

SINCE SINCE

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1. THE PUZZLE

- (1) Tony has been happy since he has been taking Prozac.
- (2) Since I have been taking your kelp pills, I haven't had any trouble with my heels. [found via Google]

2. THE BACKGROUND

2.1 *Outlines of a Quick Analysis of the (English) Perfect*

- Intensional Semantics

The central notion is the extension of ϕ relative to an evaluation time and an utterance context: $\llbracket \phi \rrbracket^{t,c}$.

- Truth

A sentence ϕ uttered at time t_c is true iff $\llbracket \phi \rrbracket^{t_c,c} = 1$.

- Clause Architecture

Tense – (Perfect) – Aspect – VP

- Tense sets evaluation time (interval) relative to “higher” evaluation time or absolutely relative to utterance time.

$$(3) \quad \begin{array}{l} \text{a. } \llbracket \text{PRES } \phi \rrbracket^{t,c} = \text{I iff } \llbracket \phi \rrbracket^{t,c} = \text{I.} \\ \text{b. } \llbracket \text{PAST } \phi \rrbracket^{t,c} = \text{I iff } \exists t' \prec t : \llbracket \phi \rrbracket^{t',c} = \text{I.} \end{array}$$

$$(4) \quad \begin{array}{l} \text{a. } \text{Bill insulted Tony.} \\ \text{b. } [\text{PAST } [\text{Bill insult Tony}]] \\ \text{c. } \exists t \prec t_c : \text{Bill insult Tony at } t. \end{array}$$

- The Perfect introduces a time interval: the “perfect time span” (PTS), a.k.a. the “Extended Now”.
- The Right Boundary (RB) of the PTS is set by Tense, which simply means that the Perfect stretches the PTS backwards from the evaluation time that was passed to it by the tense above it.

$$(5) \quad \llbracket \text{PERFECT } \phi \rrbracket^{t,c} \text{ iff } \exists t' : \text{RB}(t, t') \text{ and } \llbracket \phi \rrbracket^{t',c} = \text{I.}$$

- The Left Boundary (LB) of the PTS may be set by “perfect adverbials”, which simply means that they are predicates on the evaluation time that was passed to them by the Perfect above them.

$$(6) \quad \llbracket \textit{since 1990 } \phi \rrbracket^{t,c} = \text{I iff } \text{LB}(1990, t) \text{ and } \llbracket \phi \rrbracket^{t,c} = \text{I.}$$

- The lower predicate (event) is predicated of the PTS, either directly or mediated by various devices, most notably operators associated with the Perfective or Imperfective.

$$(7) \quad \begin{array}{l} \text{a. } \llbracket \text{PRF } \phi \rrbracket^{t,c} = \text{I iff } \exists t' \subset t : \llbracket \phi \rrbracket^{t',c} = \text{I.} \\ \text{b. } \llbracket \text{IMP } \phi \rrbracket^{t,c} = \text{I iff } \exists t' \supseteq t : \llbracket \phi \rrbracket^{t',c} = \text{I.} \end{array}$$

- It is essential not to be confused about the very different notions of Perfect vs. Perfective. The Perfect co-exists happily with Perfective *or* Imperfective Aspect underneath it, which gives rise to two different kinds of Perfects.

2.2 *Two Kinds of Perfects*

- When the predicate has the subinterval property, either because of its inherent properties or because it is a derived stative/progressive, we obtain the Universal Perfect (U-Perfect).

- (8)
- a. Tony has lived on Cape Cod since 1990.
 - b. PRES PERFECT [since 1990] IMP [Tony live on Cape Cod]
 - c. There is a time span (i) whose RB is now/the time of utterance (because of the Present Tense), (ii) whose LB is 1990, and (iii) which is contained in an interval at which Tony lives on Cape Cod.

- When a predicate is located within the PTS via an existential operator (either one associated with the Perfective or an explicit adverbial like *twice*), we obtain the Existential Perfect (E-Perfect).

- (9)
- a. Tony has visited Cape Cod (twice) since 1990.
 - b. PRES PERFECT [since 1990] (twice) PRF [Tony visit Cape Cod]
 - c. There is a time span (i) whose RB is now/the time of utterance (because of the Present Tense), (ii) whose LB is 1990, and (iii) which has two distinct subintervals, (iv) each of which properly contains an interval at which Tony visits Cape Cod.

2.3 *More about Since*

Mittwoch's Observation

- (10)
- a. Tony has been in Boston since Monday.
 - b. Tony has met his therapist exactly twice since Monday.

Names of Events as Complements to Since


- (11) since the World Cup, since Meadow's graduation ceremony

Clausal Complements to Since

- (12) a. Tony has visited Cape Cod twice since Bill insulted him.
 b. Tony has been living on Cape Cod since Bill insulted him.

Type mismatch: *since* wants combine with an interval but here it gets a proposition (a set of intervals) at best.

$$(13) \quad \llbracket \phi \text{ AT } i \rrbracket^{t,c} = I \text{ iff } \llbracket \phi \rrbracket^{t,c} = I \text{ and } \llbracket i \rrbracket^{t,c} = t.$$

- (14) a. $\text{since } [\text{PAST } [[\text{Bill insult Tony}] [\text{AT Op}]]]$.

 b. $\text{since Op } \lambda t [\text{PAST } [[\text{Bill insult Tony}] [\text{AT } t]]]$.

- (15) What does Op mean?

Hypothesis: Op = *the*

- (16) Geis/Larson Facts
 I haven't been there since I told you I was there.
- (17) a. He has been to the Cape twice since Mary believes that Bill insulted him.
 b. He has been to the Cape twice since the time at which, according to Mary, Bill insulted him.
- (18) a. He has been to the Cape twice since Mary heard the rumor that Bill insulted him.
 b. \neq He has been to the Cape twice since the time at which, according to the rumor that Mary heard, Bill insulted him.

Subinterval Complements to Since.

- (19) Tony has been happy since he lived on Cape Cod.

What is “the” time at which Tony lived on Cape Cod? If Tony ever lived on Cape Cod, there are many past intervals at which he lived there, namely all the

subintervals of the maximal stretch of time throughout which he lived on Cape Cod. So, how can the definite reference succeed? We suggest that the definite here in fact picks out the maximal interval of which the property holds. This is not unheard of for definite operators.

3. THE PUZZLE

- (20) Tony has been happy since he has been taking Prozac.
- (21) Tony has been to the Cape twice since he has been taking Prozac.
- (22) *Tony has been happy since he has visited the Cape (twice).
- (23) Tony has been happy since the time since which he has been taking Prozac.

3.1 *A Derivation That Doesn't Work*

(24) since Op λt [PRES [PERFECT [IMP [[he take Prozac] [AT t]]]]]].

1. We get a rather absurd meaning for (20). The interval between now and when Tony started taking Prozac is set to be the LB of the matrix Perfect. (20) would therefore mean that from the last moment of that interval until now, Tony has been happy. But the last moment of that interval is now. So, (20) would have as its PTS the pathological interval containing just the time of utterance. This is of course not what (20) means.
2. Even if we could dream up some way of getting the right meaning, we can show that *since* simply cannot take as its argument an interval that reaches all the way to now. Imagine that Tony has been taking Prozac since the beginning of this month. So, under the analysis we're considering the argument of *since* is just the interval that we could refer to with *this month*. But in fact we cannot use *this month* as the argument to *since*:

- (25) a. Tony has been happy (ever) since he has been taking Prozac.
- b. #Tony has been happy (ever) since this month.

3.2 *What Works*

- (26) a. since Op λt [PRES [PERFECT [IMP [[he take Prozac since t]]]]]].
 b. simplified notation:
 since [Op_t: he has been taking Prozac since t]

(27) [Op_t: he has been taking Prozac since t]
 $\lambda t'$ Tony has been happy since t'.

(28) [Op_t: he has been taking Prozac since ~~t~~]
 $\lambda t'$ Tony has been happy since t'.

(20) is a case of Antecedent Contained Deletion.

The Larson Connection:

(29) By 1999, I will have lived in every city that John has lived (in).

(30) [every [city λx John has lived (in ~~x~~)]] λx I will have lived in x.

3.3 *The Interpretation of Op*

We are not quite done. For us to get the right interpretation for (20), we need closely consider what interval is picked out by “the time since which Tony has been taking Prozac”. Assume that Tony started taking Prozac at 3 p.m. on October 28, 1998. Then it is true that Tony has been taking Prozac since 1998. It will also be true that Tony has been taking Prozac since October 1998. It will also be true that Tony has been taking Prozac since late October 1998. And so on: there are many intervals that contain the actual starting point of Tony’s taking Prozac. So, we might think that we should simply pick out the smallest such interval: that will deliver the actual starting point.

But no: it gets worse. Strictly speaking it is also true that Tony has been taking Prozac since early 2000. Why? Because our semantics delivers an *at least since*-reading. If we infer from someone claiming “Tony has been taking Prozac since early 2000” that early 2000 is when Tony started taking Prozac, that is to be seen as a quantity implicature. Because of the presence of these intervals, there

won't even be a minimal interval in the set of intervals that the operator operates on.

So, how can the starting point be found? We suggest that what the operator does is find in the set of intervals that interval from whose presence in the set we can deduce the presence of all the others in the set. Intuitively, the operator finds “the most informative” interval in the set. And that will be the smallest leftmost interval in the set.

Note that this procedure is independently needed:

(31) Since when has Tony been taking Prozac?

4. FURTHER ISSUES

4.1 *Preposition Stranding*

In cases of ACD in prepositional phrases, the ellipsis of the proposition itself is optional:

(32) He lived in whatever town you lived (in).

But in our construction, the proposition must elide:

(33) *Tony has been since he has been taking Prozac since.

What is this difference due to? Preposition stranding of *in* is possible and optional:

(34) a. In which city does he live?
b. Which city does he live in?

Preposition stranding of *since* is not possible:

(35) a. Since when have you been living on the Cape?

- b. *When have you been living on the Cape since?

So it is the stranding of *since* in (33) that explains its ungrammaticality. Danny Fox (p.c.) suggests that what happens in (20) is that it is the deletion of stranded *since* that rescues the structure, along the lines of “salvation by deletion”, of the type proposed by Lasnik and Merchant.

4.2 Alternatives

1. von Stechow: deletion under PF-adjacency

(36) Tony has been happy since [~~since~~ Op]_i he has been taking Prozac
t_i.

2. Zimmermann: posit silent SINCE just as we posited silent AT.

(37) *I was unhappy until I have been taking Prozac.

(38) should be equivalent to:

I was unhappy until the time since which I have been taking Prozac.

4.3 Why Not?

Why not *After After*, *Before Before*, etc.?

- (39) a. Fred left after Bill left.
b. Fred left after the time after which Bill left.
- (40) a. Fred left before Bill left.
b. Fred left before the time before which Bill left.
- (41) a. *After when did Fred leave?
b. *Before when did Fred leave?

4.4 *Absence of E-Perfects in Since-Complements*

- (42) (=22) *Tony has been happy since he has visited the Cape (twice).
- (43) Since when have you been living on the Cape?
- (44) *Since when have you visited the Cape (twice)?
- (45) Since when do you like artichokes?
- (46) a. *Why have you read “Anna Karenina” twice [since 1990]_F?
b. Why have you been reading “Anna Karenina” [since 1990]_F?
- (47) a. *I have read “Anna Karenina” twice at least since 1990
b. I have been reading “Anna Karenina” at least since 1990

4.5 *Since-Deletion in Other Languages*

- (48) Tony nimmt seit 1990 Prozac.
Tony takes since 1990 Prozac
'Tony has been taking Prozac since 1990.'
- (49) Tony ist glücklich seit er Prozac nimmt.
Tony is happy since he Prozac takes
'Tony has been happy since he has been taking Prozac.'

4.6 *No Ambiguity in Since*

- (50) Tony has gone dancing twice since he has been taking Prozac.

4.7 *Other Perfect Adverbials*

- (51) Tony has been happy for the two months that he has been taking Prozac.

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