Does Dutch A-Scrambling Involve Movement? Evidence from Antecedent Priming

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A-scrambling for givenness marking

(1) Hoe zit het met je review van dat boek van Haegeman?
'How are you progressing with your review of that book by Haegeman?'

a. #Nou, ik denk dat ik morgen **het boek van**
well, I think that I tomorrow the book by
Haegeman ga lezen.
Haegeman go read

b. Nou, ik denk dat ik **het boek van Haegeman**
well, I think that I the book by Haegeman
morgen ga lezen.
tomorrow go read

Plan for the talk

- Report on the outcome of a series of experiments probing the syntax of Dutch A-scrambling
- Some syntactic background: why is the syntax of A-scrambling a matter of debate?
- Some psycholinguistic background
- The experiments
- Results
- Discussion

Syntactic background

GB theory

- Scrambling initially analyzed as A'-movement (adjunction)
- Webelhuth (1989) argued that scrambling has mixed A- and A'- properties.
- Two types of scrambling: A'-scrambling (aka Focus Scrambling) and A-scrambling (aka neutral scrambling)
  - » Vanden Wyngaerd 1989, Mahajan 1990 and Neeleman 1991, a.o.)

A’-scrambling

- does not affect binding or secondary predication
- gives rise to weak crossover effects
- is not clause-bounded
- reconstructs (obligatorily) for scope
  - » see Neeleman 1994, Jacobs 1997, Haider and Rosengren 1998 for some discussion
- Clearly, these properties can only be properly understood if A’-scrambling is a kind of A’-movement.

A-scrambling

- feeds and bleeds binding and secondary predication
- does not give rise to weak crossover effects
- is clause-bounded
- does not seem to give rise to scope reconstruction
  - » see Vanden Wyngaerd 1989, Mahajan 1990, Zwart 1993, and Neeleman 1994
- These properties are broadly compatible with either an A-movement or a base-generation analysis of A-scrambling

Dutch LD-scrambling is A'-scrambling

(2) a. dat ***hem***$_{1/*2}$ zelfs JAN$_1$ niet gelooft dat Piet$_2$ t_1
that him even John not believes that Peter
dit boek zou geven.
this book would give

b. dat ***zichzelf***$_{*1/2}$ zelfs JAN$_1$ niet gelooft dat Piet$_2$ t_1
that himself even John not believes that Peter
dit boek zou geven.
this book would give

Local scrambling: Givenness marking through A-scrambling

(3) Zeg, weet je of Jan's zoon aanwezig is? Ja, ik geloof …
'Say, do you know whether John's son is around? Yes, I believe …'

a. #dat Marie tijdens de toespraak **Jan's zoon** heeft gefotografeerd
that Mary during the speech John's son has photographed

b. dat Marie **Jan's zoon** tijdens de toespraak heeft gefotografeerd
that Mary John's son during the speech has photographed

c. *dat **Jan's zoon** Marie tijdens de toespraak heeft gefotografeerd
that John's son Mary during the speech has photographed

Local scrambling: Focus-scrambling (A'-scrambling)

(4) Zeg, heeft Marie tijdens Jan's toespraak zijn dochter gefotografeerd?
Nee, ik zag …
'Say, has Peter photographed John's daughter during his speech?
No, I saw …'

a. dat Marie tijdens de toespraak **Jan's ZOON** heeft gefotografeerd
that Mary during the speech John's son has photographed

b. dat Marie **Jan's ZOON** tijdens de toespraak heeft gefotografeerd
that Mary John's son during the speech has photographed

c. % dat **Jan's ZOON** Marie tijdens de toespraak heeft gefotografeerd
that John's son Mary during the speech has photographed

Choosing between competing analyses of A-scrambling

Analytical options

Order	Adjunct	Movement	Proposals
OV	fixed	yes	Mahajan 1990, De Hoop 1992, a.o.
OV	flexible	yes	Vanden Wyngaerd 1989, a.o.
OV	flexible	no	Neeleman 1991,1994, Bayer and Kornfilt 1994, a.o.)
VO	fixed	yes	Koster 1999
VO	flexible	yes	Zwart 1993

An argument for movement based on scope?

- It has been argued that A-movement displays quantifier lowering effects (see May 1979, Lebeaux 1998, Fox 1999):

(5) a. [$_{IP}$ Some young lady$_1$ seems [t_1 to be likely **[t_1 to dance with every senator]**]]
(i) some > every; (ii) every > some

b. [$_{IP}$ Some young lady$_1$ seems to herself$_1$ [t_1 to be likely **[t_1 to dance with every senator]**]]
(i) some > every; (ii) *every > some

c. [$_{IP}$ Mary$_1$ seems to some young lady [t_1 to be likely **[t_1 to dance with every senator]**]]
(i) some > every; (ii) *every > some

Reconstruction for scope when A-scrambling is motivated by givenness marking?

- When interpreted as given, an A-scrambled indefinite receives a specific reading.
- It will therefore fail to demonstrate scope interaction even if it were to reconstruct
  - » (see Kerstens 1975, De Hoop 1992 and Diesing 1992, among others).
- A-scrambling can also be motivated by scope (Ruys 2001).
- But of course, it does not reconstruct for scope in in that case.

The ‘trigger’ problem

- Movement theories may incur a ‘trigger problem’
  - multiple interpretive effects (givenness, scope)
  - every argument can A-scramble across an adverb: so multiple triggering heads needed (see Neeleman and Van de Koot 2008 for discussion)
- Not a critical problem:
  - abstract trigger (Müller 1998)
  - triggerless (A-)movement (Haider & Rosengren 2003)

Minimum components of a triggerless theory

- Characterize scrambling structures as having additional complexity at LF
  - additional copies of movement (A-movement)
  - delayed theta-role assignment (base generation)
- Require the additional complexity to have an effect at the interpretive interface.

Cross-modal priming and gap detection

Cross-modal priming (Swinney, Onifer, Prather, & Hirshkowitz, 1979)

Brechtje hoorde dat hij de winkelier meer dan vijfentwintig keer…

Trace Reactivation Hypothesis

- CMP can detect position-specific reactivation effects.
- CMP is able to provide evidence that the antecedent in a dependency is linked to a trace
  - » Nicol & Swinney 1989, Love & Swinney 1996, Nakano et al. 2002, among others
- E.g. Nakano et al.: reactivation of Japanese long-distance scrambled categories in pre-verbal position.

CMP and gap detection

- A'-relations: reactivation at the gap
  - » Love & Swinney 1996, Nakano, Felser & Clahsen 2002, for studies focusing on moved objects in a VO and an OV language, respectively
- Passives and unaccusatives: delayed reactivation some 750 ms downstream from the gap location
  - » Osterhout & Swinney 1993, Friedmann et al. 2008; robust finding recently replicated for unaccusatives with an eye-tracking study (Koring et al. 2012)

CMP and A-scrambling

- Studies of short scrambling do not generally distinguish between A-scrambling and short A'-scrambling, which may well be responsible for the murky picture that emerges from them (see Sekerina 2003 for an overview)
- Clahsen & Featherston 1999: two studies on A-scrambling of DO across IO in German in V2 structures.
  - Mixed results: (immediate) reactivation at purported gap only if V-movement strands a particle.
  - Potential confounds resulting from V2 environment

Towards an experimental study of Dutch A-scrambling

Design considerations

- Present A-scrambling examples with a facilitating context that forces an interpretation of the scrambled material as given.
- Study scrambling in embedded contexts, where verb movement is not a factor.
- Movement analyses do not agree on the position of the trace, which may be either preverbal or postverbal.

Design considerations

- CMP studies have found reactivation at the gap in structures involving A'-movement.
- CMP looking at A-movement have produced mixed results
  - delayed reactivation (e.g. Friedmann et al. 2008)
  - immediate reactivation (Clahsen & Featherston 1999)
- Use wh-movement to obtain a baseline: we should be able to detect reactivation at the site of the A'-trace.

The experiments

Overview of experiments

Online cross-modal priming tasks

- Experiment 1: A-scrambling
- Experiment 2: Wh-movement
- Experiment 3: A-scrambling (follow-up to Exp. 1)

Offline truth-value judgment task

- Experiment 4: Scope reconstruction (to gain complementary evidence from a different task)

Experiment 1: A-scrambling

(7) Context:
Gisteren heeft een overvaller **een winkelier** met een mes om het leven gebracht.
'Yesterday, a robber killed a shopkeeper with a knife.'

Stimulus:
Brechtje hoorde dat hij **de winkelier** meer dan vijfentwintig keer ***
Brechtje heard that he the shopkeeper more than twenty-five times
gestoken heeft na de kassa leeg gehaald te hebben.
stabbed has after the till empty got to have

'Brechtje heard that he stabbed the shopkeeper more than twenty-five times after having emptied the till.'

- Identical target: winkelier
- Unrelated target: kandelaar

Experiment 2: wh-movement

(8) Context:
De politie wist zeker dat de bende het op een aantal banken voorzien had.
'The police knew for sure that the gang were targeting a couple of banks.'

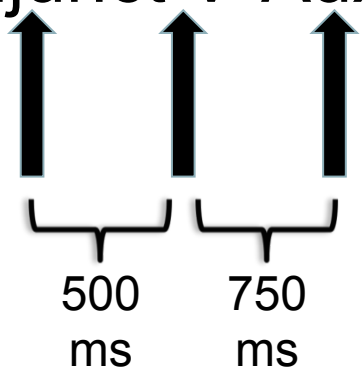
Stimulus:
Maar ze wisten niet zeker **welke bank** de misdadigers op maandag ***
but they knew not for-sure which bank the criminals on monday
beroofd hadden toen er onvoldoende bewaking was.
robbed had when there insufficient guarding was

'But they didn't know for sure which bank the criminals had robbed on Monday when the level of security was insufficient.'

- Identical target: bank
- Unrelated target: wiel

Experiments 1 and 2: Design

- Six experimental conditions in a 3x2 design with the factors Location (pre-gap, gap, and post-verbal) and Target Type (identical, unrelated).
- The gap location was at the putative trace position, with the pre-gap location 500 ms prior to it and the post-verbal location 750 ms after it.
- … long-adjunct V-Aux ‘padding’



Experiments 1 and 2: Predictions

- If displaced constituents are reactivated at their canonical pre-verbal position, the size of the priming effect should be larger at the second test position (the putative trace position) than at the control position 500 ms earlier.
- If direct objects in Dutch originate in the post-verbal position, however, or if priming in A-movement structures is generally delayed, then the priming effect should be largest at the post-verbal test positions.

Experiments 1 and 2: Materials

- 20 experimental DO scrambling items for experiment 1
- 20 experimental DO wh-movement items for experiment 2
- Six different presentation lists created in a Latin square design such that participants would be exposed to each experimental item in one of the conditions only.
- Experiment 1 & 2 items mixed with 40 fillers and pseudo-randomised

Experiments 1-2: Target words

- 20 target (visual probe) words identical to the direct object and 20 target words unrelated to the direct object were used for each experiment.
- Identical and unrelated targets matched as closely as possible for frequency using the CELEX Lexical Database (Baayen, Piepenbrock & Van Rijn, 1993).
- Identical and unrelated targets also matched pairwise for letter length.
- All nonword targets had legitimate phonotactics.

Experiments 1-2: Comprehension questions

- To ensure participants paid attention to the context and stimulus sentences, comprehension questions (yes/no questions) were added to one third of the trials with half requiring “yes” answers.
- Within the questions requiring “yes” answers, half occurred after non-words targets and half after word targets. This was the same for questions requiring “no” as an answer.

Participants

- **Experiments 1 and 2**: 82 adult native speakers of Dutch (16 males; mean age: 24.7 years; range: 18-59 years).

Procedure: CMP

- DMDX (Forster & Forster 2003) used to present the stimulus materials and to record responses.
- Reaction times were recorded from the onset of the target.
- Participants indicated yes/no responses by pressing one of the two designated buttons of a gamepad.
- Following some practice trials, participants went through 80 actual trials which included two breaks each after 27 trials.

Analysis

- Mixed effects logistic regression models were used to analyze the data (Baayen, Davidson & Bates 2008).
- Prior to statistical analysis, the following were removed:
  - responses which exceeded a timeout of 2000 ms
  - incorrect responses
  - outlier data points (+/-1.5 SDs away from the group mean RT per condition)

Results: Experiment 1 (A-scrambling)

Condition	Mean RT (SD)	Difference
Pre-gap, identical	634 (102)	
Pre-gap, unrelated	705 (132)	*71**
Gap, identical	651 (122)	
Gap, unrelated	703 (119)	*52**
Post-verbal, identical	635 (103)	
Post-verbal, unrelated	650 (114)	*15**

- All three test positions showed a significant effect of Target Type (pre-gap: t = 8.0; gap: t = 6.0; post-gap: t = 2.4).
- Significant Location by Target type interaction (both pregap x postverbal (t = 4.0) and gap x postverbal (t = 2.8), indicating a downward trend.

=> *No position-specific priming!*

Results: Experiment 1 (A-scrambling)

- Results indicate that the scrambled object was not reactivated at its canonical pre-verbal position, or after the verb was encountered.
- The observed priming pattern suggests a memory effect, with the object's representation fading with increasing distance.

Results: Experiment 2 (wh-movement)

Condition	Mean RT (SD)	Difference
Pre-gap, identical	669 (126)	
Pre-gap, unrelated	690 (114)	*21*
Gap, identical	658 (117)	
Gap, unrelated	703 (137)	*45**
Post-verbal, identical	663 (122)	
Post-verbal, unrelated	669 (119)	*6*

- Effect of Target Type only significant at the gap location (t = 4.8) (t = 1.7 pre-gap and t = 1.6 post-verbal)

  => *Priming effect at the putative trace position but not at the other two test positions*

Experiment 3: A-scrambling

(9) Context:
Gisteren heeft een overvaller **een winkelier** met een mes om het leven gebracht.
'Yesterday, a robber killed a shopkeeper with a knife.'

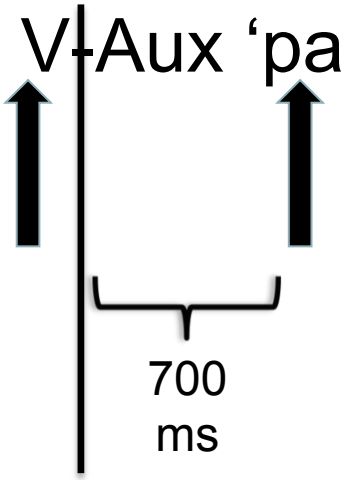
Stimulus:
Brechtje hoorde dat hij **de winkelier** meer dan vijentwintig keer ***
Brechtje heard that he the shopkeeper more than twenty-five times
gestoken heeft na de kassa leeg gehaald te hebben.
stabbed has after the till empty got to have

'Brechtje heard that he stabbed the shopkeeper more than twenty-five times after having emptied the till.'

- Identical target: winkelier
- Unrelated target: kandelaar

Experiment 3: Design

- Four experimental conditions in a 2x2 design with the factors Location (gap, post-verbal) and Target Type (identical, unrelated).
- As before, the gap location was at the putative pre-verbal trace position, while the post-verbal location was 700 ms from verb offset.
- dat DP_{Sub} DP_{obj} Long-adjunct V-Aux 'padding'



Experiment 3: Predictions

- If constituents displaced from a post-verbal position show delayed reactivation (compare Friedmann et al. 2008), then the size of the priming effect should be larger at the second test position than at the pre-verbal control position.

Experiment 3

- Materials: same as for experiment 1
- Procedure: same as for experiments 1 and 2
- Target words: same as for experiment 1
- Analysis: same as for experiments 1 and 2
- Participants: 40 adult native speakers of Dutch (9 males; mean age: 20.9 years, range: 18-33 years)

Results: Experiment 3 (A-scrambling)

Condition	Mean RT (SD)	Difference
Gap, identical	614 (93)	
Gap, unrelated	682 (100)	*68**
Post-verbal, identical	618 (90)	
Post-verbal, unrelated	655 (103)	*37**

- Priming effect significant at both test points (gap: t = 6.9, post-verbal: t = 4.3).
- A significant Location by Target Type interaction reflecting that fact that the priming effect is smaller at the post-verbal position (t = 2.0)

  => *No evidence for delayed reactivation*

Experiment 4: Truth-value judgment task

(10) Context (presented in Dutch!):
‘Fred has a busy job as a dentist and therefore he usually does not get round to reading a scientific article. But during his recent Easter holidays he finally got a decent opportunity: first he read an article during the outbound train journey to Rome and subsequently another one on his way back.’

Stimulus (incongruent/false):

Tijdens	de	paasvakantie	heeft	Fred	een	artikel	twee	keer	gelezen.
during	*the*	*Easter holiday*	*has*	*Fred*	*an*	*article*	*two*	*times*	*read*

Stimulus (congruent/true):

Tijdens	de	paasvakantie	heeft	Fred	twee	keer	een	artikel	gelezen.
during	*the*	*Easter holiday*	*has*	*Fred*	*two*	*times*	*an*	*article*	*read*

Experiment 4

- Materials
  - 10 critical items all involving a context and a stimulus sentence as in (17)
  - 20 fillers with a similar format, ten of which incongruent and ten congruent (five of these with the inverse scope reading congruent).
  - All items were pseudo-randomized.
- Participants
  - 120 adult native speakers of Dutch (22 males; mean age: 23.4 years, range: 18-59 years).
  - 60 of the participants in experiment 4 took part in the CMP experiments 1 and 2.

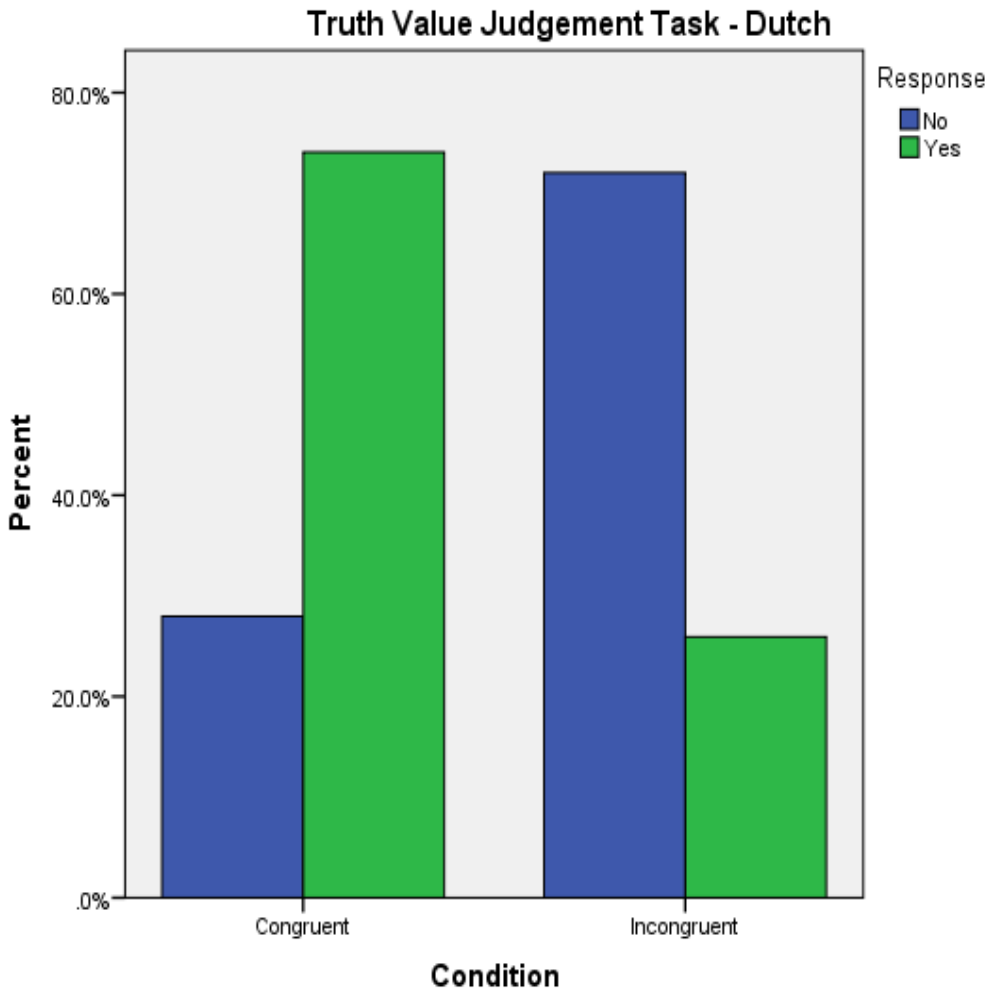
Procedure: Truth-value judgment task

- Presented as a questionnaire using Google Forms.
- Participants were asked to read the stories carefully and judge whether the sentence that followed matched the story by selecting either “yes” or “no”.
- There were a total of 30 trials

Results: Experiment 4 (TV judgment task)

Congruent
- yes: 71% (SD = 46%)

Incongruent
- yes: 25% (SD = 43%)



Discussion

Working assumptions of the study

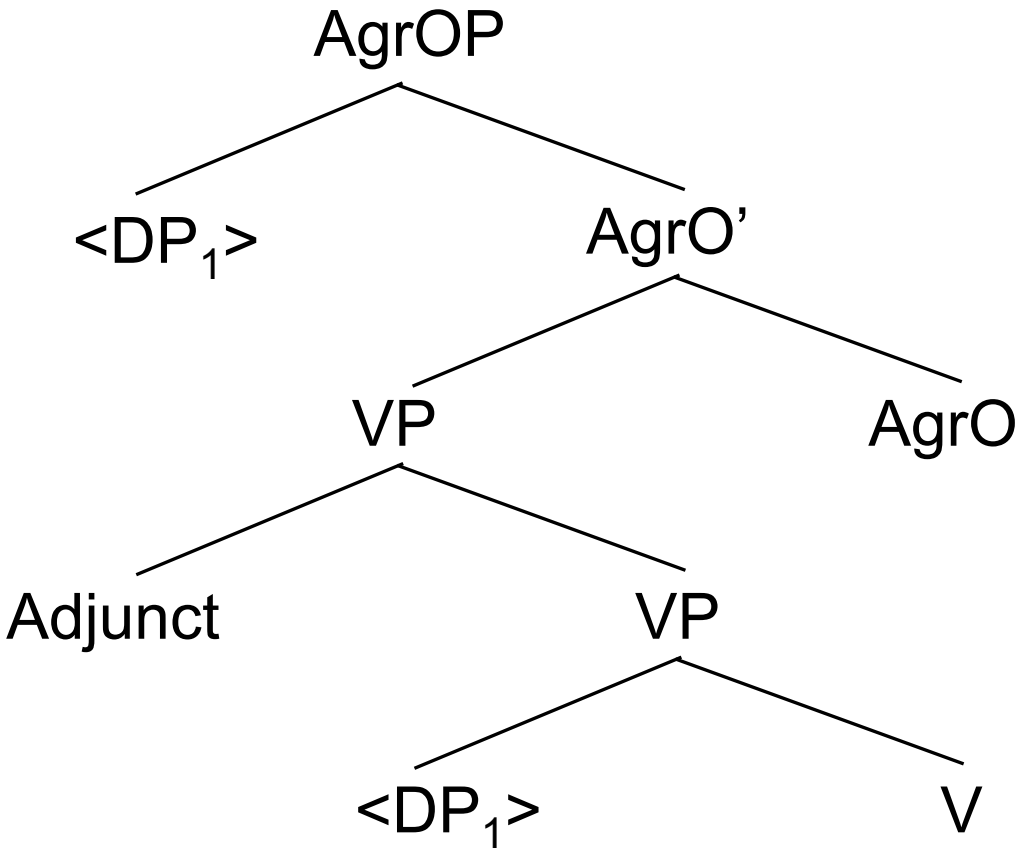
- Syntactic hypothesis:
  - Movement creates copies
- Linking hypothesis:
  - Creation of a copy reactivates the antecedent

Proposals with a preverbal trace

- Our findings provide no evidence for an analysis with a preverbal trace of A-movement.
- There are two potential variants:
  - fixed adjunct
  - flexible adjunct

OV – fixed adjunct (movement)

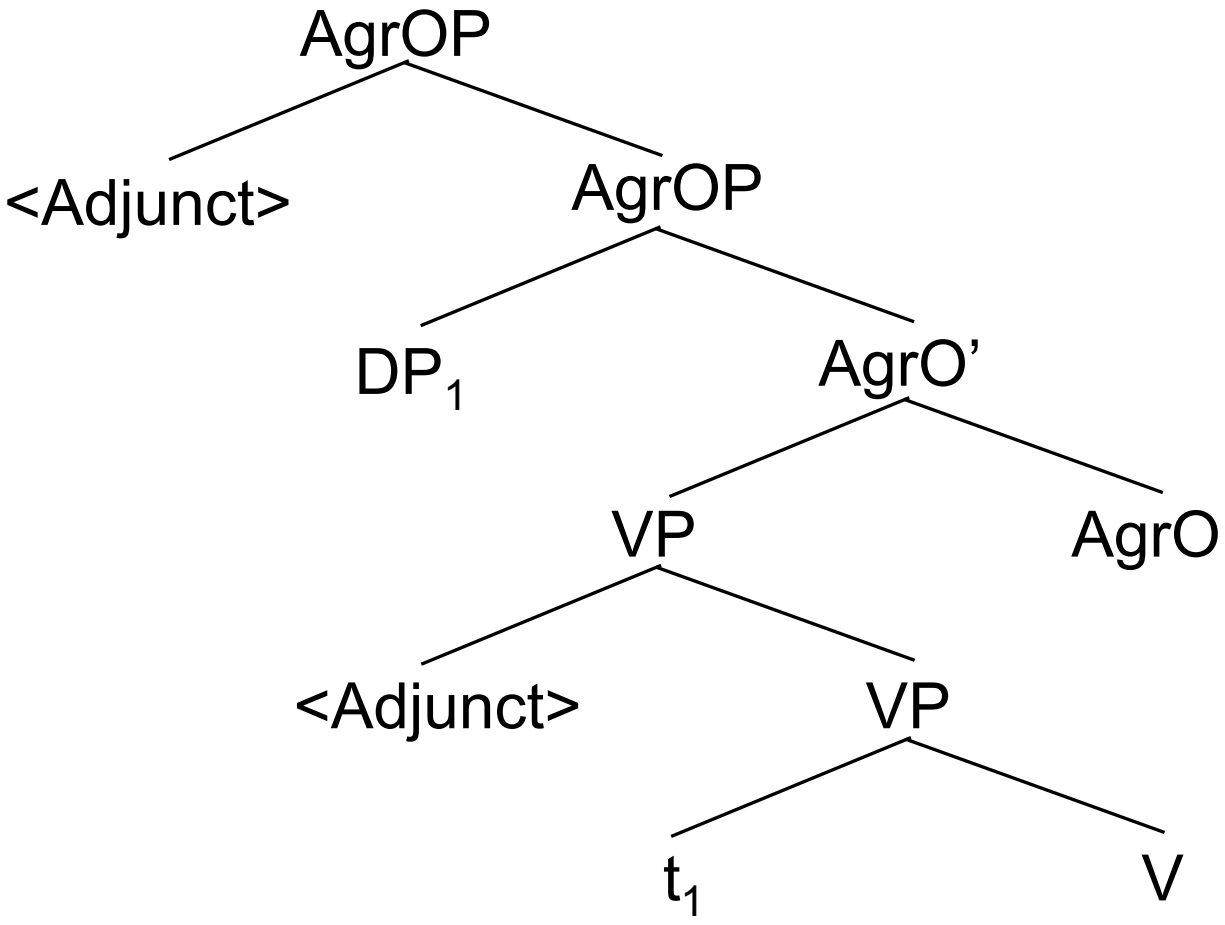
(11)



Mahajan 1990, De Hoop 1992, Adger 1994, Runner 1995, Broekhuis 2008

OV – flexible adjunct (movement)

(12)



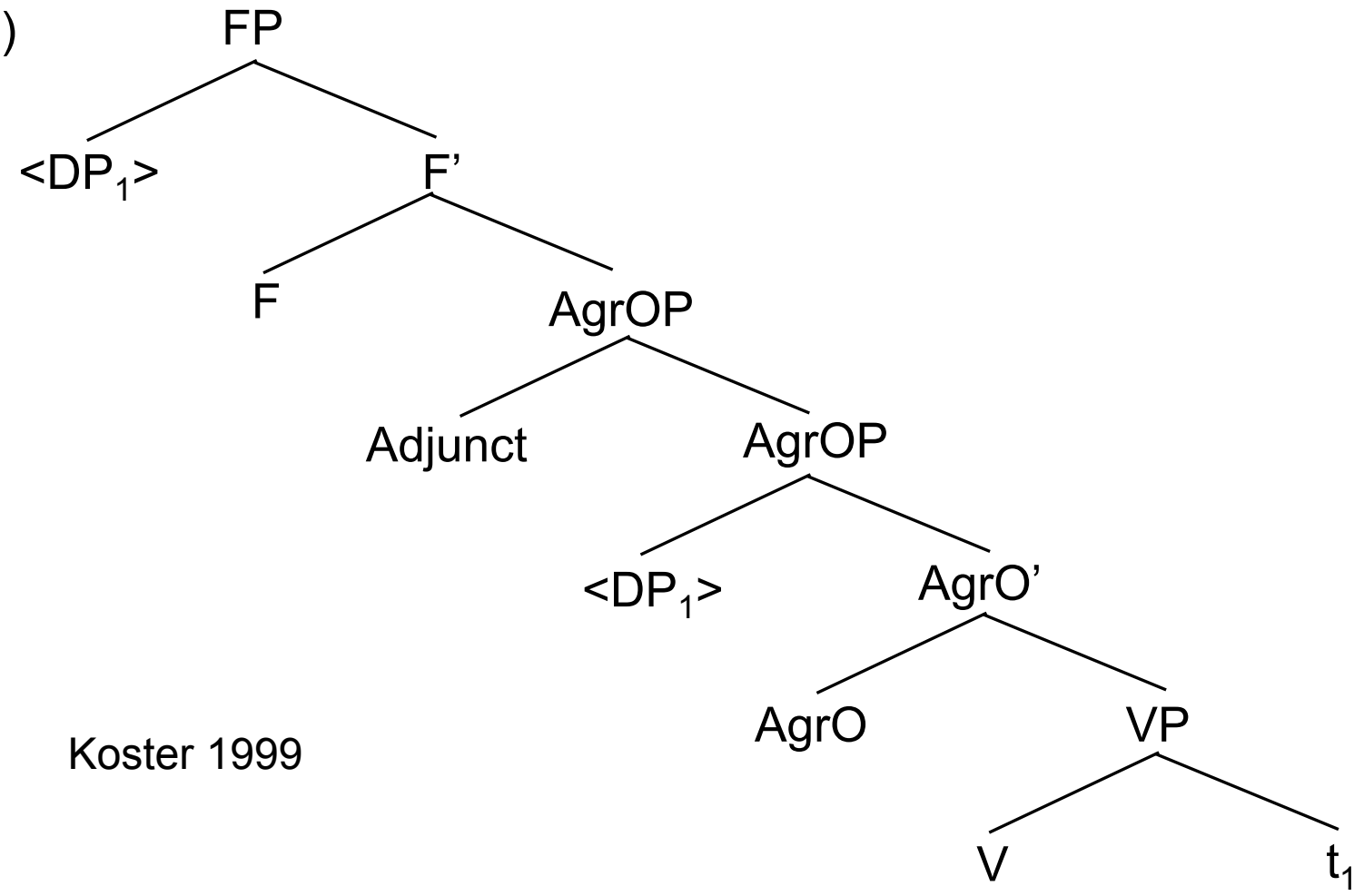
Vanden Wyngaerd 1989

Proposals with a postverbal trace

- Our findings provide no evidence for an analysis with a postverbal trace of A-movement.
- There are again two potential variants:
  - fixed adjunct
  - flexible adjunct

VO – fixed adjunct (movement)

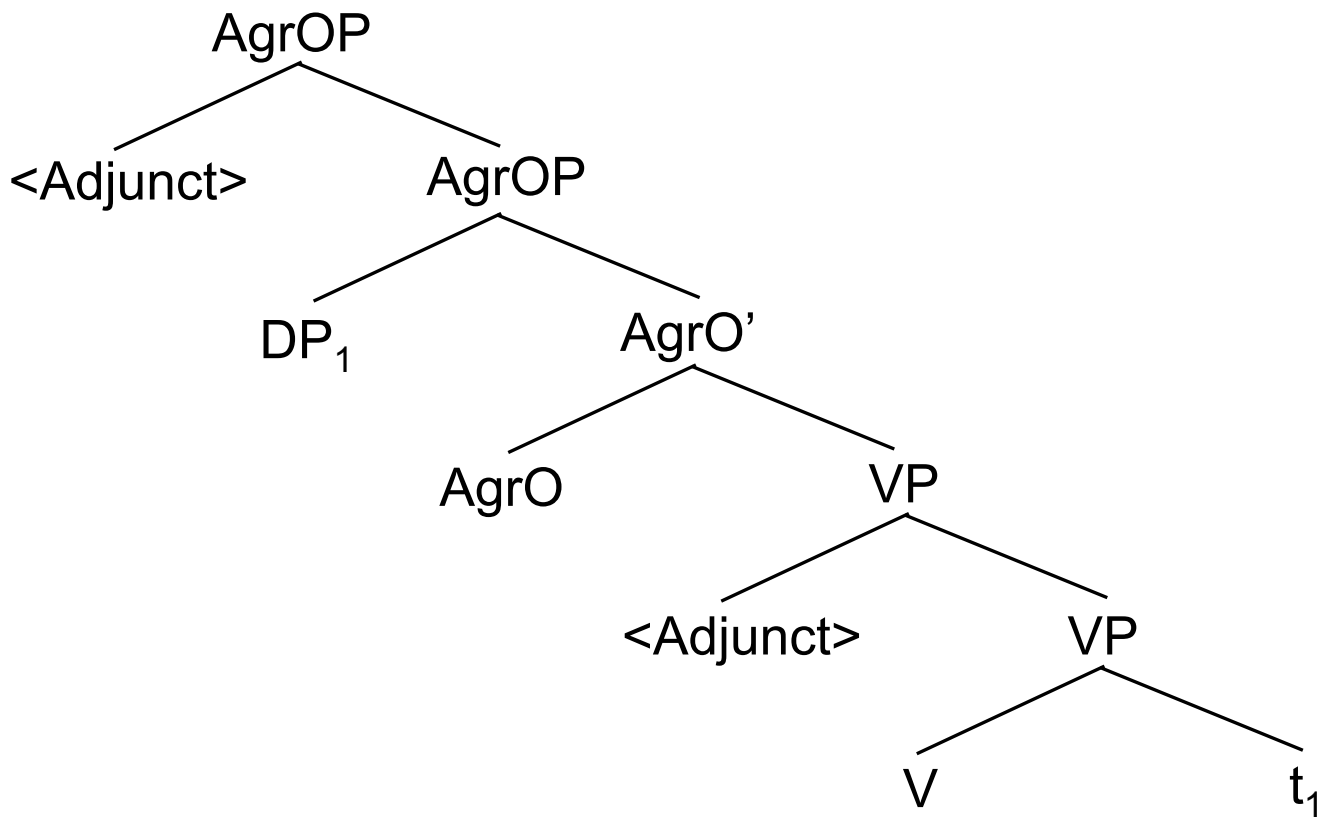
(13)



Koster 1999

VO – flexible adjunct (movement)

(14)



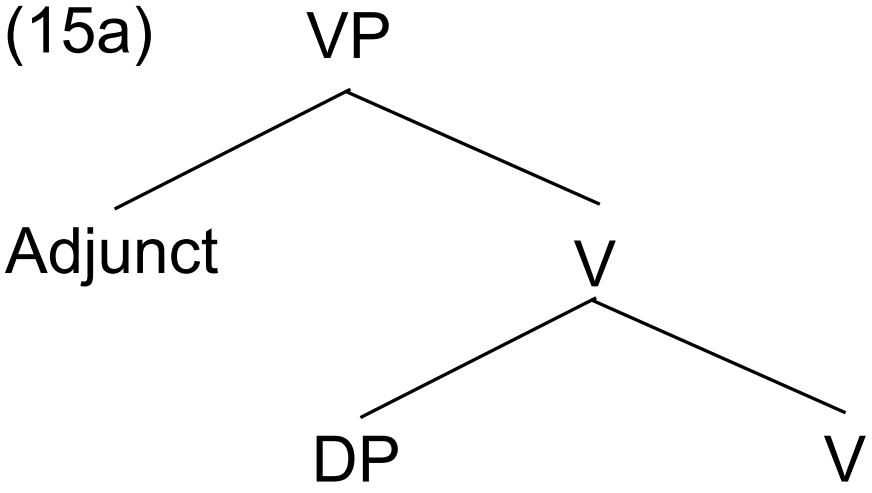
Zwart 1993

Base-generation proposal

- On our working hypotheses, the reactivation found at verb onset in experiment 2 is a reflection of the copy left by wh-movement.
- The absence of any preverbal or postverbal reactivation in experiments 1 and 3 indicates the absence of a copy left by A-movement.
- These results are best compatible with a base-generation analysis of A-scrambling.
- This proposal abandons UTAH and allows the object to merge with the verbal projection either before or after the adjunct.

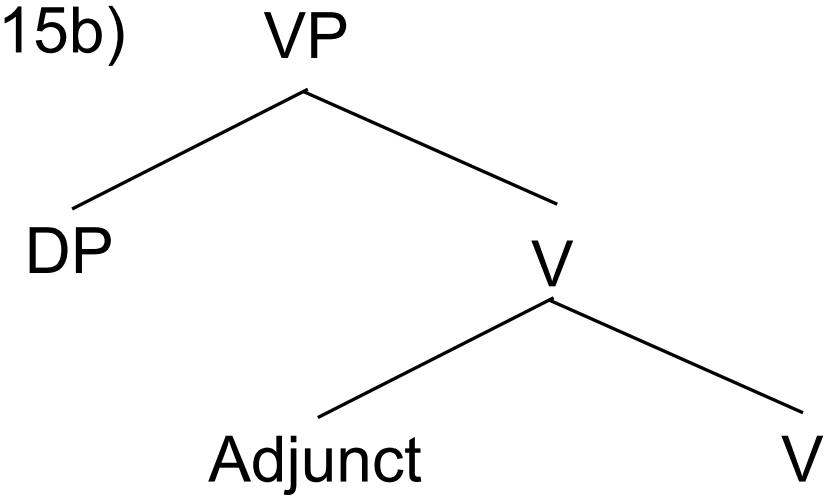
Base-generation analysis

(15a)



Neutral order

(15b)



Marked order

Bayer & Kornfilt 1994; Neeleman 1991, 1994; Fanselow 2001, 2003

Alternative working hypotheses v1

- Revised syntactic hypothesis:
  - A'-movement creates copies
  - A-movement optionally leaves a copy (perhaps a 'bare' trace elsewhere; Lasnik 1999; Fox 1999; Boeckx 2001 for a close variant)
- Linking hypothesis:
  - Creation of a copy reactivates the antecedent.

- A-scrambling does not reconstruct.
- So a movement analysis of A-scrambling does not appear to be ruled out.

Alternative working hypotheses v1

- But the revised syntactic hypothesis is built on the acceptance of traces for which there is no empirical evidence.
- This seems an unacceptably high price to pay to save the movement analysis (and thus the extreme locality of θ-marking that accompanies UTAH).
- Unanswered questions:
  - Why should the trace of A-movement be different from the trace of A'-movement?
  - How should one interpret the existing results showing reactivation in A-movement structures?

Alternative working hypotheses v2

- Syntactic hypothesis:
  - Movement leaves a copy
- Revised linking hypothesis
  - Creation of a copy created by A'-movement reactivates the antecedent
  - Creation of a copy created by A-movement gives rise to delayed reactivation

- Conclusion: A-scrambling does not involve Move.
- Problem: An account is required for the hypothesized difference in reactivation patterns.

Alternative working hypotheses v3

- Revised syntactic hypothesis
  - A'-movement leaves a copy
  - A-movement optionally leaves a copy (perhaps a 'bare' trace elsewhere; Lasnik 1999; Fox 1999; Boeckx 2001 for a close variant)
- Revised linking hypothesis:
  - Creation of a copy created by A'-movement reactivates the antecedent
  - Processing of a bare trace gives rise to delayed reactivation in A-movement chains.
- Conclusion: A-scrambling does not involve Move

Wrapping up

- We have found evidence for preverbal reactivation of wh-moved categories.
- Our experiments have not uncovered any evidence to support a movement analysis of A-scrambling.
- No preverbal, postverbal or delayed reactivation for A-scrambled categories.
- Finally, the overwhelming tendency not to reconstruct in the TV judgment task is inconsistent with a movement analysis.

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