Two acquisition paradoxes: the effectiveness of the input

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The MEGA project: Modeling early grammar acquisition
See for project description: http://www.childgrammar.com/
First paradox: direct questions

English child language  
>+wh> precedes <+fin>-in-C°  
*what is that?*  
where does bear go?

Dutch child language  
>+fin>-in-C° precedes <+wh>  
*wat is dat nou?*  
waar moet dat nou toe?

- The sentence-initial <+wh>-pronoun appears before residual V2 in child English.
- It follows V2 in child Dutch (idem in the other V2 Germanic languages)

What causes the order preferences in child English/Dutch?
Second paradox: position of the verb

All (adult) Dutch input sentences have the form
--- V<+fin> ------- (V<−fin>)
--- V<+fin> ------- (Object-V<−fin>)

- Dutch child language neglects the denotational V<+fin> in favor of the denotational V<−fin>.
- Hence, the OV parameter is set before V2.

nogge [ijsje halen]?  haal (jij) nogge [ijsje \(t_{V_{fin}}\)]?
(still icecream get)   (get (you) still icecream ?)

ik [boekje lezen]  ik lees [boekje \(t_{V_{fin}}\)]
(I booklet read )     (I read booklet)

What causes the order preference in child Dutch?
Preliminary answer

- The paradoxes are solved by a natural data selection and decoding procedure by the child.

- The obvious effect of that procedure allows us to question the poverty of the stimulus.

- All examples and graphs from Sarah (Kampen corpus CHILDES), but the findings are confirmed by data from other Dutch children.
English versus Dutch on <+wh>

English  what  have  you  bought?
Dutch    wat  heb  je  gekocht?
English  where  can  I  buy  a  sandwich?
Dutch    waar  kan  ik  een  sandwich  kopen?

Dutch/English: parallel pattern shifts

- Move <+wh> to Spec.C
- Move <+fin> to C°

Same categories, same shifts
The acquisitional difference

[what have you — bought — ?]  [wat heb je — — gekocht ?]

English: A <+wh> in front: age 2-2½ (instantaneous!)
B <+fin> to C₀: age 3½ -4 (a full year later!)

Dutch: B <+fin> to C₀: age 2-2½ (3-4 months)
A <+wh> in front: age 2½ -3 (>6 months)

Explain: same shifts, different acquisition order
My points are: 1. the difference in acquisition order
   2. the difference in ±instantaneous
The paradox

The same parameters
A: <+wh> to Spec.C
B: <+fin> to C°

In an opposite acquisition order
Dutch  <+fin> \rightarrow <+wh>
English  <+wh> \rightarrow <+fin>

The cause cannot be
- Different UG parameters (same) a priori
- Different constructions (same) input

How did the Dutch child and the English child get a different acquisition order?
Related questions

 <+wh> 

- Why is <+wh> not instantaneous in Dutch/V2 Germanic?
  (although all Dutch wh-questions have a <+wh>)

 <+fin> in C° 

- Why is residual V2 slow as compared to full V2? (although both rules apply to Auxes in the first place)

The subject is an issue, since

- Why is subject-V_{<aux>} inversion blocked in SVO English/French?
- Why is subject-V_{<aux>} inversion instantaneous in Dutch?

When and how does the acquisition procedure spot the typological difference SVO/V2?
The child’s strategy: input reduction

Initial ‘proto-grammar’

- Leave out all that you do not recognize (especially leave out all grammatical markings).

- Restrict yourself to single binary combinations of pragmatically interpretable items (denotational or deitic).

- Add an element if it supports a pragmatic understanding of the expression in a standard way.

The order of acquisition steps is crucial: the child re-discovers a learnability hierarchy imposed by the system.
Elementary types of binary reduction

(presenational have been left out)

(topic comment) English SVO

- daddy do wanna bear
- door open
- rabbit on

(topic comment) Dutch V2

- papa doen moet doen
- deur dicht kannie dicht
- Nijntje op

operator comment

- moet doen
- kannie dicht
- is/zit op
- wil beer

comment

- denotational characteristic of the situation
- standard addition for an illocutive orientation
- standard addition for an aboutness orientation

Illocution operators soon set a norm in V1/V2 types
Proto-grammar clauses start with an optional front field
✓ word-status elements (no clitics or affixes)
✓ added to a denotational comment

front field

<table>
<thead>
<tr>
<th>single topic</th>
<th>single operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>function: aboutness</td>
<td>function: illocution</td>
</tr>
<tr>
<td>type: name</td>
<td>type: constant</td>
</tr>
</tbody>
</table>

SVO input reinforces [topic + comment]
V1/V2 input reinforces [operator + comment]
Illocution operators in child Dutch: three factors

First factor
Dutch input 3 times as much modals (plus aspectual go) and compared to the English input (my count in 2 CHILDES corpora).

Second factor
Dutch modals have often the pronominal subject cliticized:
kwil (I-want), wilje (want-you), kga (I-go), gaje (go-you), gak (go-l), kmoet (I-must), moeje (must-you), moek (must-l), kank (can-I)

Third factor (Van Kampen 2008)
22% of all (non-question) input sentences are V_{<+fin>} first (V1)
gaan we boekje lezen; kan ‘m niet open maken

SVO English: the initial input reduction does not recover modals
Recombination/Left branch stacking in Dutch V2

Binary grammar: 
\[
\begin{aligned}
&\text{operator qualified comment} \\
&\text{topic qualified comment}
\end{aligned}
\]

➢ Triple reduction products are easiest recognized as binary stacks.

a.  
```text
operator  
  topic  
    moet  
    kannie  
  deur  
  Nijntje  
  liedje  
  comment  
    doen  
  comment  
    <+operator>  
```

b.  
```text
topic  
  comment  
    <+topic>  
  pappa  
  deur  
  Nijntje  
  liedje  
  comment  
    moet  
    kannie  
  comment  
    <+operator>  
    doen  
```

Ternary splits fail to make use of earlier binary products
The category <+V> 

- Denotationals that are <+finite> appear in the operator position (sometimes before, sometimes after the topic).
- The elements that take part in \( X^{\pm \text{fin}} \rightarrow V \)
  \( X^{+\text{fin}, +\text{aux}} \rightarrow V \)
  (\(+\text{fin}\) is an illocution operator added to \(+V\))

- The non-stressed topic is reinterpreted as the subject
Recombination/Left branch stacking

Reinterpretation of the reduced structure in terms of subject-finite verb (before week 125).

Dutch Sarah: subject inversions **week 110-125**
= acquisition point V2 (Van Kampen 2008).

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Subject-V&lt;+fin&gt;</td>
<td>28%</td>
</tr>
<tr>
<td>b. <em>nu/dan</em>-V&lt;+fin&gt;-Subject</td>
<td>4%</td>
</tr>
<tr>
<td>c. V&lt;+fin&gt;-Subject</td>
<td>17%</td>
</tr>
<tr>
<td>d. V&lt;+fin&gt; (no subject)</td>
<td>51%</td>
</tr>
</tbody>
</table>

\[21\%\]

The Germanic V2 type originates early as operator+topic recombination in proto-grammar
The $<$+wh$>$ difference: Single topic/single operator

Dutch V2

operator $<$+fin$>$

topic

comment
gaat pappa nou doen ?

child Dutch: a $<$+wh$>$ operator blocked by standard illocution operator $<$+fin$>$.

English SVO

operator $<$+wh$>$

topic

comment

what daddy doing ?

child English: a $<$+wh$>$ operator possible due to standard topic.

Child V2: the illocution operator is standard
Child SVO: the topic is standard
The presence/absence of the illocution operator creates
a selective environment for further acquisition steps
Acquisition of <+wh> in child Dutch

The Dutch acquisition of Move <+wh> to Spec.C not until

- <+wh> is identified as the <+D> (determiner) in front of NPs

- <+D>-marked parts move in front of [>+fin]c^o as topics

  de jongen gaat weg (the boy goes away)
  dat heeft hij gekocht (that has he bought)
  wat heeft hij gekocht? (what has he bought?)

The D <+wh> in the V2 type follows D <+wh> topic movement, which is more general
The coincidence of A and C: the <+wh> does not enter the V2 system as an operator, but as a DP in Spec,C
The (over) use of *nou* in V2 Dutch before and after <+wh>.

<+wh> in Spec.C has a more primitive, but strong competitor *nou*. 
Preliminary conclusions

- Input reduction as decoding procedure may explain in V2 types
  - b. Rise and fall of <+Q> adverb *nou*.
  - c. Delay of <+wh> until there is systematic D-marking
  - d. Appearance of <+fin> as illocution operator.
  - e. Early appearance of subject-V<+fin> inversion.

- Input reduction as decoding procedure explains in general:
  - f. Strict locality of all grammatical relations.
  - g. Maintenance of binary structures.

The binarity and locality of reduction types carry over to UG. The acquisition procedure is the basis of minimalism.
The second paradox

The Dutch child avoids the simple structures (at the left) for the reduced complex structures (at the right)

avoided
- (papa) slaapt niet (daddy sleeps not)
- (ik) glij af (I slide off)
- (papa) maakt fiets (daddy makes bike)
- (mama) maakt pop (mummy makes doll)

operator

preferred
- (papa) moet niet slapen (daddy (must) not sleep)
- (ik) wil af-glijden (I want off-slide)
- (papa) gaat fiets-maken (daddy goes bike make)
- (mama) pop-(ge)maakt (mummy has doll made)

How does the Dutch child get this preference for $<-$finite$>$ denotationals?
A canonical lexical representation

- The child sticks to a canonical lexical representation with a fixed distribution.
- All forms deviating from the canonical form are first disregarded (to maintain a minimal grammatical orientation later adapted by movement)

Consequences

- V2 and V1 types are learnable only if >2/3 of the predicates is based on (semi-)auxiliaries.
- The West-Germanic lexicon is based on verb-final patterns from the very beginning on.

The early lexicon determines the West-Germanic OV type
The acquisition of V2

a) \( \text{Aux} \quad \cdots \quad X_{<\text{fin}>} \quad \emptyset \quad \cdots \quad X_{<\text{fin}>} \) 
   \[ \left\{ \quad \text{underlying OV pattern} \right\} \]

b) \( X_{<+\text{fin}>} \quad \cdots \quad t \quad X_{<+\text{fin}>} \)

Late rise of pattern b)

- The relative rarity of finite denotationals in the input
  - as compared to non-finite denotationals
  - as compared to (finite) operators (modals)

The V2 rule removes the anomaly of a denotational in initial position and a gap in the final position.
Recapitulation

- The pattern-shift is learned/acquired after some 2/3 of the clauses have an illocution operator. V2 regularizes that pattern by adding the <+fin> denotationals.

- Denotational elements that allow $X^{<\pm \text{fin}}$ define the category <+V>.

- The lexicon functions as a grammatical memory for underlying structure.

- The category <+V> follows from a morphological paradigm and its syntactic context (traditional view).

**Curious:** The universal part-of-speech <+V> is learned from a language-specific context.
The V2 graph again

From point P on the new <+fin> forms are denotationals with a predicative head gap.
Acquisition steps and evidence frames

Evidence frame
A repetitive grammatical context for a reduced form that invites an acquisition step.

Two types of Evidence frames
1. the insertion of a grammatical element in that context (Merge). OR
2. the addition of a grammatical element plus a rearrangement (Move)

The acquisition procedure only needs these two types of pattern-recognition to derive grammar from input.
1. Adding a designated element $F_i$

Example: reduced form *bear -- walking*  

→ full form *bear is walking* (adding)

The semantic relation XP-ZP is pragmatically understood.

The designated element $F_i$ is ZP added.

Designated element $F_i$ is input identifiable.  
It need not be selected from an a priori set.
2. Rearrangement of designated element \(<F_i>\) (Move)

Example: \(V_2\)
operator: \(gaat\ Beer\ weglopen\ /\ Beer\ gaat\ weglopen\)
\(\rightarrow V_{<+\text{fin}>}\ \loopt\ Beer\ weg\ – / Beer\ loopt\ weg\ –\)

- The acquisition procedure postulates a movement when target and gap have been identified in previous acquisition steps
  1. gap in ZP final position.
  2. \(<+F>\) position occupied by operator.

Locality of movement follows from the locality of the frame
Evidence frame

- Let each acquisition step be equivalent to adding a grammatical feature $F_i$ to the lexicon.

- The grammatical feature $F_i$ infects a lexical item due to a repetitive context. That unites
  - A morpho-phonological form
  - A binary syntactic context
  - A semantic distinction

Together the evidence frame for acquiring $F_i$

The stimulus for $F_i$ is effective due to the proto-grammar
Results

- Reduction yields a focus on crucial properties
  - Local binarities
  - Categories
  - Movement

Learnability of locality: Van Kampen (2005, 2008)
Learnability of categories ($\pm N$, $\pm V$): Van Kampen (2004, 2005)
Learnability of movement: Van Kampen (1997)

The order of acquisition steps is imposed by the system. It need not be “innate”.
Parallels and differences

- Fodor and Dresher have proposed that acquisition steps are based on surface cues. Elementary frames or treelets.

- The additional intuition here is that the treelets are derived from input by the reduction filter.

- The evidence frame is a unique trigger, but it works over time to get the new category $F_i$ and its context automated.

The reduction filter is not based on innate UG information. The filter follows from the grammatical ignorance of the child.
Program (child language and simulation)

My preference for language acquisition research is to get a simulation program that:

1) Reconstruct (from CHILDES files) the succession of acquisition steps.

2) Predicts the succession of acquisition steps given a proto-grammar + (reduced) input.

3) Derives the major language types.

A simulation based on systematic reduction should bring the data in focus.
References


Kampen, J. van (2008) 'Typological guidance in the acquisition of V2 Dutch', In M. Jouitteau (ed.) Special Issue on V1/V2 languages in *Lingua*.


