Plurals and events (chap. 4) : Essential Separation

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Structure of the argument

Schein attempts to show that the truth-condition of sentences like (1a) are unavailable if we assume that "*teach*" denotes a 4-ary predicate (3 arguments of the verb + event)[1]

(1) a. Three video games taught the two quarterbacks exactly two new plays each.

b. **Observed truth-conditions:**
Every quarterback learned two new plays
They received instruction from three video-games.

c. "*teach*" denotes an $eeevt$ predicate

An argument of impossibility is tricky to make: one needs to make sure that the reading is impossible to obtain under any auxiliary assumptions. In particular, Schein explores two classes of auxiliary assumptions:

1. **Composition:** how quantifiers compose with one another.
2. **Denotation of $[\![$teach$]\!]$:** what 4-way relation "*teach*" denotes.

1 What about the event quantifier? What about other denotations of *every*?

If I am right that the main problem of (**??**) is really all about the last two quantifiers, then much of the rest of the chapter is irrelevant. Indeed, Schein attempts several solutions that all meddle with the first two quantifiers. For sake of having an exhaustive review, I will present these arguments nonetheless.

[1] Schein uses *indirect* semantics, where a sentence first gets translated into a formula of some logical language, which itself receives a model-theoretic representation. I rephrase in terms of the more familiar *direct* semantics of Heim and Kratzer, where sentences immediately translates to model-theoretic objects.

Never running out of compositional creativity, Schein discusses two refinements to our logical translations:

1. Placement of event closure
2. Denotation of teach

Denotation of $[\![$teach$]\!]$ Here, we have one constraint: the predicate denoted by *teach* must "*express a true relation*". By that, he means that $[\![\text{teach}]\!](X)(y)(Z)(e)$ is true then Z must teach Y to X (at e)[2]. So far, we've been assuming the weakest meaning compatible with this requirement, i.e. (2).

(2) **Inexhaustive**
$[\![\text{teach}]\!](X)(y)(Z)(e)$ iff Z teaches y to X (at e)

But we could impose further requirement:

(3) **S/IO-Exhaustive**

a. $[\![\text{teach}]\!](X)(y)(Z)(e)$ iff Z teaches y to X (at e)
$\forall Z', X', Y'$ Z' teaches Y' to X' (at e) $\rightarrow Z' = Z$ and $X' = X$

b. The only teachers of the event are Z
The only taught of the event are X

(4) **S/IO-Exhaustive relative to direct object**

a. $[\![\text{teach}]\!](X)(y)(Z)(e)$ iff Z teaches y to X (at e)
$\forall Z', X'$ Z' teaches y to X' (at e) $\rightarrow Z' = Z$ and $X' = X$

b. X is everything taught y
Z is everything teaching y

(5) **Fully exhaustive**

a. $[\![\text{teach}]\!](X)(y)(Z)(e)$ iff Z teaches y to X (at e)
$\forall Z', X', Y'$ Z' teaches Y' to X' (at e) $\rightarrow Z' = Z$ and $X' = X$ and $Y' = Y$

b. X is everything taught y
Z is everything teaching y

I am uncertain why Schein chooses these particular denotations. This seems to rely on the argument from chapter 3 that at least *plural* arguments must be read exhaus-

[2] The use of the locution "*at e*" suggests that Schein uses events the way people use situations ; they are simply bundle of facts. If left unconstrained, it may be become hard to define thematic role heads in this view.

tively. Given that we now have one more argument (i.e. the monitor), we need to further refine these denotations:

(6) **S/IO-Exhaustive**

a. $[\![\text{teach}]\!](X)(y)(Z)(W)(e)$ iff Z teaches y to X on W (at e)
$\forall Z', X', Y', W'$ Z' teaches Y' to X' on W' (at e) $\rightarrow Z' = Z$ and $X' = X$

b. The only teachers of the event are Z
The only taught of the event are X

(7) **S/IO-Exhaustive relative to direct object and adjunct**

a. $[\![\text{teach}]\!](X)(y)(Z)(W)(e)$ iff Z teaches y to X on W (at e)
$\forall Z', X'$ Z' teaches y to X' on W (at e) $\rightarrow Z' = Z$ and $X' = X$

b. X is everything taught y
Z is everything teaching y

(8) **Fully exhaustive**

a. $[\![\text{teach}]\!](X)(y)(Z)(W)(e)$ iff Z teaches y to X on W (at e)
$\forall Z', X', Y', W'$ Z' teaches Y' to X' on W' (at e) $\rightarrow Z' = Z$ and $X' = X$ and $Y' = Y$ and $W' = W$

b. The event contains X teaches y to Z on W and nothing else

Note: As argued in Kratzer, there are intermediate position between complete separation and completely polyadic formulas. One could imagine adjuncts are separate, while arugments belong to the polyadic predicate.

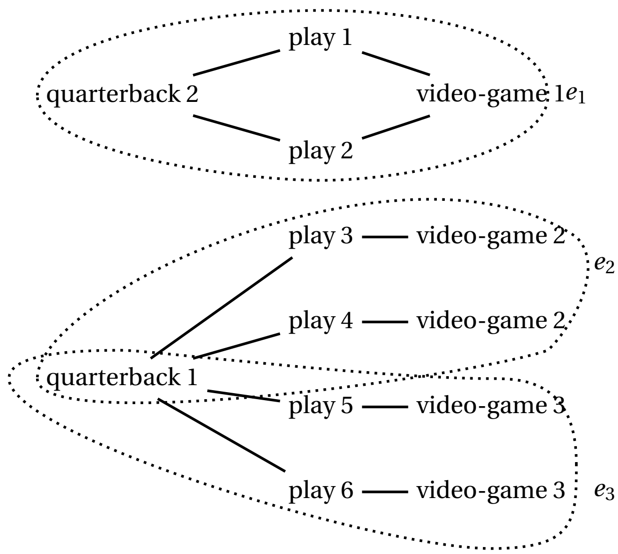
Position of event closure. Four placements are considered: widest scope, intermediate scope, lowest scope and within the binary quantifier. For reasons that are never explicitly commented on, Schein only considers one placement within the binary quantifier.

(9) $(\exists e)$ ... three video-games × [the two quarterbacks $(\exists e)$,] ... $(\exists e,)$ ... exactly two new plays on a big monitor ... $(\exists e)$

As a general remark, Champollion notes in a ESSLLI hand-out that a ven Benthem problem will arise every time a quantifier takes scope under event closure. I think some of the comments below fall within the scope of this general remark

1.1 Testing the combinations

First case: intermediate scope Here, we get to choose for each (quarterback × video-game) pair which e to evaluate "*exactly two new plays*" and "*a big monitor*" in. Exploiting the van Benthem vulnerability, we choose events that are just big enough to contain exactly two new plays, essentially nullifying the effect *exactly two*. So in a scenario where some quarterback was taught 4 plays, we pick two events small that split the four events in two sets of two. Since "*exactly 2*" will be satisfied in each event, the sentence is predicted true when it is false.



(10)

Second case: widest scope+full or S/IO exhaustivity. Because event closure has widest scope, exhaustivity will enforce that there is only one agent for all teachings. In other words, the same group of video-games taught every quarterback. This is quite independent from any quantification we may come up with so binary or unary quantification makes no difference.

(11) $\exists e$ ... three video-games × [the two quarterbacks] ...... exactly two new plays on a big monitor ... ()

Third case: widest-scope + S/IO exhaustivity relative to direct object This exhaustivity requirement is less stringent. The event may contain different groups of teachers so long as per quarterback and monitor, there is only one group of teachers. That prevents truth-conditions too strong as above. But it does not rid us of the problem one quarterback may be taught four plays, so long as they were taught on two monitors, as in (10).

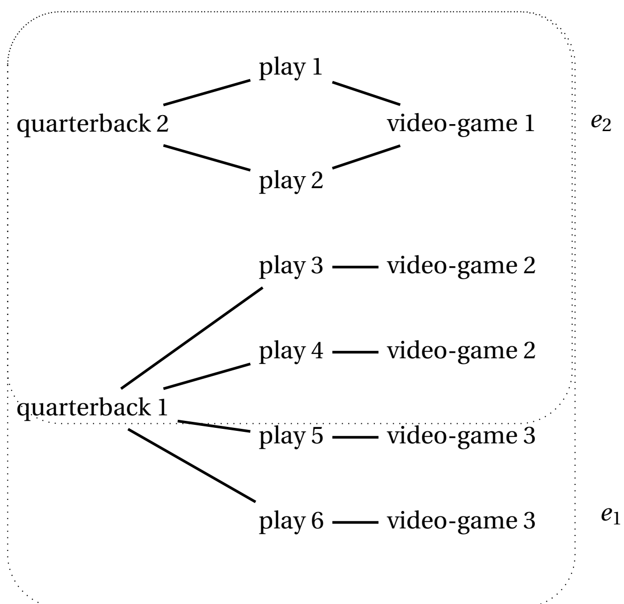
Note: Schein conspicuously ignores one version that would get us out of trouble. (12) require exhaustivity per object. So that there could only be one monitor per player

(12) **S/IO-Exhaustive relative to direct object *only***

a. $[\![\text{teach}]\!](X)(y)(Z)(W)(e)$ iff Z teaches y to X on W (at e)
$\forall Z', X', W'$ Z' teaches y to X' on W (at e) $\rightarrow Z' = Z$ and $X' = X$ and $W' = W$

b. X is everything that is taught to y
Z is everything teaching y
W is all the supports on which y is taught

In other words, we would predict the right truth-conditions if the event picked up by the highest quantifier is e_1 in the figure below ; since this is the event that Schein makes all his reasoning about, this is an important omission. Of course, this will not get us out of trouble since there is a way to satisfy the event description with e_2 instead.

(13) 

Fourth case: binary quantifier over events As discussed above, Schein's binary quantifiers is not really one. However, $\exists e$ is treated in a way that seems standard. In order to not get in the weeds of binary quantification, we may effectively treat the effect of that move as introducing a Skolem choice function, which picks out for each quarterback one event, but the event does not vary with the video games:

(14) $\exists f_{\texttt{quarterback}' \rightarrow v}$ $[\![\text{3 video games}]\!] \times [\![\text{the two quarterbacks}]\!](X, y)$,
Exactly 2 $Z \in [\![\text{plays}]\!]$, $[\![\text{teach}]\!](X)(y)(Z)(f(y))$

2 What next?

In the last part of the chapter, Schein considers what would happen if we were to maintain polyadicity but accept the existence of thematic role in the meta-language of our formulas:

(15) $[\![\text{teach}]\!](X)(y)(Z)(e)$ =true iff $\textsc{Agent}(e) = X \wedge \textsc{Theme}(e) = y \wedge \textsc{Goal}(e) = z \wedge$ e is a teaching

However, it is unclear that this is any different from full exhaustivity. Pulling a last ace from his sleeve, Schein mentions a trick that would have been useful in dealing with the problematically strong reading of full exhaustivity earlier: what if we inserted talk of sub-events quantifiers in the LF?

(16) $\exists e$, $[\![$three video-games$]\!]$ ... $[\![$two quarterbacks$]\!]$ ... $[\![$exactly two new plays$]\!]$ ... $\exists e' \prec e$,

If events may be summed up arbitrarily, then this formula is equivalent to a low existential and will not be of any help.

Appendix

One of the crucial argument for essential separation was:

(17) a. I received exactly two passwords on a single slip of paper
b. **Reading:**
I received exactly two passwords
I received them on a single slip of paper

With essential separation, we can create LFs where *exactly 2* scopes above the agent and the theme to the exclusion of the locative:

(18) [exactly 2 passwords λx. [I received x]] on a single slip of paper

Interestingly, *exactly 2 passwords* cannot scope any lower than that, or problematic readings are over-generated

(19) a. I received exactly two passwords
b. Exactly two passwords were received by anyone.
I received these passwords