snippets

Issue 37 - December 2019
Special issue in honor of Uli Sauerland

Contents

Unifying partitive and adjective-modifying *percent*

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DOI: http://dx.doi.org/10.7358/snip-2019-037-past

Ahn and Sauerland (2015, 2017; hereafter A&S) analyze two constructions: proportional partitives like (1a), and "non-conservative" proportional measurement constructions like (1b):

(1) a. The company hired 70% of the women.
b. The company hired 70% women.
Paraphrase: 70% of the company's hirees were women.

A&S treat (1a) and (1b) as involving distinct syntactic representations that nonetheless both contain proportional partitive structures; in (1a) this is obvious, and in (1b) the partitive structure is embedded in a syntactic environment that generates the non-conservative reading. This snippet deals only with the partitive structure itself, and thus I focus on (1a).

According to A&S, (1a) has a structure like (2).

(2) [70 [percent [the women]]] λ_1 the company hired t_1

The crucial semantic work is done by ⟦percent⟧, which A&S define as in (3):

(3) $\llbracket\text{percent}\rrbracket_{\text{A\&S}} = \lambda x \lambda n \lambda P.\ \dfrac{\mu(x \sqcap \sigma y[P(y)])}{\mu(x)} = \dfrac{n}{100}$

where μ is a contextually determined measure function, $a \sqcap b$ is the mereological overlap of a and b, and $\sigma y[P(y)]$ is the sum of the members of P.

When ⟦percent⟧ combines with its arguments in succession, the result is as in (4).

(4) $\dfrac{\mu(\sigma x[\text{women}(x)] \sqcap \sigma y[\text{the company hired } y])}{\mu(\sigma x[\text{women}(x)])} = \dfrac{70}{100}$

Assuming that context assigns μ to $|\cdot|$ (cardinality), this gets the right result: the cardinality of the overlap of women and hirees, divided by the cardinality of the total plurality of women, is $\frac{70}{100}$.

While A&S's definition of ⟦percent⟧ gets the right results, it begs for unification with another use of *percent* as an adjectival modifier, as discussed by Kennedy and McNally (2005):

(5) The glass is 75% full.

How do we unify? I will start with the adjective-modifying case, then translate to partitives. For the former, we define ⟦percent⟧ as in (6); it takes an adjective denotation A (a relation between degrees and individuals) and number n, and returns a predicate true of x if the maximal degree to which x is A is n% of the way up A's scale.

(6) $\llbracket\text{percent}\rrbracket = \lambda A \lambda n \lambda x.\ \dfrac{\max(\{d \mid A(d)(x)\}) - \min(\text{RNG}(A))}{\max(\text{RNG}(A)) - \min(\text{RNG}(A))} = \dfrac{n}{100}$

where $\text{RNG}(A) \equiv \{d \mid \exists x[A(d)(x) \text{ is defined}]\}$

The reference to maximal/minimal degrees accounts for the familiar observation that proportional modifiers require closed scales (cf. *#70% tall*).

Turning to *70% of the women*, I roughly follow A&S in adopting the following syntax:

(7) [SOME [70 [percent [MUCH [the women]]]]] λ_1 the company hired t_1

Partially adopting ideas from Wellwood 2015, the main work here is done by silent MUCH, which takes an individual and returns an adjective-type denotation.

(8) $[\![\text{MUCH}]\!] = \lambda x \lambda d \lambda y : \mu(x) \geq d.\ y \sqsubseteq x \wedge \mu(y) \geq d$

$[\![\text{MUCH}]\!](x)(d)(y)$ presupposes that d is no greater than $\mu(x)$, and asserts that y is a part of x and $\mu(y)$ is at least d. As a result, $\min(\text{RNG}([\![\text{MUCH}]\!](x)))$ is the zero-degree of μ $(= 0_\mu)$, and because of the presupposition, $\max(\text{RNG}([\![\text{MUCH}]\!](x))) = \mu(x)$. Thus, $[\![$70% of the women$]\!]$ is as in (9):

(9) $[\![\text{percent}]\!]([\![\text{MUCH}]\!]([\![\text{the women}]\!]))([\![70]\!]) =$

$$\lambda y.\ \frac{\max(\{d \mid y \sqsubseteq \sigma x[\text{women}(x)] \wedge \mu(y) \geq d\}) - 0_\mu}{\mu(\sigma x[\text{women}(x)]) - 0_\mu} = \frac{70}{100}$$

In plain English, we get a predicate true of a part of the women iff its cardinality is 70% of that of the total plurality of women. This then restricts the existentially quantifying SOME, with the rest of the sentence being the scope; the resulting denotation of (1a) is as in (10):

(10) $$\exists y \left[\begin{array}{l} \dfrac{\max(\{d \mid y \sqsubseteq \sigma x[\text{women}(x)] \wedge \mu(y) \geq d\}) - 0_\mu}{\mu(\sigma x[\text{women}(x)]) - 0_\mu} = \dfrac{70}{100} \\ \wedge \text{the company hired } y \end{array} \right]$$

The final denotation is thus paraphrasable as follows: there is a plural individual y that is a collection of women whose cardinality is 70% of that of the total plurality of women, and is such that the company hired y. This matches the intuitive truth conditions of (1a), while adopting a unified semantic analysis for $[\![\text{percent}]\!]$. Moreover, while a full demonstration must be left for future work, this analysis can be extended equally well to A&S's treatment of (1b), and the proposed structural relationship between (1a) and (1b) can be maintained.

References

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This research has been funded by the DFG project 'Relative measurement and the DP-border', which is gratefully acknowledged.

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