Case marking affects the processing of animacy with simple verbs, but not particle verbs

An event-related potential study

Anna Czyptionka & Carsten Eulitz
The parser prefers canonically transitive sentences: Sentences with animate subjects and inanimate objects.

Sentences with two animate arguments cause higher processing costs than canonically transitive ones.

In comprehension:
• Longer reading times (Trueswell et al., 1994),
• different activation patterns (Grewe et al., 2007)
• ERP deflections (Weckerly & Kutas, 1999; Frisch & Schlesewsky, 2001) – mostly negativities à la N400

In production:
• Preference for animate arguments in early and syntactically prominent positions (e.g., Bock & Warren 1985; Prat-Sala & Branigan 2000)
German two-place verbs come with canonical or noncanonical case marking.

- **NOM-ACC verbs**: canonical / structural case

- **NOM-DAT verbs**: noncanonical / lexical case!

NOM-DAT verbs have **noncanonically transitive semantics**:

Distribution of semantic properties does not match the Agent-Patient distribution, often: objects are more agentive.

(Dowty, 1990; Blume, 2000; Meinunger, 2007; Grimm, 2010)
Different kinds of verbs 1: Case marking

In processing:

• Noncanonical NOM-DAT verbs cause higher processing costs than canonical NOM-ACC verbs. (Hopf et al. 1998, Bader et al., 2000)

• Noncanonically transitive verbs come with different unmarked word orders; no OS garden-path for NOM-DAT verbs (Cuppes, 2002; Bornkessel et al., 2004)

General pattern:

• Reassigning dative instead of a structural case causes N400 (not a P600)

• **Animacy effects are weaker for NOM-DAT verbs than for NOM-ACC verbs!** (Czypionka, 2014)
Case marking in sentence comprehension

Where do case marking effects in comprehension come from?

My favourite suggestion: Two different processes (Bayer, Bader and Meng 2001; Bader, Meng and Bayer 2000):

• Revision of syntactic structure (additional layer for NOM-DAT)
• Lexical reaccess to the lexical entry of the object to check for dative morphology
Animacy effects with different verbs

Animacy effects are weaker for NOM-DAT than for NOM-ACC verbs.

Why?

• **Semantic processing:**

  The noncanonically transitive semantics of dative verbs fit better with animate objects.

• **Syntactic processing:**

  The animacy effect is partly masked by the effects of case marking with dative verbs (additional layer; lexical reaccess)

Is there a way to distinguish?

... this is where particle verbs are useful.
Different kinds of verbs 2: Simple and particle verbs

Another way to distinguish German verbs:

- **simple verbs** (non-separable): *folgen* (to follow)
- **particle verbs**, (separable), consisting of a **particle** and a **base**: *nachlaufen* (after-run = to run after)

The connection between case marking and argument semantics is the same in simple and particle verbs:

- Particle verbs: NOM-ACC and NOM-DAT
- Noncanonical case marking ~ noncanonical argument semantics: This is the same for simple and particle verbs (Meinunger, 2007).
Syntax of simple and particle verbs

Simple verbs
NOM-ACC: Standard structure (depending on framework)
NOM-DAT: Standard structure + something

Particle verbs:
We need a special projection for the separable particle.
Particle NOM-ACC and NOM-DAT verbs should be less different from each other than simple NOM-ACC and NOM-DAT verbs.
Simple and particle verbs, again:

<table>
<thead>
<tr>
<th>Simple verbs</th>
<th>Particle verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOM-ACC and NOM-DAT</td>
<td>NOM-ACC and NOM-DAT</td>
</tr>
<tr>
<td>• Different semantics</td>
<td>• Different semantics</td>
</tr>
<tr>
<td>• DAT needs lexical reaccess to object</td>
<td>• DAT needs lexical reaccess to object?</td>
</tr>
<tr>
<td>• Different syntax</td>
<td>• Syntax not that different</td>
</tr>
</tbody>
</table>

Case marking effects in simple verbs could reflect lexical, syntactic and semantic differences.

Case marking effects in particle verbs should only reflect semantic and perhaps lexical differences.
New question

Why is the effect of object animacy weaker for dative verbs than for accusative verbs?

Will this modulation of the animacy effect work for both simple and particle verbs?

Hypothesis:

• If the lack of an ANIMACY effect for NOM-DAT verbs has semantic or lexical reasons, we expect ANIMACY*CASE with simple and particle verbs.

• If the lack of an ANIMACY effect for NOM-DAT verbs has syntactic reasons, we expect ANIMACY*CASE with simple verbs, but not with particle verbs.
Methods & Procedure

Two EEG sentence comprehension studies

Within-subjects factors: ANIMACY (inanimate or animate objects)
CASE (NOM-ACC or NOM-DAT)

Between-subjects factors: PARTICLE (verbs with or without separable particles)

36 critical sentence quartets for both studies = 144 critical sentences + 72 fillers

**Simple verbs:** 22 accusative verbs, 16 dative verbs
23 participants, 21 in final analysis = more than 20 segments

**Particle verbs:** 25 accusative verbs, 21 dative verbs
25 participants, 21 in final analysis = more than 20 segments
Stimulus set Experiment 1: Simple verbs

inanimate object, NOM-ACC verb (inanim-acc):

dass Ärztinnen Krankenakten durchaus verstehen, und ...
that doctor.FEM.PL(.NOM) sick-file.PL(.ACC) indeed understand, and ...
`Gerd says that doctors indeed understand medical files, and Monika says so, too.´

animate object, NOM-ACC verb (anim-acc):

... Ärztinnen Krankenschwestern durchaus verstehen, ...
... doctor.FEM.PL(.NOM) sick-sister.PL(.ACC) indeed understand, ...
`... doctors indeed understand nurses, ...´

inanimate object, NOM-DAT verb (inanim-dat):

... Ärztinnen Krankenakten durchaus vertrauen, ...
... doctor.FEM.PL(.NOM) sick-file.PL(.DAT) indeed trust, ...
`... doctors indeed trust medical files, ...´

animate object, NOM-DAT verb (anim-dat):

... Ärztinnen Krankenschwestern durchaus vertrauen, ...
... doctor.FEM.PL(.NOM) sick-sister.PL(.DAT) indeed trust, ...
`... doctors indeed trust nurses, ...´
Stimulus set Experiment 2: Particle verbs

**inanimate object, NOM-ACC verb (inanim-acc):**

... dass Banditen Postkutschen manchmal ausrauben, ...
... that bandit.PL(NOM) post-carriage.PL(ACC) sometimes rob, ...
`... that bandits sometimes rob stagecoaches.´

**animate object, NOM-ACC verb (anim-acc):**

... dass Banditen Postboten manchmal ausrauben, ...
... that bandit.PL(NOM) post-messenger.PL(ACC) sometimes rob, ...
`... that bandits sometimes rob mailmen.´

**inanimate object, NOM-DAT verb (inanim-dat):**

... dass Banditen Postkutschen manchmal auflauern, ...
... that bandit.PL(NOM) post-carriage.PL(DAT) sometimes waylay, ...
`... that bandits sometimes ambush stagecoaches.´

**animate object, NOM-DAT verb (anim-dat):**

... dass Banditen Postboten manchmal auflauern, ...
... that bandit.PL(NOM) post-messenger.PL(DAT) sometimes waylay, ...
`... that bandits sometimes ambush mailmen.´
Results – very short version

Case marking effects for simple verbs, no case marking effects for particle verbs.
Interaction of object animacy and Case marking for simple verbs, not for particle verbs.

Simple verbs:

400-600 ms: ANIMACY effects for NOM-ACC, no or very weak ANIMACY effects for NOM-DAT.
1400-1700 ms: main effect CASE

Particle verbs:

400-600 ms: Small main effect of ANIMACY for both NOM-ACC and NOM-DAT verbs.
400-600 ms: Mapping views, animate-inanimate

**simple verbs**

**NOM-ACC**

**NOM-DAT**

**particle verbs**

**NOM-ACC**

**NOM-DAT**

**NOM-ACC**: ANIMACY effects

**NOM-DAT**: no object animacy effects

**NOM-ACC**: ANIMACY

**NOM-DAT**: ANIMACY
400-600 ms: Mean voltages in ROIs

Simple verbs

Particle verbs
400-600 ms: Simple verbs, selected sites

simple verbs

particle verbs

NOM-ACC

NOM-DAT

NOM-ACC

NOM-DAT

DGfS 2016 Konstanz, AG 2, A. Czyponka & C. Eulitz
400-600 ms: ANIMACY, simple accusative verbs

Two graphs are shown, each representing different conditions:

- **Left Graph**
  - Title: FCz
  - Y-axis: µV
  - X-axis: ms
  - Legend:
    - Blue solid line: inanimate-accusative
    - Red solid line: animate-accusative

- **Right Graph**
  - Title: FCz
  - Y-axis: µV
  - X-axis: ms
  - Legend:
    - Blue dashed line: inanimate-dative
    - Red dashed line: animate-dative
400-600 ms: ANIMACY, simple accusative verbs
400-600 ms: no ANIMACY, simple dative verbs
400-600 ms: Interaction ANIMACY*CASE, simple verbs
400-600 ms: Particle verbs, selected sites

simple verbs

particle verbs

NOM-ACC

NOM-ACC

NOM-DAT

NOM-DAT

0.5 µV

0.5 µV

DGfS 2016 Konstanz, AG 2, A. Czypionka & C. Eulitz
400-600 ms: ANIMACY, accusative particle verbs
400-600 ms: ANIMACY, dative particle verbs

DGfS 2016 Konstanz, AG 2, A. Czypionka & C. Eulitz
400-600 ms: ANIMACY, all particle verbs
1400-1700 ms: Mapping views, DAT-ACC

**simple verbs**
- inanimate
- animate

**particle verbs**
- inanimate
- animate

Main effect CASE, most visible in left-anterior sites

No main effect CASE
1400-1700 ms: Mean voltages in ROIs

Simple verbs

Particle verbs

DGfS 2016 Konstanz, AG 2, A. Czyzponka & C. Eulitz
1400-1700 ms: Mapping views, DAT-ACC

simple verbs

particle verbs

-0,5 µV

0,5 µV

main effect CASE, most visible in left-anterior sites

no main effect CASE

DGfS 2016 Konstanz, AG 2, A. Czypionka & C. Eulitz
1400-1700 ms: CASE, simple verbs, inanimate
1400-1700 ms: CASE, simple verbs, animate
1400-1700 ms: CASE, all simple verbs
1400-1700 ms: no CASE, all particle verbs
Results, all verbs

Simple verbs:

ANIMACY for NOM-ACC, no ANIMACY for NOM-DAT

400-600 ms, interaction ANIMACY*CASE (most visible on central sites)
1400-1700, CASE (most visible in left-anterior sites)

Particle verbs:

small ANIMACY effect for both NOM-ACC and NOM-DAT

400-600 ms, interaction ANIMACY*ROI, ANIMACY most visible in left-anterior sites
1400-1700, no CASE
Conclusion 1

Case marking influences the processing of object animacy in sentences with simple verbs, but not with particle verbs.

• **This does not fit the semantic explanation:**
  The semantic differences between accusative and dative verbs should be the same, no matter if they are simple or particle verbs.

• **This supports the syntactic explanation:**
  The ANIMACY effect for simple dative verbs is overridden by the processing of syntactic and lexical differences between simple accusative and simple dative verbs.

The modulation of the object animacy effect in simple verbs reflects syntactic processing.
Conclusion 2

So far, we have not found any case marking effects for particle verbs.

Case marking effects for simple verbs are different from the ones described in the literature; no N400.

- Case marking effects likely reflect additional syntactic processing; not semantics.
- We should re-evaluate the role of lexical access to the object.
Questions

• What is the role of complex word recognition in the sentence context?

• Is lexical reaccess to the object position necessary for NOM-DAT particle verbs only, or is it also necessary for NOM-ACC particle verbs?

• How is lexical case processed?

  Which substeps does the parser perform, apart from the rebuilding of the syntactic representation, once a NOM-DAT verb is encountered?

  Would this apply universally to all case-marking languages?
Thank you!

and many thanks to

Oleksiy Bobrov, Mariya Kharaman, Juliane Thoran, Thi Xuan Mai Truongh, Lucia Kiduma, Sarah Schmid

Josef Bayer and the Constance Syntax Colloquium 2014-2016
References