Enough!

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1   Introduction

Beck and Rullmann (1999) argued that a simple maximality based account to questions is insufficient (pun intended) for a question like (1):

(1)   How many eggs are sufficient (to bake this cake)?

This question does not ask for the maximal number of eggs that is sufficient for baking this cake. Instead, Beck & Rullmann proposed a more sophisticated maximal informativity account, according to which (1) asks for the most informative number n such that n eggs are sufficient for the cake. This will in fact be the minimum number eggs needed.[1]

Along the way, Beck & Rullmann discussed the notion of sufficiency, proposing ideas that had not been made explicit before. They did this not because sufficiency is a primary target of their investigation but to make sure that the technical implementation of their theory of maximal informativity of questions is explicit and plausible.

They suggested two equivalent paraphrases of the sentence in (2):

(2)   Four eggs are sufficient (to bake this cake).

(3)   a.   It is not necessary (given the rules for your cake baking) that you have more than four eggs.

   b.   It is possible (given the rules for your cake baking) that you have only four eggs.

When they specified the lexical meaning of *sufficient*, they opted for using the ◇*only* version:

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[1] The maximal informativity account is extended in von Fintel, Fox, and Iatridou (2014) to the semantics of definites.

> We will derive this semantics via the lexical meaning of *sufficient*. We will take as our guideline the paraphrase in (3b). We will assume that semantically the argument of *sufficient* is propositional in nature. *Sufficient* then contributes modal possibility as well as a meaning component amounting to *only*.

Their brief discussion was pivotal for my work with Sabine Iatridou on the sufficiency modal construction (SMC; von Fintel and Iatridou (2005a, 2007)), where we looked at ways that language compositionally constructs a sufficiency meaning. The central construction we analyzed displays a structure that seems to correspond to neither (3a) nor (3b):

(4)   To get good cheese, you only have to go to the North End!

We argued that (4) actually does correspond to the structure of (3a): we proposed that in (4), *only* decomposes into negation + *more than* and wrap around the necessity modal *have to*. We identified a bunch of properties of the SMC and noted many puzzles and connections.[2]

In the intervening years, there has been quite a bit of work on sufficiency (and at least one of its foils: excess) but I believe that the domain is ripe for further work. Consider this then an invitation for Hotze to (re-)join the fray and clarify things for us all.[3]

2   The notional category of sufficiency

The study of the notional category of sufficiency, or "enoughology", promises to provide a field of inquiry unsurpassed in richness, complexity, and the power to absorb.[4] In what follows, I will survey several aspects of this topic that have received attention so far. My hope is that there will soon be progress both on specific issues and on the general contours of the category. I find many of the puzzles not just intriguing but irksome in their recalcitrance to straightforward analysis.

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[2] One of these connections is to the analysis of discontinuous exceptives such as the French *ne ... que*, on which now see Homer (2015); Authier (2020).

[3] This short paper is therefore in the tradition of von Fintel and Kratzer (2014), where we (unsuccessfully) sought to engage the advice of an expert on a set of tricky issues.

[4] This sentence is a shameless remix of a sentence about "the logic of ordinary speech" from Strawson (1952:p.232).

2.1 *Too* and *enough*

The founding document of this field is the all too rarely cited Nelson (1980), which I found out about through Humberstone (2006) and Schwarzschild (2008). Nelson discussed structures such as the following:

(5)   This dress is too expensive for me to buy.

(6)   The dress is good enough to wear anywhere.

Nelson identified the comparative nature of the meanings and the presence of hidden possibility modality in the complements of *too* and *enough*. One can easily intuit that (5) means something like "The cost of the dress exceeds any cost at which it would be possible for me to buy the dress", and that (6) means roughly "The quality of the dress is at least as high as one that would make it possible for it be worn anywhere." Schwarzschild (2008) proposed a lexical entry for *too* that encodes this kind of meaning, including the hidden modality.

    Other work on *too* and *enough* includes Meier (2003); Hacquard (2005); Grano (2022).[5] Grano tried to adjudicate the question whether the modality is hidden in *too* and *enough* or contributed by the infinitival complement. He provided evidence for the latter. Nevertheless, I suspect there's more to discover here.

    The linguistics of *too* and *enough* is intricate enough to confound even the most sophisticated brains, as shown in the famous puzzler (Wason and Reich (1979); Fortuin (2014)):

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[5] Hacquard (2005) explored the fact that these constructions give rise to the effect of "actuality entailments" that are more well-known in the case of overtly modal constructions. See Grano (2022) for even more references. Meier (2003) added a third expression to the mix: *so ... that* as in *The jet flies so fast that it can beat the speed record*, which is essentially equivalent to *The jet flies fast enough to beat the speed record*. I can't refrain from mentioning one of my favorite puzzles in linguistics, explored by Hoeksema and Napoli (1993), who discussed the fact that the meaning expressed by *The sun was so hot (that) I fainted* can also be expressed by the paratactic *I fainted, the sun was so hot* (aided by a particular intonational contour). Since the conditional conjunctions to be discussed soon also involve a richer interpretation than one would normally expect in juxtapositions/conjunctions, there may be even more connections to uncover here.

(7)   No head injury is too trivial to ignore.

2.2   The SMC

Here's some useful advice for turophiles:

(8)   To get good cheese,
   a.   it's enough $\left\{ \begin{array}{l} \text{if you} \\ \text{for you to} \end{array} \right\}$ go to the North End.

   b.   you only have to go to the North End.

Note that we can replace *enough* with the collocation *only have to*. As mentioned in the introduction, this latter construction is the topic of von Fintel and Iatridou (2005a); von Fintel and Iatridou (2007). Follow-up work included Franke (2006); Krasikova and Zhechev (2006); Enguehard (2021); Alonso-Ovalle and Hirsch (2022); Condoravdi and Francez (2022). These works have established that there is something deeply puzzling about how *only have to* gets to express sufficiency. All the accounts attempt something heroic and I'm not convinced by any of them, including our own. Situating the composition of *only have to* in the larger context of enoughology may help in future work on this, so the canvas of possibly related issues and topics that I am painting here can hopefully serve as a map for exploration.

2.3   Connections

2.3.1   Scalar *only*

Several of us have concluded that the *only* in *only have to* has not (just) an exclusive meaning but (also) a merely scalar or mirative impact, on which see, among others, Coppock and Beaver (2014); Alxatib (2020). The core observation here is that there's something odd (or joking) about identifying something remarkable as the "only" thing one has to do to achieve a certain goal:

(9)   !! To win the Nobel, you only have to cure cancer.

It appears that this signal is present in lexicalized expressions as well:

(10) !! To win the Nobel, it is $\left\{ \begin{array}{c} \text{sufficient} \\ \text{enough} \end{array} \right\}$ to cure cancer.

2.3.2 Anankastic conditionals

In the course of our investigation, we identified further related constructions that can host the sufficiency meaning. First:

(11) If you want good cheese, $\left\{ \begin{array}{c} \text{it's enough for you to} \\ \text{you only have to} \end{array} \right\}$ go to the North End.

So-called anankastic conditionals such as the one in (11) bring with them a whole other hairball of analytic difficulties, on which see among others: Sæbø (2001); von Fintel and Iatridou (2005b); Huitink (2005a); Huitink (2005b); von Stechow, Krasikova, and Penka (2006); Krasikova (2010); Dunaway and Silk (2014); Condoravdi and Lauer (2016). Most recently, there are Phillips-Brown (2019) and Sæbø (2020), both of whom conclude that anankastic conditionals remain a mystery.

2.3.3 Conditional conjunction

We also pointed out another frame in which the sufficiency modal is at home:

(12) You only have to go to the North End and you'll find plenty of good cheese.

This then would mean engaging with the literature on conditional conjunctions (for a start: Culicover and Jackendoff 1997; Keshet 2012; von Fintel and Iatridou 2017), the core case being something like (13a), which means pretty much the same as the conditional (13b):

(13) a. I think of him and there are shivers down my spine.

b. If I think of him, there are shivers down my spine.

Now the SMC-version differs from this core case in two crucial ways: (i) the first conjunct contains the (complex) modal *only have to*, and (ii)

this modal does not appear in any explicity conditional paraphrase: (12) does not mean "if you only have to go to the North End, you'll find plenty of good cheese". In fact, the SMC is the only modal that can appear in the first conjunct:

(14)?? You must invest in this company and you will become rich.

Once we're here, there are more puzzling cases in the vicinity:

(15) a. It won't take much and she'll win.

  b. It wouldn't have taken much and she would have won.

2.3.4 Maximizing *all*

Instead of *you only have to go to the North End*, we can also use an *all*-cleft:

(16) To get good cheese, all you have to do is to go to the North End.

On this, see Homer (2019); Tellings (2020).

2.3.5 Sufficiency conditionals

Coppock and Lindahl (2015) discussed another set of cases of minimal sufficiency readings, involving conditionals with some minimizer in the antecedent and variants with a noun phrase in the subject of a causative predicate:[6]

(17) a. If I just think of him, it sends shivers down my spine.

  b. Just the thought of him sends sends shivers down my spine.

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[6] Panizza and Sudo (2020) proposed an intricate analysis of the nominal version of this construction without even mentioning the conditional version or discussing the likelihood that the NP stands for something sentential.

2.3.6 Nouwen's puzzle

Finally, we come to a set of observations due to Nouwen (2010b); Nouwen (2010a), namely that the compositional structure of statements of minimal requirements is puzzling:

(18)   The minimum number of points I need to score to win the bet is 300.

Nouwen showed that the meaning of (18) is reached relatively easily if the modal *need* is read as an existential or possibility modal. That of course is not immediately plausible as a meaning for *need*. We come full circle back to Rullmannland: Nouwen suggested *need* here behaves like the Salish modals analyzed in Rullmann, Matthewson, and Davis (2008).[7] So, one might think that we could make progress here and elsewhere in enoughology if we took into consideration recent work on the quantificational force of modals (Jeretič 2021); Newkirk (2022); Staniszewski (2022).[8]

3   Conclusion

If your head is swirling with all these constructions and the way they might be interconnected, yeah, that's where I am as well. It feels like we have a bunch of ingredients that with some shaking and baking can often give rise to sufficiency meanings. The holy grail is an overarching view that explains what's going on. And I'm afraid I have only scratched the surface. For one thing, all I have talked about is English, but this is of course not (all) parochial to English, as we showed in von Fintel and Iatridou (2005a); von Fintel and Iatridou (2007).[9] Lastly, I should note that when logicians speak of sufficient (vs. necessary) conditions, it is not clear that we're dealing with the kind of notion of sufficiency (whose foil is excess rather than necessity) we have surveyed here. What's going

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[7] Lassiter (2011) presented an alternative that I am skeptical about.

[8] Beck (2010) and Dotlačil and Nouwen (2016) contain further relevant discussion in the context of quantifiers in comparatives.

[9] Fortuin (2013) provided a cross-linguistic survey of ways languages express sufficiency (and excess), without touching on the compositional puzzles I am here concerned with.

on?

So, my plea: Hotze, can you help out an old friend?

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