Nominal reference and the imperfective in Polish and English

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This paper puts forth an argument that Polish and English differ with respect to the ASPECTUAL SCOPE of the imperfective (a.k.a. the progressive).0 The aspectual scope of the imperfective is to be distinguished from its MODAL SCOPE, which is by all appearances the same in both languages. The evidence for aspectual scope comes from a comparison of the PROCESS reading in English and Polish. The contrast to be studied is between a Polish sentence like 1a and its English counterpart in 1b.1

(1)
a. ?#Ewa jadła   trzy   jabłka,   kiedy Jan   w-padł^P.
   Eve eat.PST.F three.A apples.A when John PV-fall.PST.M
b. Eve was eating three apples when John dropped in.

The English progressive hides an ambiguity between two readings which are distinguished in Polish. On one of these readings, the Polish sentence is unacceptable. The task of this paper to explain why.

The two interpretations at issue can be called the SEQUENTIAL and SIMULTANEOUS readings. Consider the following renditions of 1a:

Sequential vs. simultaneous

(2)
a. #Ewa jadła   jedno po drugim trzy jabłka,   kiedy ...
   Eve eat.PST.F one after second three.A apples.A when ...
   'Eve was eating three apples one after another when ...'
b. Ewa jadła   równocześnie   trzy   jabłka,   kiedy ...
   Eve eat.PST.F simultaneously three.A apples.A when ...

'Eve was eating three apples simultaneously when …'

What 2 brings out is a distinction with respect to which the English progressive in 1a remains silent. The main clause of the English sentence can describe the situation in which Eve is actually eating only one apple but in which there is reason to think that she will eventually eat all three, but the main clause in its Polish counterpart describes only the situation in which three apples are being eaten simultaneously (by normal standards, somewhat implausible). Thus, whereas the English progressive allows either the sequential or the simultaneous reading, the Polish imperfective excludes the sequential one.

Such a contrast is totally unexpected in an event semantic theory like that of Parsons 1990, where the progressive is translated as a 'Hold' relation between events and times. Specifically, 'Hold(e,t)' means that an event e is in its developing portion at time t (p. 25). In Parsons' framework, the Polish and English sentences would receive a logical translation like

∃e[eating(e) ∧ Agent(e,Eve) ∧ Theme(e,three-apples) ∧ ∃t[t<now ∧ Hold(e,t)]].

This representation says that there is an eating event with Eve as the Agent and three apples as the Theme which holds at some time interval in the past. Note that 'Hold' is insensitive to the argument of the Theme relation, and so without a theory of aspectual composition, the observed difference between Polish and English cannot naturally emerge.

I couch my analysis in Krifka's (1989a–b, 1992) lattice–theoretic approach to aspectual composition, arguing that his theory allows us to revealingly express the aforementioned contrast between Polish and English.[2] The critical role of aspectual composition is to account for how the aspectual values of NPs and verbs interact to yield an aspectual characterization for the larger constituent which contains them. I propose that the Polish imperfective differs in aspectual scope from the English progressive. Specifically, the basic difference is as follows.

• The Polish imperfective morpheme is a suffix which combines with a verb stem to yield a V° (its aspectual scope is the verb). The English progressive morpheme is an auxiliary of category I° which combines with a VP to yield an I′ (its aspectual scope is the VP).

This difference, in turn, has the following major consequence.

• The Polish imperfective combines with an object NP whose nominal predicate has homogeneous reference. The English progressive lacks this restriction.

Even if the aspectual scope of the imperfective is not the same in Polish and English, its modal scope—which contains minimally the verb and its internal arguments—presumably is. The arguments for intensionality are applicable to Polish as well.[3] I do not attempt to integrate these two facets of the imperfective in the present paper. Instead, I concentrate on the aspectual character of the imperfective and on how the difference in aspectual scope accounts for the contrast observed.

NOMINAL REFERENCE AND IMPERFECTIVE IN POLISH AND ENGLISH

1. Polish data

In this section, I review the basic data to be explained. As originally noted by Wierzbicka 1968, a subclass of imperfective verbs is sensitive to whether the object it combines with has a specifier of measure or not. This subclass consists of those imperfective verbs which take an argument providing a measure for the event described. Such arguments are traditionally known as 'effected' objects, 'consumed' objects, and objects which sustain a definite change of state (Dowty (1991, §6)).[4] Consider first the examples in 3.

(3)
                  Mass term as object NP

a. Ewa jadła^I zupę jarzynową, kiedy Piotr za·telefonował^P.
   Eve eat.PST.F soup.A vegetable.A when Peter PV·telephone.PST.M
   'Eve was eating vegetable soup when Peter telephoned'

b. #Ewa jadła^I trochę zupy jarzynowej, kiedy Piotr …
   Eve eat.PST.F a·little soup.G vegetable.G when Peter …
   'Eve was eating a little vegetable soup when Peter telephoned'

c. #Ewa jadła^I dużo zupy jarzynowej, kiedy Piotr …
   Eve eat.PST.F much soup.G vegetable.G when Peter …
   'Eve was eating a lot of vegetable soup when Peter telephoned'

d. #Ewa jadła^I zupy jarzynowej, kiedy Piotr …
   Eve eat.PST.F soup.G vegetable.G when Peter …
   'Eve was eating some of the vegetable soup, when Peter telephoned'

e. #Ewa jadła^I talerz zupy jarzynowej, kiedy Piotr …
   Eve eat.PST bowl.A soup.G vegetable.G when Peter …
   'Eve was eating a bowl of vegetable soup, when Peter telephoned'

Since the bare mass NP in 3a lacks a specifier, it combines unproblematically with the imperfective verb. In 3b–e, however, the object NP has a specifier of measure and the sentences are unacceptable. In 3b–c, *troche* and *dużo* are best analyzed as head elements (e.g., of category D°), assigning genitive case to their complements. Analogously, the partitive genitive in 3d is assumed to be triggered by a covert partitive determiner. Finally, *talerz* in 3e quantifies over a conventional measuring unit for the substance soup, creating a count term.

Note that the equivalents of 3b–e with the perfective counterpart of *jeść* are fine. This is demonstrated for 3b.

(4)
                  Fully acceptable with perfective verb

Ewa z·jadła^P trochę zupy jarzynowej, kiedy Piotr …
Eve PV·eat.PST.F a·little soup.G vegetable.G when Peter …
'Eve had eaten a little vegetable soup when Peter telephoned'

4 most naturally has the reading in which Eve eats the soup before Peter telephones.[5]

The descriptive generalization gleaned from 3–4 is that *an object NP with a specifier of measure does not combine felicitously with an imperfective verb.* A

parallel generalization for the English progressive does not hold. Further corroboration of this generalization in Polish is supplied by count terms as objects.

Count term as object NP

(5)
a. Bożena pisała   list,   kiedy Jan   wrócił?.P.
   Bożena write.PST.F letter.A when John return.PST.M
   'Bożena was writing a/the letter when John returned'
b. Bożena pisała   listy,   kiedy Jan   wrócił?.P.
   Bożena write.PST.F letters.A when John return.PST.M
   'Bożena was writing letters when John returned'
c. #Bożena pisała   dwa   listy,   kiedy Jan   wrócił?.P.
   Bożena write.PST.F two.A   letters.A when John return.PST.M
   'Bożena was writing two letters when John returned'
d. #Bożena pisała   kilka   listów, kiedy Jan   wrócił?.P.
   Bożena write.PST.F several letters.G when John return.PST.M
   'Bożena was writing several letters when John returned'

5a–b contain a singular (in)definite object and a bare plural object, respectively.[6] As these do not include specifiers of measure, we expect such sentences to be acceptable, and they are. In contrast, 5c–d exemplify the nominal predicate *listy* quantified by the cardinality specifier *dwa* and the vague proportional specifier *kilka*, respectively. Both of these sentences exhibit the kind of unacceptability seen in 3. As before, replacing the imperfective verb in 5c–d with its perfective counterpart *napisać*[P] 'write' renders them acceptable (albeit with a completive reading).

Taken together, 3 and 5 show that the generalization for Polish is independent of the mass vs. count and definiteness vs. indefiniteness distinctions. Although the object NPs in these examples are generally indefinite, this is by no means necessary. In 5a–b, for example, a demonstrative can be added without any change in acceptability. Thus, we are left with the notion "specification by a modifier of measure"—as Wierzbicka (1968, 2237) once put it—as the key to the generalization. But such a statement is ultimately unsatisfactory, for sentences like 5c–d become perfectly acceptable, if only we can understand them on the simultaneous reading. A purely syntactic generalization, however it is to be made precise, fails in this case.

2. Objects and events

To explicate the interaction of nominal reference with the imperfective, the semantic properties of different predicates need to be perspicuously represented. In what follows, I adopt the algebraic semantic approach to nominal reference and temporal constitution of Krifka (1989a–b, 1992). Krifka extends the lattice-theoretic framework for mass nouns and plurals of Link 1983 to the temporal domain. In this section, the necessary background is presented, and in §§3–5 the theory's application to Polish is investigated.

The leading idea of the algebraic semantic approach is to enrich the sorts of entities present in the model structure. In particular, a set of OBJECTS O and a set

of EVENTS E are postulated.[7] The latter step follows Davidson's (1967) lead in adding events as primitives to the model. O is assumed to be disjoint from E, i.e., $O \cap E = \emptyset$, hence no object is also an event, and vice versa. Given a set M of entities, where $M \subseteq O$ or $M \subseteq E$, the 2-place JOIN operation '$\oplus$' is introduced as a mapping from $M \times M$ to M, i.e., it sends pairs of entities to entities of the same sort. Thus, if we take M to be a set of objects, then $\oplus$ takes two objects u_1 and u_2 and yields the JOIN OBJECT $u_1 \oplus u_2$. Similarly, if M is a set of events, then JOIN EVENTS are also created via the join operation. $\oplus$ is postulated to be idempotent, commutative, associative, and closed with respect to M. If we add the requirement that a join always exist for any two entities of M, then the algebra (M, $\oplus$) has the structure of a COMPLETE JOIN SEMILATTICE. Taking the variables x, y, and z to range over entities of M, the axioms expressing these constraints are formalized in 6.

Axioms

(6)
a. $\forall x[x \oplus x] = x$ (idempotency)
b. $\forall x, y[x \oplus y = y \oplus x]$ (commutativity)
c. $\forall x, y, z[x \oplus [y \oplus z] = [x \oplus y] \oplus z]$ (associativity)
d. $\forall x, y \exists z[x \oplus y = z]$ (completeness)

To paraphrase, the join of an entity with itself yields the same entity (idempotency), the join of several entities is indifferent to the order of join (commutativity and associativity), and the join of any two entities in M is certain to exist in M (completeness).

An entity x is related to the join entity $x \oplus z$ via the PART relation '$\leq$'. If x is part of $x \oplus z$, this is represented as $x \leq x \oplus z$. More generally, if x is part of y, we write $x \leq y$. A stricter notion of part is the PROPER PART relation '$<$': x is a proper part of y iff x is a part of y and yet not equal to y. Finally, if two entities share a common part, then they OVERLAP '$\circ$'. These relations are formalized in 7.

Part relations

(7)
a. $x \leq y \leftrightarrow x \oplus y = y$ (part)
b. $x < y \leftrightarrow x \leq y \wedge \neg x = y$ (proper part)
c. $x \circ y \leftrightarrow \exists z[z \leq x \wedge z \leq y]$ (overlap)

Consider now a 1-place predicate M such that M is the extension of M. If $||\cdot||$ is the denotation function relative to a model, then $||M||$ is the denotation of M and $||M|| = M$.

Suppose that we wish to designate the entity in $||M||$ which is the join of all entities in $||M||$. This (unique) complex join entity is the SUPREMUM of $||M||$, and we designate it as the lowest UPPER BOUND of $||M||$. ('ι' in 8b is the Russellian description operator.)

Supremum

(8)
a. $\forall x, M[UP(x, ||M||) \leftrightarrow \forall y[M(y) \rightarrow y \leq x]]$ (upper bound of $||M||$)
b. $\forall M[SUP(||M||) = \iota x[UP(x, ||M||) \wedge \forall y[UP(y, ||M||) \rightarrow x \leq y]]]$ (supremum of $||M||$, i.e., the lowest upper bound of $||M||$)

A simple illustration of a supremum makes the point. Take $\|M\|$ to be the set $\{w, x, y, z, w \oplus x, w \oplus y, x \oplus y, w \oplus x \oplus y\}$ (e.g., the set of 'long dissertations'). The join $w \oplus x \oplus y$ is clearly an upper bound of $\|M\|$, for any entity of $\|M\|$ is a part of it. But the join $w \oplus x \oplus y$ is also an upper bound of $\|M\|$ (hence the join entity $w \oplus x \oplus y \oplus z$ is also an upper bound of $\|M\|$, for nothing requires an upper bound of $\|M\|$ to be included in $\|M\|$ (hence the join entity $w \oplus x \oplus y \oplus z$ cannot be 'long dissertations', but it could simply be 'dissertations'). Many other (higher) upper bounds of $\|M\|$ are also imaginable. But it is evident from 8b that only the join entity $w \oplus x \oplus y$ is the supremum of $\|M\|$, for it is the only upper bound which is a part of all other upper bounds.

3. Referential types

With the two lattice sorts of objects and events in place, the most important referential types for present purposes can now be defined. The two fundamental notions are those of CUMULATIVE REFERENCE and DIVISIVE REFERENCE (Link 1983, Krifka 1989a–b, 1992). Let M be a 1-place predicate, as before.

Referential types

(9) a. $\forall M[\text{CUM}(M) \leftrightarrow \forall x,y[M(x) \land M(y) \rightarrow M(x \oplus y)]]$
     (M has cumulative reference)
  b. $\forall M[\text{DIV}(M) \leftrightarrow \forall x,y[M(x) \land y \leqslant x \rightarrow M(y)]]$
     (M has divisive reference)
  c. $\forall M[\text{HOM}(M) \leftrightarrow \text{CUM}(M) \land \text{DIV}(M)]$
     (M has homogeneous reference)

If a predicate refers cumulatively, then if it applies to each of two entities, it applies to their join as well. On the other hand, if a predicate refers divisively, then if it applies to an entity, then it applies to all parts of that entity, if there are any. Finally, a predicate with both cumulative and divisive reference has HOMOGENEOUS REFERENCE.

Consider how these referential types characterize the nominal predicates in 3. Take the mass nominal predicate *zupa jarzynowa* 'vegetable soup' in 3a: if x is an (unspecified) amount of vegetable soup and y is likewise an amount of vegetable soup, then clearly the join object $x \oplus y$ is also an amount of vegetable soup. Hence *zupa jarzynowa* has cumulative reference. But it also has divisive reference, for if x is an amount of vegetable soup and y is a sub-amount of x, then y is still an amount of vegetable soup (albeit a lesser amount). These facts are concisely stated in terms of the representation language as

$$\|\text{zupa-jarzynowa}'\| \sqsubseteq O \land \text{CUM}(\text{zupa-jarzynowa}') \land \text{DIV}(\text{zupa-jarzynowa}'),$$

which by 9c entails that zupa-jarzynowa' also has homogeneous reference.

Characterizations of the nominal predicates exemplified in 3b–e are given in 10. Strictly speaking, specifiers like *troche* are either quantifiers or cardinality predicates. Although both the quantificational and the cardinality readings show the same pattern of unacceptability in Polish, only the cardinality predicate is characterized here. The definitions in 9 are not applicable to quantifiers, which denote relations between sets. In what follows, I ignore for the most part the fact that

these nominal predicates have internal structure and therefore treat them as though they were, simplex predicates.

Cf. 3b–e; GPART = 'genitivus partitivus'

(10) a. $\text{DIV}(\text{troche-zupy-jarzynowej}') \land \neg\text{CUM}(\text{troche-zupy-jarzynowej}')$
   b. $\text{CUM}(\text{dużo-zupy-jarzynowej}') \land \neg\text{DIV}(\text{dużo-zupy-jarzynowej}')$
   c. $\text{DIV}(\text{GPART-zupy-jarzynowej}') \land \neg\text{CUM}(\text{GPART-zupy-jarzynowej}')$
   d. $\neg\text{CUM}(\text{talerz-zupy-jarzynowej}') \land \neg\text{DIV}(\text{talerz-zupy-jarzynowej}')$

As seen in 10, the other nominal predicates of 3 all lack homogeneous reference. For example, *troche zupy jarzynowej* 'a little vegetable soup' fails 9a for cumulative reference because the join of two small amounts of soup may itself not be a small amount of soup. The failure of divisive reference is characteristic of *dużo zupy jarzynowej* 'a lot of vegetable soup', for there is no guarantee that a sub-amount of a lot of vegetable soup will be a lot of soup (though cumulative reference does hold). Thus, it is reasonable to hypothesize that the unacceptability of 3b–e stems from the object predicate's lacking homogeneous reference (and not exclusively either cumulative or divisive reference).

Further comment is needed for 10c, the characterization of the partitive genitive in 3d. Recall that the genitive case marking is conjectured to be triggered by a covert partitive operator, analogous to the overt specifiers which assign genitive case to their nominal complements. Even if correct, it is less apparent that the partitive genitive lacks cumulative reference, as stated in 10c. Intuitively, if reference is made to parts of an entity like soup, then not only are sub-parts of those parts of the soup also parts of the soup (divisibility), but join parts of the soup are also parts of the soup (cumulativity). If this were correct, then the partitive genitive should have homogeneous reference, and the homogeneity generalization for the pattern of unacceptability would fall short.

Happily, there is independent reason to think that the characterization in 10c is correct. I hypothesize that the partitive genitive in Polish refers to *proper parts of some object(s)*, essentially equivalent to *some of the x* in English. This hypothesis is confirmed by the following contrasts:[8]

(11)
                                      GPART: *reference to proper parts*

a. Ewa z'jadła^P   zupy   jarzynowej
   Eve PV-eat.PST.F soup.G   vegetable.G
   i   Piotr z'jadł^P   resztę
   and Peter PV-eat.PST.M   rest.A
   'Eve ate some of the vegetable soup and Peter ate the rest'

b. #Ewa z'jadła^P   zupę   jarzynową   i   Piotr z'jadł^P ...
   Eve PV-eat.PST.F soup.A   vegetable.A and Peter PV-eat.PST.M ...
   #'Eve ate the vegetable soup and Peter ate the rest'

c. #Ewa z'jadła^P   zupy   jarzynowej
   Eve PV-eat.PST.F soup.G   vegetable.G
   i   nie   zostało   nic   dla   Piotra.
   and NEG   remain.PST.N nothing for Peter.G
   #'Eve ate some of the vegetable soup and there was none left for Peter'

d. Ewa zjadła^P zupę jarzynową i nie zostało nic ...
   Eve PV-eat.PST.F soup.A vegetable.A and NEG be.PST.N nothing ...
   'Eve ate the vegetable soup and there was none left for Peter'

Reference to proper parts (partitive genitive) is incompatible with reference to the whole (accusative). The sentence pairs 11a–b and 11c–d contrast the partitive genitive with the accusative. In 11a, the partitive genitive entails that a proper sub-amount of the vegetable soup was eaten by Eve, enabling Peter to have eaten the rest. However, this is not feasible in 11b, where the accusative NP is interpreted as a definite description. Since Eve ate all the soup, there could not have been any left for Peter, and so the sentence expresses a contradiction.

11c–d are constructed to obtain exactly the opposite result. In 11c, it is asserted that no soup remained, but this is inconsistent with the partitive genitive, which stipulates that only a proper sub-amount of the soup was eaten. But in 11d this is fine, for the accusative NP entails that all the soup was eaten, and therefore none could have remained for Peter's consumption.

What the examples in 11 confirm is that the partitive genitive indeed cannot refer to wholes. But if correct, then cumulative reference fails, for the join of two proper parts of the vegetable soup may itself be *the* vegetable soup, which is no longer a proper part of the vegetable soup. And if cumulativity of reference fails, then homogeneity of reference for the partitive genitive also clearly fails.

To obtain this result formally, an appropriate definition of GPART is needed. I propose the definition in 12a and illustrate it with the chosen example.[9]

(12)
a. G-PART := $\lambda M \lambda u \exists u_0[u' \subset u_0 \wedge u_0 = \iota u_0[M(u_0)] \wedge u_0 = \mathrm{SUP}(\|M\|)]$ *Def. of GPART*
b. *zupy jarzynowej* ⇒
   $\lambda M \lambda u \exists u_0[u' \subset u_0 \wedge u_0 = \iota u_0[M(u_0)] \wedge u_0 = \mathrm{SUP}(\|M\|)](\text{zupa-jarzynowa}') \rightarrow$
   $\lambda u \exists u_0[u' \subset u_0 \wedge u_0 = \iota u_0[\alpha(u_0) \wedge u_0 = \mathrm{SUP}(\|\alpha\|)]](\text{zupa-jarzynowa}') \rightarrow$
   $\mathrm{SUP}(\|\text{zupa-jarzynowa}'\|)]]$

It can be proven that the partitive genitive as defined in 12a does not have the property of cumulative reference. To do this, one must demonstrate that the definition in 9a is invalid for the predicate $\lambda u' \exists u_0[u' \subset u_0 \wedge u_0 = \iota u_0[\alpha(u_0) \wedge u_0 = \mathrm{SUP}(\|\alpha\|)]]$, i.e., $\neg \mathrm{CUM}(\lambda u' \exists u_0[u' \subset u_0 \wedge u_0 = \iota u_0[\alpha(u_0) \wedge u_0 = \mathrm{SUP}(\|\alpha\|)]])$. For reasons of space, and because the intuitive reasoning has already been given, I do not provide the formal demonstration here.

We now turn to a characterization of the nominal predicates in 5 (all count terms). With the exception of the singular NP in 5a, their characterizations are straightforward.

(13)
a. $\neg \mathrm{CUM}(\text{list}') \wedge \neg \mathrm{DIV}(\text{list}')$ 'a letter';
   $\mathrm{CUM}(\lambda u[u = \mathrm{SUP}(\|\text{list}'\|) \wedge \text{list}'(u)]) \wedge \neg \mathrm{DIV}(\lambda u[u = \mathrm{SUP}(\|\text{list}'\|) \wedge$
   $\text{list}'(u)])$ 'the letter'   *Cf. 5a–d*
b. $\mathrm{CUM}(\text{listy}') \wedge \mathrm{DIV}(\text{listy}')$

c. $\neg \mathrm{CUM}(\text{dwa-listy}') \wedge \neg \mathrm{DIV}(\text{dwa-listy}')$
d. $\mathrm{CUM}(\text{kilka-listów}') \wedge \neg \mathrm{DIV}(\text{kilka-listów}')$

The acceptability of the bare plural in 5b correlates with its homogeneous reference (13b), and the unacceptability of the cardinality determiners in 5c–d is consistent with the failure of homogeneous reference for these predicates, as stated in 13c–d.

For the singular NP *list* 'a/the letter' in 5a, there are two readings to consider. The apparent difficulty is that on neither the indefinite nor the definite interpretation does the predicate have homogeneous reference. Thus, the join of two letters is no longer a letter, and a part of a letter is also not a letter. Definite NPs have cumulative reference trivially by 9a, because there is a unique object (the supremum) in the domain of discourse to which the definite description applies. Nevertheless, divisive reference clearly fails, for not any part of the supremum is the supremum.

While there is little doubt that the characterizations of count terms like *list* in 13a are correct, we can ask whether there is another reading of such NPs which has homogeneous reference. If there is not, then the generalization that homogeneous reference is required of the nominal predicate with the imperfective cannot be maintained. Consider, however, a weak partitive reading: reference to *parts*, as opposed to *proper parts*, would be appropriate, for such a partitive reading would be sufficiently weaker than the partitive genitive interpretation treated above. I call this weaker partitive reading the PARTITIVE ACCUSATIVE and consider some motivation for its existence.

(14) *Reference to parts*
a. #Ewa jadła^I całe jabłko, kiedy Piotr wpadł^P.
   Eve eat.PST.F whole.A apple.A when Peter PV-fall.PST.M
   'Eve was eating the whole apple when Peter dropped in'
b. #Bożena pisała^I cały list, kiedy Jan wrócił.
   Bożena write.PST.F whole.A letter.A when John return.PST.M
   'Bożena was writing the whole letter when John returned'
c. Ewa jadła^I jabłko, ale nagle wy-szła^P z pokoju
   Eve eat.PST.F apple.A but suddenly PV-go.PST.F out-of room.G
   i Piotr s-kończył^P je jeść.
   and Peter PV-finish.PST.M it.A eat
   'Eve was eating a/the apple, but suddenly she went out of the room and Peter finished eating it'
d. Bożena pisała^I długi list, ale nagle musiała^I ode-jść^P,
   Bożena write.PST.F long.A letter.A but suddenly must.PST.F PV-leave
   więc Jan s-kończył^P go pisać.
   so John PV-finish.PST.M it.A write
   'Bożena was writing the long letter, but suddenly she had to leave, so John finished writing it'

If we make the plausible assumption that the modifier *cały* 'whole' restricts reference to entire objects or wholes, then 14a–b are unacceptable because the verb

is imperfective and therefore reference to parts, as sanctioned by the partitive accusative, is necessary and yet disallowed. 14c–d, on the other hand, show that the object may be only partly consumed or created by a single agent, which is consistent with the partitive reading. Note, incidentally, that if the relevant verbs in these sentences were in the perfective aspect, then these sentences would be unacceptable.

Does the partitive accusative have homogeneous reference? Recall that the partitive genitive failed on cumulativity precisely because of reference to proper parts. The partitive accusative does not fail on these grounds, for it includes the weaker part notion. Informally, the join of any two parts of an object is still a part of the object, even if the result is identical with the object itself, *for the part relation is compatible with identity* (cf. 6a, 7a). The partitive accusative 'APART' is defined and illustrated with *jabłko* 'apple' in what follows:[10]

(15)
a. $\text{A-PART} := \lambda M \lambda u \exists u_0 [u' \le u_0 \wedge M(u_0)]$
b. *jabłko* 'an apple' $\Rightarrow$
   $\lambda M \lambda u \exists u_0 [u' \le u_0 \wedge M(u_0)](\text{jabłko}') \rightarrow \lambda u \exists u_0 [u' \le u_0 \wedge \text{jabłko}'(u_0)]$

Def. of APART

It can be proven that the partitive accusative crucially has cumulative reference (divisive reference is not at issue), i.e., that $\text{CUM}(\lambda u'[u' \le u \wedge M(u)])$ is valid.[11] Again, the reasoning is clear, and due to space I suppress the formal details. (I provide an analogous proof for the imperfective in §4.)

In this section, I have argued that the acceptability or unacceptability of the Polish sentences in 3 and 5 stems from the reference properties of the nominal predicate in object position. As anticipated in the outset of the paper, a subclass of imperfective verbs in Polish combine only with object NPs having homogeneous reference. Although analysis of the data supports this conclusion, we might ask about the nature of this restriction on the imperfective. In particular, it is not at all evident why Polish should have it and English should not. To obtain an answer to this question, I turn to a representation for the Polish imperfective and the English progressive and thereafter to the theory of aspectual composition.

4. Imperfective

Krifka (1989b, 177) discusses two strategies for analyzing the English progressive. The first is to construe the progressive as a 'topological' operator defined in terms of the part relation which changes the referential type of a verbal predicate. The second is to take the progressive to be an operator which changes the meaning of the verbal predicate in a more radical way, e.g., from an event-denoting expression to a state-denoting one. For present purposes, I follow Krifka in opting for the 'topological' analysis.[12]

The characterization of the progressive as a 'topological' operator is in fact analogous to the definition of the accusative partitive (APART) in 15a. In both cases, reference is made to parts of an entity, whether of an event or of an object. The 'topological' definition is given in 16a, and it is applied to the verbal predicate

eat three apples in 16c. With respect to the process interpretation, recall that I consider the Polish imperfective and the English progressive to be aspectually equivalent. Hence the same definition suffices for both.

Imperfective/Progressive

(16)
a. $\text{PROG} := \lambda M \lambda e \exists e'[e' \le e \wedge M(e)]$
b. *eat three apples* $\Rightarrow \lambda e \exists u[\text{eat}'(e) \wedge \text{three-apples}'(u) \wedge \text{PAT*}(e,u)]$
c. *be eating three apples* $\Rightarrow$
   $\lambda M \lambda e \exists e'[e' \le e \wedge M(e)](\lambda e \exists u[\text{eat}'(e) \wedge \text{three-apples}'(u) \wedge \text{PAT*}(e,u)]) \rightarrow$
   $\lambda e \exists e'[e' \le e \wedge \exists u[\text{eat}'(e) \wedge \text{three-apples}'(u) \wedge \text{PAT*}(e,u)]]$

PAT* designates the particular type of patient relation associated with predicates like *eat*. It is essentially equivalent to Dowty's (1991) Incremental Theme role.

Given the definition of the imperfective in 16a, we want to establish that such a partitive predicate has homogeneous reference, for this result is needed in §5. Intuitively—as with APART—it does, for the join of any two parts of an event is still a part of that event (cumulativity), and a part of a part of an event is also a part of that event (divisibility). But since Krifka does not give the formal proof, let us do so here. To prove homogeneity, both cumulativity and divisibility must be demonstrated.[13]

Proof of HOM($\lambda e'[e' \le e \wedge \alpha(e)]$)

(17)
• Proof of CUM($\lambda e'[e' \le e \wedge \alpha(e)]$)

$\lambda e'[e' \le e \wedge \alpha(e)](e_1)$ [1] Assumption (9a)

e_1, e_2, not necessarily distinct, s.t.
$\lambda e'[e' \le e \wedge \alpha(e)](e_1),$ [2] λ-conversion, [1]
$[e_1 \le e \wedge \alpha(e)]$
$[e_2 \le e \wedge \alpha(e)]$
$\lambda e'[e' \le e \wedge \alpha(e)](e_2)$

$e_1 \le e \leftrightarrow e_1 \oplus e = e,$ [3] Def. of part (7a)
$e_2 \le e \leftrightarrow e_2 \oplus e = e$

$e_1 \oplus e = e_1 \oplus (e_2 \oplus e) = e$ [4] Substitution ($e_2 \oplus e$ for e) [3]

$(e_1 \oplus e_2) \oplus e = e$ [5] Associativity (6c), [4]

$e_1 \oplus e_2 \le e$ [6] Def. of part (7a), [5]

$[e_1 \oplus e_2 \le e \wedge \alpha(e)]$ [7] Substitution (into 1st formula of [2]), [6]

$\lambda e'[e' \le e \wedge \alpha(e)](e_1 \oplus e_2)$ [8] λ-abstraction, [7]

∴ CUM($\lambda e'[e' \le e \wedge \alpha(e)]$)   [8] Def. of cumulative reference (9a)

• Proof of DIV($\lambda e'[e' \le e \wedge \alpha(e)]$)

e_1, e_2, not necessarily distinct, s.t.
$e_2 \le e_1,$
$\lambda e'[e' \le e \wedge \alpha(e)](e_1)$ [1] Assumption (9b)
$[e_1 \le e \wedge \alpha(e)]$

$e_2 \le e_1 \leftrightarrow e_2 \oplus e_1 = e_1$ [2] Def. of part (7a)
$e_1 \le e \leftrightarrow e_1 \oplus e = e$ [3] Def. of part (7a), [1]

$e_2 \oplus (e_1 \oplus e) = e$ [4] Substitution, [3], [4]

$(e_2 \oplus e_1) \oplus e = e$ [5] Associativity (6c), [5]

$e_2 \oplus e_1 \oplus e_1 = e_1$ [6] Substitution, [3], [4]

$e_2 \oplus e = e$ [7] Substitution (c for $e_1 \oplus$ c), [3], [6]

$e_2 \leq e$
$[e_2 \leq e \wedge \alpha(e)]$ [8] Def. of part (7a), [7]
$\lambda e'[e' \leq e \wedge \alpha(e)](e_2)$ [9] Substitution [2], [8]
$\lambda e'[e' \leq e \wedge \alpha(e)]$ [10] λ-abstraction, [9]
$\therefore \mathbf{HOM}(\lambda e'[e' \leq e \wedge \alpha(e)])$ [11] Def. of divisive reference (9b)

From the proof in 17 it is clear that the verbal predicate in 16c has homogeneous reference. In fact, all Polish sentences in the imperfective and English sentences in the progressive will share this property precisely because both the imperfective and the progressive receive the same translation, as defined in 16a. Nevertheless, the difference between Polish and English is still not resolved, for homogeneity of the imperfective and progressive is silent about the internal structure of the expression. In the next and final section, I tackle this problem.

5. Mapping aspectual content

If both the Polish imperfective and the English progressive receive the same translation, then the question arises as to where the relevant difference between the two languages is located. That is, why does the imperfective require the object to have homogeneous reference, whereas the progressive does not? My hypothesis is that this contrast stems from a difference in order of semantic combination, which in turn arises out of different structural configurations in the two languages.

This idea is made explicit as follows. In English, 16a is the translation of progressive *be* (category Iº), which combines with Vº directly. If correct, then progressivity cannot be located in the *-ing* suffix *per se*, for this suffix arguably combines with the verb proper. In Polish, however, there is no equivalent of progressive *be*, and the imperfective is a suffix which combines with the verb stem directly before the verb is allowed to combine with its internal arguments. Using the example in 16c, this difference in order of combination is illustrated in 18a–b.

(18)
a.   *English in (a), Polish in (b)*

I': $\lambda e\exists e[e' \leq e \wedge \exists u[eat'(e) \wedge \text{three-apples}'(u) \wedge \text{PAT}^*(e,u)]]$

$\quad$ VP: $\lambda e\exists u[eat'(e) \wedge \text{three-apples}'(u) \wedge \text{PAT}^*(e,u)]$
$\quad$ Iº: $\lambda M\lambda e\exists e[e' \leq e \wedge M(e)]$

b.
VP: $\lambda e\exists e[e' \leq e \wedge jeść'(e) \wedge \exists u[\text{trzy-jabłka}'(u) \wedge \text{PAT}^*(e',u)]]$

$\quad$ NP: $\lambda M\lambda e\exists e[M(e') \wedge \exists u[\text{trzy-jabłka}'(u') \wedge \text{trzy-jabłka}'(u') \wedge \text{PAT}^*(e',u')]$
$\quad$ Vº: $\lambda e\exists e[e' \leq e \wedge M(e)]$

$\quad\quad$ V: $jeść'$
$\quad\quad$ SUF: $\lambda M\lambda e\exists e[e' \leq e \wedge jeść'(e)]$

The difference between 18a and 18b is that whereas the top predicate in the former refers to a set of sub-events of an eating event e with three apples *as the*

patient of e, the top predicate in the latter refers to a set of sub-events of an eating event e with three apples *as the patient of each sub-event of* e. In English, the progressive predicate combines with the VP precisely because progressive *be* is syntactically located in Iº. Consequently, it cannot combine directly with the verb. In Polish, on the other hand, the imperfective predicate combines directly with the verb stem precisely because it is a verbal suffix and has no positional realization analogous to progressive *be*. The result is a partitive verbal predicate of sub-events of an event, which then combines with an object NP, as shown in 18b.

Let us call a verbal predicate to which the imperfective or the progressive has applied a DERIVED verbal predicate. We know from 17 that these derived predicates have homogeneous reference. In fact, the derived predicate (of events e') is homogeneous even if the basic verbal predicate (of an event e) lacks homogeneous reference, as *eat three apples* in 18a would. This is because the complex predicate containing a simple verb plus non-homogeneous object NP will itself lack homogeneous reference (Krifka 1989a, 95). However, no inconsistency arises, for while the non-homogeneous VP predicate applies to an event e, the homogeneous imperfective predicate applies to sub-events e' of e. Since these are predicates of different events, *there is no way for the progressive predicate to require that the object NP have homogeneous reference in a derived progressive predicate*. For Polish, on the other hand, the crux of the matter is to establish that derived imperfective predicates like that in 18b *do* require that the object NP have homogeneous reference, since this is what evidently happens.

As pointed out above, the derived imperfective predicate in Polish is crucially distinguished from the English one in that the object NP is related via the PAT* relation to sub-events e' of e (cf. 18). Thus, we want to prove that a nominal predicate characterizing objects which are related to sub-events e' of an event e necessarily has homogeneous reference. Specifically, we must show that the nominal predicate must have homogeneous reference if the verbal predicate that it is combined with is to be true of any sub-event. As this is a critical link in my argument, I supply the proof in 19.

(19)   *Proof of homogeneity for nominal predicate w/ PROG in Polish*

$\phi = \lambda e'[e' \leq e \wedge \alpha(e)]$,   DEFINITIONS: α is predicate of
$\delta' = \lambda u[\delta(u) \wedge \exists e_1[\phi(e_1) \wedge \theta(e_1,u)]]$ events, δ is predicate of objects, θ is PAT* thematic relation

• Proof of CUM(δ')

u_1, u_2, not necessarily distinct, s.t.   [1] Assumption (9a)
$\delta'(u_1)$ and $\delta'(u_2)$
$[\delta(u_1) \wedge \exists e_1[\phi(e_1) \wedge \theta(e_1, u_1)]]$,   [2] λ-conversion, def. of δ', [1]
$[\delta(u_2) \wedge \exists e_2[\phi(e_2) \wedge \theta(e_2, u_2)]$
$\phi(e_1 \oplus e_2)$ [3] CUM(ϕ) (17), [2]
$\theta(e_1 \oplus e_2, u_1 \oplus u_2)$ [4] Krifka's SUMMATIVITY for θ
      (i.e., $R(e, x) \wedge R(e', x') \rightarrow R(e \oplus$
      $e', x \oplus x)$, see Krifka (1989a, 92)),
      [2]
$\delta(u_1 \oplus u_2)$ [4] Def. of δ', [3], [4]

CUM(δ)

$[9]$ Def. of cumulative reference

(9a)

∴ CUM(δ̂) $[10]$ Def. of δ̂

• Proof of DIV(δ̂)

$[1]$ Assumption (9b)

u_1, u_2, not necessarily distinct, s.t.

$u_2 \leq u_1$ and δ̂(u_1)

$[2]$ λ-conversion, def. of δ̂, [1]

$[δ̂(u_1) \land \exists e_1[\phi(e_1) \land \theta(e_1, u_1)]]$

$[3]$ Krifka's Mapping to Events for

θ (i.e., $R(e, x) \land x' \leq x \rightarrow \exists e'[e' \leq e \land R(e', x')$, see Krifka (1989a,

92)), [1], [2]

$\exists e_2[e_2 \leq e_1 \land \theta(e_2, u_1)]$

$[4]$ DIV(φ) (17), [2], [3]

$\phi(e_2)$

$[5]$ Def. of δ̂, [3], [4]

δ̂(u_2)

$[4]$ Def. of divisive reference (9b)

$[5]$ Def. of δ̂

∴ DIV(δ̂)

∴ HOM(δ̂)

By 19, we know that Polish imperfective verbs with the PAT* thematic relation require their object NP to have homogeneous reference. Crucial to the argument is the claim that object NPs in Polish combine with a partitive verbal predicate, whereas such NPs in English do not. For derived English progressive predicates of the type exemplified in 18a, it cannot be proven that the object NP either has or lacks homogeneous reference. This result, then, is a welcome one. Ultimately, the difference between Polish and English is tied to where the imperfective interpretation enters the semantic composition. In Polish, it is at the V°-level, but in English, it is at the VP-level. In the final analysis, this is all that really needs to be said.[14]

Notes

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[1]Gloss abbreviations are: PST = past tense, F = feminine, M = masculine, A = accusative, G = genitive, PV = preverb. A raised 'I' marks an imperfective verb and a raised 'P', a perfective verb. The dot '·' separates a preverb from its verb stem, contrary to orthographic practice. The '#' indicates semantic anomaly on the intended reading. Finally, the when-clause is present merely to control for the process reading, which is the relevant interpretation. Otherwise, it is not crucial.

[2]A purely set-theoretic approach to aspectual composition is presented in Verkuyl 1989. For lack of space, I do not explore an application of Verkuyl's approach in this paper.

[3]In Dowry's (1979/1991) classic *inertia worlds* analysis, the progressive *be...ing* is translated as a modal operator, having scope over the sentence, i.e., PROG(φ). Landman 1992 takes the progressive to have scope over the VP, denoting a relation between events and event types.

[4]This paper does not discuss the range of Polish verbs belonging to this class. With Dowry, I assume that they are distinguished from other verbs in terms of the thematic relation selected.

[5]This interpretation is not fixed: if the order of the clauses is reversed, then it is more natural to understand the telephoning as preceding the eating.

[6]For present purposes, no distinction is drawn between different sorts of objects (e.g., substances and individuals). See Link 1983 for an analysis of this distinction.

[8]The perfective verb *z·jeść*^P 'eat' is employed in 11 because the partitive genitive is unacceptable with the imperfective (3d). The (articleless) accusative object is most naturally interpreted as a definite description with the perfective.

[9]Definite descriptions apply to the supremum of entities in a lattice sort (Krifka 1989a, 107). The condition that u_0 be the supremum of the lattice sort captures the constraint that the partitive genitive must modify a definite NP.

[10]This weaker partitive reading is briefly discussed in Krifka (1989b, §2.3.8, 1992, §7.). Note that there are other differences between the two partitives (e.g., definiteness, plurality) which I ignore here.

[11]Technically, the variable bound by the existential quantifier has to be made free for the proof to work.

[12]As Krifka notes (p. 177), the part analysis of the progressive is not fully adequate, for it ignores problems of intensionality. See (Krifka 1989b, 178) for some ideas on how to meet the demands of intensionality.

[13]See note 11.

[14]A final matter, which I cannot take up in detail here, is why the simultaneous reading in examples like 2b is acceptable. I would argue that the simultaneous reading is reducible to the APART interpretation (15a) applied to sub-parts of a group. In 2b, for example, APART applies to sub-parts of each apple of the group of three apples at the same time. And since APART has homogeneous reference, it is evident that the simultaneous reading as a derived partitive predicate applying to parts of atoms of a group will too.

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