *alcuno* is not used as an ordinary indefinite determiner, but can be used in certain negative polarity-like environments. See Chierchia (1998) for discussion.

[14]   Although I only considered indefinite determiners in these examples, number sensitivity is also attested with other determiners, such as *every* and *most*: *every boy/*boys*, *most *boy/boys*.

[15]   As discussed by Dowty (1977) and many others after him; see, for instance, Landman (1992), and Portner (1998).

as if external obstacles – whether explicitly mentioned or not, and no matter how likely they are to interfere in the ongoing event – are not taken into account when we assess the truth of a sentence like (44) or (45).

What happens when an event is prevented from completion not by an external obstacle, but by the internal limitations of one of its participants? Consider a variation of (45) (based on an example by Fred Landman):

(46)   John was crossing the Atlantic (when a shark killed him).

Imagine (46) being uttered half an hour after John started swimming from the west coast of Africa towards the Brazilian coast on the other side of the Atlantic. This sentence is very likely to be judged false, quite obviously for the reason that the Atlantic is a huge body of water, and the John that we have in mind is a normal human being. Since any human being would give up or die before being even close to Brazilian waters, the fact that our John had started swimming before the reference time (the time of John's death, in the scenario above) is not enough to make the sentence true. Contrary to the plausibly imaginable killers and buses in the case of (44) and (45), the relevant obstacle here has to do with John's physical condition, vis-a-vis the size of the Atlantic. On the other hand, if John is known to have supernatural powers, judgments change, and the sentence is considered appropriate to describe the situation (as in *Superman was crossing the Atlantic*).

These facts tell us that progressive sentences with accomplishment VPs can be false, even when the process constituting the event being described is already underway. When animate participants are involved, not only their physical conditions, but also their mental states seem to matter. Consider (45) again, but this time uttered under different circumstances. Imagine John is standing on one side of the street when he sees a one-hundred dollar bill lying right in the middle of it. He starts walking into the street to pick up the bill, when a bus comes and hit him. (45) is judged false in this case, and this can only be due to the fact that John did not intend to cross the street, since apart from this aspect, the scenario is identical to the one we discussed above.

What we need, then, is a supplement to our current lexical entry for Imp that takes these facts into account, and which blocks the entailments from progressive sentences to their non-progressive, perfective counterparts. In what follows, we present Paul Portner's modal analysis of the progressive (Portner 1998), which has its roots in influential early work by David Dowty (Dowty 1977).

Portner's point of departure is Angelika Kratzer's semantics for modality (Kratzer 1981, 1991), which has three crucial ingredients: a quantifier over possible worlds, a modal base, and an ordering source. Given a world w (the world of evaluation), the modal base M provides a set of propositions, $M(w)$, which constrains the set of worlds that are being quantified over. Only worlds in which every proposition in the set provided by the modal base is true ($\cap M(w)$) are relevant for the interpretation of the sentence. There is, moreover, an ordering source O, which also provides a set of propositions ($O(w)$), a set understood as an ideal according to which worlds can be ranked. A world w' is at least as close to the ideal as world w'' ($w' \leq_o w''$) if, and only if, every proposition that is true in w' is also true in w''. The core feature of the proposal is that, when evaluated with respect to a world w, quantification is restricted to the worlds belonging to ($\cap M(w)$) that are ranked best according to $O(w)$: $Best(M, O, w)$. Choices of modal bases and ordering sources vary from context to context and are usually determined by both linguistic and extralinguistic material. For instance, a sentence such as *John must go to jail* can be evaluated with respect to a circumstantial modal base (given the fact that John murdered a person ...) and a deontic ordering

source (given what the law prescribes ...). In this case, the sentence will be true if among the worlds in which the relevant facts occurred, the best ones are all worlds in which John goes to jail. This will be the case if there are laws against murders, and the only punishment for this type of crime is sending the murderer to jail.

Portner's proposal is to analyze the meaning of progressive sentences as involving universal modal quantification, along the lines summarized above. The question then is what kinds of modal base and ordering sources are involved in these sentences. Portner's suggestion is that the modal base is a variety of circumstantial one, and that the ordering source is based on the ideal that the event described by the sentence (under VP) is not interrupted by any 'outside' factor. Let us consider the example he used to illustrate his ideas:

(47)   Mary was climbing Mount Toby.

Circumstantial modal bases take into consideration what the relevant facts are in a certain context. The modal base for (47) would deliver a set of propositions expressing the relevant facts about Mary's current physical and mental conditions (her strength, her age, her dispositions, etc.), Mount Toby's physical state (its height, its soil, its shape, etc.), and also what Mary is doing (Had she started climbing Mount Toby? Was she heading the right way? Was she lost?). This set might look like (48) below:

(48) $M(w)$ = {'Mary was in good physical condition', 'Mary does not give up easily', 'It was raining lightly on Mount Toby at 7 a.m.', 'Mary was headed the right way on the trail at 7 a.m.', ... }

Given the circumstances above, (47) is intuitively true. However, notice that among the worlds in which every proposition in (48) is true, there are worlds in which Mary will never manage to climb Mount Toby. Think about worlds in which she gets eaten by a bear, or in which she slips and gets seriously injured. Things like that are not necessarily uncommon when people climb mountains, especially if they are not professionals. However, the likelihood of such events seems to be irrelevant when we compute the truth conditions for (47). That is when the ordering source enters the scene in Portner's analyses. In the case of (47), it would look something like (49):

(49) $O(w)$ = {'Mary does not get eaten by a bear', 'Mary does not slip and hurt her ankle', 'A surprise summer blizzard does not start on Mount Toby', 'Mary does not get lost', ... }

Together, the propositions in (49) express an ideal set of worlds in which Mary encounters no obstacle in her way towards the top of MT. In a sense, in these worlds (the worlds in $\cap O(w)$), whether or not Mary manages to climb Mount Toby depends exclusively on how they (Mary and Mount Toby) are at the relevant time. According to (48) and (49), $Best(M,O,w)$ contains all the worlds in which Mary and Mount Toby are similar to what they are in the actual world at the relevant time, and no outside factors like bears, rocks, or blizzards interrupt the climbing. The idea is that (47) will be true just in case all such worlds are worlds in which Mary climbs Mount Toby.

Under the circumstances in (48), (47) is predicted to be true. On the other hand, if it is snowing heavily on Mount Toby, the proposition 'It was raining lightly on Mount Toby' would be replaced by 'It is snowing heavily on Mount Toby' in $M(w)$. Now, Mary could never make it to the top, even if she tries hard. In this case, $Best(M,O,w)$ would contain worlds in which Mary does not climb Mount Toby, and the sentence is predicted to be false. Both predictions are borne out.

At this point, it should be clear how Portner's theory could handle the puzzling contrast between (45) and (46), repeated below:

(50)   John was crossing the street (when a bus hit him).

(51)   John was crossing the Atlantic (when a shark killed him).

It is clear from what we saw above that both the modal base and the ordering source depend on the description of the event under VP. Thus, in the case of (50), $M(w)$ includes all the relevant facts about John and the street he is crossing, whereas in the case of (51), it includes all the relevant facts about John and the Atlantic Ocean, including the fact that it is a huge body of water. In this case, even if we restrict attention to worlds in which all potential obstacles for the completion of an event of John crossing the Atlantic were removed (no sharks, no unexpected storms, etc.), given John's limited physical ability, and the size of the ocean, most, if not all, worlds in this set would be worlds in which he fails to cross the Atlantic. Accordingly, the sentence is judged false. In the case of (50), if the street is an average street, e.g. if it is 30 feet wide, then this information is part of $M(w)$. Since John would manage to cross the street as soon as we remove the external obstacles (oncoming buses, cars running fast, etc.), the sentence is predicted to be true, a welcome result.

It is also clear that the set of propositions delivered by the modal base and the ordering source is sensitive not only to the world of evaluation, but also to a reference time. Modal bases and ordering sources change as time goes by. For instance, for a sentence like *At three o'clock, Mary was climbing Mount Toby*, what counts as relevant is not Mary's physical conditions when she was a young child, or how tall Mount Toby was during the Paleolithic. Rather, it is their properties at three o'clock that matter.

To account for this dependency on an event description and a reference time, we make the modal ingredients of Imp sensitive to an intensional as well as to a temporal parameter. The new lexical entry that emerges from this discussion is given in (52) below:

(52) $[\![\mathrm{Imp}]\!] = \lambda \wp. \, \lambda t. \, \lambda w. \, \forall w' \in BEST(\wp, M, O, w, t) \, \exists e : t \subseteq \tau(e) \, \& \, \wp(w')(e).$

(53) $BEST(\wp, M, O, w, t)$ = the set of worlds w' in $\cap M(\wp, w, t)$, such that there is no world w'' in $\cap M(\wp, w, t)$ where $w'' <_{o(\wp, w, t)} w'$.

Notice that the first argument of Imp in (52) is the intension of a VP denotation, a function from worlds to sets of events. The second argument is a time interval. These two arguments will feed the modal base and the ordering source that are used to select the best worlds which are being quantified over.

2.3.2 Habituals and modality

According to what we have proposed so far, progressive and habitual readings of imperfective sentences share the same temporal ingredients. It was argued that the difference between those readings stems from a difference concerning the singularity/plurality of the events being quantified over: singular events in the case of progressive readings, plural events in the case of habituals. Moreover, we have just seen that sentences expressing progressive readings have a modal component as well. In this section, I will argue that habitual readings share the same modal component, thus maintaining the view that progressive and habitual readings have the same source (modulo number specification), namely, Imp.

Consider the following scenario: John, who loves soccer, does not live far from a local college campus, where the only soccer field in the neighborhood is located. He goes there regularly to play with his friends. Sentence (54) below is true under these circumstances:

(54)   John plays soccer (regularly).

This sentence tells us something about John's current dispositions. Unless some external factor interferes, he will walk to the campus and play soccer again in the future, as he has been doing for a while. The proviso 'unless some external factor interferes' is crucial since a speaker who utters (54) does not commit himself to the existence of future events of John playing soccer regardless of what might happen to John. Thus, if John suddenly dies before tomorrow morning, he will of course never walk to the campus again, let alone play soccer. Also, if tomorrow John gets a message saying that the campus has closed, and that all departments and facilities, including the soccer field, are being transferred to another location, which happens to be 10 miles away from John's house, he will stop playing soccer. But these possibilities do not interfere with the truth of (54). In assessing the truth of (54), we seem to ignore all possible interruptions of a current sequence of events of John playing soccer. In fact, sentences like (55) can be perfectly true:

(55)   John used to play soccer, when he died.

Notice the striking similarity between what we saw before in the case of progressive readings, and what we are now seeing with respect to habitual readings. In particular, compare our discussions of (45), *John was crossing the street*, and (54). In the former, we discarded all potential external obstacles to the completion of a singular event, whereas in the latter we discarded all potential obstacles to the continuation of a sequence of events, which, as discussed earlier, is a plural event. Since the singular/plural distinction was factored out from the meaning of Imp, it is natural to conclude that the modal component integrated into Imp which we noted in progressive readings carries over to cases involving habitual readings. In other words, the logical forms associated with progressive and habitual readings of imperfective sentences can be taken to be one and the same, except for the number specification of the aspectual operator Imp.[16]

Before I go through the details of these logical forms, and discuss some important consequences, let me present another fact that strengthens the parallel between progressive and habitual readings. Recall Landman's discovery that in the case of sentences like (46), *John was crossing the Atlantic*, which are judged false if John is not a superhero, what is crucial is the fact that John's physical condition, and the Atlantic's huge dimensions make it impossible for him to cross the ocean, even if we grant that external obstacles are going to be

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[16] A *NALS* reviewer asked why there is a contrast between the progressive (i), which is fine, and the habitual (ii), which is not:

(i)   Mary was going to Rome, but finally she didn't go (the train derailed).

(ii)   Mary used to smoke, but finally she didn't smoke.

According to what we said above, in the case of progressive sentences such as (i), circumstantial modality only requires that Mary be on her way to Rome at some past reference time, whereas in the case of habituals such as (ii) it requires that Mary had already smoked before this reference time. As a consequence, (i), but not (ii), is consistent with there having been no VP-event at all. This is a consequence of the way Imp modality interacts with singular and plural event descriptions. The parallel that is being highlighted in the text between (50) and (55) concerns the fact that the truth of both progressive and habitual sentences at a certain reference time is consistent with the absence of a VP-eventuality whose running time includes the reference time.

removed. Thus, in this case it is not enough that John believes he can cross the Atlantic, and intends to do so. The conclusion was that the actual physical features of the participants in the events described under VP are also taken into account by the circumstantial modal base. Are there similar situations involving habituality? I believe there are. Consider the following cartoon-like scenario: One of the hobbies of a certain superhero is to cross the Atlantic daily to keep in shape. However, last night, while he was sleeping, he lost his superpowers forever, and became a normal human being. He does not know that, so this morning he will wake up and prepare for his exercise, just like he does every day. Now, sentence (56) below is not judged true, despite the fact that the superhero's dispositions have not changed.

(56)   The superhero crosses the Atlantic (regularly).

As in the previous case, the relevant circumstances here include physical facts about the superhero and the ocean, and that seems to be the reason why the sentence is judged false. Once again, we seem to be dealing with a circumstantial modal base which, like the one Portner proposed for the progressive readings, is sensitive to the properties of the event described under VP and to the properties of its participants at some reference time. I will assume that this is the case, and propose the (simplified) syntactic structure in (57) for the habitual reading of (54):

(57) $[_{TP} \text{Pres}_i \, [_{AspP} \text{Imp-pl} \, [_{VP} \text{John play soccer}]]]$

Its meaning is given below:

(58) $\lambda w. \, \forall w' \in BEST(\wp, M, O, w, t)[\exists e : PL(\wp(w'))(e) \, \& \, t^* \subseteq \tau(e)]$
          $\wp = \lambda w. \lambda e. \, e$ is an event of John playing soccer in w

For instance, imagine (54) uttered at a time before the campus and the soccer field were closed. The set of worlds yielded by the circumstantial modal base M at that time would look like (59) below:

(59) $M(\wp, w, t) = \{$John played soccer with his friends several times recently, John is in good physical conditions, John intends to play soccer again, there is a soccer stadium close to John's house, $\dots \}$

This set of worlds contains relevant information about John's physical and mental states at the utterance time, about the existence of a stadium in the neighborhood, and also about past occurrences of John playing soccer. I assume these are the minimal relevant circumstances taken into consideration by the modal base in simple habitual sentences.

What about the ordering source? The propositions in the set delivered by the ordering source O encode the conditions for a sequence of events of the type described under VP not to be interrupted at the reference time. In our case we have something along the lines of (60):

(60) $O(\wp, w, t) = \{$John does not die tomorrow, John does not get arrested, the stadium does not close, $\dots \}$

The set $BEST(\wp, M, O, w, t)$ will then consist of the worlds in $\cap M(\wp, w, t)$ which rank best according to $O(w, t)$. (58) requires that there be a plural event of John playing soccer in all these worlds. This sequence of events should be going on at the utterance time. As a result, (58) requires the existence of both past and future singular events of John playing soccer. In our case, since both $M(\wp, w, t)$ and $O(\wp, w, t)$ are consistent with the existence of

future events of John playing soccer, *BEST* will contain worlds in which John keeps playing soccer. Therefore, the existence of future playing events in these worlds is guaranteed.

Imagine, however, that due to a tragic car accident, John cannot control the movements of his legs anymore, and that (54) was uttered after these facts became known to the speaker. This crucial aspect of the new scenario has a direct impact on $M(\wp, w, t)$:

(61) $M(\wp, w, t) = \{$<u>John cannot move his legs</u>, John played soccer with his friends several times recently, <u>there is a stadium close to John's house</u>, ... $\}$

Given (61), the worlds in *BEST* are not worlds in which there are future singular events of John playing soccer. As a consequence, they are not worlds in which there is an ongoing plural event of John playing soccer. (54) is correctly predicted to be false in this case.

As for past events, in the case of (54) it is quite likely that a person uttering that sentence intends to talk about John's routine, and if so, it is natural to assume that the modal base contains information about whether or not there were previous playing events in the world of evaluation. Thus, in the scenario we had sketched above, the worlds in *BEST* are worlds in which there were events of John playing soccer before the utterance time, and (54) is correctly predicted to be true under those circumstances. Notice that the sentence would be false if John had never played soccer before the utterance time. Since $M(\wp, w, t)$ would contain this information, there would never be a plural event of John playing soccer whose running time included the utterance time in the worlds in *BEST*. I believe this is correct. If John had never played soccer before the utterance time, then (54) would be unlikely to be judged true.

Things are different with habitual sentences related to professional activities, as in the well-known case of *Mary handles the mail from Antarctica* discussed in Krifka et al (1995), which can be true even if Mary has never handled any mail from Antarctica. In cases like this one, it seems plausible that the relevant circumstances that enter into the modal base include information about Mary's profession or her job contract, and not necessarily about actual events from her job. As for the ordering source, it needs to ensure that the best worlds are worlds in which pre-conditions for events of the relevant type (handling mail from Antarctica) to occur are satisfied. This certainly includes the pre-condition that there be mail from Antarctica to be handled. It is in worlds like these that we assert the existence of a sequence of events of Mary handling mail from Antarctica.

Summing up, habitual readings of imperfective sentences involve the same kind of modality involved in progressive readings, with differences arising from the VP event number – singular in the case of progressives, and plural in the case of habituals – and the event type sensitivity of the modal base and the ordering sources associated with Imp. Since the temporal components of these readings are also the same (ongoingness), we arrive at a unified semantics for the aspectual operators present in imperfective sentences.

2.4 Adverbs of quantification

Up to this point, we have been discussing habitual sentences such as *John smokes* which we called simple habituals. However, habituality is often discussed in connection with sentences containing adverbs of quantification (AQs), such as *always*, *never*, or *sometimes*:

(62)   John always smokes, when he goes to a party.

Moreover, imperfective morphology is also a usual ingredient of such sentences, as the Portuguese examples below illustrate:

(63)   Quando Pedro escrevia   um artigo, ele sempre o submetia   a um periódico.
        When   Pedro wrote-imp an article, he always it submitted-imp to a   periodical
        'When Pedro wrote an article, he always submitted it to a periodical.'

These facts make it important that we integrate sentences with AQs into our proposal connecting habituals and plurality. Before we proceed in this direction, two points are worth noticing about these examples. First, despite the presence of imperfective morphology in the verbal forms of (63) and related sentences, neither the main clause nor the adverbial *when*-clause necessarily describe ongoing events or habits. (63), for instance, is most readily interpreted as a generalization relating complete, culminated events of Pedro writing an article, and complete, culminated events of him submitting the article to a journal. If anything is ongoing in this case, it is the generalization itself, which is reported as going on at some relevant past interval, such as the time when Pedro was an assistant professor at some university. The second point is that AQs can also be used with perfective morphology, as in (64):

(64)   Sempre que   Pedro escreveu   um artigo, ele o submeteu   a um periódico.
        always when Pedro wrote-pfv an article, he it submitted-pfv to a   periodical
        'Every time Pedro wrote an article, he submitted it to a periodical.'

This sentence too can describe a generalization relating events of Pedro writing an article and events of him submitting it to a journal. However, as many have observed, there is a difference between (63) and (64).[17] The first example expresses a lawlike, non-accidental generalization, whereas the second can be about an accidental relation which merely describes an observed pattern. Thus the truth of (63), but not of (64), tolerates exceptions and readily supports counterfactual reasoning. For instance, if some exceptional factor made it impossible for John to write any paper in a certain semester, (63) could still be true and allow the following inference:

(65)   If Pedro had written an article during that semester, he would have submitted it to a periodical.

These two points suggest that modality should not be built into the meaning of AQs, but rather follow from the presence of imperfective morphology. Moreover, as the first point above implies, the imperfective operator should be able to scope above the AQ, although it appears attached to the verbal forms in the main and subordinate clauses. This is depicted in the tree below:

(66)

                              Imp/Pfv   always   VP

I will assume that AQs denote restricted quantification over events with verb phrases in their immediate scope (see de Swart 1998, Rothstein 1995, among others). There are a variety of factors that helps determine the restrictor of these adverbs, including adverbial clauses, word order, topic/focus articulation, the presence of presupposition triggers, etc. How exactly these elements interact and how the restrictor ends up denoting a specific predicate of events

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[17] See, for instance, Lenci and Bertinetto (2000); Ferreira (2005b); Deo (2009).

should not concern us here. For the purposes of this article, we can follow von Fintel (1994) and assume the presence of a contextual variable C, similar to a deictic/anaphoric pronoun, but denoting a predicate of events.[18] Also a debatable matter is the nature of the relation between the events described by the restrictor and the events described by VP.[19] For the sake of simplicity, I will leave this relation unspecified and just use a variable R. Possible values include temporal overlap or proximity, causality, and identity.

As for the syntactic structure, I assume that R heads a VP adverbial phrase and that an AQ such as *always* (together with its restrictor) is generated as R's sister and then moved to take scope right above VP:

(67)

$$always_C$$
        1   VP
            VP   AdvP
                R   t_1
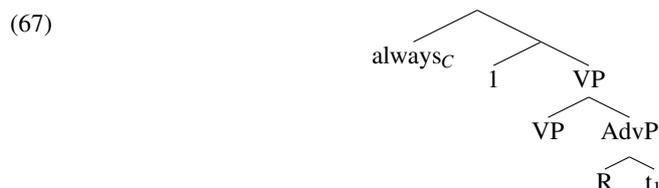
The constituent *always$_C$* denotes a universal quantifier over events. The meaning of (67) can now be paraphrased as follows: every C-event is R-related to a VP-event. For an example such as (62), repeated below as (68), we have that every event of John going to a party is related to an event of him smoking. A plausible value for R in this case is temporal overlap.

(68)   John always smokes, when he goes to a party.

The question now is what kind of meaning we should assign to the structure in (67), which is the structure that results from the combination of an AQ with its restrictor and its nuclear scope. This is an important question, since according to what we proposed in (66), it is this meaning that the imperfective operator will take as its argument. It is at this point that event plurality re-enters the stage. To understand how it does so, we need a brief excursus into certain aspects of the semantics of nominal quantifiers in an event-based framework.

Consider first the following sentence:

(69)   Every student struck a note (on the piano).

A natural candidate for the logical representation of (69) is (70):

(70) $\forall x : student(x) \rightarrow \exists e \exists y : play(e,x,y) \,\&\, note(y)$

Imagine that we are talking about a group of ten students. Then, according to (70), (69) asserts the existence of ten events, each of which is an event of a student playing a note. From this we may infer the existence of a bigger event having all the smaller events of a single student playing a single note as its parts. But notice that this bigger event is not represented in (70). Is this a problem? The examples below, taken from Schein (1993, p. 7), suggest that it is:

(71)   Unharmoniously, every student sustained a note on the Wurlitzer for sixteen measures.

(72)   In slow progression, every student struck a note on the Wurlitzer.

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[18] For relevant discussion and examples, see Beaver and Clark (2003), von Fintel (1994), Partee (1995), Hajičová et al (1998), and references therein.

[19] See Rothstein (1995), Schwarz (1998), and Beaver and Clark (2003) for relevant discussion.

As Schein points out, the adverbs above qualify the 'ensemble events'. In fact, it does not make much sense to qualify a single event of someone sustaining a single note as either harmonious or unharmonious, and similarly for qualifying the striking of a single note as being in slow progression. We must thus posit two event variables in the logical form of these sentences.

(73) $\exists e : unhrmns(e) \, \& \, \forall x : student(x) \rightarrow \exists e' \leq e[\exists y : sustain(e',x,y) \, \& \, note(y)]$

(74) $\exists e : slow\_prog(e) \, \& \, \forall x : student(x) \rightarrow \exists e' \leq e[\exists y : struck(e',x,y) \, \& \, note(y)]$

In both cases, the argument of the initial adverb is an event having parts that are events described by the verb phrase. Intervening between the two event quantifiers in the representations above is the distributive quantifier *every student*, which, we can assume, introduces the partitive relation $\leq$.

There is, however, one aspect of the meanings of the sentences in (71) and (72) that is not captured in the logical representations in (73) and (74). Take (71), for instance. If students and professors were playing together, with the students playing in perfect harmony, and with disharmony stemming exclusively from the professors, then (71) would not be true. But all (73) requires from the playing by the students is that it be a part of an unharmonious event. What is missing, then, is a requirement that the unharmonious event have no parts which are not events of a student sustaining a note. We will see how to incorporate this feature shortly.

Related issues concerning event plurality have also been discussed extensively by Schein (1993), and by Kratzer (2003) in connection with certain cases of cumulative readings involving plural and quantified DPs, as in the example below, taken from Kratzer (2003):

(75)   Three copy editors caught every mistake in the manuscript.

The sentence can describe a situation in which each copy editor caught mistakes in the manuscript, with every mistake being caught by at least one of them. A relatively straightforward way to capture this reading is to assume that the group formed by the three editors was the agent of a big mistake-catching event in which every mistake was caught by at least one of them. In her compositional implementation of this idea, Kratzer proposes a denotation for the QP *every mistake* and for the transitive verb *caught* along the following lines:[20]

(76) $[\![every\ mistake]\!] = \lambda P.\lambda E.\forall x[mistake(x) \rightarrow \exists e'[e' < E \, \& \, P(x)(e')]] \, \&$
          $\exists X[mistakes(X) \, \& \, P(X)(E)]]$
          $[\![caught]\!] = \lambda x.\lambda e.\ caught(x,e)$

After this QP combines with the verb via functional application, we get the following denotation for the VP:

(77) $[\![caught\ every\ mistake]\!] = \lambda E.\ \forall x[mistake(x) \rightarrow \exists e'[e' < E \, \& \, caught(x,e')]] \, \&$
          $\exists X[mistakes(X) \, \& \, caught(X,E)]]$

This is a predicate of plural/mereological events. These events must have as their parts mistake-catching events and nothing else. Moreover, for every mistake x, the catching of x must be a part of the bigger, plural event.

Applying these ideas to Schein's examples in (71) (the analysis of (72) would be entirely parallel), we obtain the following simplified representation:

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[20] Kratzer takes the external argument of transitive verbs to be introduced by a separate syntactic head. That is why the denotation of *caught* appears with only one individual argument.

(78)   Unharmoniously, every student sustained a note.

(79) $\exists E : unhrmns(E)$ & $\forall x[student(x) \rightarrow \exists e'[e' < E$ & $sustained\_a\_note(x,e')]]$ &
$\exists X[students(X)$ & $sustained\_a\_note(X,E)]]$

The unharmonious event is now taken to be a plural event whose parts are all student-sustaining-a-note events, and which are such that for every student, there is a part of this plural event which is an event of him sustaining a note.

   We are now ready to return to our examples with adverbs of quantification, and see how the above excursus can be helpful in their analysis. We repeat (62) for convenience:

(80)   John always smokes when he goes to a party.

Putting tense and aspect aside for a brief moment, we have the following structure:

(81)
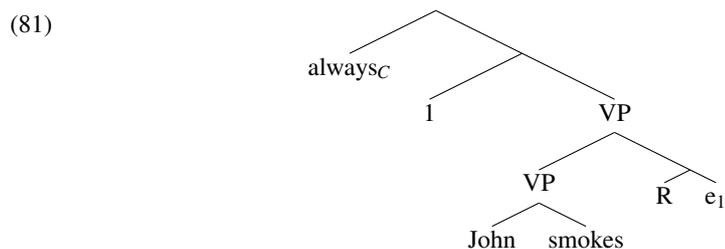
Remember that we are treating AQs as restricted event quantifiers, which gives them the same semantic profile as QPs such as *every student*, modulo the event/individual distinction. Given the discussion above about such QPs, we propose the following denotation for $always_C$:[21]

(82) $[\![always_C]\!] = \lambda P.\lambda E.\forall e'[C(e') \rightarrow \exists e[e < E$ & $P(e')(e)]]$ & $\exists E'[C^*(E')$ & $P(E')(E)]]$

The first argument (P) of this denotation is a relation between events, and its second argument (E) is a plural event. Let us see how the interpretation of (81) proceeds step by step:

(83) $[\![John\ smokes]\!] = \lambda e.\ smoke(j,e)$
        $[\![R\ e_1]\!] = \lambda e.\ R(e_1,e)$
        $[\![VP]\!] = \lambda e.\ smoke(j,e)$ & $R(e_1,e)$
        $[\![1\ VP]\!] = \lambda e_1.\lambda e.\ smoke(j,e)$ & $R(e_1,e)$
        $[\![always_C]\!] = \lambda P.\lambda E.\forall e'[C(e') \rightarrow \exists e[e < E$ & $P(e')(e)]]$ &
        $\exists E'[C^*(E')$ & $P(E')(E)]]$
        $[\![John\ always_C\ smokes]\!] = \lambda E.\forall e'[C(e') \rightarrow \exists e[e < E$ & $smoke(j,e)$ & $R(e',e)]]$ &
        $\exists E'[C^*(E')$ & $smoke(j,E)$ & $R(E',E)]]$

The result of this derivation is a predicate of plural events. If E is such an event, then each part of E is an event of John smoking that temporally overlaps with an event of him going to a party. Moreover, every event of John going to a party must temporally overlap an event that is part of E.

   It is this predicate of plural events that will serve as the argument of the aspectual head, perfective or imperfective, in accordance with what we proposed in (66) and repeat below:

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[21] Variables ranging over plural events are represented with capital letters. C is a contextually-supplied predicate of events, and C^* is its closure under sum formation.

(84)

Limiting our attention to the imperfective aspect, the result will be a habitual interpretation, along the same lines that we discussed before in connection with simple habituals, such as *John smokes*. This interpretation asserts the existence of an on-going sequence of events of John smoking in some set of possible worlds. The only difference is that in the case of sentences with contextually restricted *always*, (i) the events in the sequence all relate to the events described by the AQ restrictor, and (ii) all such restricting events are related to a member of the sequence.[22]

2.4.1 Bare habituals

There is another class of habitual sentences that seem to involve contextually restricted quantification over events. However, contrary to the examples discussed in the previous section, these do not contain an overt adverb of quantification; they are often referred to as *bare habituals*. (85) is an example:

(85)   When John goes to a party, he smokes.

This sentence is indeed very close in meaning to sentences such as (86) involving overt AQs:

(86)   a.   When John goes to a party, he always smokes.
         b.   When John goes to a party, he usually smokes.

It is thus natural to extend our analysis of (86) to (85), by assuming that the latter has a covert *HAB* in the same position in which *always* and *usually* appear in (86). What is the nature of *HAB*? As pointed out by Ferreira (2005a), *HAB* does not behave like *always* when it interacts with negation:

(87)   When John goes to a party, he doesn't smoke.

(88)   a.   When John goes to a party, he doesn't always smoke.
         b.   When John goes to a party, he always doesn't smoke.

Example (87) conveys that John never smokes at a party. This is also true of sentences with *always*, when it precedes and scopes above negation, as in (88b). However, as shown in (88a), *always* can also follow and scope under negation, giving rise to a weaker reading. If *HAB* and *always* have the same meaning, we have to stipulate that *HAB* can only have wide scope with respect to negation.

As also pointed out by Ferreira (2005a), *HAB* does not behave like *usually*, or like any other proportional, non-universal AQ. Whereas sentences such as (86b) convey that there are parties at which John does not smoke, there is no such implication in the case of (85). If there is any implicature at all in (85), it is that John smokes at every party. Drawing a parallel with nominal determiners, Ferreira points out that the contrast above seems similar

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[22] In the case of negative quantifiers, such as *never*, we assume that negation acts as a stativizer (de Swart 1996). The output state holds at a certain interval if, and only if, no relevant events of the VP-type occurs within this interval:

(i) $[\![\text{never}_C]\!] = \lambda P.\lambda s.\forall e'[C(e') \rightarrow \neg\exists e[\tau(e) \subseteq \tau(s) \ \& \ P(e')(e)]]$

The relation between stative predicates and imperfectivity will be discussed in Sect. 2.5.

in nature to a contrast between definite plural DPs, such as *the books*, and quantified DPs, such as *every book* or *most books*:

(89)   a.   John didn't read every book.
            b.   John didn't read the books.

(90)   a.   John read most books.
            b.   John read the books.

In the case of (89), notice that whereas (89a) implicates that John read some (but not all) of the books, the most natural reading of (89b) is that John read none of the books. As for (90), only (90a) implicates that John did not read every book. (90b), if it implicates anything in this respect, implicates that John read all of the books. Ferreira's proposal, which we accept here, was to identify *HAB* with a plural definite determiner over events.

Summing up what we saw in this section, there are three types of habitual sentences: simple habituals (*John smokes*) are just the plural counterpart of progressives (*John is smoking*) and do not involve restrictive, proportional event quantification of any sort. Habituals with adverbs of quantification (*When ..., John always smokes*) involve an overt quantifier over singular events. This event quantifier delivers a set of plural events, which serve as the argument for the same imperfective operator that appears in simple habituals. Finally, bare habituals (*When ..., John smokes*) involve a silent plural event determiner that also appears under the scope of a plurality-seeking imperfective operator. As should be clear by now, what all of these habituals have in common is the presence of this Imp_{pl} operator in their logical forms.

2.5 Statives and plurality

All imperfective sentences discussed so far – both progressives and habituals – have involved eventive predicates. However, stative predicates as well can combine with imperfective morphology. We thus need to find ways to extend our theory of imperfectivity to them.

Let us start by considering the following two sentences:

(91)   a.   John smokes.
            b.   John lives in London.

These are both simple present sentences. The first has a habitual, but not a progressive reading. The second simply conveys that a state of John living in London holds at the speech time, with no suggestion of plurality or habituality. In the previous sections, we have assumed that the simple present of eventive predicates in English is a combination of present tense with an imperfective operator that selects for plural predicates. Should we extend this assumption to cases with stative predicates and assign the same morphosyntactic profile to both sentences above?

A piece of evidence that ongoing stativity and habituality seem to pattern together from a morphosyntactic point of view comes from the Past Imperfect in Colloquial Brazilian Portuguese. For many speakers, such verbal inflection only triggers habitual readings when it appears on eventive predicates. The progressive reading is strongly dispreferred or simply rejected. Stative predicates, however, are fine, and, as in the case of the simple present forms, simply convey that the state holds at some reference time:

(92)   Colloquial Brazilian Portuguese Past Imperfect

    a.   João fumava.   (only habitual)
           João smoked-imp
    b.   João morava   em Londres.
           João lived-imp in   London

We assume that this is not a coincidence and suggest a tentative generalization relating habitual and stative imperfective forms:

(93)   Imperfective forms of stative predicates pattern with habitual imperfectives, but not with progressive ones.

Of course, this can only be noticed when a language has specialized forms, one for progressive and one for habitual readings, as in the English (and Portuguese) Simple Present and the Brazilian Portuguese Past Imperfect.

This section makes a proposal about the mereological structure of stative predicates and how it interacts with the temporal and modal ingredients of imperfectivity we discussed before. We aim at an initial understanding of what might be behind the generalization in (93) and a more comprehensive theory of imperfectivity. The general idea we will adopt is that stative predicates resemble nominal mass predicates in being uncountable from a semantic point of view. They contrast with eventive predicates, which are countable and can be singular or plural, as discussed.

In concrete terms, we propose that stative predicates are non-atomic. Thus, if P is the denotation of a stative predicate in a given world and s is a state holding in that world, the following is always the case:

(94) $P(s) \rightarrow \exists s' : s' < s \ \& \ P(s')$

This property says that any element in the denotation of a stative predicate is non-minimal, having proper parts that are also in the denotation of the predicate. This makes the combination of Imp_{sg} with statives semantically anomalous, since $sg(s,P)$ requires P to have minimal parts. Imperfective statives will always be formed with Imp_{pl}. We propose that this is what is behind generalization (93).

If this is on the right track, the emerging crosslinguistic generalization regarding Imp's mereological properties is the following: we find Imp operators combining with uncountable and plural countable predicates (excluding singular ones), but we do not find Imp operators combining with uncountable and singular countable predicates (excluding plural ones). This generalization seems like the verbal counterpart of a number-related generalization made by Gennaro Chierchia about the nominal domain:

(95)   There are quantifiers for mass and plural nouns that exclude singulars (like English *most* or Italian *molto*), but there are no quantifiers for mass and singular nouns that exclude plurals.   (Chierchia 1998, p. 80)

Chierchia tries to explain his generalization by saying that the non-existence of quantifiers that select for singulars and mass predicates is due to the absence of a natural algebraic property that would apply only to these predicates, excluding pluralities. In the same spirit, I am suggesting that an algebraic property – non-atomicity – underlies the habitual/stative versus progressive distinction in the imperfective domain.

Turning now to the absence of habitual-like plurality readings with imperfective statives that we saw in the beginning of this section, I propose a second formal property that dis-

tinguishes stative predicates from eventive predicates. I assume that any element s in the denotation of a stative predicate P is temporally convex in the following sense:

(96) $[\forall t : t \subseteq \tau(s) \rightarrow [\exists s' < s : \tau(s') = t \ \& \ P(s')]]$

It follows from this property that there is no sum of temporally disconnected elements in the denotation of a stative predicate. Take, for instance, the VP predicate *John live- in London*. Suppose that John lived in London in the seventies, moved to Paris in the eighties, and then moved back to London in the nineties. The idea is that the mereological sum of the two living-in-London states will not be in the denotation of the predicate, since there is a temporal gap in between. In other words, any time point t' belonging to the 1980s would falsify the formula under the scope of $\forall t$ in (96). More generally, if $s1$ and $s2$ are two temporally disconnected P-states, their mereological sum $s1 \oplus s2$ will not be in the denotation of P. The immediate consequence is that an imperfective stative sentence such as *John lives in London* cannot express a temporal sequence of states.

Two other important points about the interaction between statives and the temporal/modal ingredients of imperfectivity follow from (96). First, the property makes it look as if the temporal ingredient of imperfectivity (ongoingness) is missing. Notice that for any stative predicate P, the following will hold:

(97)   For any interval t^*:
         $[\exists s : P(s) \ \& \ t^* = \tau(s)] \Leftrightarrow [\exists s : P(s) \ \& \ t^* \subseteq \tau(s)]$

The left-to-right implication is trivial, and the right-to-left implication is a direct consequence of (96). Thus, for any state s, to say that s holds at t^* and to say that s holds at an interval that is at least as large as t^* are truth-conditionally equivalent.

Second, attributing (96) to stative predicates will make the ordering source introduced by an Imp operator above them empty. There is no way of avoiding the existence of a P-state that holds at an interval overlapping some reference time if a P-state already holds at this reference time. Moreover, the circumstantial modal base M introduced by Imp is realistic in the sense that the actual/evaluation world w^* always belong to $\cap M(\wp, w^*, t^*)$. And since we are assuming that the selected worlds all agree with w^* in whether or not P holds at the reference time introduced by Imp, we conclude the following:

(98)   For any state s, s holds at interval t^* (introduced by Imp) in a world w^*, if and only if, s holds at t^* in all circumstantially accessible (from w^*) worlds.

The upshot of this discussion is that combining a stative predicate with an Imp operator has the same semantic effect that would be obtained if the predicate was embedded immediately under a Tense head and no aspectual or modal operator was present. In other words: the stative predicate is only required to hold at the reference time (supplied by T) and the world at which the entire clause is evaluated. That is why sentences such as (99) and (100) below simply mean that a state of John living in London holds at the utterance time in the first case, or holds at the time I first met John in the second:[23]

(99)   John lives in London.

(100)   João morava   em Londres (quando eu o   conheci.)
         John lived-imp in London when   I   him met-pfv

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[23] Although they may implicate that the states hold at larger intervals. See Gennari (1999) for discussion.

What must be emphasized here is that there is no need to assume that we are dealing with a different Imp morpheme, or that Imp is "fake" in these stative sentences. This point will become important when we discuss imperfective marking in counterfactuals in Sect. 3.

2.6 Imperfectives and (un)boundedness

The main idea put forth in the previous sections was that progressive readings of imperfective sentences express the occurrence (in certain possible worlds) of an ongoing singular event, whereas habitual readings express the occurrence (in certain possible worlds) of a plurality of events of a certain type. Moreover, we identified statives as non-atomic, mass-like predicates, and discussed how their corresponding imperfective forms reduce to the expression of a state holding at a certain time interval.

In discussing progressive readings and their relation to singularity, we used the English periphrastic forms (be+V-ing) as our typical examples. However, there are also many instances of these forms which instead convey the existence of a plurality of events or the existence of a state. This is illustrated in (101):

(101)   a.   John is writing good papers.
          b.   John is living in London.

In the first case, a plurality of John-writing-a-paper events must be going on at the utterance time, and in the second case, a state of John living in London must hold at the utterance time. But neither of them conveys the same meaning as its non-progressive counterpart:

(102)   a.   John writes good papers.
          b.   John lives in London.

In this section, we discuss the role of progressive morphology in cases like (101) and propose that a notion of temporal boundedness is part of its meaning. We also suggest a mereology sensitive account of the contrast between (101) and (102), and show how it affects the temporal and modal ingredients of these imperfective sentences.

There is one aspect of habitual sentences that is still missing from our analysis – an aspect which connects the mereological and modal ingredients that we have postulated as part of the Imp operator. Habitual sentences seem to assign some sort of inertia to the sequence of events they describe. Thus, *John smokes* suggests that if John's mental and physical properties stay as they are and nothing extraordinary happens to him, he will keep smoking forever (or at least as long as he lives). If John is not a smoker and is just trying a couple of cigarettes to see what it feels like to smoke, we would not say that he smokes. This is problematic for our analysis. Given John's intention to smoke a few cigarettes, there will be an ongoing plurality of events of John smoking in our circumstantial worlds in which no external effects interfere. Thus, a temporally bounded sequence of events is not sufficient to make a corresponding habitual sentence true, even if the occurrence of the events is tied to the intentions of the event's agent at the reference time. In fact, as Carlson (1989) noticed, properties that are inherently temporally bounded do not produce good habitual sentences:

(103)   A dog runs across my lawn every morning.

(104)   #A dog runs across my lawn every morning this week.

Whereas a sequence of morning runs can in principle be extended in time forever, this is not the case when we explicitly limit the running to this week's mornings.[24]

To accommodate these facts, as well as some others that will be discussed shortly, we will refine the semantics of our habitual Imp operators, introducing an intensional mereological notion of *unboundedness*. The idea is that a property of events is unbounded with respect to a set of possible worlds when its extensions in these worlds have no maximal element. More formally, if S is a set of worlds and $\wp$ is a property of events,

(105) $\wp$ is unbounded with respect to S if, and only if,
$$\forall e \forall w \in S[\wp(w)(e) \rightarrow \exists e'[e < e' \ \& \ \wp(w)(e')]]$$

When a habitual Imp operator combines with a property of events, it requires that the property be unbounded in the worlds selected by the modal base and the ordering source (the *BEST* worlds in our Portnerian implementation).

With this amendment, we get what we were looking for. For the sentence *John smokes* to be true, the property described by the VP must be unbounded in all worlds in which John's mental and physical states are like his actual mental and physical states, and in which no external obstacles interrupt a sequence of events of John smoking. That means that if in any of these worlds there is an ongoing sequence of events of John smoking, these sequences go on forever. That will be the case if smoking is a disposition of John's, but not if his current behavior is a mere consequence of his intention to see what smoking feels like.[25]

Carlson's contrast is also explained. (104) sounds incoherent because a sequence of events of a dog running across my lawn in a given, fixed week cannot be extended beyond that week. Therefore, the property cannot be unbounded in any set of worlds at all. (103) does not impose any intrinsic limitation on the sequence of events being described and indeed conveys that a dog will keep showing up on my lawn if nothing extraordinary happens.

Interestingly, none of the limitations seen above with simple present sentences extend to their present continuous counterparts. Consider, for instance, the following examples uttered in the middle of the week:

(106)   John is smoking this week (just to see what it feels like).

(107)   A dog is running across my lawn every morning this week.

They are fine and convey the existence of temporally bounded ongoing sequences of events. Two points can be made based on these facts. First, the English progressive can be used to

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[24] The oddness of (104) seems to be tied to the fact that the temporal phrase *this week* restricts the QP *every morning*, which scopes below the habitual Imp. Moreover, it denotes a short interval that does not fit well with the concept of stability associated with habituality. Examples which make reference to larger intervals that frame the habit itself and that do not enter into the characterization of the property associated with the habit sound much better, as illustrated with the following examples from a *NALS* reviewer:

(i)   A milkman delivers our milk this year.

(ii)   John used to put the children to bed last year.

[25] Notice that we are not saying that a person who utters *John smokes* is asserting that *John will smoke forever*. This person may believe that people change in the course of their lives, and that unexpected things may happen to everybody. As a *NALS* reviewer points out, an entailment from *John smokes* to *John will smoke forever* might obtain under certain modal analyses of *will*. This is certainly an interesting issue to investigate. However, discussing whether or not *will* is a modal operator or what kind of modality it conveys would take us too far afield. For simplicity, I will assume here that *will* in *John will smoke forever* is just a non-modal, temporal (forward shifting) operator and that *John smokes* does not entail *John will smoke forever*.

talk about sequences of events. Second, even when a progressive sentence is about a plurality of events, it is not equivalent to its non-progressive counterpart. Here is an interesting example, presented in Boneh and Doron (2013, p.180):

(108)   a.   This student writes good papers.
         b.   This student is writing good papers.

The authors point out that "the sentence in (108a) [= their (11a)] describes a disposition of the student, expressed by iteration of good-paper-writing in all worlds close to the ideal world of the modal base. In (108b) [= their (11b)] on the other hand, the good-paper-writing may very well be accidental, with the progressive only requiring the continuation of a particular sequence of good-paper-writing in those accessible worlds where these particular good papers are written." Based on this type of contrast, Boneh and Doron conclude that progressive and habitual readings do not involve the same kind of modality. Our framework, however, does not force us into the same conclusion. A single circumstantial modal operator is enough to explain the contrast, once we take into account the effect that (un)boundedness has when applied to the worlds selected by the modal base and the ordering source attached to this operator.

Our revised proposal for the English progressive is that it instantiates an imperfective operator that can combine with both the singular and the plural operators that we have been assuming here. However, it always requires that the property it attaches to be bounded in the worlds selected by the modal base and the ordering source. 'Boundedness' here should be understood as the contrary of 'unboundedness':

(109)   A property of events $\wp$ is bounded with respect to a set of worlds S iff
         $\forall w \in S \, \exists e[\wp(w)(e) \, \& \, \neg\exists e'[e < e' \, \& \, \wp(w)(e')]]$

The same line of reasoning can be applied to cases in which a stative predicate combines with the progressive:

(110)   a.   John is living in London.
         b.   John lives in London.

In this case, a state that holds at a certain interval will have to be viewed as a temporally bounded eventuality overlapping this interval. This process, we suggest, brings to salience the changes of state that characterize the boundaries of the event (moving to and out of London, in the case above) and makes the progressive sentence particularly suitable for uses focusing on transitory properties of the participants (John, in the case above), such as having recently moved to London or having the intention to move out of the city in the near future.

The nature of the predicate is predicted to play a role: properties that are taken to be inherently stable should be more resistant to progressive forms (cf. # *John is knowing English*). Although, we do not always expect a clear-cut contrast between situations in which only the progressive or only the non-progressive sentence is fine, it is clear that non-progressive forms tend to be used when more stable situations are at stake, something that the contrast (110a)/(110b) certainly conveys.[26]

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[26] For discussion on this point, see Deo (2009, 2014), who offers a semantic/pragmatic account based on Gricean implicatures arising from the interaction between progressive and non-progressive imperfective forms.

2.7 Interim summary

Let us take stock of the main proposals we have made so far. We have investigated the meaning of habitual and progressive readings of imperfective sentences in detail, as well as their relation to sentences with imperfective statives. We proposed that imperfective sentences share the same modal and temporal ingredients, but differ in terms of their mereological ingredients. Progressive readings involve modal quantification over ongoing minimal events in a predicate denotation, whereas habitual readings involve quantification over plural homogeneous events. The core meaning of all imperfective operators can be seen as a parametrized function *IMP*, expressed as a composition of three types of ingredients (represented below as the metalanguage operators *MOD*, *ONG*, and *N*):

(111)   *The Semantic Ingredients of Imperfectivity*
$IMP = \lambda \wp.\lambda i.\lambda w.\ MOD(w)(i)(\lambda w'.\lambda e.\ ONG(e)(i)\ \&\ N(\wp(w'))(e))$
$MOD = \lambda \wp.\lambda i.\lambda w.\ \forall w' \in BEST(\wp,M,O,w,i)\ \exists e : \wp(w')(e)$
$ONG = \lambda e.\lambda i.\ i \subseteq \tau(e)$

N is a parameter with two values: *SG* and *PL*
$SG(P)(e) \iff P(e)\ \&\ \neg\exists e' < e : P(e')$
$PL(P)(e) \iff P(e)\ \&\ \exists e_1,e_2,...,e_n < e : P(e_1)\ \&\ P(e_2)\ \&\ ...\ \&\ P(e_n)\ \&$
$\bigotimes(e_1,e_2,...,e_n)\ \&\ e = e_1 \oplus e_2 \oplus ... \oplus e_n$

(Un)boundedness presupposition:
$IMP_{PL}(\wp)(i)(w)$ is defined only if
$\wp_{PL}$ is *unbounded* with respect to $\{w' : w' \in BEST(\wp,M,O,w,i)\}$
$IMP_{SG}(\wp)(i)(w)$ is defined only if
$\wp_{SG}$ is *bounded* with respect to $\{w' : w' \in BEST(\wp,M,O,w,i)\}$

Natural language imperfective operators are instantiated by selecting *SG*, *PL*, or both as possible values of parameter *N*. This will give rise to specialized forms that express only progressive or habitual readings, as well as non-specialized forms which are ambiguous and can express both readings. We also saw that when an imperfective operator combines with a stative predicate, only *PL* gives rise to a semantically coherent operator, due to the non-atomicity of these predicates. Finally, we assumed that habitual IMPs presuppose temporal unboundedness of the predicate they combine with, whereas progressive IMPs presuppose temporal boundedness. We conjectured, however, that certain progressive operators, while preserving the boundedness requirement, can also instantiate *PL*, and end up expressing temporally restricted habits or states.

3 Habituals and counterfactuals

The previous sections were devoted to a unifying analysis of progressive and habitual readings, motivated by the crosslinguistic fact that these readings are often expressed by the same imperfective verbal morphology. We now turn to the second crosslinguistic generalization we are interested in, the one about the use of imperfective, habitual morphology in counterfactual constructions. We start quoting Sabine Iatridou, who discusses this generalization in detail:

(112)   "Imp can appear in progressive, generic, or CF sentences. However, if genericity and the progressive take different forms, then counterfactuality will always pattern

with the former, never with the latter. (...) I would like to emphasize that if the sameness of form of the verb in ongoing events and generics suffices to tempt us in the direction of reductionist accounts, then the sameness of form of the verb in generics and CFs 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 CFs share the same form.[...] I have not encountered a language where CFs and ongoing events have one form, and generics a different one."

<div align="right">(Iatridou 2000, pp. 258-259)</div>

The rest of this paper is an attempt to construct such a unified account, building on the ideas and results we have presented so far.

3.1 Counterfactual modals

Counterfactual constructions (CFs), as the name suggests, convey contrary-to-fact situations which deviate in some way or another from a given world of evaluation, usually the actual world. Counterfactual conditionals, for instance, convey hypothetical reasoning based on a premise (usually expressed by an *if*-clause) that is implicated to be false:

(113)   If John were sick, he would be at home.

This example implicates that John is not sick. Whether this implication is an entailment, a presupposition, or an implicature is a controversial issue and will not concern us here. There is also a rich and extensive literature on the nature of the modality underlying CFness. For concreteness, I will assume that conditionals in general – and CFs in particular – are formed by a (possibly silent) modal quantifier, and that *if*-clauses play the role of a restrictor of this quantifier (Lewis 1975, Kratzer 1981, and many authors after them).

(114)   CF
                                        ╱   ╲
                                   ╱   ╲   ConsequentP
                              Modal   *If*-Clause

Following work by Robert Stalnaker and David Lewis, among others, I assume that modal quantification in CFs are based on a notion of similarity among worlds, and employ some sort of function that selects worlds in which the *if*-clause is true and which are as similar as possible to the evaluation world (typically, the actual world). Putting many details aside, we get something along the following lines for (113):

(115)   If John were sick, he would be at home.
          Implication: John is not sick.
          Assertion: The worlds in which John is sick and which are most similar to the actual world are also worlds in which John is at home.

With this minimal background in mind, we turn to the role played by tense and aspect in the composition of the meaning of CF conditionals.

3.2 On the role of past morphology

Iatridou's survey of the grammatical ingredients of counterfactuality began with what she called *fake past*. What she meant was that in many languages there are past tense morphemes in CFs which do not seem to convey pastness and would not be used in non-CF constructions. Here are some contrasting examples presented by her (Iatridou 2010, p. 2):

(116)   a.   If I had a car (now), I would be happy.
         b.   *I had a car now.

(117)   a.   If he had been descended from Napoleon he would have been shorter.
         b.   *He had been descended from Napoleon.

(118)   a.   If he left tomorrow, he would get there next week.
         b.   *He left tomorrow.

As the examples make clear, in CFs the past tense can be used to convey hypothetical situations in the present and in the future. Moreover, when the hypothesis is about the past, we find the past tense on top of a perfect construction (have+participle), which by itself can locate a situation in the past ("John has eaten an apple").

Since Iatridou's seminal work, the role of past tense morphology in CFs has been investigated in detail by Ana Arregui and Michela Ippolito.[27] It is impossible here to do justice to the richness and importance of their work, or to highlight all of the differences between their ideas and implementations. What is important to our discussion in this paper is that both argue that the past tense in CFs is real but displaced. Although it shows up in the antecedent and the consequent of CFs, it is semantically related to the modal operator. That means that the past tense in CFs has a semantic effect on the selection of the possible worlds the modal operator quantifies over. Arregui (2005, 2007), for instance, analyses CFs as *de re* claims about the past. She proposes that both the antecedent and the consequent of a CF are (semantically) tenseless and denote properties of time intervals, as schematically shown below

(119)   If John were sick, he would be at home.
         MODAL(PAST)(λi. John be sick at i)(λi. John be at home at i)

The following paraphrases, though not precise, may help clarify the idea:

(120)   If John were sick, he would be at home.
         [In the most similar worlds in which the past led to a present in which John is sick, John is also at home.]

(121)   If I had won the lottery, I would have bought a car.
         [In the most similar worlds in which the past led to a present in which I have won the lottery, I have also bought a car.]

(122)   If John took the medicine, he would get better.
         [In the most similar worlds in which the past led to a present in which John takes/will take the medicine, John also gets/will get better.]

Notice that both the *if*-clause and the consequent clause are evaluated at the utterance time. Pastness plays a role only in the characterization of the possible worlds being quantified over. It is this idea that we will incorporate into our analysis. Even though we are not delving into

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[27]   See Arregui (2005, 2007, 2009), and Ippolito (2002, 2003, 2006, 2013).

a lot of detail, these brief remarks should suffice for our goal here, which is an analysis of the role of imperfective morphology on CFs.

3.3 Iatridou's generalization

We now turn to Iatridou's second major point which concerns fake aspectual marking or, more precisely, fake imperfective marking, in CFs. As she observes about Greek, "in general, the Greek verb is either in the perfective or the imperfective. However, in CFs, the verb always appears in the imperfective" (Iatridou 2010, p. 5-6). She gives the following examples to illustrate this fact:

(123)   An eperne   to farmako, tha ginotan   kalitera
         if   take-pst-imp the medicine, FUT become-pst-imp better
         'If s/he took the medicine, s/he would get better'

(124)   An pandrevotan   mia prigipisa, tha esoze   tin eteria
         if   marry-pst/-imp a   princess, FUT save-pst-imp his firm
         'If he married a princess, he would save his company.'

Her crucial point here is that these examples are not interpreted as progressive or habitual. The events are understood as culminated and would have been marked with perfective morphology in non-CF constructions. Thus we seem to have an instance of fake imperfective in Greek CFs. As Iatridou shows, other languages with perfective/imperfective morphology seem to follow the same pattern.

At this point one might ask what happens with CFs in languages which have specialized markers for imperfectivity, that is, one for progressive readings and one for habitual readings. Hindi is such a language, as the following examples from Bhatt and Pancheva (2005) show:

(125)   Yusuf   skuul jaa-taa   hai
         Yusuf.m school go-Impfv/Hab.MSg be.Prs.Sg
         'Yusuf goes to school.'

(126)   Yusuf   skuul jaa rahaa   hai
         Yusuf.m school go Prog.MSg be.Prs.Sg
         'Yusuf is going to school.'

Bhatt and Pancheva (2005, p. 2) points out that "the syncretism that we find in Hindi is between the marker of Habitual meaning and the marker of Counterfactual meaning, and not between the marker of Progressive meaning and the marker of Counterfactual meaning." The following example illustrates the point:

(127)   *-taa* habitual marker as counterfactual marker: OK

         agar Mona yahã: aa-tii,   to   me us-ke-saath fot.o khichvaa-taa
         if   Mona.f here come-Hab then I   her-with   photo draw.caus-Hab
         'If Mona had come here, I would have had a picture taken with her.'

(128)   *rahaa* progressive marker as counterfactual marker: not OK

         agar Mona yahã: aa   rahii hai, to   Sona-bhii   aa-egii
         if   Mona.f here   come Prog.f, be.Prs then Sona.f-also come-Fut.f
         'If Mona is coming here, then Sona also will.'   [Note: not counterfactual]

Thus, CF imperfectives in Hindi are habituals, not progressives. Moreover, as discussed by Iatridou (2000, 2010) and Bhatt and Pancheva (2005), habitual marking on Hindi CFs seems to be fake. First, although the progressive marker and the habituality marker cannot co-occur outside of CF contexts, in CFs they can:

(129)   *vo gaa rahaa ho-taa
          he sing Prog be-Hab

(130)   agar vo gaa rahaa ho-taa, to   log   wah wah kar rahe   ho-te
          if   he sing Prog be-Hab then people wow wow do Prog.MPl be-Hab.MPl
          'If he was singing, people would be going *wah wah*.'

Second, although individual-level statives usually cannot take the habituality marker, in CFs they can:

(131)   *vo lambaa ho-taa   (hai)
          he tall   be-Hab (is)

(132)   agar vo lambaa ho-taa, to   army use   bhartii kar le-tii
          if   he tall   be-Hab then army he.Dat admit do take-Hab.f
          'If he was tall, the army would have admitted him.'

Finally, although habitual sentences take one habituality marker, CFs whose hypothesis is about a habitual statement take two habituality markers:

(133)   vo macchlii khaa-taa hai
          he fish   eat-Hab be.Prs
          'He eats fish (on a regular basis)'

(134)   agar vo macchlii khaa-taa ho-taa, to   use   yeh biimaarii nahiiN ho-tii
          if   he fish   eat-Hab be-Hab then he.Dat this illness   Neg   be-Hab.f
          'If he ate fish (on a regular basis), then he would not have this disease.'

As the data above clearly shows, the imperfective marking that we find in Hindi CFs is indeed a fake, habitual marking.

Commenting on her extensive cross-linguistic survey on tense and aspect marking on CFs, Iatridou states that she was not able to find a language where CFs and progressives are formally alike with habituals marked differently.

Based on this important finding, she states what I will call Iatridou's Generalization:

(135)   *Iatridou's Generalization*
          In languages without a dedicated CF morpheme, verbs in CF constructions are marked as imperfective. When such a language has different forms for progressive and habitual readings, CFs pattern with habituals, not with the progressive.

In the rest of this section, I try to develop an explanation for this generalization.[28]

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[28] A *NALS* reviewer points out that Italian has a habitual periphrasis that cannot be used in CFs (or progressives):
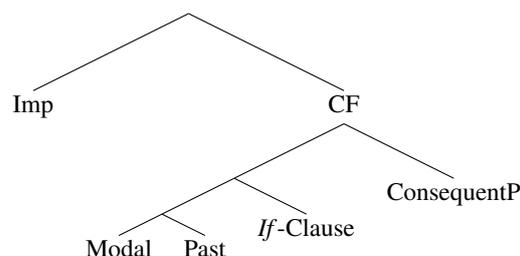
(i)   Se Maria soleva   fumare, soleva   soffrire di problemi respiratori.
        if Maria used_to smoke   she_used_to suffer of problems respiratory
        'If Maria used to smoke, she used to suffer from respiratory problems.'

According to the reviewer, this sentence can only be read as an epistemic conditional. As (s)he points out, "the fact that the aspectual periphrasis specialized for HAB readings is not OK in CFs suggests that the

3.4 On the role of imperfective morphology

The question we should answer now is: what is the semantic role played by the imperfective (habitual) marking that Iatridou diagnosed as another grammatical ingredient of CFs, and which was also shown to be fake, i.e., not to convey the idea of an on-going habit? My proposal runs along the same lines as Ippolito's and Arregui's ideas about the past tense. The imperfective morpheme "scopes" above the modal operator (Anand and Hacquard (2010)). The *if*-clause and the consequent clauses are not specified for (im)perfectivity; in the framework I am adopting here they denote properties of intervals.[29]

(136)

```
                    /\
                   /  \
                  /    \
               Imp      CF
                       /\
                      /  \
                     /    \
                    /   ConsequentP
                   /\
                  /  \
              /\  If-Clause
             /  \
         Modal   Past
```

My crucial assumption is that the modal combines with the past tense, the *if*-clause, and the ConsequentP and outputs a stative predicate. It is this stative predicate that will serve as an argument to the imperfective operator located immediately above it.

Given what we saw in the previous sections, stative predicates are selected by the same Imp morpheme that selects for plural predicates and that triggers habitual readings – hence the fact that CF Imp and habitual Imp are formally alike. This is our explanation for Iatridou's generalization. The fact that no "habitual flavor" can be noticed follows from the way stative predicates and the Imp operator interact, as discussed in Sect. 2. There, we assim-

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particular imperfective morphology that allows both for HAB readings and for CF readings is a semantically underspecified form."

This is an interesting observation as one might have expected that the example above could also be interpreted as a CF about a present habit. This is what happens, for instance, in subjunctive conditionals with certain periphrastic habitual constructions in other languages:

(ii)   If Peter were in the habit of smoking ...   [English]

(iii)   Se Pedro costumasse   fumar, ...
         if Pedro used_to-past_subj smoke ...
         'If Pedro were (now) in the habit of smoking, ...'   [Portuguese]

The fact that these constructions can be interpreted as CFs about a present habit might be tied to the fact that the verbal periphrases can occur in other tense/aspect combinations, including the simple present:

(iv)   Pedro costuma fumar.
         Pedro is in the habit of smoking.

This is not the case with the English *used to* construction, for instance (*uses to*), but it might also apply to the Italian case with *soleva*. This issue certainly deserves more attention, something which I will have to leave for another occasion.

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[29] Unless the hypotheses themselves are about a habit or an ongoing event, in which case two Imp morphemes will be employed in the structure that serves as input to interpretation: one in the *if*-clause and one above the modal. In Hindi, the two morphemes are pronounced, as we reported in the previous section. In Romance and Greek, on the other hand, only one morpheme is spelled out, reflecting morphological peculiarities of these languages.

ilated stative predicates to uncountable (mass-like) predicates and attributed the apparent lack of modality in imperfective statives to the interaction between (i) the temporal homogeneity that characterizes stative predicates, (ii) the realistic and reference-time sensitive circumstantial modal base attached to Imp, and (iii) the emptiness of its ordering source. Exactly the same reasoning applies to the modal operator that heads CF conditionals.

Treating CF modals as statives seems natural if we notice that other modal predicates behave like stative predicates. For instance, English and Portuguese modal verbs can appear in the simple present without conveying plurality of events, just like any non-modal stative predicate, and different from eventive predicates. The English/Portuguese examples below simply conveys a current possibility or permission:

(137) Pedro pode estar em casa.
       Pedro may be   at   home
       'Pedro may be at home.'

(138) Pedro pode deixar o   pas.
       Pedro may leave the country
       'Pedro may leave the country.'

Moreover, in Hindi, we can see the specialized habitual Imp occurring with modals, conveying for instance a person's ability at a certain reference time:

(139) Yusuf havaii-jahaaz uraa sak-taa   hai/thaa
       Yusuf air-ship   fly CAN-hab be.Prs/be.Pst
       Yusuf is/was able to fly airplanes.' (Bhatt 1999, p. 176)

As for the denotation of the CF modal, and having in mind CF paraphrases we gave before (see (140) below), we need something along the lines of (141a) and the defining principle in (141b):

(140) If John were sick, he would be at home.
       [In the most similar worlds in which the past led to a present in which John is sick, John is also at home.]

(141) a. $[\![\text{CF-modal}]\!]^{t^*,w^*}(i)(P)(Q) = [\lambda s.\ \tau(s) = t^*\ \&\ \mathscr{M}^{cf}_{P,Q,i}(s,w^*)]$

       b. A $\mathscr{M}^{cf}_{P,Q,i}$-state holds at t^* in w^* if and only if
           the worlds most similar to w^* in which the past (i) led to a present (t^*) at which P is true are also worlds in which the past (i) led to a present (t^*) at which Q is true.

The idea is that a world w^* is in the modal state $\mathscr{M}^{cf}$ at time t^* (with respect to properties P, Q and interval i) whenever the worlds whose pasts are as similar as possible to w^*'s past (i) and in which P is true at t^* are also worlds in which Q is true at t^*.

Notice that whether or not the state holds in a given world depends on whether or not an eventuality of a certain type occurs in certain related worlds. For instance, in (140) above, the modal state will hold in the actual world if, and only if, a state of John being home holds in the most similar worlds in which John is sick. This dependence on the occurrence of a certain eventuality bears a certain resemblance to the resultant states proposed by Parsons (1990, pp. 234-236) for the English Perfect. A resultant state holds at an interval i if, and only if, a certain event occurred at an interval preceding i. For instance, if John kissed Mary at some point in the past, a resultant state (a state of John's having kissed Mary) will hold at any interval following this event of John kissing Mary. The nature of the modal state is

similar to the resultant state in that it also depends on the occurrence of a certain eventuality. It differs from this type of state only in the way the temporal and modal parameters are manipulated: in the case of the Perfect, the resultant state holds in the same world as the event described under VP, whereas in the case of CFs, the modal state holds in a world different from the worlds in which the VP-eventuality occurs.

As for the internal temporal profile of the *if*-clause and the consequent clause, I assume that grammatical aspect, as well as tense, are left unspecified at the top level of these clauses, and that they denote properties of intervals. This is illustrated below, with R being a free variable ranging over relations between intervals:

(142)   If John were here, he would be happy.

(143) $[\![$if John were here$]\!] = \lambda t.\, \exists s :\, R(\tau(s),t)\; \&\; \text{John\_be\_here}(s)$

In a case like (142), the relation R holds between the eventuality's interval and the interval at which the clause is evaluated. I assume that in the absence of any other contextual clue it defaults to the identity relation. As a result, (142) will be interpreted as a conditional about the present.

Leaving R unspecified becomes crucial in accounting for what Michela Ippolito called "the temporal flexibility of imperfect conditionals". As an illustration, consider the following examples, taken from Ippolito (2004):[30]

(144)   Se arrivavi   ieri   sera, incontravi   mia sorella.
         if you_arrive-imp yesterday night you_meet-imp my sister
         'If you had arrived yesterday night, you would have met my sister.'

(145)   Se partivi   domani, incontravi   mia sorella.
         if you_leave-imp tomorrow you_meet-imp my sister
         'If you left tomorrow, you would meet my sister.'

In both examples, the verbs appear in the imperfect. However, (144) is interpreted as a hypothesis about the past, whereas (145) is interpreted as a hypothesis about the future. I assume that the presence of the adverbials *sera* and *domani* inhibits the default value of R, which will then be instantiated as temporal precedence ($<$) in (144), and as its converse ($>$) in (145):

(146) $[\![$se arrivavi ieri$]\!] = \lambda t.\, \exists e :\, \tau(e) < t\; \&\; \text{you\_arrive}(e)\; \&\; \text{in\_yesterday}(e)$

(147) $[\![$se partivi domani$]\!] = \lambda t.\, \exists e :\, \tau(e) > t\; \&\; \text{you\_leave}(e)\; \&\; \text{in\_tomorrow}(e)$

Let us return to the compositional interpretation of (136). In accordance to (141), we get the following, after Imp is interpreted:

(148) $[\![$Imp CF$]\!]^{t^*,w^*} = \lambda t.\, \exists s :\, t \subseteq \tau(s)\; \&\; \mathscr{M}^{cf}_{P,Q,i}(s,w^*)$

As for the Tense head on top of Imp, given the indexical temporal feature of the CF modal state described in (141) ($\tau(s) = t^*$), the only tense compatible with it is the present tense, which denotes the utterance time:

(149) $[_{\text{TP}}$ Pres $[_{\text{Asp}}$ Imp CF $]\,]$
         $[\![$TP$]\!]^{t^*,w^*} = 1$ *iff* $[\exists s :\, \tau(s) = t^*\; \&\; \mathscr{M}^{cf}_{P,Q,i}(s,w^*)]$

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[30] Thanks to a *NALS* reviewer who called my attention to this point, mentioning that this flexibility is also observed in Greek.

Therefore, if the proposal presented in this section is on the right track, the aspectual head above the modal operator will be semantically related to the utterance time. What is relevant for us about this point is that this might be the explanation behind Iatridou's observation that imperfectivity is one of the grammatical ingredients of counterfactuals. The reasoning would go as follows: There seems to be a cross-linguistic constraint on present perfectives. Comrie (1976, p. 66ff) mentions that present perfectives are much less common than past perfectives, and when we do find such combinations, they are interpreted as a future tense or get some special meaning, as in the so-called narrative present. As the author points out, the present tense is "essentially imperfective." This incompatibility between present tense and perfective aspect can be seen as a consequence of the (proper) inclusion relation introduced by the perfective head and the assumption that the present tense by default denotes the utterance time, which is conceptualized an in indivisible, minimal time interval. Therefore, present+perfective would be incoherent from a semantic point of view. CFs with perfective marking would thus be anomalous.

Summing up our discussion on CF imperfectives: We have proposed that imperfective morphology on CFs is real, but displaced. It shows up on the verbs in the antecedent and/or consequent of a CF conditional, but it scopes above a modal operator present in these constructions. This modal operator is a stativizer, so Imp is attached to a stative predicate. Moreover, it is not "covered" by a past tense head and relates directly to the utterance time. These assumptions, together with our theory of imperfectivity discussed before, lead to a possible derivation of Iatridou's generalization about impefectivity being one of the grammatical ingredients of CFs and CF-Imp patterning with habituals and not with progressives.

Several issues remain open. For instance, I have been quite speculative on why perfective verbal forms seem not to be used in CFs. I have tied this fact to a cross-linguistic ban on present+perfective combinations. An alternative line of inquiry might be the actuality entailments triggered by the use of perfective aspect with certain modal verbs, as discussed by Valentine Hacquard (see Hacquard 2006). Such an entailment would, of course, be inconsistent with couterfactuality and this might help to explain why perfective conditionals would not be CF conditionals. On the other hand, we have focused our analysis on the empirical findings in Iatridou's work, especially data from Romance, Greek, and Hindi. Bjorkman and Halpert (2013) and Halpert and Karawani (2012) have discussed data from languages that seem to behave differently, indicating that the ban on perfective CFs might not be universal, but rather depend on how pastness and (im)perfectivity are encoded on verbal affixes. If this is on the right track, it will definitely have an impact on the ideas put forward in this paper. It is clear that much work remains to be done.

4 Conclusion

This paper provided a unifying approach to imperfectivity, according to which all instances of imperfective morphology – progressive, habitual, stative, and counterfactual imperfectives – share a common temporal and modal semantic core. They only differ from each other in their sensitivity to the mereological properties (event plurality, countability, and boundedness) of the verbal predicates to which they are semantically related. The main ideas put forward in the paper were:

– Imperfective morphemes denote mereology-sensitive existential event quantifiers. Progressive readings involve quantification over minimal events in a predicate denotation. Habitual readings involve quantification over plural events (as suggested by Krifka et al 1995; Kratzer 2003, 2007).

- Eventive predicates are count predicates, having minimal elements (as well as sums thereof) in their denotations. Stative predicates are non-atomic, mass-like predicates.
- All imperfective operators share the same temporal (ongoingness) and modal ingredients, and that is why progressive and habitual readings are frequently expressed by the same verbal forms.
- Imperfective modality, analogously to Portner's (1998) Kratzerian Progressive operator, involves a circumstantial modal base and an ordering source based on eventuality non-interruption, which are both sensitive to the property described under a verb phrase, and to a reference time.
- Due to the homogeneity of stative predicates, ongoingness and modal effects will not be noticed when an imperfective operator combines with such predicates. The net result will be truth-conditionally similar to asserting that a state holds at some reference time in the evaluation/actual world.
- When languages have different forms for progressive and habitual readings, imperfective statives pattern with the latter. Given our mereology-oriented approach to imperfectivity and verbal predicates, it is natural to connect this generalization to a generalization made by Chierchia (1998) about nominal quantifiers, which states that there are quantifiers for mass and plural nouns that exclude singulars, but there are no quantifiers for mass and singular nouns that exclude plurals.
- Counterfactual modals take a past interval as well as two interval properties (not specified for (im)perfectivity) as arguments and output a stative predicate. This modal scopes under an aspectual operator that takes the time of utterance as its reference time. Due to a crosslinguistic ban on present perfectives, languages tend to use imperfective aspect in CFs. Moreover, given our previous point on imperfective statives, in languages that have different forms for habituals and progressives, CFs will pattern with the latter, and not with the former, explaining Iatridou's Generalization.

Needless to say, many issues were left open that deserve more attention.[31] Hopefully, the project of developing a general theory of imperfectivity based on mereology sensitive event quantifiers will at least prove itself useful in bringing new questions about – and eventually sharpening our understanding of – this intriguing morpho-semantic notion.

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[31] For instance, other uses of imperfective morphology in English, Romance, and elsewhere, were discussed by Arregui et al (2014), Cipria and Roberts (2000), Giorgi and Pianesi (2004), and Ippolito (2004).

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