„Backward“ Binding as a Psych effect

A binding Illusion?

Anne Temme & Elisabeth Verhoeven
Humboldt-Universität zu Berlin

Berlin-Stuttgart meeting on Psych verbs - November 21, 2014

Contents

Main goal: Provide experimental evidence for exceptional EXP-Binding in German

1. Backward Binding: Psych effect or binding illusion?
2. Backward Binding Experiment: Method & Material
3. Results, Conclusion & Outlook

1. Backward Binding: Psych effect or binding illusion?

Backward Binding as a Psych effect

What is a psych effect and how is it special?

- triggered by exceptional properties of non-agentive experiencer object structures; leads to behavior that violates grammatical rules

- occur in a large number of languages
& affect central phenomena of grammar (e.g., islandhood, word oder or control)
& violate specific rules in several languages (i.e. clitic doubling and genitive of negation) (see Landau 2010 for an overview of core and peripheral psych effects)

➡ Assumption:
experiential/mental domain is grammatically relevant;
[exp] is a relevant grammatical feature of verb meaning

Backward Binding as a Psych effect

Psych effects are restricted to a special subclass of EO verbs

- Reinhart 2001: Some subjects in EO structures are ambiguous between Causer and Subject Matter (SM) interpretation > psych effects only with SM subjects

- Arad 1998: Some EO structures vary between eventive vs. stative reading > psych effects only with stative reading

- different types of EO_{ACC} verbs/class II psych verbs

  - stative EO_{ACC} verbs: no agentive reading - *depress, worry*; German: *interessieren, bedrücken*

  - „labile“ EO_{ACC} verbs: alternate between agentive & non-agentive reading - *shock, annoy*; German: *ärgern, nerven, stören*

Backward Binding as a Psych effect

Backward Binding (BB) violates basic principles of Binding Theory

- B&R (1988) - Backward Binding (**BB**) with Italian EO verbs:
  "*Perhaps the most notorious puzzle raised by psych-verbs of the preoccupare class [class II psych verbs] is their anomalous behavior with respect to the theory of Binding.*"

(1) *Questi pettegolezzi su di* ***sé$_i$*** *preoccupano* ***Gianni$_i$*** *piú di ogni altra cosa.*
'These gossips about himself worry Gianni more than anything else.'

(2) **Questi pettegolezzi su di* ***sé$_i$*** *descrivono* ***Gianni$_i$*** *meglio di ogni biografia ufficiale.*
'These gossips about himself describe Gianni better than any official biography.'

- Principle A (Binding Theory; BT):
  local c-command requirement for syntactic binding of anaphors

Backward Binding as a Psych effect

EO verbs seem to have special syntactic or discourse properties

- How/Why is there a potential psych effect? It is argued that EO-Antecedents are subject/topics of a clause either syntactically or semantically & subjects are suitable binders.

  - Finer-grained syntax:
    EXP-BB is derived backward binding: EXP-antecedent semantically binds from its base position (B&R 1988, Pesetsky 1987, 1995) (theta-grid [EXP, TH]; case grid [ACC, —])

  - Finer-grained semantics:
    Thematic hierarchy/ aspectual prominence/inherent topicality of the participants
    (Jackendoff 1972, E. Grimshaw 1990, Kiss 2002, among others)

  - One global solution:
    BB anaphors are logophoric anaphors, which do not require c-command
    (Broccias 1997)

Backward Binding as a Psych effect

BB effects provide evidence for the special syntax of EO verbs

- BB in OE structures seems to violate Principle A of BT

  (3) [*Pictures of each other*$_i$]$_{NOM}$ *worried*$_{EXP}$ [*the linguists*$_i$]$_{ACC}$.

- Nominative/„subject“ anaphors: the subject antecedent should be structurally reconstructable —> BB is derived & not base generated

  (4) a. *His$_i$ mother seems to everybody$_i$ to be the best.*
  b. *seems to everybody$_i$* [*his$_i$ mother to be the best*]

- BB with psych verbs not reconstructible (in a simple transitive analysis) —> apparently violates grammatical rule

- BB is documented cross-linguistically; e.g. Italian, English, Chinese, Hungarian, Japanese (among others)

→ BB structures are used for assumptions about the nature of psych structures

Backward Binding as a Psych effect

BB structures occur with different types of anaphors

(5) a. His_i health $worried_{EXP}$ $every\ patient_i$.
b. *His_i doctor $visited_{AG}$ $every\ patient_i$. (Reinhart 2001)

- Further & frequent structure types in the literature

(6) a. Each other's supporters $worried_{EXP}$ Freud and Jung.
b. Each other's remarks $annoyed_{EXP}$ John and Mary.
c. *Each other's parents $harmed_{AG}$ John and Mary.
d. *Each other's teachers $insulted_{AG}$ John and Mary.(Pesetsky 1987, 1995)

- Only reference and evaluation of BB as psych effect in German: Platzack 2009

(7) **Bilder voneinander beunruhigten die Linguisten.* (German)
'Pictures of each other worried the linguists.'

- German: In general, structures containing reflexives & reciprocals are odd, i.e. *die X von sich/voneinander*

Backward Binding as a binding illusion

Should we consider BB as indicator for the nature of psych verbs?

- Varying intuitions about the wellformedness of BB structures within and across languages

- Varying assumptions about the critical factors: verb type, subject type, animacy, volitionality, aspect, type of anaphor

- Picture-NP-anaphors/possessive reciprocals: problematic case - sensitive to pragmatic factors. > BT for true argument reflexives, but not for picture-NPs; analysis as logophors (i.e. bound or anaphoric pronouns) (Pollard & Sag 1992, Reinhart & Reuland 1993), experimental study on the coreferential reading of picture-NP-reflexives (Goldwater & Runner 2006)

  ➡ No stabile empirical observations as support for conclusions about the nature of psych verbs or the grammatical modeling (θ roles, EXP base generation)?

Backward Binding as a binding illusion

Empirical data is not adequately controlled for proper binding configurations

- Structures with locally backward bound possessives (Reinhart's examples)

(8) a. His children$_i$ visited the patient$_i$. *coreference, no c-command*
b. ??His$_i$ children visited every patient$_i$. *variable binding, c-command*

- The violation of the c-command requirement in the bound variable configuration in (8b) leads to WCO effects
- Coreferential interpretation with DPs in (8a) does not require c-command in order to be interpreted properly
- WCO effects are theoretically predicted for object antecedents binding subject anaphors
- Evidence for exceptional binding based on this kind of structure-type is only valid under pronominal variable binding: Psych effect => WCO tolerance

Backward Binding as a binding illusion

Generic operator potentially trivialize Q-Binders

- Bound variable interpretation of possessive pronouns requires coindexation to (inherently non-referring) quantifiers in order to guarantee an underlying binding configuration and covariation between binder and bindee.

(9) A guide ensures that every tour to Louvre is fun.
  a. *Yesterday, a guide ensured that every tour to Louvre is fun.*
  b. *In general, a guide ensures that every tour to Louvre is fun.*

„the generic operator leads to a trivialization of the universal so that each time a relevant portion of the world is considered, a single guide is involved in each situation of a tour to Louvre“ Fox & Sauerland (1996)

=> The quantifier cannot ensure semantic binding (existential, E-type)
=> We have coreference of pronouns even with presence of Q-Binder

Backward Binding as a binding illusion

Q-trivialization might underlie the BB structures

- OE-structures have derived subjects. The pronoun can be interpreted as bound variable (c-command fulfilled pre-derivational).

  (9) Yesterday, his_i health worried every $patient_i$. [his_i…[EXP…$Quant_i$ [~~his_i~~]]

- In agentive structures, the pronoun cannot get bound variable interpretation (c-command violation)

  (10) *Yesterday his_i doctor visited every $patient_i$. [his_i …AG … $Quant_i$]

- Referential NPs: The pronoun is coreferential with ‚Peter‘, (discourse binding; pragm.)

  (11)]*Yesterday, his_i mother visited $Peter_i$.* **D_i**] [his_i …AG …Peter]

- The pronoun is coreferential with the quantifier bound to the generic operator

  (12) Usually, his_i doctor visits every $patient_i$. GEN_i[his_i…AG…E-$Quant_i$]

Backward Binding as a binding illusion

We find similar interaction effects of A- and D-quantification with indefinites

- Indefinites are ambiguous in opaque contexts (Fodor & Sag 1982)

(13) a. *He wants to marry a woman.* (spec/non-spec)
b. *He married a woman.* (strong spec-interpretation)

- this is also possible for Qs: quantificational (Q-) vs. pronominal interpretation

(14) a. *Er könnte jede Frau anrufen*. (pron., E-type)
b. *Er hat jede Frau angerufen*. (Q)

Backward Binding as a binding illusion

Generic potential also varies with verb types and lexical information

„perhaps the best one can do is to assume that [existential] *readings and* [universal] *readings are both generally available, but certain sentences may strongly disfavour one of them due to specific properties of their meaning.“*
(…)
*„For a sentence like “**a student interviewed every professor**“, it is very hard or impossible to get the reading where every professor has wide scope over a student (in contrast with, e.g., "**a mechanic inspected every plane**“).*

Chierchia (1992)

—> factors like verb type (stage-level/individual-level) and subject type influence the generic potential of a structure.

—> Individual tendency to get access the generic reading of a structure

Backward Binding as a binding illusion

WCO effects occur under violation of syntactic or linear prominence rules

- WCO typology: two relevant conditions: syntactic and/or linear prominence (Bresnan 1998); English needs both, in German at least one condition must be fulfilled

(15) a. ✓…dass jeder$_{NOM}$ seine Mutter$_{ACC}$ mag. (syntactic & linear)
b. ✓…dass seine Mutter$_{ACC}$ jeder$_{NOM}$ mag. (syntactic)

'…that everyone likes his mother.'

c. ✓…dass jeden$_{ACC}$ seine Mutter$_{NOM}$ mag. (linear)
d. ✱…dass seine Mutter$_{NOM}$ jeden$_{ACC}$ mag. (neither)

'…that his mother likes everyone.'

2. Backward Binding Experiment: Method & Material

Hypotheses

Summary of the facts & resulting hypotheses

1. Psych effects affect central phenomena & occur cross-linguistically > indicates [exp]-relevance for grammatical component
2. „Backward“ binding in German is blocked by prohibition against WCO/ c-command violation WCO effects disappear under generic readings

H1: Genericity
Generic structures/opaque contexts license Backward „Binding“ (illusions) compared to particular/transparent contexts.

H2: Verb type
EO structures with SM subjects license Backward Binding compared to agentive structures.

Method

We conducted a simple pre-study in order to verify material and method

- Absolute binary judgments (y/n grammaticality task): primarily qualitative (output-related)Featherston 2005 but proportions reveal quantitative results (well-formedness)
  Bader & Häussler 2010

- 12 target items, additional control and filler items

- 27 test subjects (3 randomized lists): age ⌀ 28,5; 54% female

- 2x2 factorial design: ASPECT (particular, generic)
  VERBTYPE (agentive, experiencer)

- Web-based questionnaire, software: OnExp 1.3 (GAU Göttingen), unpaid, 15 mins

- Data analysis: obtain non-numerical data; Mixed effect Logistic regression using R version 3.1.0 ; glmer{lme4}

Material: Binder-QPs

Consider restrictor-less universal quantifiers for a proper binding configuration

- Quantified expressions (Q+restrictor) potentially relate to discourse referents: *every professor*

- Non-distributive universal quantifiers also show potential topicality, i.e., in German *alle*

(16) *Der Unfall hat alle schockiert.*
=the accident has all shocked

- Universal distributive bare quantifiers as binder, i.e. In German *jed-e(r)*, *kein-e(r)*

(17) *Der Unfall hat jeden schockiert.*
=the accident has everyone shocked

Material: Sentence aspect

Sentence aspect can be specified with explicit operators such as adverbials

Generic reading: trigger E-type reading of the universal Q

- Q-Adv.: introduce explicit generic operators
- Tense: Present tense (preferred for generic interpretations)

  In general, his_i health worries everyone.

- Additional opacity operator licensed by periphrastic subjunctive, e.g., *would*, *may*, *should*

  In general, his health might worry everyone.

Particular reading: ensure proper binding configuration

- Temporal Adverbials **&** Past tense

  Yesterday his_i health worried $everyone_i$.

Material: Verb type

EO verbs and agentive verbs are the most opposite pair of verb classes

EO verbs:

- Accusative experiencers (B&R's, Class II): $\text{Theme}_{\text{NOM}}$ - $\text{Experiencer}_{\text{ACC}}$
- non-causative interpretation (cf. Subject type)

Agentive verbs:

- Uncontroversial regarding backward binding (also in accounts of BB as peripheral psych effect)
- canonical transitives: $\text{Agent}_{\text{NOM}}$ - $\text{Patient}_{\text{ACC}}$

  begrüßen (‘greet‘), *beraten* (‘advise‘), *kritisieren* (‘criticize‘), *überprüfen* (‘check‘), *hänseln* (‘tease‘), *besuchen* (‘visit‘), *schlagen* (‘hit‘), *untersuchen* (‘examine‘), *unterstützen* (‘support‘), *umarmen* (‘hug‘), *anrufen* (‘call‘), *ausfragen* (‘interrogate‘)
- agent vs. causer: stative passive test *ist besucht/*ist umarmt/*ist angerufen (…)

Causative verbs are controversial and won't be considered for now

Material: Subject matter

We can identify SM-subjects by primary choice of prepositions by_{CAU} **vs.** $about_{SM}$

(18) a. *Her*$_i$ *health*$_{SM}$ *worried Lucie*$_i$.
= easiest: health is subject matter of Lucie's worry

b. *??The doctor's letter*$_C$ *worried Lucie.*
= cause construal is more natural: letter causes worry about something else

- SubjectExperiencer versions with *about*-PPs represent subject-matter subjects (Pesetsky 1995)
  Lucie worries about the doctor's letter. (subject-matter-only)

- Corresponding prepositions in German are VON vs. ÜBER

Assumption 1: For some verbs, the SM- or C-option is pre-determined. VON-selecting verbs do not license subject matter subjects

Assumption 2: The subjects of EO verbs predominantly selecting ÜBER-PPs in their SE-paraphrase prevents C-interpretations of the subjects

Material: Subject matter

Choose *about*-selecting verbs as EO subclass to ensure subject matter selection

- Observation: 3 Classes of EO verbs in German with a strong tendency to select one over the other or both:

  PP-Class I: VON-selecting EO verbs
  *(ist) angewidert von/*über, provoziert von/*über, genervt von/*über*

  PP-Class II: ÜBER-selecting EO verbs
  *(ist) beunruhigt *von/über, verärgert *von/über, amüsiert *von/über*

  PP-Class III: Verbs selecting both
  (ist) enttäuscht von/über, erschrocken von/über, begeistert von/über

- We chose PP-Class II and some PP-Class III verbs for the items:
  deprimieren, verärgern, entsetzen, betrüben, verwundern, erstaunen, erfreuen, schockieren, amüsieren, bestürzen, empören, beunruhigen

Material: Animacy

Animacy naturally varies with verb types: How can we control for it?

- Agents are restricted to animate individuals (volitionality featured);
- Subject matters of EO structures are best encoded with inanimate subjects. "Animate" individuals represent actions/properties, as in *The doctor worried Lucie*.

Assumption 1: Direct adjustment of animacy by animate NPs causes differences with respect to processing cost and plausibility.

Assumption 2: Triggering salience of animate contributors more indirectly will „conceptually align" agentive and experiential structures.

- We implement explicit existence of individuals by complex possessor noun phrases containing individual-related abstract nouns and animate posessors
  the opinions of his father, *the statements of his friends,* *the wishes of his wife*
- We adjust agentive structures with respect to complexity.
  the colleagues of his father, *the parents of his friends,* *the friends of his wife*

Material: Target items

The items vary in verb type and sentence aspect

- Items contain verbs according to the VERBCLASS values: agentive [agt] and experiential [exp]
- and inducing ASPECT according to the values particular [par] and generic [gen]

[agt, par]: *Gestern haben die Eltern **seiner** Freunde **jeden** begrüßt.*
'Yesterday, the parents of his friends welcomed everybody.'

[exp, par]: *Gestern haben die Aussagen **seiner** Freunde **jeden** deprimiert.*
'Yesterday, the statements of his friends depressed everybody.'

[agt, gen]: *Im Allgemeinen würden die Eltern **seiner** Freunde **jeden** begrüßen.*
'In general, the parents of his friends would welcome everybody.'

[exp, gen]: *Im Allgemeinen können die Aussagen **seiner** Freunde **jeden** deprimieren.*
'In general, the statements of his friends would depress everybody.'

Material: Control items

Control items ensure that target structures theoretically have binding potential

- Type 1: backward referential: same structure, but referential „Binder“ instead of QP (high „yes“ rate expected)

  *Heute haben die Kollegen **seiner** Abteilung **Robert** besucht.*
  =today have the colleagues of his$_i$ department Robert$_i$ visited
  'Today, the colleagues of his department visited Robert.'

- Type 2: forward passives: same material but structure enables forward binding (high „yes“ rate expected)

  *Heute wurde **jeder** von dem Leiter **seiner** Abteilung besucht.*
  =today was everybody$_i$ of the manager of his$_i$ department visited
  'Today, everybody was visited by the manager of his department.'

Material: Filler items

Filler items must fit the experimental conditions of two marked elements

- Type 1: principle B violation (satisfy „no“-votings)

  *Am Tag zuvor hat **er** den **Bürgermeister** angesprochen.*
  =the day before has he the mayor spoke-to
  'The day before, he_i spoke the $mayor._i$'

- Type 2: embedded representative/individual (mid-type filler item)

  *Die Daten von **ihm** hat **Klaus** angefordert.*
  =the data of him_i has $Klaus_i$ ordered-up

- Type 3: embedded benefactive (mid-type filler item)

  *Das Formular für **ihn** konnte **der Vater** abholen.*
  =the printed form for him_i could the $father_i$ collect

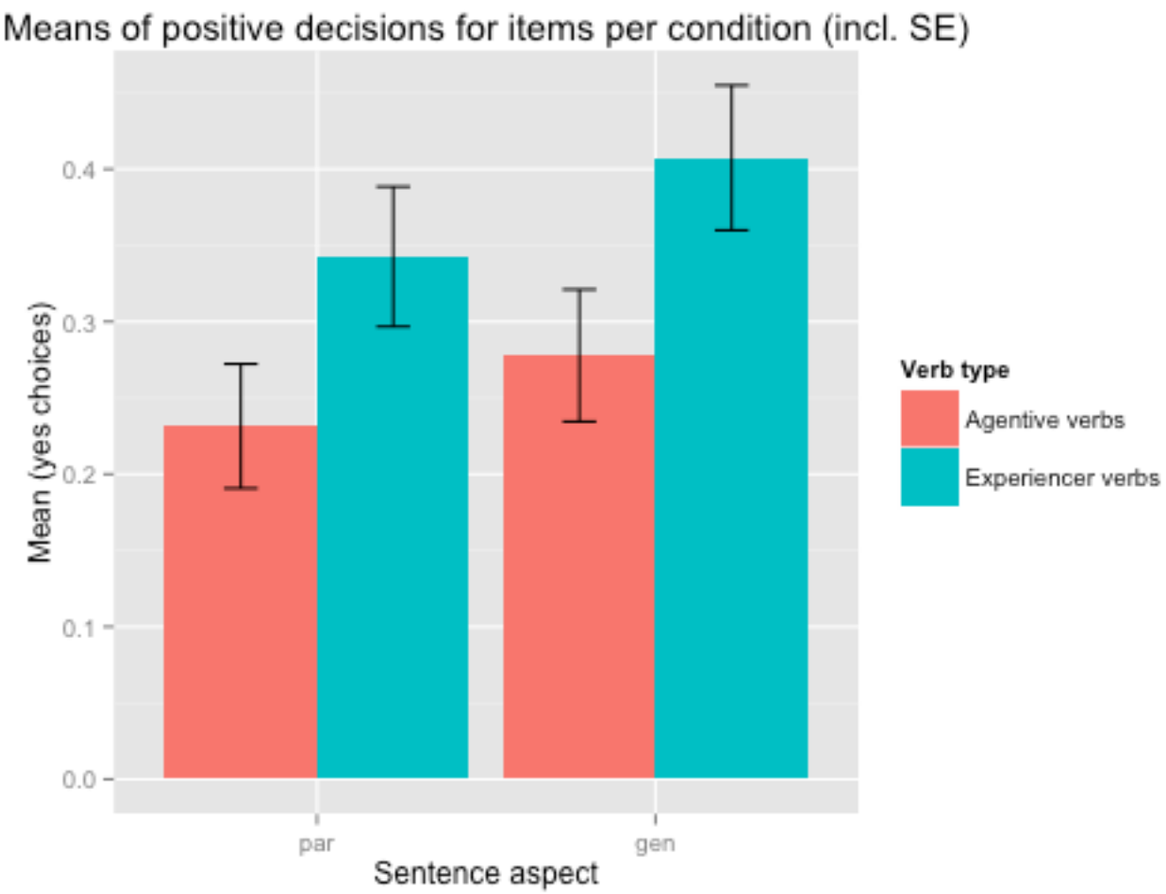
3. Results, Conclusion & Outlook

Results

Experiencer verbs and generic sentence aspect increase acceptability rates

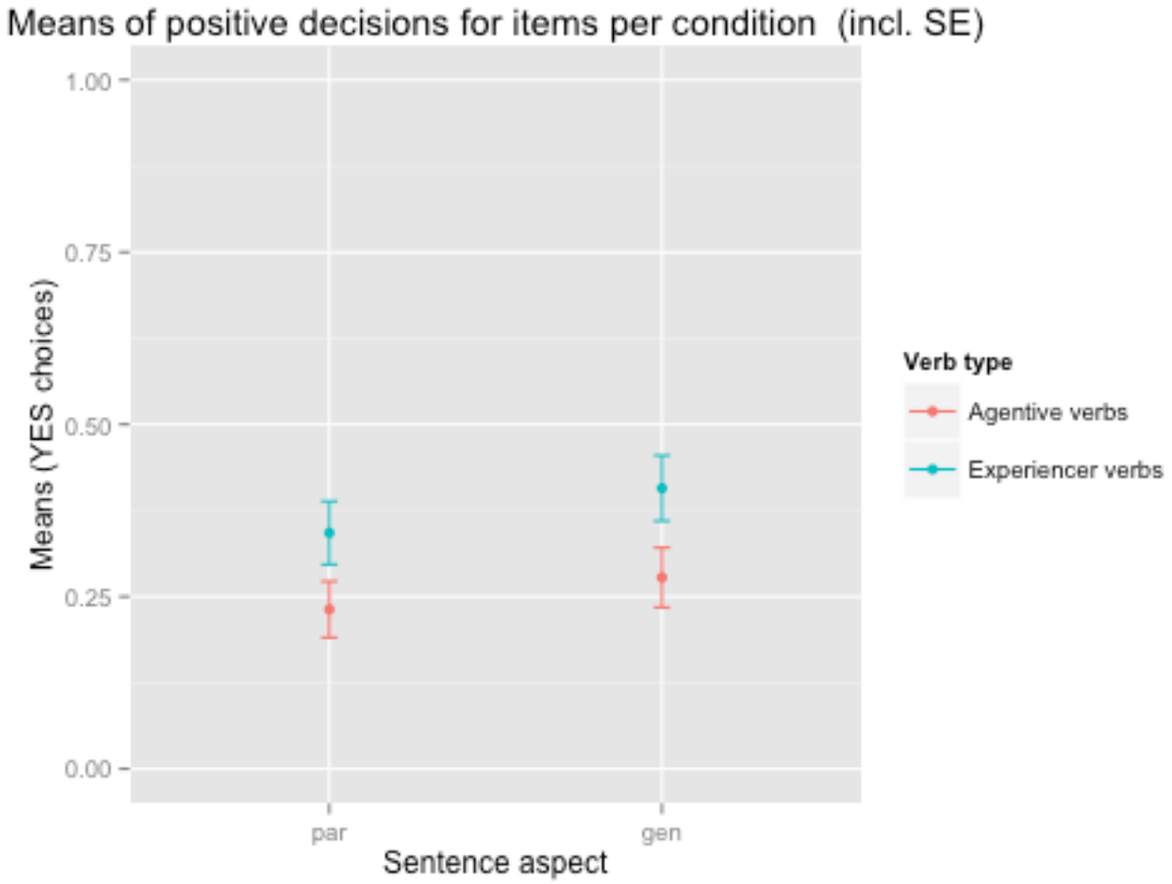
- Grand mean: **y≈31%** n≈69%
- Means per condition:

YES	VERB **AG**	VERB **EXP**
ASPECT **PAR**	.23	.34
ASPECT **GEN**	.28	.41



Results

Experiencer verbs significantly increase likelihood of yes-decisions



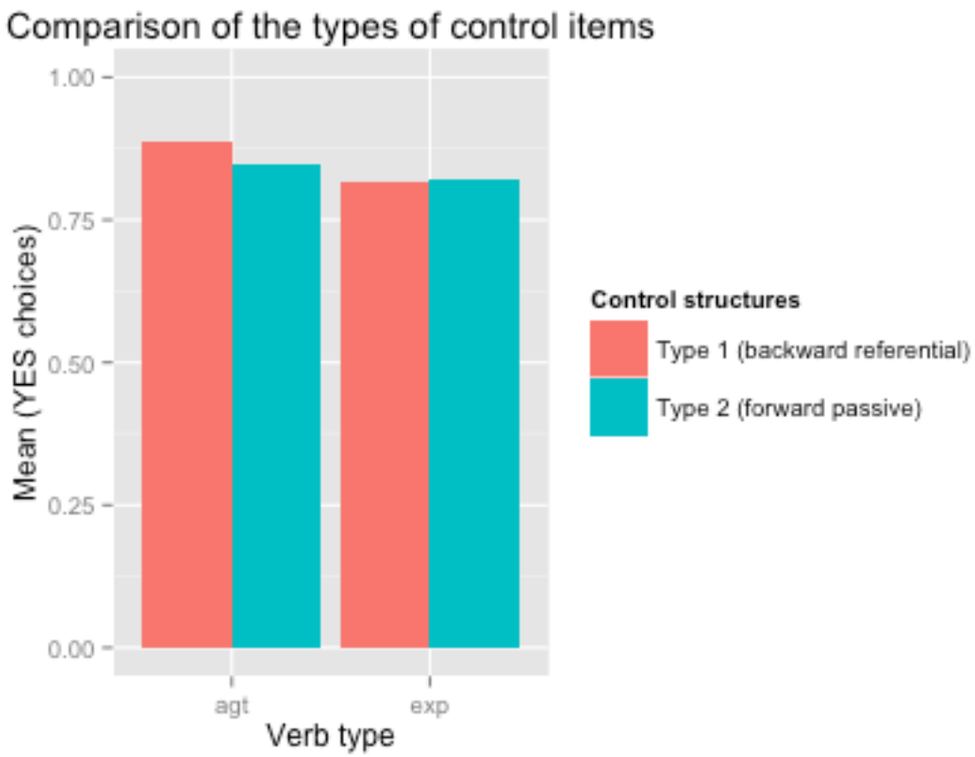
FACTOR	Estim.	p
(Int.)	-2.9338	0.0004
ASPECT=gen	0.5656	0.068 .
VERBTYPE=exp	1.2118	0.0001***

grammaticality~verb type+aspect+(1|subject)+(1|item)

Results

Control item rates show that target item structure is unproblematic

- Type 1: backward referential (proper name) (40 obs)
  Heute haben die Kollegen seiner$_i$ *Abteilung Robert*$_i$ *besucht.*
  'Today, the colleagues of his department visited Robert.'
- Type 2: forward passive (Q-Subject) (40 obs)
  Heute wurde jeder$_i$ *von dem Leiter seiner*$_i$ *Abteilung besucht.*
  'Today, everyone has been visited by the manager of his department.'



Conclusion

- H1: Higher acceptability rates for generic structures, but no solid evidence for gen/opaque contexts licensing backward „binding“ (illusions)

  - ➤ effect narrowly missed p<.05
  - ➤ depends on E-type reading of the Q-Binder - individual differences!

- H2: EO structures (with SM subjects) seem to license backward binding compared to agentive structures.

  - ➤ evidence for psych effect
  - ➤ 34% positive decision for [exp, par]: weak acceptance rate for backward binding (vs. 85% backward coreference & forward binding [exp, par])
  - ➤ WCO tolerance based on other properties than designated argument structure of EO verbs

Backward Binding of EO verbs are effects in the domain of non-wellformedness

Outlook

Pre-study reveals solid methodological base for follow-up studies

- Test other **verb types**:
  1. Is BB a peripheral Psych effect? (see assumptions about causatives)
  2. Some causatives also exhibit varying theta structures

von vs. *über*: Causer vs. Subject Matter

von vs. *durch*: Causer vs. Source

+ Test different subject types for EXP (subject matter hypothesis)

„*…that backward binding is licensed by the causative nature of the construction rather than its psych properties.*“ (Landau 2010)

- Test **datives**: argued to show much stronger effects (evidence for word order psych effects in German; corpus study Bader and Häussler 2010b/forced choice study Temme & Verhoeven (subm)) 36% y for EXP_{ACC} in particular contexts

Outlook

- Test different **languages**
- Test type of Q and of anaphor-NP to contribute research about binding configurations for locally bound possessives, binding illusions and topicality potential of Qs
- Test type of verbs under aspect-driven classification (no direkt link between SM-subject licensing and potential agentivity)

There's still a lot to be done!

Thank you!

References

Arad 1998. Psych-notes.

Bader & Häussler 2010. Toward a model of grammaticality judgments.

Bader & Häussler 2010b. Word order in German: A corpus study.

Belletti & Rizzi 1988. Psych-verbs and Θ-Theory.

Bresnan 1998. Morphology Competes with Syntax: Explaining Typological Variation in Weak Crossover Effects.

Broccias 1997. Binding Theory and Its Consequences for Minimalist Syntax

Chierchia 1992. Anaphora and Dynamic Binding. Linguistics and Philosophy

Featherston 2005 The Decathlon Model of empirical syntax.

Fox & Sauerland 1996. Illusive Scope of Universal Quantifiers.

Goldwater, Micah & Runner 2006. Coreferential interpretations of reflexives in picture noun phrases: an experimental approach.

Grimshaw, Jane. 1990. Argument structure.

Jackendoff 1972. Semantic Interpretation in generative grammar.

É. Kiss 2002. The Syntax of Hungarian.

Landau 2010. The Locative Syntax of Experiencers. Cambridge: MIT Press.

Pesetsky 1987. Binding problems with experiencer verbs.
----- 1995. Zero syntax: Experiencers and cascades.

Platzack 2009. Backward Binding and the C-T Phase: A Case of Syntactic Haplology. In Functional Heads.

Reinhart 1982. Pragmatics and linguistics. An analysis of sentence topics.
- - 2001. Experiencing derivations
- -2002. The Theta System: An Overview.

Temme & Verhoeven. revised. Verb class, case, and order: A cross-linguistic experiment.