Multilingualism in the Individual: A Psycholinguistic Perspective

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Outline

- Introducing the PRIM
- Child vs. adult language learning
- Case Study 1: Pronouns and referential dependencies
- Case Study 2: Morphological priming
- Summary & outlook
The *Potsdam Research Institute for Multilingualism* (PRIM) investigates the representation and processing of language in multilingual individuals, focusing on morphological and syntactic phenomena.

Core areas of grammatical processing will be investigated using current psycholinguistic and neuro-cognitive experimental techniques.
Participants

- We will study people who have learnt (or are learning) more than one language
  - early multilinguals
  - late multilinguals
  - multilingual patients
## Facilities

<table>
<thead>
<tr>
<th>RT-Lab</th>
<th>Behavioural (response time) experiments</th>
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<tbody>
<tr>
<td><strong>Eyetracking During Reading Lab</strong>&lt;br&gt;Eyelink 1000 system</td>
<td>Eye movement monitoring during reading</td>
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<td><strong>EEG Lab</strong>&lt;br&gt;BrainAmp DC System to</td>
<td>Recording ERPs using both the violation paradigm as well as the novel delayed vocalization technique.</td>
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<tr>
<td><strong>Visual-World Eyetracking Lab</strong>&lt;br&gt;RED 250/500 system</td>
<td>Eye movement monitoring during listening</td>
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Being bi- or multilingual

Someone is bilingual, if he or she has learned two languages from birth and masters them equally well.

Really??

Multilingualism/Bilingualism: Individuals who more or less proficient in more than one language.
Children can easily learn two languages at native level.

The acquisition and use of a second language for adults IS different and may be a challenge.
What’s special about native language acquisition?

Learning (general): Adding new knowledge/capacities to previous knowledge/capacities
*For example*: studying linguistics, learning how to swim

Language learning in childhood: Loss of given options by fixing on a particular language
*Before* the acquisition of a particular language:
- a set of genetically given options
- not pre-wired to a specific language
*After* the acquisition of a particular language:
- universal options no longer available
- language faculty fixed to specific language(s)

→ L1 (native) language acquisition is qualitatively different from general learning.
How is non-native grammar acquisition different?

- Success in L2 grammar acquisition is the exception.
- Ultimate attainment varies.
- There is variation in L2 developmental sequences.
- Fossilization in L2 grammar acquisition is common.
- Even advanced L2 learners often fail to give reliable grammaticality judgments.
- Language teaching and corrections are required for successful L2 grammar acquisition.
- Success of L2 acquisition depends upon external factors such as motivation, attitude, aptitude.
On the other hand ...

- Near-native-like levels of attainment can occasionally be achieved.
- L2 learners usually receive less input than children learning their L1.
- Adult L2 learners usually learn language in less favourable learning environments than children learning their native language.
- Perhaps language teaching and explicit corrections are not that relevant for successful L2 learning.
How is non-native grammar acquisition different?

**Hypothesis A:**
Native and non-native grammar acquisition are fundamentally different:

L1: genetically determined process of development/maturation using a task-specific learning device

L2: general learning process

**Hypothesis B:**
Adults and children make use of the same mechanisms for learning grammar.

L1/L2 differences are less dramatic and due to other factors.
Referential dependencies

- Interpretation of an element in a sentence or discourse is dependent on another element
- Important for coherent text and discourse production and discourse
- Pronouns are involved in referential dependencies
Pronoun Interpretation

Pronoun Reference

I’ll position the target, and when I nod my head, shoot at it.
Binding Condition A:
A reflexive must be locally bound

Ken thinks that Boris likes himself.

Binding Condition B:
A pronoun cannot be locally bound

Ken thinks that Boris likes him.

Chomsky (1981)
Different types of information affect real-time anaphor resolution, including e.g.

- Gender & number congruence
- Grammatical function
- Order & times of mention
- Discourse salience
- Structural coreference constraints

Nicol & Swinney (2003)
Discourse prominence

It was Peter who took the floor. Peter explained to John that he had a problem.

Verb semantics

Peter liked John, because he...

Peter feared John, because he...
Possible reasons for non-nativelike L2 processing:

• Lack of L2 grammatical knowledge

• L1 influence

• Difficulty deploying L2 grammatical knowledge in real time
  - different constraint weightings
  - different constraint timing
  - decoding problems, slow processing speed, resource limitations
Research Questions

- Are constraints on pronoun interpretation difficult to learn for non-natives?

- Do non-native comprehenders process pronominal elements in the same way as natives?

=> Traditional research methods are insufficient to answer these questions.
**Method:** eye-monitoring during reading

**Design:** 2 potential antecedents, +/-gender compatible

**Participants:** L1 English, L1 German/L2 English speakers, intermediate to advanced, late adult L2 learners of English

*Helen has worked at the army hospital for years. She noticed that the soldier had wounded **himself** while on duty in the Far East.*

*Felser & Cunnings (2012), Applied Psycholinguistics*
Study 1: Reflexives (English)

**Method:** eye-monitoring during reading with offline comprehension questions randomly interspersed between trials.

**Design:** 2 potential antecedents, +/-gender compatible

**Participants:** L1 English, L1 German/L2 English speakers

*Helen has worked at the army hospital for years. She noticed that the soldier had wounded himself while on duty in the Far East.*

*Helen has worked at the army hospital for years. She noticed that the soldier had wounded herself while on duty in the Far East.*
Mini Infrared cameras record eye movements.

Helen has worked at the army hospital for years. She noticed that the soldier had wounded himself while on duty in the Far East.
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Eyetracking during reading

- Longer reading times signal processing difficulties
- Regressive eye movements & rereading times as well

Helen has worked at the army hospital for years. She noticed that the soldier had wounded himself while on duty in the Far East.
# Study 1: Reflexives

**Offline antecedent choices**

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<thead>
<tr>
<th></th>
<th>English Natives</th>
<th>German Learners</th>
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<tbody>
<tr>
<td></td>
<td>Single Match</td>
<td>Double Match</td>
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<tr>
<td>Sue–John–himself</td>
<td></td>
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<tr>
<td><strong>Exp. 1</strong></td>
<td></td>
<td></td>
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<tr>
<td>100</td>
<td><strong>98</strong></td>
<td>100</td>
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<tr>
<td>(0)</td>
<td>(7)</td>
<td>(0)</td>
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<tr>
<td><strong>Exp. 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td><strong>99</strong></td>
<td><strong>99</strong></td>
</tr>
<tr>
<td>(0)</td>
<td>(5)</td>
<td>(3)</td>
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Eyetracking Results:

English L1 native speakers show processing difficulties if the correct antecedent has the "wrong" stereotypical gender:

Helen has worked at the army hospital for years. She noticed that the soldier had wounded herself while on duty in the Far East.

Gender of the distractor has no effect:

Helen has worked at the army hospital for years. She noticed that the soldier had wounded himself while on duty in the Far East.
Eyetracking Results:

L2 speakers show processing difficulties if the distractor has the wrong gender:

\emph{Helen} has worked at the army hospital for years. \emph{She} noticed that \emph{the soldier} had wounded \emph{himself} while on duty in the Far East.

Gender conflict with the correct antecedent is only noticed later:

\emph{Helen} has worked at the army hospital for years. \emph{She} noticed that \emph{the soldier} had wounded \emph{herself} while on duty in the Far East.
Study 1: Reflexives (English)

First Fixation durations, reflexive pronoun

- A gender effect for the correct antecedent
- A gender effect for the incorrect antecedent

Graphs showing fixation durations for reflexive pronouns in L1 and L2.
Study 1: Reflexives (English)

Rereading times, reflexive pronoun

- A gender effect for the correct antecedent
- A gender effect for the correct antecedent
- Interaktion

L1

L2

the soldier ...herself
Study 1: Reflexives (English)

Eyetracking Results:

Native speakers identify the correct antecedent immediately and without detours.

Non-native speakers first consider the (incorrect) distractor

→ Application of syntactic constraints is delayed in L2 processing.

→ Discourse prominence of potential antecedents determines first attempt of pronoun interpretation in the L2.
...although same ("binding principle A") holds for German:

*Peter bemerkte, dass der *Soldat* sich verletzt hatte.*

=> The L1/L2 differences are NOT due L1 transfer!
Online application of syntactically-based constraints easy and direct for native speakers, not so for adult foreign language learners.

L2 processing is more affected by discourse information than L1 processing.

No evidence for L1 influence on real time processing of pronominal elements.
The sooner, the better?

Studying speakers of the bilingual (Turkish and German) language community in Berlin:
Turkish born
German learnt at different ages, some in later childhood (kindergarten or elementary school), some from birth, some as adolescents or adults

→ How does age-of-acquisition influence grammatical processing skills in German?
Two morphological phenomena of German

1. Participles
Regular participles with -t
kaufen – gekauft, verkaufen- verkauft

2. Deverbal nominalisations with -ung
reinigen – Reinigung

Clahsen, H. & J. Veríssimo (2016). Linguistic Approaches to Bilingualism
Study 2: Morphology in language comprehension

➢ How are morphologically complex words processed in real time?
➢ Are derived and inflected words broken down into their morphological components during language comprehension?
➢ How are these forms represented in lexical memory?
Morphological Priming in the L1

- **Repetition Priming:**
  
  kaufe $\rightarrow$ kaufe $<$ schweige $\rightarrow$ kaufe  
  reinige $\rightarrow$ reinige $<$ schreibe $\rightarrow$ reinige

- **Morphological Priming:**
  
  gekauft $\rightarrow$ kaufe $<$ schweige $\rightarrow$ kaufe $\cong$/ $\rightarrow$ kaufe  
  Reinigung $\rightarrow$ reinige $<$ schreibe $\rightarrow$ reinige $\cong$/ $\rightarrow$ reinige

Complex words are segmented into their morphological component parts online thereby facilitating the recognition of a subsequent word form with the same root/stem:

ge-[kauf]-t $\rightarrow$ [kauf]-e  
[Reinig]-ung $\rightarrow$ [reinig]-e
How does age of onset of acquisition affect grammatical processing skills in German?

(a) ‘The earlier, the better’
(b) ‘Great until age X’, thereafter it gets worse.’
(c) ‘The earlier, the better’, until a certain critical age.
Masked Priming
Maskiertes Priming

Diagramm: Bei der Maskierten Priming-Experimente wird ein Maskenwort (z.B. "boiled") nach einem kurzen Primewort (z.B. "BOIL") gezeigt. Der Versuchsperson wird die Aufgabe gestellt, das Maskenwort zu benennen. Der zeitliche Abstand zwischen Primewort und Maskenwort kann variiert werden (z.B. 60 ms).
Results

![Graph showing the relationship between priming and age of acquisition for two different derivation types: -ung and -t participles. The graph illustrates a decline in priming as the age of acquisition increases, with the -ung derivation showing a steeper decline compared to the -t participles.](attachment:image.png)
Modularity of language: effects of age of acquisition are subtle and selective.

The same is true for L1/L2 differences in morphological processing: derivation as in L1, inflection not.

Sensitive period offers an opportunity of learning a language like an L1 up to age 6/7.
1. Multilingualism is an asset to an individual’s life.

2. If possible one should take advantage of sensitive periods of language development.

3. Multilingual education promotes multilingualism and does not necessarily lead to higher intelligence or a longer life.