Temporal Foundations of the Aspectual Classes

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Vendler (1957):

<table>
<thead>
<tr>
<th>✓ VP for an hour</th>
<th>✓ be VP-ing</th>
<th>✓ VP in an hour</th>
<th>✓ be VP-ing</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ VP for an hour</td>
<td>✓VP for an hour</td>
<td>✓VP in an hour</td>
<td></td>
</tr>
<tr>
<td>✓ VP in an hour</td>
<td>✓draw, dance, sing</td>
<td>✓draw, dance, sing</td>
<td></td>
</tr>
<tr>
<td>#VP for an hour</td>
<td>#accomplishment</td>
<td>#accomplishment</td>
<td></td>
</tr>
<tr>
<td>✓ VP in an hour</td>
<td>✓bake a cake, draw a circle</td>
<td>✓reach the top, recognize Mary</td>
<td></td>
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Proposal: Static and eventive predicates are type-logically, not sortally, distinct. Static predicates are predicates of moments of time, while eventive predicates are predicates of intervals (sets of moments).

Initial motivation: this analysis reconciles the subevent analysis of the progressive with the fact that progressive predicates are static.

Progressive predicates are static because:

Progressives and states are semantically uniform in their present and past tense forms:

(1) a. Max ran.
    b. Max runs. [Habitual reading only]

(2) a. Max was here.
    b. Max is here.

(3) a. Max was running.
    b. Max is running.

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Progressives and states interact the same way with point adverbials Leech (1971), (Vlach, 1981)

(4) a. Max was here when I arrived. [arrival during being here]
    b. Max was running when I arrived. [arrival during running]
    c. Max ran when I arrived. [arrival before running]

(5) a. When we arrived she made some fresh coffee. [arrival before coffee making]
    b. When we arrived she was making some fresh coffee. [arrival during coffee making]

Progressives and states share certain environments that exclude events.

(6) a. The inspector revealed/discovered Max to lie. [habitual only]
    b. The inspector revealed/discovered Max to be a liar.
    c. The inspector revealed/discovered Max to be lying.

Progressives and states interact identically with modals (Condoravdi, 2002).

(7) a. John must/might read LGB. [future shifted, deontic/metaphysical]
    b. John must/might be in the library. [simultaneous, epistemic]
    c. John must/might be reading LGB. [simultaneous, epistemic]

Progressives and states may not occur in the progressive (Vlach 1981).

(8) a. *Max is being here. [PROG(be here)]
    b. *Max is being running. [PROG(be running)]
    c. Max is running. [PROG(run)]

So: 1) What about the meaning of the progressive operator requires the derivative to be stative, and 2) why are stative predicates blocked from the progressive?


(9) \[ \text{PROG}(\Phi) = \lambda e' \exists e [\Phi(e) \land e' \sqsubseteq e] \]

Since activities (walk, sing, accelerate) are subpart homogeneous (Vendler, 1957), when the underlying predicate is an activity, the progressive derivative is predicted to be an activity as well:

(10) a. The rocket continuosly accelerated.
    b. The rocket was continuosly accelerating.
Revised progressive:

Given a set of times T, let *T be the closure of T under the join operation and *T be the
subset of *T containing only those members of *T that are not in T (the ‘pluralities’ or
intervals) (cf. Link 1983). t is a moment (member of T), *t is an interval (member of *T)
and *t is either (member of *T).

\[ \text{PROG}(\Phi) = \lambda t \exists *t [\Phi(*t) \& t \subseteq *t] \]

If the progressive is stative by virtue of holding at a moment, then holding at a moment is the
defining characteristic of stativity (see also Katz 2001, 2003). Two observations corroborate
this view:

Stative predicates are compatible with the present tense:

1. Max resembles Moritz.
2. Max is running.
3. *Max runs. (on an episodic reading)

Stative predicates with duration adverbials pattern like eventive predicates:

1. When I arrived, Max was in his office. [office during arrival]
2. When I arrived, Max was in his office for an hour. [office after arrival]
(14)  a. The inspector discovered Max to be in his office.
    b. *The inspector discovered Max to be in his office for an hour.

(15)  a. Max must/might be in his office.
    [epistemic, simultaneous]
    b. Max must/might be in his office for an hour.
    [deontic/metaphysical, future shifted]

Confound: for has an intensional usage as well (see also Piñón 1999):

(16)  Two US men who were jailed for 8 years in Iran for spying have been released on bail, say state media (BBC News, 21.09.2011).

But not e.g. German eine Stunde lang.

(17)  Max muss/könnte eine Stunde lang in seinem Büro sein.
    Max must/might one hour long in his office be
    ‘Max must/might be in his office for an hour.’ [deontic/metaphysical only]

(18)  Als ich angekommen bin, war Max eine Stunde lang in seinem Büro.
    when I arrived am, was Max one hour long in his office
    ‘When I arrived, Max was in his office for an hour.’ [hour starts at arrival]

Why do states and activities pattern together in for-phrase contexts?

    \[\text{for an hour}(\Phi) \equiv \lambda t \text{ an hour}(\Phi) \land \forall t \left[ t \subseteq \text{ for an hour}(\Phi) \land \forall t \left[ t \subseteq \text{ for an hour}(\Phi) \right] \right] \]

(20)  a. \[\text{be in his office} \equiv \lambda t \text{ be in his office at } t\]
    b. \[\text{be in his office for an hour} \equiv \lambda t \text{ an hour}(\Phi) \land \forall t \left[ t \subseteq \text{ for an hour}(\Phi) \right] \]

(21)  Modal for:
    \[\text{for } x \text{ an hour}(\Phi) \equiv \lambda t \Phi(t) \land \forall w \left[ w \text{ is compatible with what } x \text{ intends } \rightarrow \exists t \left[ t \subseteq \text{ for an hour}(\Phi)(t) \text{ in } w \right] \right] \]

Conclusion: The attribution of (non-modal, real-world) duration to a state makes it an event.

Remark 1: We might now expect states with duration adverbials to be compatible with the progressive, which they’re not. See below.

Remark 2: The semantic basic-ness of stative predicates does not go hand in hand with structural basic-ness (witness the progressive). States have varyingly complex internal structures which license different behaviors, e.g. the stage/individual-level distinction.

Remark 3: Will this view accommodatate a typology of states?

‘Davidsonian states’ (stand, sleep, glisten) pattern like events but cannot be said to ‘happen’.
(22)  a. *Max sleeps. [on an episodic reading]
    b. Max is sleeping.
    c. Max must/might sleep [deontic/metaphysical only]
    d. *The inspector discovered Max to sleep.

(23)  a. *Max slept. While that happened, Moritz played the piano.
    b. Moritz played the piano. While that happened, Max slept.

Davidsonian states pattern overwhelmingly like events. They lack a property that happen selects. Eventhood is a necessary but not sufficient condition for compatibility with happen. Davidsonian states are subclass of event. Subtypes of states differ in internal structure (the stage/individual-level distinction).

**Active participles in contemporary (Syrian) Arabic**

Arabic active participles differ in their interaction with telic and atelic predicates (Wild, 1964; Woidich, 1975; Cowell, 2005; Mughazy, 2005).

<table>
<thead>
<tr>
<th>Verb</th>
<th>Passive Participle</th>
<th>Active Participle</th>
</tr>
</thead>
<tbody>
<tr>
<td>faʕal</td>
<td>mafʕil</td>
<td>faʕil</td>
</tr>
<tr>
<td>faʕʕal</td>
<td>mifʕʕal</td>
<td>mifʕʕil</td>
</tr>
<tr>
<td>fʕal</td>
<td>mifʕal</td>
<td>mifʕil</td>
</tr>
</tbody>
</table>

(24)  Activities:
    a. māzin rākib ʕa l-bisklīt.
        mazin riding on the-bicycle
        ‘Mazin is riding the bicycle.’
    b. māzin hāmil l-kursi.
        mazin carrying the-chair
        ‘Mazin is carrying the chair.’

(25)  States:
    a. māzin ʕārif ʕa ẓ-ẓawāb.
        mazin knowing the-answer
        ‘Mazin knows the answer.’
    b. māzin šāyif mūna.
        mazin seeing muna
        ‘Mazin sees Muna.’

(26)  Accomplishments:
    a. māzin mīḍayiyif naḏḏārāt-u.
        mazin losing glasses-his
        ‘Mazin has lost his glasses.’
b. māzin ʾāmil gāto.
   mazin making cake
   ‘Mazin has made a cake.’

The participial predicates are stative:

(27) a. ʿendma ẓ̱ī-t, kān māzin rākib ʿa l-bisklīt.
    when came-1s, was māzin riding on the-bicycle
    ‘When I arrived, Mazin was riding the bicycle.’

b. ʿendma ẓ̱ī-t, kān māzin ʾāmil gāto.
    when came-1s, was māzin making gāto.
    ‘When I arrived, Mazin had made a cake.’

(28) a. māzin lāzīm yikūn rākib ʿa l-bisklīt.
    māzin must be riding on the-bicycle
    ‘Mazin must be riding the bicycle.’
    [epistemic]

b. māzin lāzīm yikūn ʾāmil gāto.
    māzin must be making gāto.
    ‘Mazin must have made a cake.’
    [epistemic]

(29) $[[\text{active participle}(\Phi)]^w = \lambda t \ \exists^* t \ [t \sqsubseteq *t \ & \ \forall^* t' \ [t' \sqsubseteq *t \ & *t' \in \text{Dom}(\Phi) \rightarrow \Phi_w(*t')]$]

(30) a. $[[\text{rākib ʿa l-bisklīt (riding the bike)] = \lambda t \ \exists^* t \ [t \sqsubseteq ^*t \ & \ \forall^* t' \ [^*t' \sqsubseteq ^*t \rightarrow \text{ride(the bike, } ^*t')]$]

b. $[[\text{ʾārif l-iẓāba (knowing the answer)] = \lambda t \ \exists t' \ [t \sqsubseteq t' \ & \ \forall t'' \ [t'' \sqsubseteq t' \rightarrow \text{know(the answer, } t'')]$]

c. $[[\text{ʾāmil gāto (making a cake)] = \lambda t \ \exists^* t \ [t \sqsubseteq ^*t \ & \ \forall^* t' \ [^*t' \sqsubseteq ^*t \rightarrow \text{makes(a cake, } ^*t')]$]

The state that (26a) and (26b) describe is what Parsons (1990) and Kratzer (2000) call the target state inherent in the meaning of the verb.

    māzin losing glasses-his but found-them afterwards
    (‘Mazin has lost his glasses, but found them again afterwards.’)

b. * ana ʾāmil gāto bas akal-t-u baʿdēn.
    I making cake but ate-I-it afterwards
    (‘I have baked a cake, but I ate it afterwards.’)

Kratzer says that the duration adverbial in (32a) modifies the target state caused by the pumping up of the (inflatable) boat.

(32) a. The boat was pumped up for two hours.
b. $\lambda s\lambda e [\text{pump-up}(e) \& \text{inflated}(\text{the boat})(s) \& \text{cause}(s)(e)]$

c. Stativizer: $\lambda R\lambda s\exists e[R(s)(e)]$ (better: ‘resultativizer’)

d. $[\text{Stativizer}[\text{pump up the boat}]] = \lambda s\exists e [\text{pump-up}(e) \& \text{inflated}(\text{the boat})(s) \& \text{cause}(s)(e)]$

(33) $[\text{amal gato (make a cake)}] = \lambda^\circ t \lambda^\circ t' [\text{make(the cake, }^\circ t') \& \text{is-made(the cake, }^\circ t) \& ^\circ t < ^\circ t']$

(34) $\lambda t \exists^\circ t [t \leq ^\circ t \& \forall ^\circ t'\ [\forall ^\circ t' \leq ^\circ t \rightarrow \exists^\circ t'' [\text{make(Mazin, the cake, }^\circ t'') \& \text{is-made(the cake, }^\circ t') \& ^\circ t'' < ^\circ t']]]$

By the way, the resemblance between the active participle of telic predicates and the English perfect is more than coincidental:

The present perfect puzzle:

(35) a. *māzin miḍayyiña nadḍārāt-u l-ahad.
      mazin losing glasses-his the-sunday
      (‘Mazin has lost his glasses on Sunday.’)

b. ūendma ẓā-t, *(kān) māzin ūāmil gāto.
      when came-1s, *(was) mazin making cake
      ‘When I arrived, Mazin had made a cake.’

Existential perfect readings:

(36) a. ana ūāmil gāto marra.
      I making cake once
      ‘I have made a cake once.’

b. ana rākib ūa bisklit marra.
      I riding on bicycle once
      ‘I have ridden a bicycle once.’
Some philosophical ramblings

Krifka (1998):

[Earlier work] assumed discrete representations of paths and times—paths are seen as a collection of points in space, time intervals are seen as sets of time points. This leads to the “filmstrip” model of change, a perspective that may seem plausible after the advent of movie cameras, but arguably is not the way how movement and change is conceptualized. We do not see a moving object as appearing in a succession of distinct locations; rather, we see it as moving continuously along a path. (p. 198)

Actually, the filmstrip model is the way how (visual) movement and change is conceptualized. See VanRullen et al. (2008) on the wagon wheel illusion, also Dubois and VanRullen (2011), Salvioni et al. (2013), as well as Walsh (2003), Milner and Goodale (2006), Xuan et al. (2007) and Bueti et al. (2008) on shared neural correlates of time perception and degree magnitude.

So it’s not that implausible to claim that events consist of states:

\[
(37) \quad e = (s_0, s_1, s_2 \ldots s_n)
\]

\[
(38) \quad \begin{align*}
\text{a. } & [\text{bake a cake}] = \lambda^s t \lambda^s [\text{bake(a cake, } s) & \& \tau(\tau(s))] \\
\text{b. } & [\text{be in his office}] = \lambda^s t \lambda s [\text{be-in(his office, } s) & \& t = \tau(s)]
\end{align*}
\]

\[
(39) \quad \begin{align*}
\text{a. } & [\text{PROG}(\Phi)] = \lambda^t \exists^t, \tau s [\Phi(\tau t, \tau s) \& t \subseteq \tau t] \\
\text{b. } & [\text{for an hour}(\Phi)] = \lambda^s t \text{ an hour}(\tau t) \& \forall^* t [t \subseteq \tau t \& \tau t \in \text{Dom}(\Phi) \rightarrow \exists^* s \Phi(\tau t, \tau s)]
\end{align*}
\]

\[
(40) \quad [\text{be in his office for an hour}] = \lambda^s t \text{ an hour}(\tau t) \& \forall t [t \subseteq \tau t \rightarrow \exists s \text{ be-in(his office, } s) \& t = \tau(s)]
\]

Conclusion:

The hypothesis that stative predicates hold only at moments (or of dimensionless situations) while eventive predicates hold only of intervals (or of non-dimensionless situations) is explanatory for certain phenomena and not implausible for others.

References


Xuan, Bin, and Daren Zhang, and Sheng He, and Xiangchuan Chen. 2007. Larger stimuli are judged to last longer. Journal of Vision 7:1–5.