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The Syntax and Semantics of Aspect
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Aspect and Modality

1 The Progressive and the Imperfective Paradox

1.1 The basic facts

Imperfective Paradox

(1) a. Activities: (1a.i) $\rightarrow$ (1a.ii)
   i. Mary was pushing a cart.
   ii. Mary pushed a cart.
   b. Accomplishments: (1b.i) $\not\rightarrow$ (1b.ii)
   i. Mary was drawing a circle.
   ii. Mary drew a circle.

An initial temptation: 'DP VP-ing' is true if an event of 'DP VP' is ongoing.

But what does it mean for an event to be ongoing? This is the question that we will try to answer.

1.2 Bennett and Partee (1972)'s Superinterval Analysis

Bennett and Partee (1972):

(2) [Prog ϕ] is true at interval I iff there exists an interval I' such that I $\subset$ I', I is not a final subinterval of I', and ϕ is true at I'.

1.2.1 Some Desirable Entailments

Deriving (1a.ii) from (1a.i)

a. If (1a.i) is true then there is an interval I' which contains a past interval I, s.t. 'Mary push a cart' is true at I'.

b. 'Mary push a cart' is an activity. Hence the subinterval property holds of it. Hence 'Mary push a cart' is also true of I.

c. I is a past interval at which 'Mary push a cart' is true. Hence (1a.ii) follows.

Not deriving (1b.ii) from (1b.i)

a. If (1b.i) is true then there is an interval I' which contains a past interval I, s.t. 'Mary draw a circle' is true at I'.

b. 'Mary draw a circle' is an accomplishment. No subinterval property. In fact, no subevent of the relevant sort. Consequently we cannot derive (1b.ii).

The 'not a final subinterval' bit captures the fact that if we say 'Mary was drawing a circle at 5pm', it must not be the case that 'Mary drew a circle at 5pm.'

This condition raises questions about the analysis of cases like:

(3) We were filling the room with smoke.
(see Schein (2002):54-63, esp. fn. 41 for relevant discussion)

1.2.2 Some Problematic Results

A problematic entailment: 'Mary will have drawn a circle'

a. If (1b.i) is true then there is an interval I' which contains a past interval I, s.t. 'Mary draw a circle' is true at I'.

b. Consider a point in the future beyond I'. From this point, it will be true that there is an event of 'Mary draw a circle' in the past. Hence it follows that 'Mary will have drawn a circle'.

A problem of interruptions:

(4) a. Mary was pushing a cart when she was abducted by aliens.
b. Mary was drawing a circle when she was abducted by aliens.

Intuitively, if Mary pushed the cart a bit / drew part of the circle, we judge (4a, b) as true.

But the superinterval analysis does not make (4b) true in this scenario. (4a) works with the reasonable assumptions that I is an open interval.)

1.3 Dowty (1979)'s Inertia Worlds

Dowty (1979) observation: the problems for Bennett and Partee (1972)'s account arise from the requirement that ϕ has to be true at a superinterval in the the real world.

Dowty modifies his semantics so that ϕ does not have to be true at a superinterval in the real world, but instead in a set of world that he names *Inertia Worlds.*

(5) Inertia Worlds - are to be thought of as worlds which are exactly like the given world up to the time in question and in which the future course of events after this time develops in ways most compatible with the past course of events.
Inr(I,w) = set of inertia worlds for w and interval I.
(from Dowty (1979):148)

(6) [Prog ϕ] is true at $< I, w >$ iff for some interval I' s.t. $I \subset I'$ and I is not a final subinterval for I', and for all w' such that $w' \in$ Inr(I, w), ϕ is true at $< I', w' >$.

1.3.1 Handling Interruptions

Consider Mary's unexpected abduction by aliens, which interrupts her pushing the cart / drawing a circle.

This interruption made (4b) come out as false under the Bennett and Partee (1972) account.

With the inertia world proposal, the idea is that alien abductions are not part of the normal course of events. So the actual world does not actually make it into the inertia worlds. In the inertia worlds, there is no alien abduction or similar interruption and there is a superinterval I' at which Mary draws a circle.

1.3.2 Handling the Imperfective Paradox

• Activities:

a. Suppose 'Mary was pushing a cart' is true in w now.

b. Then 'Mary be pushing a cart' was true at some I in the past in w.

c. Hence in all inertia worlds w', 'Mary push a cart' is true at some I' s.t. $I \subset I'$.

d. By the subinterval property, in all intertia worlds w', 'Mary push a cart' is true at I.

e. W.r.t. the past, w and the inertia worlds are alike, hence 'Mary push a cart' is true at I at w i.e. 'Mary pushed a cart' is true.

• Accomplishments:

a-c. same as for activities

d. No subinterval property. Hence illicit entailment is not generated.

e. The actual world does not have to be an inertia world. Hence the 'Mary will have drawn a circle' entailment is not generated either.

1.3.3 The Flipping of Coins

(7) a. The coin is coming up heads.
b. The coin is coming up tails.

(8) A situation where John has started drawing an equine object:
a. John is drawing a horse.
b. John is drawing a unicorn.

(9) John sees a $100 bill in the middle of the street and walks into the street to pick it up.
a. John is crossing the street.
b. John is walking to the middle of the street.

1.4 Parsons (1990)'s Incomplete Events

Dowty solved the problems associated with the Imperfective Paradox by introducing modality which allowed us to make reference to possibly non-actual complete events.

Parsons (1990) attempts to avoid modality altogether by introducing incomplete events as a primitive.

The idea is that event descriptions like 'Max cross the street' have in their denotation both 'complete' events in which Max actually crosses the street and 'incomplete' events in which Max only gets part of the way across the street.

1.4.1 The Basic Proposal exemplified

(10) a. **Hold**:

i. John was crossing the street.
$\exists e \exists I \exists t$ [I $<$ now $\wedge$ cross(e) $\wedge$ Agent(e) = John $\wedge$ Theme(e) = the-street $\wedge$ Hold(e,t)]

ii. John was pushing the cart.
$\exists e \exists I \exists t$ [I $<$ now $\wedge$ push(e) $\wedge$ Agent(e) = John $\wedge$ Theme(e) = the-cart $\wedge$ Hold(e,t)]

b. **Cul** (Culminate):

i. John crossed the street.
$\exists e \exists I \exists t$ [I $<$ now $\wedge$ cross(e) $\wedge$ Agent(e) = John $\wedge$ Theme(e) = the-street $\wedge$ Cul(e,t)]

ii. John pushed the cart.
$\exists e \exists I \exists t$ [I $<$ now $\wedge$ push(e) $\wedge$ Agent(e) = John $\wedge$ Theme(e) = the-cart $\wedge$ Cul(e,t)]

(10a.i) does not entail (10b.i) - just because an event holds, it doesn't follow that it culminates.

As it stands, (10a.ii) does not entail (10b.ii) either.
The entailment follows from the fact that *push the cart* is an atelic event description and culmination and holding are not distinct in such cases.

1.4.2 Incomplete Objects and Incomplete Events

- What does it mean for an event to hold at a particular point of time?

(11) a. Max was crossing the street.

i. Scenario 1: Everything goes on as normal. Max crosses the street.

ii. Scenario 2: Alien Abduction!

b. Jutta was wiping out the Roman army.

i. Scenario 1: Jutta is a normal though irate resident of Bingen.

ii. Scenario 2: Jutta is an advanced robot from the future designed to wipe out large armies.

Parsons (1990)'s system is silent about which of the above we judge as true and which we judge as false.

• Incomplete Objects and Verbs of Creation

(12) a. Mary was drawing a circle.

b. $\exists x \exists e \exists I \exists t$. [t $<$ now $\wedge$ t $\in$ I $\wedge$ draw(e) $\wedge$ circle(x) $\wedge$ Ag(e) = m $\wedge$ Th(e) = x $\wedge$ Hold(e,t)]

According to (12b), there is a circle.

Parsons (1990) argues that this is not a problem since:

> ..people do refer to unfinished houses as houses, and even - though more reluctantly - to unfinished circles as circles. (from Parsons (1990):178)

But as Landman (1992) points out, an appeal to incomplete objects does not help us with cases where there really is no incomplete object.

(13) God was creating a unicorn, when he changed his mind.

1.5 Landman (1992)'s Continuation Branches

Some interruptions don't matter. Others do.

(14) a. Max was crossing the street when she was hit by a truck.

b. Jutta was wiping out the Roman army.

Dowty (1979)'s inertial worlds seem to make the correct predictions here initially. In the relevant initial worlds for (14a), Max would not be hit by a truck and would cross the street. The inertial worlds for (14b) would not lead to Jutta actually wiping out the Roman army.

Vlach (1981)'s objection: sometimes the event gets interrupted in the inertial world. More generally, what stops the real world from being an inertial world?

(15) After the truck that hit Max, there is another truck ready to get him if the first one misses, and after that another one.

What are the inertia worlds here?

(16) both (16a, b) describe the same situation (from Portner (1998))

a. At 10 a.m., John was building a house.

b. At 10 a.m., the leaky sewer was creating a sink hole which eventually swallowed up John's property.

(17) both (17a, b) describe the same situation (from Portner (1998))

a. Max was crossing the street.

b. Max was walking into the path of an incoming bus.

Landman (1992)'s insight: the properies of the event descriptions involved are important; interruptions that come from the event description cannot be overruled as easily as interruptions that come from adverbial modifiers.

1.5.1 Prog as a relation between events

Prog is an operator that relates incomplete events to sets of complete events that satisfy a certain description. The semantics given to Prog is an intensional one - so the complete events are possibly not events in this world.

(18) a. ing(VP) $\rightarrow \lambda x \lambda e$. Prog (e, VP(x))

b. Max was building a house.

$\exists e'[\tau(e') < \text{now} \wedge$ Prog(e', $\lambda e \exists y$ [House(y) $\wedge$ Build(e) $\wedge$ Ag(e) = m $\wedge$ Th(e) = y])]

1.5.2 Stages and Continuations

• Events have parts. But the part-of relation is sometimes rather trivial. My drawing a circle on the boord today is part of the 5th lecture of LSA 130, which in turn is part of this LSA Summer Institute.

Therefore it is useful to identify certain 'special' parts - parts of events about which we can say something like 'it's the same event in an earlier / further state of development'.

> We cannot say that when an event stops in a world, there is no bigger event of which it is part in that world, but we can say that when it stops, there is no bigger event in the word of which it is a stage. (from Landman (1992):23)

(19) a. f is a **continuation** of e iff e is a stage of f.

b. f **stops** at j in w iff there is no continuation of f beyond j in w.

1.5.3 Continuation Branches

Intuition: at the point where an event stops in the real world, we can give it another shot by going to the closest world, where it continues as long as this world counts as a reasonable world.

If it stops in this world, we jump to the closest world where it didn't stop as long as this world counts as a reasonable world.

Repeat until either:

(i) we reach a world where there is an event in the denotation of the VP (underlying the Progressive, i.e. Prog(VP)).

or

(ii) we reach a world that is no longer reasonable.

→ We will refer to the above chain of world-event pairs as a **continuation branch**, CON(e,w).

Reasonable needs to be interpreted w.r.t. the original world of utterance.

Consider the following scenario due to White (1995).

(20) Jutta was wiping out the Roman army.

Jutta is a robot who is 90% likely to annihilate each individual adversary. But despite this if the Roman army numbers in the thousands, Jutta is unlikely to wipe out the Roman army. But each continuation jump that we perform is pair-wise reasonable. It's just that the reasonableness w.r.t. the original world is low.

1.5.4 A semantics for Prog

(21) $[\![\text{Prog(e,P)}]\!]_{w,g} = 1$ iff $\exists f \exists v :< f, v > \in \text{CON}(g(e), w)$ and $[\![P]\!]_{v,g}(f) = 1$.
where CON$((g(e), w)$ is the continuation branch of $g(e)$ in w.

• Interruptions that do not matter:

(22) Max was crossing the street when aliens abducted him.
- we go to the closest world where he is not abducted by aliens and where his crossing continues. Given that he is in good shape and other facts about the street, we expect him to cross in this world. Let's assume that he does. If there is a truck waiting to hit him in this world, we'll have to jump again. But in the end, we expect to get to a reasonable world where he does cross the street.

• Interruptions that matter:

(23) Jutta was wiping out the Roman army.

- keeping in mind that Jutta is a normal though irate person from Bingen, it is highly unlikely that Jutta will actually wipe out the Roman army. We give her many chances, restarting the event every time a Roman gets her, but after a while we end up in a world that is no longer reasonable.

• Miracles:

(24) Jutta was wiping out the Roman army.

Scenario: Freya, the goddess of war, enters into Jutta and she single-handedly manages to demolish the entire Roman army.

- we don't enter into the continuation worlds at all. We just follow the current world until the Roman army is demolished. The fact that the current world is in some sense unreasonable is irrelevant.

• Perspectives:

(25) I take a train from Heidelberg to Amsterdam. At some point the train is diverted to Utrecht because of problems with the railroad tracks.

Possible Responses:

a. I was going to Amsterdam when the train was diverted to Utrecht.

b. I was going to Utrecht, only I didn't know it at the time.

(based on an example suggested by Roger Schwarzschild to Fred Landman)

1.6 Portner (1998)'s Modal Semantics

The modal semantics proposed by Landman (1992) makes use of the following primitives / formal devices.

(26) a. stage-of

b. reasonable

c. continuation worlds

Portner (1998) argues that if we adopt a suitably articulated model of modality (e.g. Kratzer (1991)), it is possible to construct a semantics for the progressive that does not need to employ the means in (26).

The main idea is to use our current understanding of modality to explicate properly Dowty (1979)'s notion of 'inertia world'.

1.6.1 A theory of modality: modal bases and ordering sources

Initial motivations:

(27) In the view of what the law provides,

a. Mary must not steal Bill's car.

b. Mary must go to jail.
(suppose Mary does in fact steal Bill's car.)

The cases in (27) can be handled by a view of modality that involves a modal base $M(w)$ - the set of facts relevant to the interpretation of the sentence at hand - and an ordering source $L(w)$, which orders worlds according to how well they comply with some standard.

(28) a. Modal Base = {world where Mary doesn't steal Bill's car, worlds where Mary steals Bill's car and goes to jail, worlds where Mary steals Bill's car and does not go to jail,....}

b. Ordering source = {. . ., there is no car theft, car-thieves go to jail, . . .}

c. Ordering Source orders Modal Base:
Modal Base = {world where Mary doesn't steal Bill's car $>$ worlds where Mary steals Bill's car and goes to jail $>$ worlds where Mary steals Bill's car and does not go to jail,....}

If it is known that that Mary did in fact steal Bill's car, then the modal base only includes world where Mary stole Bill's car and so the best world is one where Mary goes to jail.

(29) a. Best(M,L,w) = the set of worlds w' in M(w) s.t. there is no w'' in M(w) where $w'' < L_{M,w}w'$.

b. $[\![$Mary must go to jail$]\!]^{M,L}$ = that proposition p s.t. for any world w, $p(w) = 1$ iff for every world w' in Best(M,L,w), Mary goes to jail in w'.

1.6.2 Progressive Modal Bases and Ordering Sources

(30) Attempt 1:

a. Circ(e) = the modal base = the set of circumstances relevant to whether e is completed.

b. NI(e) = the ordering source = the set of propositions which assert that e does not get interrupted. (No Interruptions)

c. Prog(ϕ) is true at $< i, w >$ iff there is an event e in w s.t. T(e) = i and for all worlds w' in Best(Circ,NI,e), there is an interval i' which includes i as a non-final subinterval such that ϕ is true at $< i', w' >$.

(31) a. Max was crossing the street (when a bus hit him).
- the bus is not part of the event description so facts about it don't enter the modal base.

b. Jutta was wiping out the Roman army.
- the Roman army and Jutta are part of the event description so facts about Jutta's abilities and the Roman army enter the modal base.
- in the miracle case, we assume that Jutta has special abilities.

Sensitivity to event descriptions:

(32) One event or two:

a. Max was crossing the street.

b. Max was walking into the path of an incoming bus.

Portner (1998) assumes that (32a, b) involve one and the same event. If this is the case, then we would expect the same Circ(e) and NI(e) for both and thus both could not be true simultaneously.

Hence he proposes that the construction of the Modal Base should be relativized to the event description.

(33) a. Circ(e, ^ λe[cross(e,Max,the-street)]) = {Max is in good physical condition, Max intends to cross the street, Max is not drunk and can walk straight,..}

b. Circ(e, ^ $\lambda e \exists x$[bus(x) $\wedge$ walk(e,Max,x)]) = {Max is in good physical condition, Max is not drunk and can walk straight, A bus is traveling down the street on a path to hit him,...}

(34) a. Best(Circ,NI,e,P) = the set of worlds $w' \in$ Circ(e,P) s.t. there is no $w'' \in$ Circ(e,P) where $w'' <_{NI,e} w'$.

b. Prog(e,P) is true at a world w iff for all worlds $w' \in$ Best(Circ,NI,e,P), there is an event e' which includes e as a non-final subpart, such that P(w')(e') is true.

1.6.3 Unclear Truth Conditions

(35) a. Given that the bus was going to hit him, John was in fact not crossing the street.

b. Despite the fact that the bus was going to hit him, Max was crossing the street.

1.7 Zucchi (1999)'s Problem of Indirect Access

Zucchi (1999) notes an important difference between theories of the progressive like Parsons (1990) and theories like Dowty (1979) / Landman (1992).

The difference concerns what event type an underlying VP denotes.

(36) Mary was drawing a circle.

a. Parsons:
$\exists x \exists e \exists I \exists t$. [t < now $\wedge$ t $\in$ I $\wedge$ draw(e) $\wedge$ circle(x) $\wedge$ Ag(e) = m $\wedge$ Th(e) = x $\wedge$ Hold(e,t)]
$\rightarrow$ 'draw a circle' has in its extension incomplete events

b. Landman:
$\exists e'[\tau(e') <$ now $\wedge$ Prog(e', $\lambda e \exists y$ [circle(y) $\wedge$ draw(e) $\wedge$ Ag(e) = m $\wedge$ Th(e) = y])]
$\rightarrow$ 'draw a circle' has in its extension only complete events

The Problem of Indirect Access:

> ...we make assumptions about the truth conditions of uninflected clauses like 'Carnap fly to the moon', 'Terry build a house', and 'Terry be at home'. However, we have only indirect evidence of how these sentences are interpreted by native speakers, since they do not occur as independent clauses in English. I'll refer to the problem of determining the truth conditions of the base sentences that are the input to tense and aspect markers as the *problem of indirect access* in the semantics of tense and aspect. (from Zucchi (1999):180)

Slavic:

(37) a. perfectivizing prefixes:
predicates of complete / incomplete events → predicates of complete events
- could involve introduction of **Cul** (Parsons)

b. imperfective prefixes:
predicates of complete events → predicates of incomplete / complete events
- similar to Landman's analysis of the English progressive.

English: Zucchi (1999) (see also Higginbotham (2004)) points out that to the extent we can find bare accomplishment VPs in English, they seem to pick out only complete events.

(38) a. #John saw Mary cross the street. He saw the bus hitting her when she was halfway across.

b. John saw Mary crossing the street. He saw the bus hitting her when she was halfway across.

(39) a. John forbade Bill to cross the street.

b. John forced Bill to cross the street.

c. John promised to cross the street.

d. John got Bill to cross the stree.

- if 'cross the street' could pick out incomplete events, we would predict incorrect predictions regarding the meanings of (39).

→ Zucchi (1999) notes that though in other ways the shortcomings of Parsons (1990)'s analysis can be fixed, the facts from (in)direct access end up favoring proposals which treat bare accomplishment VPs as predicates of complete events (such as Landman (1992), Portner (1998) etc.).

2 Imperfectives: Progressive and Habitual

In many languages, the same form, typically called the *imperfective*, is used to mark the event-in-progress (i.e. progressive) meaning and habitual meaning.

(40) Habitual = Progressive (Spanish (from Cipria and Roberts (2000)))

a. Progressive:

Ibamos a la playa cuando nos encontramos con Miguel.
go-1Pl.Impfv to the beach when Recpr. meet-1Pl.Pret with Miguel

'We were going to the beach when we ran into Miguel.'

b. Habitual:

Ibamos a la playa los domingos.
go-1Pl.Impfv to the beach on Sundays

'We went / used to go to the beach on Sundays.'

In others, distinct means are employed to convey progressive and habitual meaning. For example, in Hindi, there is a morpheme which is sometimes called imperfective which only conveys a habitual meaning. Progressive meaning involves a periphrastic auxiliary.

(41) Habitual $\neq$ Progressive (Hindi)

a. Habitual:

Yusuf skuul **jaa-taa** hai
Yusuf.m school go-Impfv / Hab.MSg be.Prs.Sg

'Yusuf goes to school.'

b. Progressive:

Yusuf skuul **jaa rahaa** hai
Yusuf.m school go Prog.MSg be.Prs.Sg

'Yusuf is going to school.'

(Historically, the habitual morpheme was also used to convey progressive meaning. In several closely related Indo-Aryan languages e.g. Marathi, it still is.)

Imperfective morphology is typically able to appear with stative predicates in contrast to progressive morphology which typically isn't.

(42) Bulgarian:

a. Ivan obiĉaŝe Maria
Ivan love-imperf.past Maria

'Ivan loved Maria.' (vs. *Ivan was loving Maria.)

b. Ivan znaeŝe frenski
Ivan know-imperf.past french

'Ivan knew French.' (vs. *Ivan was knowing French.)

c. Ivan beše bolen
Ivan be-imperf.past sick
'Ivan was sick. (when I visited him / Often in those days) (vs. *Ivan was being sick.)

d. Ivan beše visok
Ivan be-imperf.past tall
'Ivan was tall.' (vs. *Ivan was being tall.)

An initial similarity between the habitual and the progressive:

(43) Non-Quantization: for both habitual and progressive event descriptions, it is the case that if they hold for an interval, they also hold for subintervals of that interval.
a. Josef walks to school every day. (quantized)
b. Josef is walking to school (quantized).
Using imperfective as a cover term, we can say that imperfective event descriptions are non-quantized.
In contrast, whether perfective event descriptions are quantized or not depends upon the aktionsart of the predicate that they are based on.
c. Josef walked to school today. (quantized)
d. Josef walked in the park today. (not quantized)

2.1 Cipria and Roberts (2000)'s Assimilation

- A single core meaning involving a universal quantification over situations.
- An accessibility relation which determines which situations are quantified over.
- What varies across the meanings is the nature of the acccessibility relation.

(44) Meaning of the Imperfecto:
$[\![\text{IMPERF } \phi]\!]^{s,ST} = 1$ iff
$\exists s_1 \leq w_s[s_1 <_t ST \wedge$
$\forall s_2[s_2 \leq s_1 \rightarrow$
$\forall s_3[R(s_3, s_2) \rightarrow \text{exemplify}(s_3, \phi)]]]$
(from Cipria and Roberts (2000):323)

For the point at hand, Cipria and Roberts (2000)'s formulation can be simplified by omitting the outer level of universal quantification yielding the following:

(45) Meaning of the Imperfecto (Simplified):
$[\![\text{IMPERF } \phi]\!]^{s,ST} = 1$ iff
$\exists s_1 \leq w_s[s_1 <_t ST \wedge$
$\forall s_2[R(s_2, s_1) \rightarrow \text{exemplify}(s_2, \phi)]]]$

(46) a. Progressive Case:

$R = \{< s, s' >: s \text{ is an inertia situation for } s'\}$

Imperfecto ϕ is true in a situation s iff there is an interval s' which is past relative to ST and ϕ is exemplified by every inertia situation for s'.

b. Habitual Case:

$R = \{< s, s' >: s \text{ is a characteristic sub-situation for } s'\}$

Imperfecto ϕ is true in a situation s iff there is an interval s' which is past relative to ST and ϕ is exemplified by every characteristic subsituation of s'.

2.2 Ferreira (2005)'s Assimilation

Ferreira (2005):

(47) Imperfective(P) :

a. Progressive: existence of a singular P-event

b. Habitual: existence of a plural P-event

Ferreira (2005) takes the strong position that progressive and habitual readings share the **same** temporal and modal ingredients.

• Plurality of VPs

(48) a. VP_{sg} = [sg VP]

b. VP_{pl} = [pl VP]

- bare VPs pick out both atomic as well as non-atomic events.

- bare VPs combine with number morphemes **sg** and **pl**, which select for atomic / non-atomic events respectively.

(49) a. $[\![\text{sg}]\!] = \lambda P.\lambda e.P(e) \wedge e$ is atomic.

b. $[\![\text{pl}]\!] = \lambda P.\lambda e.P(e) \wedge e$ is non-atomic.

c. $[\![\text{VP}_{sg/pl}]\!] = \lambda e.[\![\text{VP}]\!](e) \wedge e$ is atomic / non-atomic.

• An inclusion semantics for imperfective morphology

(50) $[\![\text{Imp}]\!] = \lambda P.\lambda t.\exists e : t \subseteq \tau(e) \wedge P(e)$

(this is an initial formulation, one that neglects the modal aspect of the imperfective.)

2.2.1 An Initial Illustration

(51) a. progressive:

$[_{TP}$ Past$_1$ $[_{AspP}$ Imp $[_{VPsg}$ sg $[_{VP}$ John paint the house]]]]

$[\![\text{TP}]\!]^g = 1$ iff $\exists e : g(1) \subseteq \tau(e) \wedge e$ is atomic $\wedge$ paint(e,j,h)

b. habitual:
[$_{TP}$ Past$_1$ [$_{AspP}$ Imp [$_{VPpl}$ pl [$_{VP}$ John paint the house]]]]

$[\![\text{TP}]\!]^g = 1$ iff $\exists e : g(1) \subseteq \tau(e) \wedge e$ is non-atomic $\wedge$ paint(e,j,h)

A scenario: Last year, John painted his house once every month, starting on the 11th and ending on the 13th. Let's call the relevant atomic events e_1, e_2, ..., e_{12}. Corresponding to these atomic events, there are also many plural events e.g. $e_1 \oplus e_3$, $e_5 \oplus e_6 \oplus e_7$ and so on.

Case 1: Let Past$_1$ refer to July 12th.
(51a) is true, because of e_7.
(51b) is true, because of, for example, $e_7 \oplus e_8$.

Case 2: Let Past$_1$ refer to July 15th.
(51a) is false, neither e_7 nor e_8 qualify.
(51b) is true, because of, for example, $e_7 \oplus e_8$.

Note: the following assumptions are made about intervals and inclusion of intervals:
(i) $\tau(e \oplus e') = \tau(e) \oplus \tau(e')$
(ii) An interval I is included in another interval J if the left boundary of J precedes the left boundary of I and the right boundary of J follows the right boundary of I.

2.2.2 Representing Crosslinguistic Variation

Three kinds of imperfectives:

• unspecified for number:

(52) $[\![\text{Imp}]\!] = \lambda P.\lambda t.\exists e : t \subseteq \tau(e) \wedge P(e)$

→ much of Romance, some of Indo-Aryan

• specified for predicates of singular events:

(53) $[\![\text{Imp}]\!] = \lambda P_{sg}.\lambda t.\exists e : t \subseteq \tau(e) \wedge P(e)$

→ the English / Hindi progressive

• specified for predicates of plural events:

(54) $[\![\text{Imp}]\!] = \lambda P_{pl}.\lambda t.\exists e : t \subseteq \tau(e) \wedge P(e)$

→ the Hindi habitual

2.2.3 Parallels between the Progressive and the Habitual

• No commitment w.r.t. the continuation of the event in the future:

(55) Someone utters 'Max smokes'. Soon after this utterance Max dies. Assume that there was no smoking event between the utterance and Max's demise.

→ that there were no smoking events between the utterance and Max's demise is not directly relevant to the truth of 'Max smokes'.

(56) Max was crossing the street.

→ no commitment that the street was actually crossed.

• Dependence upon properties of the event participants.

(57) Max plays soccer.

Scenario 1: Max has been playing soccer for a while. He is in good physical condition etc.

→ judged true.

Scenario 2: Max has been playing soccer for a while. Yesterday he had a bad fall and tore certain muscles making it unlikely that he will play soccer again.

→ not judged true.

(58) Max is crossing the Atlantic.

Scenario 1: Max is an average swimmer. It is highly unlikely that he'll be able to make it across.

→ judged false.

Scenario 2: Max is a superhero. His skill is that he can run incredibly fast on water. The Atlantic is nothing to him.

→ judged true.

Bringing in Modality:

(59) (a Portnerian semantics)

a. $[\![\text{Impfv}]\!]^w =$
$\lambda P.\lambda t.\forall w'[w' \in \text{Best(M,O,w,t)} \rightarrow \exists e[t \subseteq \tau(e) \wedge P(w,e) = 1]$

b. Best(M,O,w,t) = the set of worlds w' in ∩M(w,t) s.t. there is no world w'' in ∩M(w,t) where $w'' <_{O(w,t)} w'$

For the habitual, this amounts to the following:

(60) $[_{TP}$ Tns$_i$ $[_{AspP}$ Impfv $[_{VP}$ pl $[_{VP}$ Max play soccer]]]]

$[\![\text{TP}]\!]^w = 1$ iff for every world w' in Best(M,O,w,g(i)), there is a plural event e that occurs in w' s.t. $g(i) \subseteq \tau(e)$ and play$_s$occer(e,m).

Ferreira (2005) suggests that the modal base and the ordering source for habitual sentences is determined in a manner similar to the one proposed for the progressive by Portner.

Modal Base and Ordering Source for 'Max plays soccer':

(61) a. Modal Base, M(w,t) = {Max played soccer with friends several times recently, Max is in good physical condition, Max intends to play soccer again, there is a soccer stadium close to his home.}

b. Ordering Source, O(w,t) = {Max does not die tomorrow, Max does not get paralyzed, Max is not kidnapped by aliens,...}

Some questions:

1. What happens when Perfective combines with singular / plural VPs?

2. Habitual aspect affects the interpretation of the subject in a way that Progressive does not.

(62) (Hindi)

a. Progressive

laṛke cricket khel rahe hẽ
boys.MPl cricket play Prog.MPl be.Prs.Pl

'The / some boys are playing cricket.

b. Habitual

laṛke cricket khel-te hẽ
boys.MPl cricket play-Hab.MPl be.Prs.Pl

'Boys / The boys play cricket.

Can this be made to follow from the singular / plural event distinction?

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