What is easy and what is hard to acquire in a second language?

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The Bottleneck Hypothesis

Functional morphology is the bottleneck of L2 acquisition; acquisition of syntax and semantics (and maybe even pragmatics) flows smoothly (Slabakova, 2006, 2008)
The Bottleneck Hypothesis

Based on comparison of findings on the acquisition of:

- Inflectional morphology
- Syntax
- Syntax-semantics interface
- Syntax-context/discourse interface
- Semantics-pragmatics interface
Modular design of the language faculty
(Reinhart 2006)
Linguistic Processes (Jackendoff, 2002)

- **Integrative** processes: within each module (phonology, syntax, semantics, etc)

- **Interface** processes: take as input one type of linguistic structure and output another.
Inflectional morphology in minimalist linguistic theory

- Part of the lexicon, so-called Functional Lexicon but crucial in integrative syntactic processes
- Carries information about grammatical meanings through interpretable features (e.g. tense, aspect, definiteness, etc.)
- Carries information about displacement of phrases (movement) through uninterpretable features
- Has to be learned as other lexicon entries
Infectional morphology example

My daughter often take-s the bus.

3 sg NP  present-3sg

Agreement
  but also
Tense
Overt subject
Nominative subject
Verb stays in VP
## Syntax-Before-Morphology (White 2003)

L2 English: Suppliance in obligatory contexts (in %)

<table>
<thead>
<tr>
<th>Study</th>
<th>3sg Agr on lexical verbs</th>
<th>Past tense</th>
<th>Be (aux and copula)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haznedar 2001</td>
<td>46.5</td>
<td>25.5</td>
<td>89</td>
</tr>
<tr>
<td>Ionin &amp; Wexler 2002</td>
<td>22</td>
<td>42</td>
<td>80.5</td>
</tr>
<tr>
<td>Lardiere 1998a,b</td>
<td>4.5</td>
<td>34.5</td>
<td>90</td>
</tr>
</tbody>
</table>
Syntax-Before-Morphology  
(White 2003)

L2 English: Suppliance in obligatory contexts (in %)

<table>
<thead>
<tr>
<th></th>
<th>Overt subject</th>
<th>Nominative Case</th>
<th>V in VP (no raising)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haznedar 2001</td>
<td>99</td>
<td>99.9</td>
<td>-</td>
</tr>
<tr>
<td>Ionin &amp; Wexler 2002</td>
<td>98</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Lardiere 1998a,b</td>
<td>98</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Syntax-Before-Morphology
(White 2003)

- Syntactic (integrative) properties are acquired BEFORE target-like inflectional morphology, in production

- Maybe comprehension of the morphology would be different? Is comprehension easier?
Study on comprehension of German verbal morphology by 24 beginner and 18 intermediate English learners. Choose the appropriate subject task.

_____ bist ein guter Freund.

- are a good friend
- Moritz
- du ‘you’
- die Schüler ‘the student’
- er ‘he’
Slabakova and Gajdos (2008)

Percentage errors in all forms of *sein* depending on type of subject

<table>
<thead>
<tr>
<th>Type of error</th>
<th>Beginners</th>
<th>Intermediate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors in choosing correct pronoun subjects</td>
<td>7.50</td>
<td>4.50</td>
</tr>
<tr>
<td>Errors in choosing correct NP subjects</td>
<td>20.18</td>
<td>29.80</td>
</tr>
</tbody>
</table>
Functional morphology is hard for some native speakers, too

Dąbrowska and Street (2006) test comprehension of pragmatically plausible and implausible passives by English natives and L2 learners. Four subject groups (n=10 each):

- Hi Ed natives (<15 yrs of education, MA/PhD)
- Lo Ed natives (high-school education)
- Hi Ed non-natives (MA/PhD)
- Lo Ed non-natives (high-school education)
Dąbrowska and Street (2006)

Stimuli (n=20 in each condition):

*The dog bit the man.* (plausible)
*The man bit the dog.* (implausible)
*The man was bitten by the dog.* (plausible)
*The dog was bitten by the man.* (implausible)

Procedure: listen to sentences and identify the doer of the action
### Accuracy Means and SD
(Dąbrowska and Street 2006)

<table>
<thead>
<tr>
<th></th>
<th>Plausible actives</th>
<th>Implausible actives</th>
<th>Plausible passives</th>
<th>Implausible passives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi Ed natives</td>
<td>100 (0)</td>
<td>100 (0)</td>
<td>100 (0)</td>
<td>96 (13)</td>
</tr>
<tr>
<td>Hi Ed non-natives</td>
<td>98 (6)</td>
<td>100 (0)</td>
<td>100 (0)</td>
<td>98 (6)</td>
</tr>
<tr>
<td>Lo Ed natives</td>
<td>98 (6)</td>
<td>64 (30)</td>
<td>98 (6)</td>
<td>36 (26)</td>
</tr>
<tr>
<td>Lo Ed non-natives</td>
<td>94 (13)</td>
<td>90 (11)</td>
<td>98 (6)</td>
<td>94 (10)</td>
</tr>
</tbody>
</table>
Conclusions
(Dąbrowska and Street 2006)

- NSs sometimes process sentences non-syntactically, relying on simple processing heuristics such as Agent-Verb-Patient template (shallow processing, ‘good-enough’ representations)

- Some NNS process syntactic cues (functional morphology) more reliably than less educated NSs
Conclusions
(Dąbrowska and Street 2006)

- Input/exposure to a particular construction is not a completely decisive factor (Lo Ed NNS did better than Lo Ed NSs on processing plausible and especially implausible passives)

- Bilingualism may actually enhance attention to formal cues in language processing
Interim conclusion on the inflectional morphology

- By definition the sticking point of acquisition because it encodes all the formal features
- Hard, not only in production but also in comprehension
- Hard for NS who do not pay attention to syntactic cues
- Harder than syntactic properties?
Relative difficulty of syntax

- Processing syntax involves universal, therefore transferable, operations, once the features encoded in functional morphology are acquired;
- Processing **complex** syntax (multiple embeddings, LD *wh*-movement) may be affected by lack of experience with specific constructions as well as working memory or processing limitations;
- Is what is difficult for NNSs easy for all NSs?
Dąbrowska (1997)

- Tested 5 groups of NSs differing in levels of education (n=10 each): cleaners, janitors, undergrads, graduate students, and lecturers at the same UK university
- Test constructions: two types of parasitic gaps, complex NP, and *tough*-movement constructions
Dąbrowska (1997)

Sample test item (written and oral presentation):

*Paul noticed that the fact that the room was tidy surprised Shona.*

Comprehension questions:

*What did Paul notice?*

*What surprised Shona?*
## Accuracy percent on complex NP comprehension (Dąbrowska 1997)

<table>
<thead>
<tr>
<th></th>
<th>Cleaners</th>
<th>Janitors</th>
<th>Undergrads</th>
<th>Graduates</th>
<th>Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29</td>
<td>14</td>
<td>38</td>
<td>66</td>
<td>90</td>
</tr>
</tbody>
</table>
Chipere (2003)

- Tested complex NP comprehension, following Dąbrowska (1997), with the same experimental design.

- Subjects were grad students NSs, high-school-only NSs, and highly-educated NNSs.

- Chipere found that the highly-educated NSs and NNS had the exact same behavior, while the low educated NSs had an error rate higher than 90%.
Relative difficulty of syntax

- Indeed, what is difficult for NNSs is also difficult for low-educated NSs who have had little exposure to complex constructions.
- After they learn the formal features, NNSs roughly pattern with their NS education peers in processing complex language.
- In processing syntax, as well as in the processing of morphology, learning an L2 may afford some advantages in terms of attending to syntactic cues in processing.
The syntax-semantics interface

Properties tested at the syntax-semantics interface are of two types:

- Complex syntax—simple semantics (Dekydtspotter, Sprouse and colleagues)
- Simple syntax—complex semantics (Gabriele, Garavito, Ionin, Montrul, Rothman, Slabakova, a.o.)

Both represent Poverty of the Stimulus phenomena (no evidence in the input)
Simple syntax—complex semantics

- Learning situations in which some meanings are denoted by seemingly similar morphemes.
  
  E.g. *English* past simple and past progressive *Spanish* preterit and imperfect aspectual tenses

- Mismatch at the L1-L2 syntax-semantics interface (different meanings are encoded in the seemingly similar morphemes)
Simple syntax—complex semantics

Guillermo robaba en la calle. (habitual)
Guillermo rob-IMP in the street
‘Guillermo habitually robbed (people) in the street.’

Guillermo robó en la calle. (one-time event)
Guillermo rob-PRET in the street
‘Guillermo robbed (someone) in the street.’

Felix robbed (people) in the street. (habitual)
Felix robbed a person in the street. (one-time event)
English simple present tense
(Slabakova 2003)

The English simple tense cannot denote ongoing events.

*She eats an apple right now. (#ongoing event)
She is eating an apple right now. (ongoing event)
She eats an apple (every day). (habitual event)

With stative predicates, however, the ongoing reading of the English present is possible.

Mike is lazy. (characteristic state)
Mike is being lazy today. (temporary state)
The English bare infinitive denotes not only the process part of an event but includes the completion of that event.

I saw Mary cross the street.  (completion entailed)
I saw Mary crossing the street.  
(no completion entailed)

Explanation: bare verbs are marked with a feature [Perfective] in the lexicon, because English inflectional morphology is impoverished.
Bulgarian present tense
(Slabakova 2003)

No present progressive tense and the present simple tense is ambiguous between a habitual and an ongoing event or state.

Maria sega jade torta. (simultaneous event)
Maria now eat-PRES cake
‘Mary is eating a cake right now.’

Maria jade torta vseki den. (habitual activity)
Maria eat-PRES cake every day
‘Mary eats cake every day.’
This is true of stative predicates as well, ambiguous between a characteristic and a temporary state.

Maria ле́же. (characteristic state)
Maria lies-present
‘Mary is a liar.’

Maria в момента ле́же. (temporary state)
Maria at this moment lies-present
‘Mary is lying (at the moment).’
Bulgarian infinitives  (Slabakova 2003)

Bulgarian verbs do not need to be marked [Perfective] in the lexicon. They are amply marked with person, number, and tense endings. Consequently, Bulgarian equivalents to bare infinitives do not entail completion of the event.

Ivan vidja Maria da presiča ulicata.
Ivan saw Maria to cross street-DET
‘John saw Mary crossing/*cross the street.’
(no completion entailed)
Learning Task (Slabakova 2003)

- English eventive verbs have the feature [Perfective]
- Bare verbs denote a complete event.
- Present tense has only a habitual interpretation
- Progressive is needed for ongoing interpretation
- States in the progressive denote temporary states
Experiment (Slabakova 2003)

- 112 Bulgarian-speaking learners of English and 24 native speakers
- 3 proficiency levels: low intermediate, high intermediate, and advanced
- A production task for ascertaining knowledge of inflectional morphology
- A truth value judgment task for checking knowledge of interpretation
Experiment (Slabakova 2003)

A quadruple testing completed interpretation of English bare forms:

Matt had an enormous appetite. He was one of those people who could eat a whole cake at one sitting. But these days he is much more careful what he eats. For example, yesterday he bought a chocolate and vanilla ice cream cake, but ate only half of it after dinner. I know, because I was there with him.

I observed Matt eat a cake.  True  False
I observed Matt eating a cake.  True  False
Results (Slabakova 2003)

Mean Accuracy on Bare Verb vs. -ing Form on Perceptual Reports (percentage)

- Bare verb (F): Incomplete event
  - Low Int: 58%
  - Hi Int: 75%
  - Advanced: 83%

- -ing (T): Incomplete event
  - Low Int: 65%
  - Hi Int: 68%
  - Advanced: 79%

- Bare verb (T): Complete event
  - Low Int: 73%
  - Hi Int: 76%
  - Advanced: 82%

- -ing (T): Complete event
  - Low Int: 64%
  - Hi Int: 75%
  - Advanced: 68%

Controls: 86%
Conclusions (Slabakova 2003)

- It is possible to acquire semantic properties in the second language that do not come from the L1
- All semantic effects of the triggering inflectional property appear to be engaged at the same time.
- Any impact of instruction? **NO**

ANOVA on the data for each group, with condition as the sole factor. All groups perform equally well on all conditions.
The syntax-discourse interface (Ivanov 2009):

Clitic-doubling (a syntactic property) is sensitive to which argument is **TOPIC** (old information, based on the current discourse)

Q: Has anybody seen Ivan?
A: Ivan \textcolor{red}{go} vidja Maria. \textcolor{red}{O-Cl-V-S}
   Ivan him-cl. saw Maria
B:*Ivan \textcolor{red}{vidja} Maria \textcolor{red}{*O-V-S}
   ‘Maria saw Ivan’
Experiment (Ivanov 2009):

**Tests:** a GJT and a context-sentence evaluation task: a situation described in English and a short dialogue in Bulgarian where the participants had to evaluate four options on a scale from 1 (totally unacceptable) to 5 (perfectly acceptable). Written and aural presentation of test items.

**Participants:** 14 intermediate and 10 advanced learners of Bulgarian, 20 native Bulgarian controls.
Experiment (Ivanov 2009):

Mr. Jordanov, the manager of Doublestream Ltd., runs into the office looking for one of the company employees, Ivan. Ivan is nowhere to be seen but there are several other employees working in their cubicles. Mr. Jordanov asks them:

Q: Has anybody seen Ivan today?
A: *Ivan go vidjah tazi sutrin.* √ Felicity
   Ivan him-cl saw-1sg this morning
   ‘I saw Ivan in the morning.’

B: *Tazi sutrin go vidjah Ivan.* √ Felicity
C: *Ivan vidjah tazi sutrin.* # Felicity
D: *Tazi sutrin vidjah Ivan.* #Felicity
Mean acceptance (out of 5)
Accusative condition Ivanov (2009)

<table>
<thead>
<tr>
<th>Participant group</th>
<th>O-Cl-V-Adv √ Felicity</th>
<th>Adv-Cl-V-O √ Felicity</th>
<th>O-V-Adv # Felicity</th>
<th>Adv-V-O # Felicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native Bulgarian controls</td>
<td>4.82</td>
<td>4.52</td>
<td>1.72</td>
<td>2.7</td>
</tr>
<tr>
<td>Advanced Bulgarian Learners</td>
<td>4.73</td>
<td>4.32</td>
<td>2.62</td>
<td>3.2</td>
</tr>
<tr>
<td>Intermediate Bulgarian Learners</td>
<td>3.7</td>
<td>3.33</td>
<td>3.79</td>
<td>4.41</td>
</tr>
</tbody>
</table>
Conclusions (Ivanov 2009):

- Knowledge of clitic-doubling cannot come from English
- The discourse requirements are not taught in Bulgarian classrooms.
- Intermediate learners as a group are not sensitive to the discourse properties of clitic-doubling
- All 9 advanced learners exhibit knowledge of syntactic as well as the discourse requirements of clitic-doubling
The semantics-pragmatics interface (Slabakova 2007, in press)

Scalar implicatures:
(1) *Some professors are smart* ➔ IMPLICATION
(2) *Not all professors are smart* BUT NOT
(3) *All professors are smart*

**Logically speaking**, *some* means *some and possibly all*.

For **pragmatic felicity**, *some* means *some but not all*. 
The semantics-pragmatics interface (Slabakova 2007, in press)

- The learning task in L2A involves transferring the purportedly universal Scalar Implicature computation mechanism from the L1.

- Therefore, we expect L2 learners to be accurate in Scalar Implicature derivation, but that processing resources may have an impact on accuracy and speed.
The semantics-pragmatics interface (Slabakova 2007, in press)

Participants in Experiment 1

English Natives: 23 adults
Korean Natives: 30 adults, who took the same test translated in Korean
English learners (Korean native speakers): 30 advanced and 20 intermediate
The semantics-pragmatics interface (Slabakova 2007, in press)

8 universally true sentences
   All elephants have trunks.
8 sentences infelicitous with some
   Some elephants have trunks.
8 sentences felicitous with some
   Some books have color pictures.
8 sentences false with all
   All books have color pictures.
8 absurd fillers
   All/some garages sing.
### Percentage of Logical Responses across participants groups in Experiment 1

<table>
<thead>
<tr>
<th>Groups</th>
<th>True all</th>
<th>False all</th>
<th>Felicitous some</th>
<th>Infelicitous some</th>
</tr>
</thead>
<tbody>
<tr>
<td>English adults</td>
<td>75.5</td>
<td>98.9</td>
<td>96.7</td>
<td>55.4</td>
</tr>
<tr>
<td>Korean adults</td>
<td>88</td>
<td>98.5</td>
<td>99</td>
<td>61.2</td>
</tr>
<tr>
<td>L2 advanced</td>
<td>82</td>
<td>98</td>
<td>98</td>
<td>39.2</td>
</tr>
<tr>
<td>L2 intermediate</td>
<td>78</td>
<td>97</td>
<td>90</td>
<td>41.8</td>
</tr>
</tbody>
</table>
Korean learners attribute more pragmatic interpretations to scalar implicatures without context than they do in their native Korean, and significantly more than English.

When asked to judge sentences with *some* in context, they offer pragmatic judgments around 90% of the times (Experiment 2).

Learners observe Gricean maxims.
Taking stock

- Syntax proper comes before morphology in production and comprehension (White 2003, Slabakova and Gajdos, 2008)
- Functional morphology is harder for low-educated NSs than NNSs (Dąbrowska and Street 2006)
- In processing complex syntax, low-educated NSs who have had little exposure to complex constructions may be at a disadvantage compared to NNSs (Gabrowska 1997, Chipere 2003)
Once the inflectional morphology is learned, learners are aware of all its semantic consequences, taught and untaught (Slabakova 2003).

Even at the syntax-discourse interface, acquisition of properties unavailable from the L1 is possible (Ivanov 2009).

At the semantics-pragmatics interface, L2 learners transfer universal properties like Gricean maxims (Slabakova 2007, in press).
The Bottleneck Hypothesis

- Inflectional morphology reflects syntactic and semantic differences between languages
- Syntax proper and meaning calculation is universal
- In order to acquire syntax and meaning in a second language, the learner has to go through the inflectional morphology
- Hence, morphology is the bottleneck of acquisition
Pedagogical Implications

- Communicative approaches to language learning vs Focus on grammatical form?
- The Bottleneck Hypothesis endorses increased emphasis on practicing grammar in the classroom
- But how? Practicing the inflectional morphology in language classrooms should happen in meaningful, plausible sentences in context, where the syntactic effects and the semantic import of the morphology is absolutely transparent and non-ambiguous.
Pedagogical Implications

- Doughty (2003) discusses classroom instruction and weighs the case for and against it. She cites UG approaches as arguing that classroom instruction is largely unnecessary (see Long & Robinson (1998)).

- I have argued here that newer evidence and enhanced understanding of the L2 acquisition processes actually support focus on the practicing of inflectional morphology in the classroom.

- At the same time, focus on subtle properties that come from universal knowledge is (still) unnecessary.
Recent generative work supports the findings of different approaches to the explicit teaching and practicing of grammar in the classroom: Skill Acquisition Theory (DeKeyser); Input Processing (VanPatten); Focus on Form (Doughty, Long).

Generative work endorses a very specific type of grammar instruction: practicing of inflectional morphology in clear, unambiguous contexts.
Bottom line

Practice your functional morphology!
In ample and clear context!
As in learning other lexical items,
it may be painful, but --
No pain, no gain!
References


