The semantics of sufficiency and excess

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Overview. We argue against the view that *enough*- and *too*-constructions, which typically express sufficiency and excess, include in their lexical entry (hidden) modals or conditionals that lead to actuality-related entailment. Instead, we propose that they only express relations between **individuals** and **extents** (or intervals) in a certain **dimension**, and inferences with regard to actuality entailment follow directly from the structure of extents (plus pragmatics).
Background. Karttunen (1971) first pointed out that *enough*- and *too*-constructions are similar to implicative predicates such as *manage to* in having an implicative reading, i.e., they imply that their complement holds (e.g., (1)) or fails to hold (e.g., (2)). To account for this, Meier (2003) proposed that *enough* and *too* are quantifiers that relate an extent predicate and an incomplete conditional and interpreted as comparisons between two extents (see (1a) and (2a)). As Hacquard (2005, 2006) pointed out, under Meier (2003)'s analysis, the implicative reading of (1) (i.e., John actually left) is of a pragmatic nature and depends on contexts: actuality entailment of *enough*-constructions is due to a totally realistic accessibility relation in interpreting the possibility modality such that it only picks out the actual world, guaranteeing that the complement holds in the actual world.

(1) (Yesterday / Usually,) John was clever **enough** to leave. *Enough*-constructions
   a. Meier (2003): the value v s.t. John was v-clever is GREATER THAN OR EQUAL TO THE MINIMUM of all values v' s.t. if John was v'-clever, John WAS ABLE TO leave.
   b. Hacquard: $[\![(1)]\!]$ presupposes that there is a degree of cleverness sufficient and necessary for someone to leave (in all accessible worlds w, if someone had this degree, he left), and asserts that John had this degree.

(2) John was **too** lazy to walk to school. *Too*-constructions
   a. Meier (2003): the value v s.t. John is v-lazy is GREATER THAN THE MAXIMUM of all values v' s.t. if John is v'-lazy, John WAS ABLE TO walk to school.
   b. Hacquard: $[\![(2)]\!]$ presupposes that there is a degree of **diligence** sufficient and necessary for someone to walk to school (in all accessible worlds w, if someone had this degree, he walked to school), and asserts that John **didn't** have this degree.

However, based on the contrast between French perfective and imperfective sentences (see (3) and (4)) (English is ambiguous on this), Hacquard (2005, 2006) claimed that actuality entailment of *enough*-constructions is not due to pragmatics. Instead, she proposed that the meaning of *enough* / *too* contains a definite description of degrees that triggers a presupposition, and this presupposition establishes an equivalence relation between a degree of adjective and the realization of the complement (see (1b) and (2b)). The non-implicative reading of (4) is due to the presence of a genericty operator that can include non actual worlds.

(3) Jean **a été** assez rapide pour s'enfuir (# mais il ne s'est pas enfui.)
Jean was-PERFECTIVE enough quick for escape but he didn't escape
'John was quick enough to escape, but he didn't escape.' $\rightsquigarrow$ actuality entailment

(4) Jean **était** assez rapide pour s'enfuir (mais il ne s'est pas enfui.)
Jean was-IMPERFECTIVE enough quick for escape but he didn't escape
'John was quick enough to escape, but he didn't escape.' $\not\rightsquigarrow$ actuality entailment

New data. Here we argue that due to the existence of naturally occurring examples like (5), in which *enough*- and *too*-constructions are conjoined, previous analyses cannot be on the right track: no matter actuality entailment is semantically or pragmatically encoded, they predict that (5) is contradictory, but it is not. (5) simply means that the café cannot host a meeting. This example suggests 3 points: (i) hidden modals or conditionals cannot be part of the intrinsic meaning of *enough*- and *too*-constructions; (ii) while *enough* is associated with necessary conditions for something to happen, *too* is associated with sufficient conditions for something not to happen; (iii) as already pointed out in previous literature (e.g., Kennedy 1999), things or events can be measured in multiple dimensions. Obviously, in each dimension, there is a range of values that makes it favorable or feasible for something to happen, thus hidden modals should be part of the meaning postulates of the complement of *enough* or *too*.

(5) This café was large enough but too noisy for us to have a meeting.
Meier and Hacquard's prediction: The café can and cannot host a meeting.

Proposal. (6) and (7) show our analyses for *enough* and *too*. They each take three arguments: a scalar adjective, an interval, and an individual. The interval indicates a range of values that makes it favorable or feasible for something to happen, and thus this information is provided by the complement of *enough* or *too*. The scalar adjective provides the information of dimension. The use of *enough* presupposes the existence of a lower bound, and the use of *too* presupposes the existence of an upper bound. Obviously, exceeding the upper bound leads to a sufficient condition for something **not** to happen, while reaching the lower bound leads to a necessary condition for something to happen (see the closeness of intervals in (6) and (7), and negative sentences have this reversed). Actuality entailment of *enough*-constructions arises when there is pragmatic meaning strengthening: i.e., we assume a sentence provides both necessary and sufficient information (cf. the use of numbers in *I ate 3 apples*). In French imperfectives, a silent genericity operator allows exceptions and thus cancels this entailment.

(6) $[\![\text{enough}]\!]_{\langle\langle dt,et\rangle,\langle dt,et\rangle\rangle} \stackrel{\text{def}}{=} \lambda S_{\langle dt,et\rangle}.\lambda I_{\langle dt\rangle}.\lambda x_e.S\text{-DIMENSION}_{\langle e,dt\rangle}(x) \subseteq [I_{\text{LOWER BOUND}}, +\infty)$
I.e., in the dimension associated with the scalar adjective S, the measurement of x **reaches the lower bound** of the interval I.

(7) $[\![\text{too}]\!]_{\langle\langle dt,et\rangle,\langle dt,et\rangle\rangle} \stackrel{\text{def}}{=} \lambda S_{\langle dt,et\rangle}.\lambda I_{\langle dt\rangle}.\lambda x_e.S\text{-DIMENSION}_{\langle e,dt\rangle}(x) \subseteq (I_{\text{UPPER BOUND}}, +\infty)$
I.e., in the dimension associated with the scalar adjective S, the measurement of x **exceeds the upper bound** of the interval I.

(8) $[\![\text{tall}]\!]_{\langle dt,et\rangle} \stackrel{\text{def}}{=} \lambda I_{\langle dt\rangle}.\lambda x_e.[\text{HEIGHT}_{\langle e,dt\rangle}(x) \subseteq I]$

(9) [John is too tall for gymnastics]
LF: $[[[[\text{too}]]_{\langle\langle dt,et\rangle,\langle dt,et\rangle\rangle}[\![\text{tall}]\!]_{\langle dt,et\rangle}][\![\text{for gymnastics}]\!]_{\langle dt\rangle}][\![\text{John}]\!]_e]$
$[\![(9)]\!] \Leftrightarrow \text{HEIGHT}(\text{John}) \subseteq (I_{\text{UPPER BOUND for gymnastics}}, +\infty)$
I.e., the height of John **exceeds the upper bound** for gymnastics.
Presupposition: there is an **upper bound** for gymnastics in the dimension of height.

(10) [Mary is tall enough for basketball]
LF: $[[[[\text{enough}]]_{\langle\langle dt,et\rangle,\langle dt,et\rangle\rangle}[\![\text{tall}]\!]_{\langle dt,et\rangle}][\![\text{for basketball}]\!]_{\langle dt\rangle}][\![\text{Mary}]\!]_e]$
$[\![(10)]\!] \Leftrightarrow \text{HEIGHT}(\text{Mary}) \subseteq [I_{\text{LOWER BOUND for basketball}}, +\infty)$
I.e., the height of Mary **reaches the lower bound** for basketball.
Presupposition: there is a **lower bound** for basketball in the dimension of height.

References. **Hacquard. 2005.** *SuB* 9.; **2006.** *SALT* 15. | **Karttunen. 1971.** *Language* 47. | **Kennedy. 1999.** | **Meier. 2003.** *NLS* 11:1.