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On the Syntax and Semantics of Temporal *When*-clauses

Road map

- Some puzzling facts about *when*-clauses
- Our syntactic/semantic analysis for *when*-clauses that solves these puzzles: they are free relatives
- Previous analyses: *when* as a temporal operator
- Further evidence that follows from the free relative analysis, but is problematic for other analyses

Temporal *when*-clauses:

1) I came to visit you [when she left].
2) I got a sunburn [when I went to Coronado Beach].
3) Sue finished the paper [when the sun came up].
4) I can't stand [when it rains].
5) It makes me sad [when it rains].

Puzzle 1: Two Readings

6) I came to visit you [**when** she left].

READING 1: *Time interval*
"I came to visit you [**at the time** she left]"
READING 2: *Occasion*
"I came to visit you [**the time** she left]"

Puzzle 2: Not an interrogative

7) I came to visit you [when she left].
8) I wonder [when she left].

The very same string in (8) has an interrogative interpretation which is not available in (7)

I. Proposal

Temporal *when*-clauses are syntactically and semantically free relatives.

Previous analyses

Syntactic analyses (Grimshaw 1985, Bresnan and Grimshaw 1978, Jacobson 1995, a.o.) : *When*-clauses are free relatives

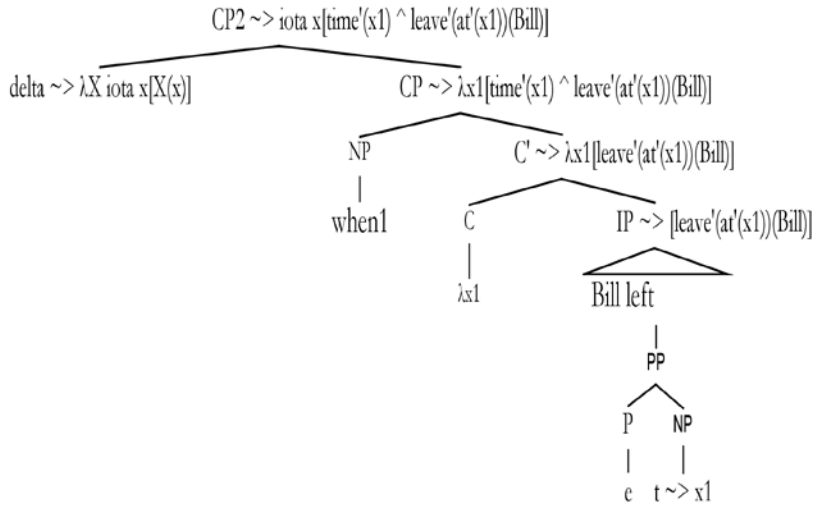
Semantic analyses (Bomoni 1997, Vikner 2004, Moens and Steedman 1988) : *When*-clauses are not free relatives

***When*-clauses are free relatives**

Free relatives are non-interrogative clauses introduced by wh-words

9) I ate [**what** you cooked].
10) I'll marry [**who** you choose].
11) I sat [**where** the chair used to be].
12) I skied [**how** you taught me].
13) I drank [**when** Steve drank].

Proposal: Semantic Derivation



The analysis given here is based on work by Jacobson(1995) and Caponigro and Pearl (2008)

Meaning of *When*

- when ~> λPλx1[P(x1) ∧ time'(x1) ∨ occasion'(x1)]
- *when* is just a set restrictor (just like all other phrasal wh-words)
- This gives *when* a unified treatment with previous semantic analyses of *who* and *what*

The "Ambiguity" of *When*

Same as *what*

14) I ate [what you cooked] – concrete object
15) I heard [what you said] – proposition
16) I understand [what you are going through] – abstract object

- Whatever we say about *what* ranging over a variety of elements, the same can be said for *when*
- The point is that there is nothing special about *when* ranging over time intervals and occasions
- Same as *then*
- The two readings come from the variable ranging over "occasions" and "time-intervals"

The temporal pronoun *then* also seems to also range over these two elements:

17) Remember **the time we went camping in the woods**?
    - Yeah, I had a lot of fun **then**.
18) John arrived **at 3:45**, and I arrived **then**, too.

Previous semantic analyses

- Bonomi (1997) and Vikner (2004) treated *when* as a temporal operator much like *before* and *after*
- Capture the intuition that the following sentences are related in some way:

19) I came to visit you [**when** she left].
20) I came to visit you [**after** she left].
21) I came to visit you [**before** she left].

Bonomi (1997): *Italian*

22) [**Quando** mi vedeva], il custode apriva la porta
"[When(ever) he saw me], the janitor opened the door"

- ***When*** is an operator that takes two sets of circumstances as its argument and returns a relation of temporal overlap

Vikner (2004): *Danish*

23) [**Da** hun kom hjem,] var hun træt.
"[(On the occasion) when she came home], she was tired"
24) [**Når** hun kom hjem,] var hun træt.
"[(On occasions) when she came home], she was tired"

- *da* ~> WHEN operator takes two events (the event in the *da*-clause is unique) as its arguments and returns the temporal relation
- *når* ~> the WHEN operator takes two events and returns the temporal relation

II. Evidence for Free Relative Analysis

Fact 1: *when*-clauses can occur where noun phrases occur

25) [When Jane arrived] was perfect.
    - She always knows the exact moment for "fashionably late".
26) I really can't stand [when you cry like that].

Fact 2: *when*-clauses can occur as the object of the preposition *against*

27) I contrasted the times you arrived late **against** [when I arrived early].

Fact 3: *when*-clauses enter into anaphoric relations

28) I got a sunburn [when I went to Coronado Beach]. Sue lived in Europe **then**. / **That** was July 20, 2003.
29) I came to visit you [when Bill left].
    - John visited **then**, too.

Fact 4: *when*-clauses are sensitive to island effects

30) I ate dinner [when you thought I should eat dinner].
31) I cooked dinner [when you were wondering whether Mary was watching TV].
32) I ordered a pizza [when she made the proposal that we should go out].

The downstairs interpretation is available for 30, but not for 31 and 32.

Comparing the analyses

- The facts follow from our analysis that *when*-clauses are free relatives, as free relatives have distributions like nominals
- The facts are problematic for the temporal operator analyses as they have to make stipulations to account for these facts

III. Temporal Relations:

The temporal alignment of the *when*-clause and the matrix clause is determined by factors other than *when*.

The temporal alignment between the *when*-clause and the matrix clause in each set is identical to the temporal alignment between the headed relatives and the matrix clause. This indicates that *when* is not responsible for that alignment, and thus that the alignment should not be part of *when*'s meaning.

Combinations of aspectual types limit the temporal alignment possibilities: Different combinations of Vendler's classic aspectual types (achievements, accomplishments, activities, states) give four different alignments:

Matrix interval contained in *when* interval:

M ↓ *when* →	Ach	Acc	Act	State
Achievement		**X**	**X**	**X**
Accomplishment			**X**	**X**
Activity				
State				

33) Ach-Act:
John arrived from London when June ate apples.
John arrived from London during the hour June ate apples.
John arrived from London the hour June ate apples.
34) Ach-State:
John arrived from Paris when Jacob lived in London.
John arrived from Paris during the year Jacob lived in London.
John arrived from Paris the year Jacob lived in London.
35) Ach-Acc:
John arrived from London when Jane wrote the article.
John arrived from London in the month Jane wrote the article.
John arrived from London the month Jane wrote the article.
36) Acc-Act:
Jane wrote the article when Barbara was writing the book.
Jane wrote the article during the month Barbara was writing the book.
Jane wrote the article the month Barbara was writing the book.
37) Acc-State:
Jane wrote the article when Jacob lived in London.
Jane wrote the article during the year Jacob lived in London.
Jane wrote the article the year Jacob lived in London.

When interval contained in matrix interval:

M ↓ *when* →	Ach	Acc	Act	State
Achievement				
Accomplishment	**X**			
Activity	**X**	**X**		
State	**X**	**X**		

38) Act-Acc:
Jane was writing the article when Barbara wrote the book.
Jane was writing the article during the month Barbara wrote the book.
Jane was writing the article the month Barbara wrote the book.
39) Acc-Ach:
Jane wrote the article when John arrived from London.
Jane wrote the article at the moment John arrived from London.
Jane wrote the article the moment John arrived from London.
40) Act-Ach:
Jane was writing the article when John arrived from London.
Jane was writing the article at the moment John arrived from London.
Jane was writing the article the moment John arrived from London.

41) State-Ach:
Jacob lived in Paris when John arrived from London.
Jacob lived in Paris at the moment John arrived from London.
Jacob lived in Paris the moment John arrived from London.
42) State-Acc:
Jacob lived in London when Jane wrote the article.
Jacob lived in London during the month Jane wrote the article.
Jacob lived in London the month Jane wrote the article.

Simultaneity:

M ↓ *when* →	Ach	Acc	Act	State
Achievement	**X**			
Accomplishment		**X**		
Activity			**X**	**X**
State			**X**	**X**

43) Ach-Ach:
John arrived from London when Bill arrived from Paris.
John arrived from London at the moment Bill arrived from Paris.
John arrived from London the moment Bill arrived from Paris.
44) Acc-Acc:
Jane wrote the article when Barbara wrote the book.
Jane wrote the article during the month Barbara wrote the book.
Jane wrote the article the month Barbara wrote the book.
45) Act-Act:
June ate apples when Barbara swam laps.
June ate apples during the hour Barbara swam laps.
June ate apples the hour Barbara swam laps.
46) State-State:
Jacob lived in London when Bill lived in Barcelona.
Jacob lived in London during the year Bill lived in Barcelona.
Jacob lived in London the year Bill lived in Barcelona.
47) State-Act:
Jacob lived in London when Jane was writing the article.
Jacob lived in London during the month Jane was writing the article.
Jacob lived in London the month Jane was writing the article.

48) Act-State:
Jane was writing the article when Jacob lived in London.
Jane was writing the article during the year Jacob lived in London.
Jane was writing the article the year Jacob lived in London.

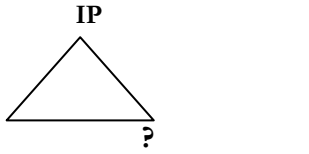
No overlap:

M ↓ *when* →	Ach	Acc	Act	State
Achievement	**X**	**X**		
Accomplishment	**X**	**X**		
Activity				
State				

Telic-Telic
49) Ach-Acc
John left for London when Jane wrote the article.
John left for London the time Jane wrote the article.
(after Jane finished writing the article)
50) Acc-Ach
Jane wrote the article when John left for London.
Jane wrote the article the time John left for London.
(after the moment John arrived)
51) Acc-Acc
Jane wrote the article when Barbara wrote the book.
Jane wrote the article the time Barbara wrote the book.
(Jane starts writing after Barbara finishes)
52) Ach-Ach
John arrived from London when Bill left for Paris.
John arrived from London the time Bill left for Paris.
(after the moment Bill left)
53) *State-State
I was in London when you were in Switzerland (for the first time).
I was in London the time you were in Switzerland.
*Your trip to Switzerland began and ended before my being in London.

As the temporal alignment of the matrix and subordinate clause in each set of triplets (that is, the *when*-clause, headed relative without preposition, and headed relative with preposition) is identical, the temporal alignment cannot be due to *when*.

How do these nomimal clauses combine with the matrix clause?



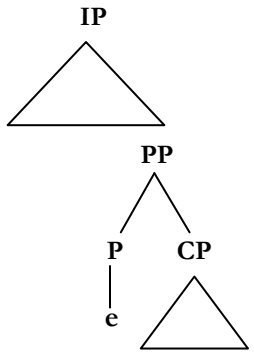
54) I came to visit you [the moment she left]
55) I came to visit you [that time she went to Cabo]
56) I came to visit you [that day]
57) I came to visit you [this morning]

- These nominals need to combine with the matrix clause in the very same way – with a silent preposition

Silent prepositions are needed independently for adverbial nominals
(Emonds 1976, 1987, McCawley 1988, Caponigro and Pearl 2008)

58) I plan to go [{0/to} places that are far away].
59) I leave town [{0/on} that day].
60) I like to dance [{0/in} that way].

See Larson (1985) for an argument against silent prepositions



Combining the *when*-clause with the matrix clause

- Regardless of what we say about "when", silent prepositions are needed to mediate the combination of adverbial nominals with the matrix clause.
- Treating *when*-clauses as free relatives reduces the problem of temporal alignment to the problem of silent prepositions

Comparing the analyses

- The temporal operator analyses have nothing to say about the temporal alignment facts
- They have no explanation as to why *when*-clauses look like free relatives
- They have no explanation as to why there are two paraphrases available for temporal *when*-clauses

V. Conclusions

- We have argued that *when*-clauses should be analyzed syntactically and semantically as free relatives. This accounts for
  - Why they look and behave like FRs
  - How they are anchored to "time intervals" or to "occasions"
- Our analysis makes a cross-linguistic prediction that languages that have free relatives may use the same word for the temporal wh-interrogatives and for *when*-clauses, while languages that do not have free relatives will use a different word for these two uses.
  - Preliminarily, the prediction seems to hold:
    - English, Italian, Danish have FRs and use the same word
    - Korean and Japanese do not have FRs and use an unrelated word

Thank you!

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