Predicates don’t always behave the way they should, a variable behavior phenomenon:

(1) Individual-level predicates?
   a. Francis is occasionally blond.
   b. Suddenly, Lynn knew the answer.

(2) Stage-level predicates?
   a. Sam goes jogging after work.
   b. Hakeem plays basketball for a living. (Fernald, 1999)

A quote:

“If a distinction between stage-level and individual-level predicates is operative in natural language, it cannot be a distinction that is made in the lexicon of a language once and for all.” (Kratzer (1995), p. 125-126)

Two seemingly separate questions:

• Q: If the stage-level/individual-level distinction is not made in the lexicon, what component (if any) is the distinction based in?

• Q: How might inner aspect play a role in stative predicates?

An overview:

1. Give a brief overview of the stage-level/individual-level distinction, noting its interaction with inner aspect.

2. Review an approach to inner aspect in eventive predicates, focusing particularly on its composition of the internal argument which accesses its properties.

3. Propose that the stage-level/individual-level distinction arises do to aspecual structure in stative predicates through a compositional process which also accesses internal argument properties.

Some assumptions:

• Neo-constructionist grammar (Exoskeletal System, Distributed Morphology, etc. (Borer, 2005a,b; Marantz, 1997; Harley and Noyer, 1999))

The basic structure of nominals: $[DP \#P [CP \sqrt{P} ...$
The basic structure of the clause: \([EP \ [TP \ [SP \ [AspP/FSP \ [\sqrt{P} \ldots ]]]]]\)

- Variable Identification (an extension of Event Identification \(\text{[Kratzer, 1996]}\))

\(\text{(3) Variable Identification: } \langle \beta, \alpha t \rangle \langle \alpha t \rangle \rightarrow \langle \beta, \alpha t \rangle\)

Mary sneezed.

\[\text{VoiceP } \lambda e \exists x. \text{sneeze}(e) \& \text{Voice}(e, Mary(x))\]

\[\exists x. \text{Mary}(x)\]

\[\text{Voice} \lambda x \lambda e. \text{sneeze}(e) \& \text{Voice}(e, x) \text{ (by Event Ident.)}\]

\[\lambda x \lambda e. \text{Voice}(e, x)\]

The intuition and goal:

Suppose functional morphology is freely combined in the syntax, subject only to a universal hierarchy of projection, and suppose previous work in the syntax of aspect. Functional morphemes which give rise to quantity interpretations then should combine with a multitude of categories, including nominals and events \(\text{[Borer, 2005a,b]}\) but also adjectives, states, and possibly others. The interpretation of quantity in each of these domains may appear different: count/mass in nominals, telicity in events, but also closed/open scales in adjectives and stage-level/individual-level distinction in states. For the particular case of states, given the universal hierarchy of projection, quantity interpretation should share many of the properties found in the case of events.

1 Stage-level and individual-level predicates

\(\text{(4) a. Firemen are altruistic. (individual-level)}\)

\(\text{b. Firemen are available. (stage-level)}\)

The examples in \((4)\) demonstrate classic examples of stage-level and individual-level predicates \(\text{[Kratzer, 1995]}\). Two properties of focus today: Spatiotemporal Modification \((5)\) and Subject Interpretation.

\(\text{(5) a. # Firemen are altruistic in the station/on Thursday.}\)

\(\text{b. Firemen are available in the station/on Thursday.}\)

\(\text{(6) a. # When firemen are altruistic, they are very helpful.}\)

\(\text{b. When firemen are available, they are at the station}\)\(^2\)

\(^1\)The structures here are taken from \(\text{Borer, 2005a,b]}\). DP = Determiner Phrase, #P = Number Phrase, CIP = Classifier Phrase, EP = Event Phrase, TP = Tense Phrase, SP = Stative Phrase, AspP = Aspectual Phrase, FSP = Functional Shell Phrase, \(\sqrt{P} = \text{Root Phrase}\)

\(^2\)I will try to be consistant on noting judgments: * = ungrammatical, ? = ungrammatical but weaker, # = unavailable reading/pragmatically odd
Spatiotemporal Modification: Individual-level predicates cannot be modified by spatiotemporal modifiers (5) or act as the restrictor of when-conditional (6).

Subject Interpretation: Subjects of individual-level predicates receive generic interpretation only (4a) while subjects of stage-level predicates can receive either generic or existential interpretations (4b).

1.1 Conditioned constructions

Additionally, several different constructions are sensitive to the stage-level/individual-level distinction, including There-insertion (7), absolute constructions (8), the copula in Spanish (9), and quantifier split in German (10).

(7) There-insertion
   a. *There are firemen altruistic.
   b. There are firemen available.

(8) Absolute constructions
   a. Having unusually long arms, John can touch the ceiling. \(\not\rightarrow\)
      If John has unusually long arms, he can touch the ceiling.
   b. Standing on a chair, John can touch the ceiling. \(\rightarrow\)
      If John is standing on a chair, he can touch the ceiling.

(9) Copula in Spanish
   a. Bombeiros sao/estao altruistas.
      Firemen ser/estar altruistic.
      ‘Firemen are altruistic.’
   b. Bombeiros *sao/estao disponible.
      Firemen ser/estar available.
      ‘Firemen are available.’ (Schmitt, 1992)

(10) Quantifier split in German
    a. * Lehrer wissen das viele.
       teachers know this many.
       ‘As for teachers, many of them know this.’
    b. Lehrer haben uns viele geholfen.
       teachers have us many helped.
       ‘As for teachers, many of them helped us.’ (Kratzer, 1995)

1.2 Interactions with inner aspect

Finally, an important observation is that the stage-level/individual-level distinction interacts with inner aspect.
Importantly, (11c) and (12c) do not have individual-level interpretations. Generalizing from these cases, individual-level predicates are barred in eventive contexts, but stage-level predicates are permitted in stative contexts.

This interaction was noted in Fernald (2000) who suggested that without it, the stage-level/individual-level distinction would collapse with inner aspect. I will refer to this as Fernald’s Generalization.

(13) Fernald’s Generalization
States: stage-level/ individual-level
Events: stage-level/*individual-level

Some questions:
1. Why are individual-level predicates barred from eventive contexts?
2. Why are stage-level predicates permitted in stative contexts?

2 Inner aspect in events

A reminder about the distribution of temporal modifiers for the classic view of inner aspect (Dowty, 1979).

(14) a. State: John loved the race (for 10 years/#in 10 years).
b. Activity: John ran (for 2 hours/#in 2 hours.)
c. Accomplishment: John ran the race (#for 34 minutes/in 34 minutes.)
d. Achievement: John won the race (#for 10 minutes/in 10 minutes.)

The traditional explanation: Having no inherent endpoint, the state (14a) and activity (14b) cannot be modified by * in X time. The accomplishment (14c) and achievement (14d) predicates both have inherent endpoints, and can be modified by * in X time which modifies the endpoint.
2.1 Inner aspect and the internal argument

The differences between activity and accomplishment predicates is of particular interest here as the distinction between them often follows from properties of their internal argument.

(15) Non-quantity argument
   a. John built houses (#in three months).
   b. Mary drank beer (#in three hours).

(16) Quantity argument
   a. John built the houses (in three months).
   b. Mary drank three beers (in three hours).

When the internal argument is non-quantity, an activity (atelic) predicate occurs. When the internal argument is quantity, an accomplishment (telic) predicate occurs.

2.2 Interpretation of quantity

There is a long tradition of linking quantity/homogenity to telic/atelic predicates respectively (Verkuyl, 1972; Dowty, 1979; Verkuyl, 1993).

(17) a. Quantity: P is quantity iff P is not homogeneous.
    b. Homogeneous: P is homogeneous iff P is cumulative and divisive.
       i. Cumulative: P is cumulative iff \( \forall x, y [P(x) \& P(y) \rightarrow P(x \cup y)] \)
       ii. Divisive: P is divisive iff \( \forall x [P(x) \rightarrow \exists y [P(y) \& y<x \& \forall x, y [P(x) \& P(y) \& y<x \rightarrow P(x-y)]]] \)

States (14a) and activities (14b) are homogeneous, whereas accomplishments (14c) and achievements (14d) are quantity. In (15) and (16), the homogeneity/quantity of the predicate is derived from the homogeneity/quantity of the internal argument respectively. Bare plural and mass nouns for a class of homogeneous nominals (18) while other nominals are argued to have quantity (19), reflecting the mass/count distinction.

(18) Non-quantity nominals
   a. water, sand, concrete, furniture, ...
   b. houses, apples, ponds, dogs, ...

(19) Quantity nominals
   a. the/a house, the/a water, the/a building, ...
   b. the houses, the apples, the dogs, ...
   c. more than three houses, over three oceans, ...

These definitions are taken from Borer (2005a).
Assuming functional structure yields these differences in quantity, Borer (2005a) suggests that 

\[ \#P \]

is the locus of quantity for nominals. When \( \#P \) is projected, the nominal is interpreted as having quantifiable divisions.

(20) \[ [[\#]] = \lambda y \lambda x. quantity(x, y) \]

(21) Composition of Quantity Nominal

\[ \begin{array}{c}
D \\
\#P \lambda x.apples(x) & \& quantity(x, three) \\
\text{three} \\
\#' \lambda y \lambda x. apples(x) & \& quantity(x, y) \text{ (by Var. Ident.)} \\
\# \\
\text{NP} \lambda x.apples(x) \\
\lambda y \lambda x. quantity(x, y)
\end{array} \]

Following Schmitt (1996); Borer (2005b) and many others (see Rosen (1999) for a review), movement of a quantity internal argument to a projection higher than the VP, here AspP, licenses the event to have quantifiable divisions.\(^4\)

(22) \[ [[\text{Asp}]] = \lambda x \lambda e. quantity(e, x) \]

(23) Composition of Quantity Eventive\(^5\)

\[ \begin{array}{c}
\text{AspP} \lambda e.eat(e) & \& quantity(e, threeapples) & \& \text{Int}(e, threeapples) \\
\text{DP} \\
\text{three} \\
\text{apples} \\
\text{Asp} \\
\lambda x \lambda e.eat(e) & \& quantity(e, x) & \& \text{Int}(e, threeapples) \text{ (by Var. Ident.)} \\
\lambda x \lambda e.quantity(e, x) \\
\text{VP} \lambda e.eat(e) & \& \text{Int}(e, threeapples)
\end{array} \]

3 Inner aspect in states

Continuing to assume that functional structure is licensing interpretations, I will take the basic structure for stative predicates to be the following: Statives are non-atomic, a property which results from the projection of functional structure SP\(^6\).

---

\(^4\)Given that non-quantity arguments must also check case, Borer (2005b) posits a projection \( F^S P \) which occurs in complementary distribution with AspP. I will not be discussing \( F^S P \) here in the analysis, also its use should be apparent.

\(^5\)Int(e,x) is used here to indicate the internal argument. I leave aside questions concerning the thematic relation carried by the internal argument.

\(^6\)I assume that states differ from events through a functional projection, SP, which stativizes the predicate and preempts verbalization. Linking the state/event distinction to atomicity (Bach, 1986), I tentively suggest that SP composes a nonatomic property of events into the event description.
We will be paying closer attention to adjectival statives, although verbal statives are not exempt from this analysis.

3.1 Adjectival scales

Kennedy and McNally (2005) discuss scale structure in the semantics of adjectives. The distribution of degree modifiers argues for at least two classes of adjectives: closed scale (25) and open scale (26).

(25) Closed scale adjectives
  a. The glass is half/mostly/completely full.
  b. Her eyes were half/most of the way/completely closed.
  c. These images are half/mostly/completely invisible.

(26) Open scale adjectives
  a. # The rope is half/mostly/completely long.
  b. # A 15-year old horse is half/mostly/completely old.
  c. # That car was half/mostly/completely expensive.

3.2 Scalar representation in syntax

Given the system proposed here, closed scale representation is the result of the projection of functional structure. In the case of adjectives, the functional structure licensed by the degree modifier, here DegP, is suggested to yield quantity interpretations.

(1) Nonatomic: P is nonatomic iff \( \forall x \exists y [P(x) \rightarrow [P(y) \& y < x]] \)

(2) \([S] = \lambda e. nonatomic(e)\)

The correct representation for the stativizing functional morpheme and its projection within the universal hierarchy are left for further research, though pointed out in Borer (2005), given the existence of transitive states SP must project between TP and whatever functional structure licenses internal arguments.

A test showing open scale interpretation makes use of the degree modifier very (very #full/#closed/#invisible vs. very long/old/expensive).

Whether DegP as used here can be considered the same functional projection proposed in Kennedy (1997) is dependent on several other factors, not the least being concerned with the ontological assumptions of adjectives and the position of degree modifiers for open vs. closed scales, and left for future work.
Given that traditionally closed scale adjectives do not necessarily need an overt degree modifier, I suggest that the adjective itself can license the projection of DegP in the syntax.

3.3 Interpretation of scale structure

Consider again our definitions of quantity \( (17) \). Open scales are homogeneous \(^9\) but closed scales are not necessarily so. At their maximum/minimum, closes scales fail to be divisive because they do not have a subpart (i.e. they fail the \( \forall x[P(x) \rightarrow \exists y[P(y) & y < x]] \) condition).

<table>
<thead>
<tr>
<th>Scale Type</th>
<th>Max/Min Degree</th>
<th>Cumulative Divisive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed</td>
<td>yes</td>
<td>( \sqrt{\text{full}} )</td>
</tr>
<tr>
<td>Open</td>
<td>no</td>
<td>( \sqrt{\text{full}} )</td>
</tr>
</tbody>
</table>
3.4 Quantity in statives

The interpretation of scale structure in adjectives appears to condition the type of predicate interpretation a stative receives to the extent that they are closed or open scale. Quantity adjectives yield stage-level interpretations while non-quantity adjectives do not.

(31) Open scale states

<table>
<thead>
<tr>
<th>Subject Interp.</th>
<th>Spatiotemp. Mod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. People are intelligent.</td>
<td>Γ/*∃ #</td>
</tr>
<tr>
<td>b. Rocks are hard.</td>
<td>Γ/*∃ #</td>
</tr>
<tr>
<td>c. Roads are wide.</td>
<td>Γ/*∃ #</td>
</tr>
</tbody>
</table>

(32) Closed scale states

<table>
<thead>
<tr>
<th>Subject Interp.</th>
<th>Spatiotemp. Mod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. People are happy.</td>
<td>Γ/∃ √</td>
</tr>
<tr>
<td>b. Ponds are empty.</td>
<td>Γ/∃ √</td>
</tr>
<tr>
<td>c. Ropes are straight.</td>
<td>Γ/∃ √</td>
</tr>
</tbody>
</table>

This seems to also be the case for verbal statives as well. When the internal argument is quantity, stage-level interpretation results, but when the internal argument is non-quantity, the predicate receives individual-level interpretation.

(33) Non-quantity argument

<table>
<thead>
<tr>
<th>Subject Interp.</th>
<th>Spatiotemp. Mod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. People own houses.</td>
<td>Γ/*∃ #</td>
</tr>
<tr>
<td>b. Women like older men.</td>
<td>Γ/*∃ #</td>
</tr>
</tbody>
</table>

(34) Quantity argument

<table>
<thead>
<tr>
<th>Subject Interp.</th>
<th>Spatiotemp. Mod.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. People own the house.</td>
<td>Γ/∃ √</td>
</tr>
<tr>
<td>b. Women like that older man.</td>
<td>Γ/∃ √</td>
</tr>
</tbody>
</table>

The Spanish copula also appears to be conditioned by the scale structure of the adjective.

---

11 These data become sharper when completely or very is put before the adjective, forcing a closed or open scale reading. Since some adjectives resist coercion into closed or open scale interpretation, completely and very are left off from the data set. Note however that this result only emphasizes the point that functional structure for quantity in one domain can lead to difference in another, here realized as closed/open scales and a distinction between stage-level and individual-level interpretation, similar to what is seen in eventives with count/mass internal arguments.

12 In Spanish completamente (completely) was used to test for closed scale interpretation of the adjectives.

13 My Spanish informant also provided the following data concerning ser/estar and its relation to English progressive/participle forms.

(1) a. Soy aburrido.
   ser  bored.
   ‘I am boring.’

b. Estoy aburrido.
   estar  bored.
   ‘I am boreed.’

These facts also link up to the stage-level/individual-level distinction. (1a) is individual-level, while (1b) is stage-level.
Open scale states

a. La gente es/esta inteligente.
The people ser/estar intelligent.
‘People are intelligent.’
b. Las rocas son/?estan duras.
The rocks ser/estar hard.
‘Rocks are hard.’
c. Las carreteras son/?estan anchas.
The roads ser/estar wide.
‘The roads are wide.’ (Spanish)

Closed scale states

a. La gente es/esta feliz.
The people ser/estar happy.
‘People are happy.’
b. Las estanques *son/estan vacios.
The ponds ser/estar empty.
‘Ponds are empty.’
c. Las cordones ?son/estan rectos.
The ropes ser/estar straight.
‘Ropes are straight.’ (Spanish)

Quantifier split in German also yeilds a similar pattern.

Open scale states

People are many intelligent.
‘As for people, many are intelligent.’
b. ?? Steine sind viele hart.
Rocks are many hard.
‘As for rocks, many are hard.’
c. ?? Strassen sind viele breit.
Roads are many wide.
‘As for roads, many are wide.’ (German)

Closed scale states

a. ?Menschen sind viele glücklich.
People are many happy.
‘As for people, many are happy.’

14In German, vollständig (completely) was used to test for closed scale interpretation of the adjectives.
b. ? Seen sind viele leer.
   ‘As for ponds, many are empty.’

c. ? Seile sind viele lang.
   ‘As for ropes, many are straight.’ (German)

This leads us to a very simple relationship between quantity/non-quantity adjectives and stage-
level/individual-level interpretation.

(39) a. If $P$ is quantity, then $P$ is stage-level.
   b. If $P$ is not quantity, then $P$ is individual-level.

Pulling these pieces together, the following picture emerges. Quantity statives are composed in the
same manner as quantity eventives. A quantity internal argument licenses the projection of AspP,
which following the universal hierarchy is projected below functional structure which realizes the
state/event distinction.

15 Hay et al. (1999); Kennedy and Levin (2002) proposed that scale structure was responsible for telicity of eventive deadjectival verbs.

(1) a. They are widening the road. ($\Rightarrow$ They have widened the road.)
   b. They are straightening the rope. ($\not\Rightarrow$ They have straightened the rope.)

Judgements on this data, however, have been mixed, but consider the following data which receives much clearer
judgements from my informants.

(2) a. The workers are widening roads. ($\Rightarrow$ The workers have widened roads.)
   b. The stylist is straightening hair. ($\Rightarrow$ The stylist has straightened hair.)
(3) a. The workers are widening the road. ($\not\Rightarrow$ The workers have widened the road.)
   b. The stylist is straightening the hair. ($\not\Rightarrow$ The stylist has straightened the hair.)

As in other cases, the internal argument controls the telicity of the predicate, with non-quantity arguments yielding
atelic readings (2) and quantity arguments yielding telic readings (3).

16 Certain generalizations about the stage-level/individual-level distinction have made note of the ascribed property
as being temporary or permanent (Jager, 2001; Maienborn, 2004; Schmitt, 1992). However, there are “funky facts”
about stage-level/individual-level predicates in which our world knowledge about temporary and permanent properties
conflicts with the grammar. Consider the following.

(1) a. John was drunk (in the yard/this morning).
   b. John was dead (in the yard/this morning).
   c. # John was intelligent (in the yard/this morning).

While drunk can easily be thought of as a temporary property and thus stage-level, dead is not so clear and one
might expect it to fall in line with intelligent as a permanent property and thus individual-level. However, note that
dead is closed-scale (completely drunk/dead/*intelligent), and by its closed scalar structure, predicates which embed
it are interpreted as stage-level.
Due to head movement (assuming we still have head movement) or head adjacency (some variant of Fusion in Distributed Morphology) and assuming Late Insertion, we can capture the Spanish copula facts by assuming that [T+S+Asp] is spelled out as estar, whereas [T+S] is spelled-out as ser \cite{schmitt2005}.

4 Conclusions

We began with two seemingly separate questions which I will now give some answers to:

- Q: If the stage-level/individual-level distinction is not made in the lexicon, what component (if any) is the distinction based in?
  A: The stage-level/individual-level distinction is made in the syntax. Functional heads bearing quantity semantics (AspP) compose within the stative to yield the distinction. Quantity

\footnote{Embick \cite{embick2004} suggests a similar structure for states on semantic and morphological grounds.}
Statives are interpreted as stage-level while non-quantity statives are interpreted as individual-level.

- Q: How might inner aspect play a role in stative predicates?
  A: Inner aspect, governed by the projection of AspP, is available in stative predicates. Telicity in eventive predicates is realized by properties of the internal argument’s structure triggering quantity (telic) or non-quantity (atelic) interpretations. The stage-level/individual-level distinction follows the same pattern and is realized by properties of the internal argument’s structure triggering quantity (stage-level) or non-quantity (individual-level) interpretations.

And what of variable behavior? I have also assumed throughout that polysemy is a property of substantive lexical items, or roots (those items which spell-out under √P). Given conceptual flexibility, substantive lexical items can be coerced by embedding them in grammatical structure. When the concept indicated by the root is unable to coerce to the structure in which it is embedded, unacceptability arises. Additionally, while polysemy appears pervasive at the level of roots, functional morphemes fail to be polysemous and form strict interpretations. Thus variable behavior of predicates is to be explained as variable behavior of roots, modulo conceptual complications, yielding to the structural interpretations in which they are embedded.

An open question:

- Why are eventives always interpreted as stage-level? In particular, if activities do not project AspP, how are they interpreted as stage-level?

References


