Aspectual Composition I: Mass / Count

(Krifka 1989; Bhatt and Pancheva 2005)

1. Aspectual Composition and (A)telicity.

(1)

	event takes time	natural end point	divi-sible	stative	EVENT TYPE	Depiction (Smith 1991)
live in Barcelona *be happy* *know French*	+		+	+	STATE	(I)--------(F) p. 37
dance *walk in the park*	+		+		ACTIVITY	I...........Farb p. 45
build a boat *walk to the park*	+	+			ACCOMPLISHMENT	I...........Fnat (R) p. 49
recognize Sue *reach the summit*		+			ACHIEVEMENT	I (R) F p.59

■ Distinction STATIVE vs. NON-STATIVE (from previous handouts)

- Test: *Between t1 and t2* ⇨ durative interpretation for statives
  ⇨ durative or inclusive interpretation for non-statives

- Impact of grammatical aspect: NON-STATIVE + PROGR / IMPERF = STATIVE

■ Distinction TELIC (natural endpoint) vs. ATELIC (no natural endpoint)

- **Test 1**: Time-span adverbials: *in* for TELIC predicates and *for* for ATELIC predicates. (Cf. h/o May 14)

(2) a. John was happy <u>for</u> a year. STATIVE: **ATELIC**
b. *John was happy <u>in</u> a year.

(3) a. Tom danced <u>for</u> an hour. ACTIVITY: **ATELIC**
b. * Tom danced <u>in</u> an hour.

(4) a. * John built the model airplane <u>for</u> an hour. ACCOMPLISHMENT: **TELIC**
b. John built the model airplane <u>in</u> an hour.

(5) a. * John reached to summit <u>for</u> 12h and 32 minutes. ACHIEVEMENT: **TELIC**
b. John reached the summit <u>in</u> 12h and 32 minutes.

- **Test 2**: To measure the length of the time interval, TELIC predicates combine with with *take*, while ATELIC predicates combine with *spend*.

(6) a. # It took me an hour to listen to music. ACTIVITY: **ATELIC**
b. I spent an hour listening to music.

(7) a. It took me an hour to solve this problem. ACCOMPLISHMENT: **TELIC**
b. I spent an hour solving this problem. Ok but only measuring a subpart of accompl

QUESTION 1: Apply test 2 to statives and achievements.

QUESTION 2: A test related to test 2 is compatibility with *finish*. Accomplishment (thus, telic) predicates are compatible with *finish*, as shown in (8). What about the other three types of predicates?

(8) Mary finished building this boat.

■ Impact of the shape of the theme / direct object on the (a)telicity of the VP-predicate

(9)

Aspectual composition (I): The telicity or atelicity --thus, the Aktionsart-- of a VP predicate depends not just on the nature of the verb, but also on the nature of its direct object. More concretely, for some verbs like *draw*, *solve*, etc., --namely, those with an "affected theme"-- the VP-predicate will be telic if its direct object is "count" (MR: well, sort of "count"), and it will be atelic otherwise. (Verkuyl 1972, 1993)

(10) a. Kate drew <u>a circle</u> on the piece of paper. ⇨ **IN** **TOOK** **TELIC**
b. Kate drew <u>circles</u> on the piece of paper. ⇨ **FOR (IN)** **SPEND** **ATELIC**

(11) a. John pushed <u>a cart</u>. ⇨ **FOR** **SPEND** **ATELIC**
b. John pushed <u>carts</u>. ⇨ **FOR** **SPEND** **ATELIC**

QUESTION 3: What about the following verbs? Do they pattern like *draw* or like *push*?

(12) *eat, write, drive, drink, read, pamper*

2. The domain of individuals

■ COUNT nouns can take plural marking and combine with numerals. E.g. *table, chair, professor*. Denotations of predicates built on count nouns:

(12) ⟦*table*⟧ =
{a, b, c}

(13) ⟦*tables*⟧ =
{ a, b, c,
a+b, a+c, b+c,
a+b+c }

(14) ⟦*two tables*⟧ =
{ a+b, a+c, b+c }

■ MASS nouns don't take plural marking (except with kind reading) and do not combine with plain numerals but with measure phrases. E.g. *watter, wood, furniture*. Denotations of predicates built on mass nouns:

(15) ⟦*water*⟧ =
{ … ,
a, b, c,
a+b, a+c, b+c,
a+b+c }

(16) ⟦*two liters of water*⟧ =
e.g. { a, b+c }

■ Formal properties for 1-place nominal predicates:

(17) A predicate P is **QUANTIZED** iff $\forall x \forall y\, [\, P(x) \wedge P(y) \rightarrow \neg(y \subset x)\,]$
That is, a predicate P is quantized iff: for any individuals x and y in its denotation, one individual cannot possibly be a proper part of the other. (Krifka 1989: D14 QUA)

(18) A predicate P is **CUMULATIVE** iff
$$\exists x \exists y [P(x) \wedge P(y) \wedge x \neq y] \quad \wedge \quad \forall x \forall y\, [\, P(x) \wedge P(y) \rightarrow P(x+y)\,]$$
That is, a predicate P is cumulative iff: there are at least two different individuals in its denotation and, for any x and y in its denotation, the sum x+y will also be in its denotation. (Krifka 1989: D13 SCUM)

QUESTION 4: Which of the nominal predicates in (12)-(16) are quantized and which are cumulative?

QUESTION 5: It is clear that a given predicate P cannot be at the same time quantized and cumulative. But can a predicate be neither quantized nor cumulative? In other words, are the notions in (17)-(18) contrary opposites (like *hot* and *cold*) or contradictory opposites (like *hot* and *not hot*)? Explain.

3. The domain of events.

■ We want to explain the impact of the shape of the direct object in aspectual composition; more concretely, we want to explain the pattern below:

(19) a. Kate ate <u>an apple / two apples</u>. ⇨ **TELIC**
b. Kate ate <u>apples</u>. ⇨ **ATELIC**

(20) a. John pushed <u>a cart / two carts</u>. ⇨ **ATELIC**
b. John pushed <u>carts</u>. ⇨ **ATELIC**

■ Formal properties for 1-place verbal predicates (same as (17)-(18) but for events):

(21) A predicate Q is **QUANTIZED** iff $\forall e \forall e'\, [\, Q(e) \wedge Q(e') \rightarrow \neg(e' \subset e)\,]$

(22) A predicate Q is **CUMULATIVE** iff
$$\exists e \exists e'[P(e) \wedge P(e') \wedge e \neq e'] \quad \wedge \quad \forall e \forall e'\, [\, P(e) \wedge P(e') \rightarrow P(e+e')\,]$$

■ Formal properties for 2-place θ-role predicates combining with an individual and an event:

(23) A predicate R is **SUMMATIVE** iff

$$\forall e \forall e' \forall x \forall x' [R(e,x) \wedge R(e',x') \rightarrow R(e+e', x+x')]$$

[= Basically, the 2-place version of cumulative.]
E.g., two events e and e' of drinking a glass of wine yield an event e+e' of drinking two glasses of wine. (Krifka 1989: D29)

(24) A predicate R satisfies **MAPPING TO OBJECTS** iff

$$\forall e \forall e' \forall x [R(e,x) \wedge e' \subset e \rightarrow \exists x'[x' \subset x \wedge R(e',x')]]$$

E.g. every proper subpart of an event e of drinking a glass of wine corresponds to a proper subpart of the glass of wine.[1] (Krifka 1989: D32)

(25) A predicate R satisfies **UNIQUENESS OF OBJECTS** iff

$$\forall e \forall x \forall x' [R(e,x) \wedge R(e,x') \rightarrow x=x']$$

That is, an event is related to a specific object. E.g., a drinking of a glass of wine is related only to this glass of wine as a theme/patient and to nothing else. (Krifka: D30)

■ Semantic representation of the VP-predicates under consideration:

(26) ⟦*eat two apples*⟧ = $\lambda e.\ \exists x\ [\ eat(e) \wedge two\text{-}apples(x) \wedge theme(e,x)\ ]$

(27) ⟦*eat apples*⟧ = $\lambda e.\ \exists x\ [\ eat(e) \wedge apples(x) \wedge theme(e,x)\ ]$

(28) ⟦*push two carts*⟧ = $\lambda e.\ \exists x\ [\ push(e) \wedge two\text{-}carts(x) \wedge theme(e,x)\ ]$

(29) ⟦*push carts*⟧ = $\lambda e.\ \exists x\ [\ push(e) \wedge carts(x) \wedge theme(e,x)\ ]$

(30) Template ϕ: $\lambda e.\ \exists x\ [\ Q(e) \wedge P(x) \wedge R(e,x)\ ]$

■ In what cases will the resulting VP-predicate be CUMULATIVE?

(30) If the verbal predicate Q is cumulative, the direct object predicate P is cumulative and the theta-predicate R is summative, then the resulting VP-predicate ϕ will be cumulative.

(32) Proof: (Krifka 1989: 93)
We want to prove that ϕ is cumulative when so composed; that is, we want to prove that if $\phi(e1)$ and $\phi(e2)$, then $\phi(e1+e2)$.
Assume e1 and e2 for which $\phi(e1)$ and $\phi(e2)$. According to the definition of ϕ, there are two objects x1 and x2 such that $[Q(e1) \wedge P(x1) \wedge R(e1,x1)]$ and $[Q(e2) \wedge P(x2) \wedge R(e2,x2)]$. Since Q and P are cumulative, it holds that $Q(e1+e2)$ and $P(e1+e2)$. Since R is summative, it holds that $R(e1+e2,x1+x2)$. Putting all the pieces together, it holds that $[Q(e1+e2) \wedge P(x1+x2) \wedge R(e1+e2, x1+x2)]$. Given this, it follows that $\phi(e1+e2)$, that is, it follows that $\exists x[Q(e1+e2) \wedge P(x) \wedge R(e1+e2,x)]$, where $x = x1+x2$.

[1] Modified from Krifka: instead of $\subseteq$, we have $\subset$. See also Bhatt and Pancheva (2005).

Quantized P

(33) ⟦*eat two apples*⟧ = $\lambda e.\ \exists x\ [\ \text{eat}(e) \wedge \text{two-apples}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ NOT CUMUL.

(34) ⟦*eat apples*⟧ = $\lambda e.\ \exists x\ [\ \text{eat}(e) \wedge \text{apples}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ CUMULATIVE

(35) ⟦*push two carts*⟧ = $\lambda e.\ \exists x\ [\ \text{push}(e) \wedge \text{two-carts}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ NOT CUMUL.

(36) ⟦*push carts*⟧ = $\lambda e.\ \exists x\ [\ \text{push}(e) \wedge \text{carts}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ CUMULATIVE

Cumulative P

■ In what cases will the resulting VP-predicate be QUANTIZED?
Note: we leave aside iterative interpretations.

(37) If the direct object predicate P is quantized and the theta-predicate R satisfies Mapping to Objects and Uniqueness of Objects, then the resulting VP-predicate ϕ will be quantized.

(38) Proof: (Krifka 1989: 95)
We assume to the contrary that P is quantized but that the resulting ϕ is not, that is, that $\phi(e1)$, $\phi(e2)$ and $e1 \subset e2$. We will show that this leads to a contradiction when ϕ is composed as in (37).
We assume that P is quantized, $\phi(e1)$, $\phi(e2)$ and $e1 \subset e2$. According to the definition of ϕ, there are two objects x1 and x2 such that $[Q(e1) \wedge P(x1) \wedge R(e1,x1)]$ and $[Q(e2) \wedge P(x2) \wedge R(e2,x2)]$. Since $e1 \subset e2$ and since R satisfies Mapping to Objects, there is an x3 for which $x3 \subset x1$ and $R(e2,x3)$. Because of Uniqueness of Objects and since we already have $R(e2,x2)$ and $R(e2,x3)$, it holds that $x2=x3$. This, together with $x3 \subset x1$, entails that $x2 \subset x1$. Putting now the pieces together, we have that $P(x1)$, $P(x2)$ and $x2 \subset x1$. But this means that P is not quantized, which contradicts our assumption.

Quantized P Mapping to Objects

(39) ⟦*eat two apples*⟧ = $\lambda e.\ \exists x\ [\ \text{eat}(e) \wedge \text{two-apples}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ QUANTIZED

(40) ⟦*eat apples*⟧ = $\lambda e.\ \exists x\ [\ \text{eat}(e) \wedge \text{apples}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ NOT QUANTIZ.

(41) ⟦*push two carts*⟧ = $\lambda e.\ \exists x\ [\ \text{push}(e) \wedge \text{two-carts}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ NOT QUANTIZ.

(42) ⟦*push carts*⟧ = $\lambda e.\ \exists x\ [\ \text{push}(e) \wedge \text{carts}(x) \wedge \text{theme}(e,x)\ ]$ ⇨ NOT QUANTIZ.

Not quantized No Mapping to Objects

QUESTION 6: Which of the two formal properties defined for the resulting VP-predicates --(non-)cumulative and (non-)quantized-- match the intuitive telic/atelic distinction?