Event containers

1 Introduction. Container (e.g., *bucket*) and measure (e.g., *liter*) nouns package an unformed substance (e.g., wine) into manipulable and countable individuals along some dimension (Chierchia 1998, Schwarzschild 2006, Partee & Borschev 2012, Scontras 2014). Some nouns are ambiguous between measure and container readings (e.g., *cup*). Under a container reading (1a), substance nouns are not typically quantized along a temporal dimension, although this is not entirely impossible under a measure reading (1b). However, calendrical nouns like *hour* can, more intuitively, package events into measurable units when accompanied by a deverbal nominal (2).

(1) a. *three hours of sugar b. three hours of wine (to chat over)

(2) a. [Twenty years of destruction] left the country in ruin.
b. [Forty hours of Bill running] caused him to sprain his ankle.
c. [Five minutes of Maggie playing the piano] were enough to convince the judges.

I develop an account of the constructions in (2), in which *hour* or *year* are "event container" nouns recruited to temporally quantize the event description denoted by the *of*-PP. It synthesizes a leading account of the syntax and semantics of container nouns (Scontras 2014) with Kamp & Schiehlen's (2002) and Toosarvandani's (forthcoming) semantics for calendrical nouns, in which they denote elements in a partition of the timeline. This account extends the theory of measurement, which has focused primarily on how concrete substances are delimited, to the more abstract domain of events.

2 Empirical preliminaries. I focus on the examples in (2a-c), and set aside partitive examples like in (3), where the temporal noun appears with a definite event description.

(3) a. [Thirty seconds of the performance] was enough to convince the judges.
b. (Just) [Five minutes of Mary's scolding of the children] upset the parents.

These have distinct syntax, evidenced in part by the (un)availability of PP-extraposition (Selkirk 1977:304). Partitives allow this (4a), but "pseudopartitives", with an indefinite event description, do not (4a-b).

(4) a. How many minutes __ did you watch [of *(the) performance]?
b. *How many minutes __ did you watch [of Maggie playing the piano]?

The *of*-PP in the construction introduced in (2) can include a bare derived nominal (2a) or an ACC-*ing* gerund with (2b) or without (2c) an internal argument, but not a finite CP (5a) nor an infinitival (5b). Of note is that the *of*-PP must denote an atelic event description, evidenced by the unavailability of a telic reading in (6) (Bill must have been sipping the same beer for three hours, without necessarily finishing it).

(5) a. *[Forty hours of/that Bill ran] caused him to sprain his ankle.
b. *[Five minutes of/for Maggie to play the piano] was enough to convince the judges.

(6) [Three hours of drinking a beer] bored Bill. (#*telic*, ^{OK}*atelic*)

3 Event container nouns. I argue that the construction in (2a-c) involves a container-like use of temporal nouns, based on the following four diagnostics. First, like container nouns (Rothstein 2009), they can antecede a plural pronoun.

(7) Maggie has to complete [twenty hours of training]. They don't need to be consecutive.

This contrasts with how these calendar nouns are used in *for* adverbials (where they do not introduce a plural discourse referent, e.g., *Maggie has to train for twenty hours. #They don't need to be consecutive/difficult*). Second, also like container nouns (but unlike measure nouns), they are compatible with quantifiers which operate over individuals (e.g., *every*, *most*, *no*; Chierchia 1998).

(8) Every/Most/No hour(s) of running go(es) by without injury.

Third, they describe elements belonging to the sort of the temporal noun, rather than of the derived nominal, again just like container nouns (i.e., *There are two cups of wine on the tray. They are blue.*) In (9), *they* does not pick out events (rather, times) as it cannot serve as the argument to a perception verb.

(9) Maggie completed [twenty hours of training]. #I saw them all.

Fourth, the times these constructions describe do not need to be temporally contiguous, just as the elements described by container nouns do not have to be spatially contiguous (i.e., two different glasses of wine can be far apart, as can two different hours of training). In fact, even calendar nouns like *Thursday*, which name non-contiguous time intervals, can serve as event containers.

(10) We have [four Thursdays of interviewing applicants] ahead of us. They're going to be exciting.

Again, this contrasts with how these temporal nouns pattern in, say, *for* adverbials, where they must denote some continuous interval (e.g., *Bill ran for two hours* is not straightforwardly felicitous if Bill ran one hour last Sunday and one hour this Sunday).

4 Proposal. I adopt Kamp & Scheihlen's (2002) semantics for calendar nouns, in which they partition a dense timeline into a set of equal-length and abutting (non-overlapping and adjacent) time intervals. I take event container nouns to locate an event within each member of this partition (represented formally, following Toosarvandani (forthcoming), as a set π):

(11) $[\![\text{minute}_C\ (\text{of})]\!] = \lambda P_{\langle et\rangle}\lambda t_i\ .\ \exists e[P(e) \wedge t \in \pi_{\text{min}} \wedge \tau(e) \subseteq t]$

I remain agnostic about whether container nouns are themselves relational and argument-taking (Landman 2004, Rothstein 2009) or not (Scontras 2014); they may be type-shifted by some operator (akin to Rothstein's 2009:135 CS-SHIFT operator) or compose with a semantically contentful particle *of*. I also make the simplifying assumption that the derived nominals contained within the *of*-PP denote predicates of events. The event container thus describes a set of time intervals of particular length (e.g., a minute), each of which includes the run time of some event satisfying the event description. Numerals are introduced in the specifier of a Num head (CARD), following Scontras (2014:33), which creates pluralities of a certain cardinality. I adapt his denotation for this functional head to the temporal domain as in (12): this creates pluralities of time intervals.

(12) $[\![\text{CARD}]\!] = \lambda T_{\langle it\rangle}\lambda n_{\#}\lambda t_i\ .\ \forall u[u \in \text{AT}(t) \rightarrow T(u)] \wedge |\ t\ | = n$

The composition of these lexical items is demonstrated in (13), for *ten hours of training*.

(13) $[\![[\text{ten CARD [hours [of training]]]}]\!]$

$= \lambda t_i\ .\ \forall u[u \in \text{AT}(t) \rightarrow \exists e[\text{train'}(e) \wedge u \in \pi_{\text{hr}} \wedge \tau(e) \subseteq u]] \wedge |\ t\ | = 10$

The predicate in (13) describes pluralities of ten atomic intervals, each an hour in length and including the temporal extent of a training event.

This semantics straightforwardly captures that event containers can antecede a plural pronoun by introducing a plural interval discourse referent. So long as the numeral introduced in the specifier of NumP is greater than 1, the semantics introduced for CARD ensures that the interval denoted is a plural one (see Sauerland 2003 for a more thorough account of plurality). It also does not require that the atomic subparts of the plural interval be adjacent, nor that they contain instantiations of the same training event. For (13), all that is required is that there be a plural interval comprising ten intervals each of one hour length, and that these subparts contain an event which fits a certain description, namely that they are training events. This is the correct semantics, as sentences like (2b) show: under its most natural reading, it is the cumulative effect of the forty hours (which happen to contain events of "Bill running") which led to Bill spraining his ankle.

5 Predictions and conclusion. We have explored how events can be quantized along the temporal dimension, by way of an event container use of calendar nouns like *hour* or *year*. Future work might more thoroughly examine the temporal parallels of other classes of quantizing nouns, such as measures and what Scontras (2014) calls atomizers (e.g., *grain*). At least as far as measures, *for* adverbials could be thought of as involving a measure use of temporal nouns, denoting a single continuous measurement (see data above, especially with reference to *for* adverbials' inability to antecede a plural pronoun). Some questions concerning event containers also remain. Of note is that plain intervals, which make no reference to an event, cannot occupy the same position as event containers as in (2).

(14) *Forty hours caused Bill to sprain his ankle.

Future work might seek to answer what allows event containers which, under the current system, denote potentially discontinuous pluralities of temporal intervals each containing the temporal extent of a certain kind of event, to be causers, but not simple intervals as in (14).

Selected References. Kamp, H., & Schiehlen, M. (2002). Temporal location in natural languages. **Landman, F.** (2004). *Indefinites and the type of sets*. **Rothstein, S.** (2009). Individuating and measure readings of classifier constructions: Evidence from Modern Hebrew. **Scontras, G. C.** (2014). *The semantics of measurement*. **Toosarvandani, M.** (forthcoming). Semantic classes of temporal adverbs. *Cambridge Handbook of Temporality in Language.*