Assessing agentivity and eventivity in object-experiencer verbs: the role of processing

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The syntax of argument structure:
empirical advancements and theoretical relevance
38th Conference of the DGfS
26 February 2016

Overview

- 1. Previous research
- 2. The role of coercion and processing in acceptability
- 3. Acceptability study
- 4. Discussion: Causative states?

Event and argument structure in object-experiencer verbs

- **Psych verbs** describe the emotional state of an Experiencer.
- This argument's syntactic realization depends on the verb and its event structure (e.g., Belletti and Rizzi 1988; Rappaport Hovav and Levin 1998; Arad 1998):
  - **Class I Subject-Experiencer (SE)**: John **fears** snakes.
    - Experiencer, Theme: **Stative** (Grimshaw 1990; Rothmayr 2009)
  - **Class II: Object-Experiencer (acc.) (OE)**: Nina **frightened** Laura.
    - Ambiguous between an **eventive and/or agentive** and a **stative** reading: *Nina frightened Laura (to make her go away).* vs. *Math frightened Laura (*to make her go away)* (Arad 1998).

Event and argument structure in OE verbs

- Syntactically, in their agentive readings they behave like typical **causative accomplishments**, while their stative readings show unusual 'psych' behavior (Belletti and Rizzi 1988; Grimshaw 1990; Iwata 1995; Arad 1998; Landau 2010; Alexiadou and Iordăchioaia 2014).
- Crucially, **some OE verbs seem to *only* permit these 'psych' readings:**

(1) a. Nina *depressed* Laura (*to make her go away).
b. Nina *concerned* Laura (*to make her go away).
(Pesetsky 1995; Arad 1998; Landau 2010)

Event and argument structure in OE verbs

- This entails a sub-class of OE verbs whose event structure limits them to distinctive 'psych' syntactic behavior. But there is disagreement about how to characterize these sub-classes.
  - Some argue that verbs are either stative (**[-eventive]**, *depress*) or ambiguous (**[± eventive]**, *frighten*; Pesetsky 1995; Arad 1998)
  - Others argue that many of these 'stative' verbs are achievements, and OE verbs are in fact either **[-agentive]** (**Nina deliberately depressed Laura*) or ambiguous (**[± agentive]**, *frighten*; Grimshaw 1990; Landau 2010 (Grimshaw 1990; Landau 2010):
- Disagreement about which verbs belong to which groups, and intuitions are delicate (Landau 2010; Grafmiller 2013).
  - Previous claims based on **introspective judgments of acceptability** with e.g., the progressive for events, agentive adverbs (*deliberately*) for agentive verbs
  - Little systematic empirical work in English (though see Verhoeven 2010 for other languages).

Event and argument structure in OE verbs

- A recent corpus/judgment study by Grafmiller (2013) challenges the theoretical claims regarding sub-classes of OE verbs.
  - **Corpora** contain 'disallowed' examples:

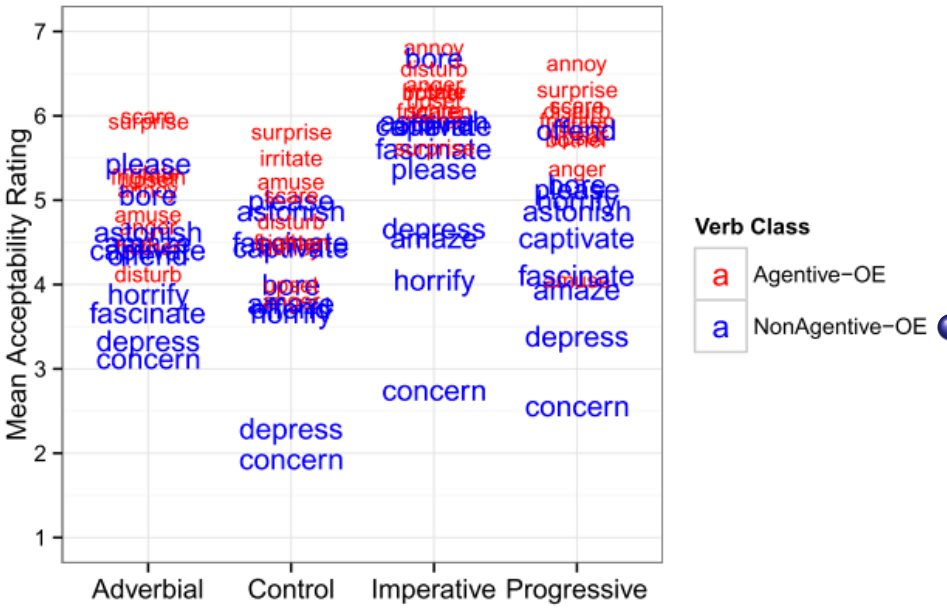
(2) a. The human race is constantly *depressing* me...
    b. I'm going to purposely *bore* you with this tip, but it TOTALLY WORKS.

(Google, Grafmiller 2013: 114)

  - And **an acceptability judgment study** using agentive diagnostics (e.g., with *deliberately*) reveals a complex picture...

Event and argument structure in OE verbs

Figure 5.4: Mean ratings for individual Obj-Exp verbs by condition



(from Grafmiller 2013: 252)

- 'Agentive' verbs generally more acceptable with agentive diagnostics than 'non-agentive' verbs (based on group means).
- But there is clearly variation within groups, and the distinction between them is not at all categorical (even if we assume some incorrect labelling in the literature).

Event and argument structure in OE verbs

- Grafmiller (2013) concludes that OE verbs are a single continuous class.
  - Any OE verb can (to some extent) describe a dynamic and/or agentive Event.
  - Range of (un-)acceptability simply due to pragmatic inferences and conceptual characteristics of the emotion the verb describes.
- While these factors do influence acceptability (Featherston 2007; Brennan and Pylkkänen 2010), the presence of 'disallowed' structures, and the failure to find categorical judgments does not entail the lack of a distinction in this domain.
- Instead, this gradience may reflect the interactions between **sentence processing** and mechanisms of **aspectual coercion**.

The role of coercion and processing

- To judge a sentence, speakers must fully or partially process it; this processing affects the final judgment.
- Among other factors, acceptability is crucially affected by the **relative difficulty of interpretation**, and ease of repair (e.g. Miller and Chomsky 1963; Fanselow and Frisch 2006; Featherston 2007; Haider 2007; Hofmeister et al. 2013).
  - Sentences which are more difficult to interpret are less acceptable.
  - Conversely, anomalous sentences which are easier to repair and interpret are relatively more acceptable.
- Aspectual coercion provides a possible interpretation strategy (Moens and Steedman 1988; Brennan and Pylkkänen 2010; Bott 2010).

The role of coercion and processing

- **Aspectual coercion**: When the event structure of the verb does not fit the restrictions of the context, listeners may be able to repair it:
  - e.g., *deliberately* requires both an agent and a process/activity component:

(3) ?I had a friend who used to be alone deliberately.
(COCA, Grafmiller 2013)

- Listeners must 'fill in' some plausible activity (or lack thereof) leading to the state of 'being alone'.
- Verbs which fit the context do not require this additional operation on the part of the listener: compare *I had a friend who used to read books deliberately*.

The role of coercion and processing

- **Greater difficulty** $\rightarrow$ **decreased acceptability**: Sentences which require coercion are more difficult than those where the verb fits the context, and are relatively less acceptable (Brennan and Pylkkänen 2010; Bott 2015).
- **Successful intepretation** $\rightarrow$ **increased acceptability**: Successful coercion can mitigate this to an extent, resulting in a **intermediate rating** between 'fully acceptable' and 'completely unacceptable'.
  - Successful coercion would produce 'disallowed' corpus examples.
- Difficulty and success of coercion may be affected by fine-grained pragmatic/conceptual (verb-specific) considerations (Moens and Steedman 1988; Bott 2010).

Acceptability study

- **Aims:**
  - Further investigate claims w.r.t. sub-classes based on **eventivity** or **agentivity**
  - Compare OE verbs to less contentious verbs
    - Acceptability is relative: we need a basis for comparison to know what 'intermediate' ratings look like
  - Clarify whether there are any discernable patterns within the variation
  - Assess the claims made regarding particular verbs in the literature (still in progress)

Acceptability study

- **Online questionnaire:**
  - Sentences rated on a continuous 1-7 scale of 'naturalness'
  - Stimuli: **72** verbs in diagnostic sentences
    - **36** OE psych verbs
    - **'Control' verbs** for comparison:
    - **18** transitive **eventive** non-psych verbs which allow agents (Event verbs, e.g., kill).
    - **18** transitive **stative** subject-experiencer (SE) verbs (e.g., love; cf. Verhoeven 2010; Grafmiller 2013).

Acceptability study

- **Diagnostics:**
  - **+Agentive:** compatibility with adverbs of intent (*deliberately, intentionally, on purpose*)
    - e.g., John deliberately *frightened* Mary.
    - Should be acceptable with Event verbs and unacceptable with SE verbs.
  - **+Eventive:** compatibility with *What happened was...* frame (Jackendoff 1983)
    - e.g., What happened was John *frightened* Mary.
    - Both with animate potential agents and inanimate subjects like *the thunder* (**the latter in appendix**)
    - Should be acceptable with Event verbs and unacceptable with SE verbs.
    - Should allow achievements, in contrast to the progressive (*What happened was Kim *noticed* my shoes.)

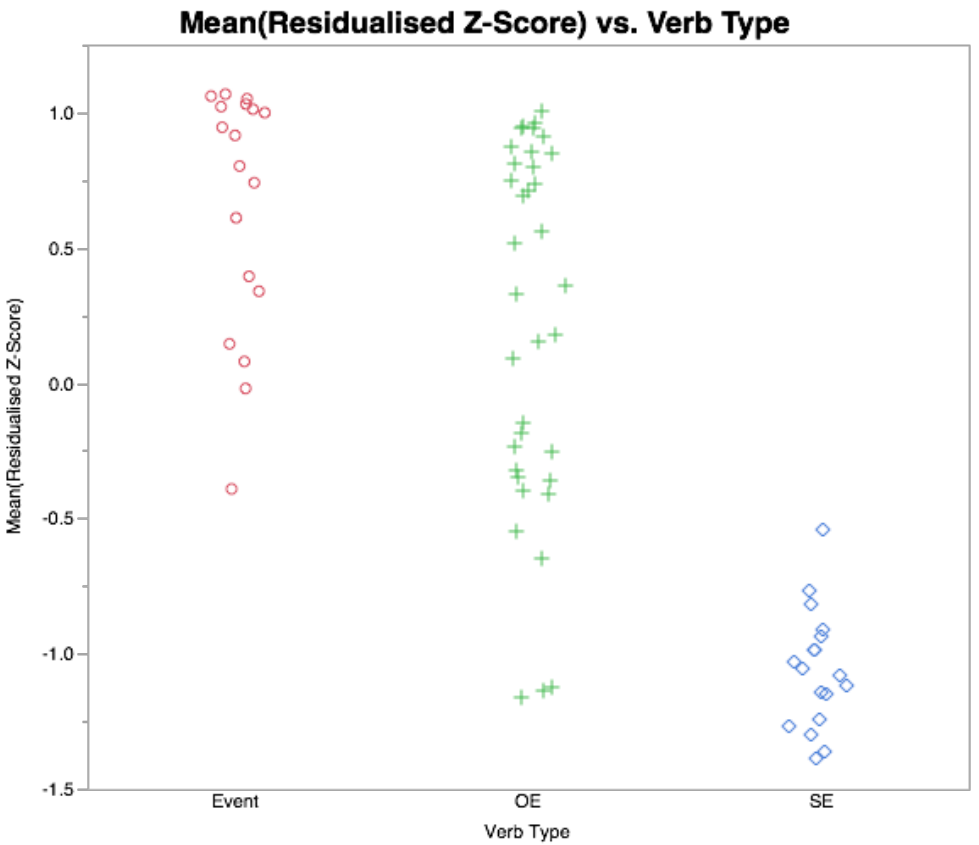
Acceptability study

- **Design**: Sentences and fillers divided and counterbalanced across 4 questionnaire versions
  - Each only contained one instance of each verb (i.e., a single context)
    - Repetition of the same verb in **multiple agentive contexts** may have minimized distinctions in Grafmiller's study, as repetition can decrease difficulty (Hofmeister et al. 2013)
  - Each participant only received one questionnaire version

Acceptability study

- **Results: Data processing**
  - Responses from 152 participants (38 per version)
    - Removed participants who finished the questionnaire too quickly, or gave the same response too often
  - Raw ratings normalized into *z*-scores by participant, to correct for scale bias/compression
    - More positive numbers indicate higher acceptability.
  - Each condition further assessed individually
    - Removed outlier ratings for each verb (greater than 2StdDev from mean)
    - Residualized ratings using frequency of past tense form to factor out influence
    - Calculated mean for each verb

Acceptability study: Agent



- There is variation in all groups
- But clear separation between the Event (hit) and SE (love) verbs
- Event verbs more acceptable with e.g., *deliberately*, SE verbs less
- A fairly clear 'dividing line' in the OE verbs , with roughly **two** areas where verbs tend to cluster
- But the lower group is still generally better with *deliberately* than the SE verbs

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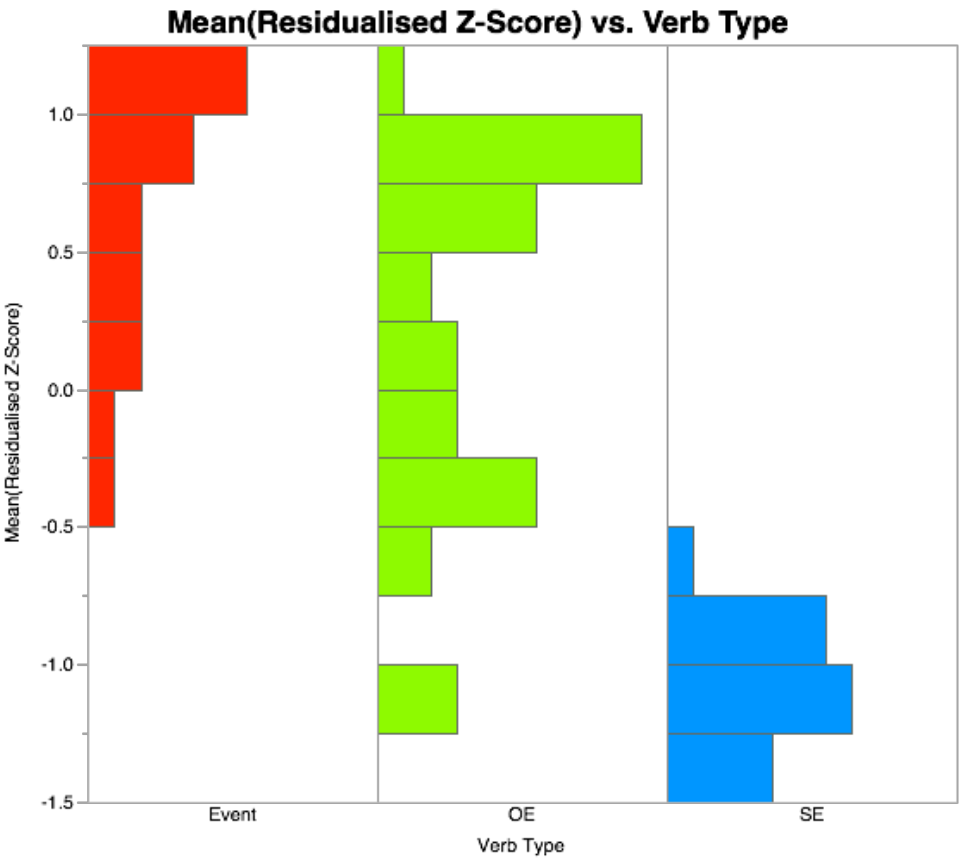

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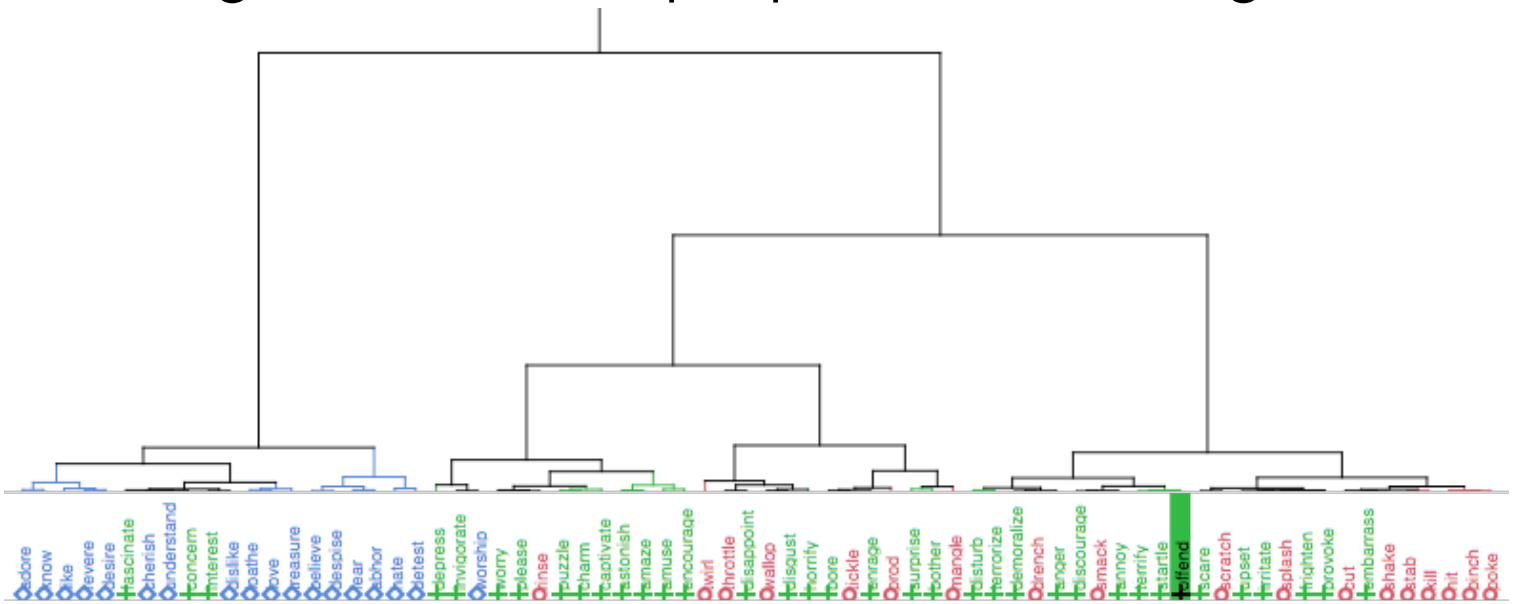
Acceptability study: Agent

- **Hierarchical clustering:** (Ward's Method) Group verbs into clusters based on minimum variance *within* cluster; clusters that are more different joined later
  - Avoids making arbitrary divisions/assumptions of density
  - Gives a better idea of the tendencies without masking variation
    - Using our means as input produces a dendrogram...



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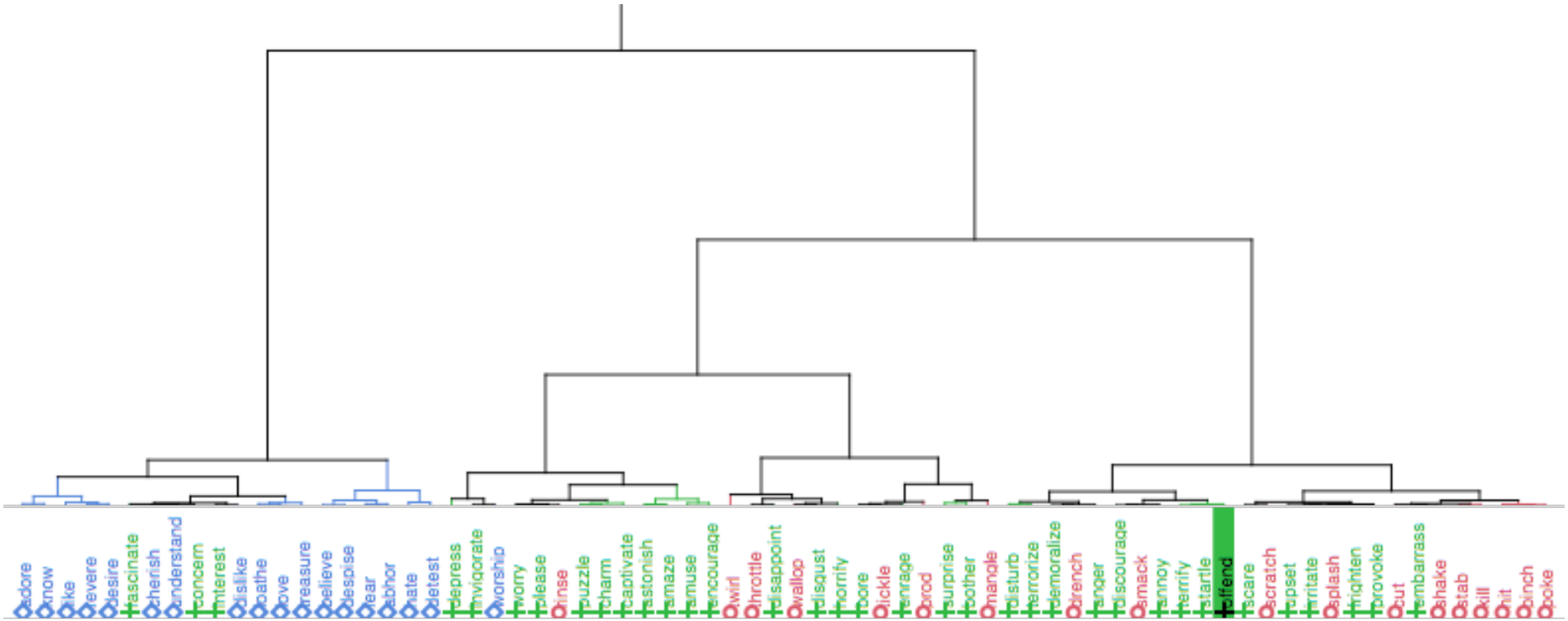
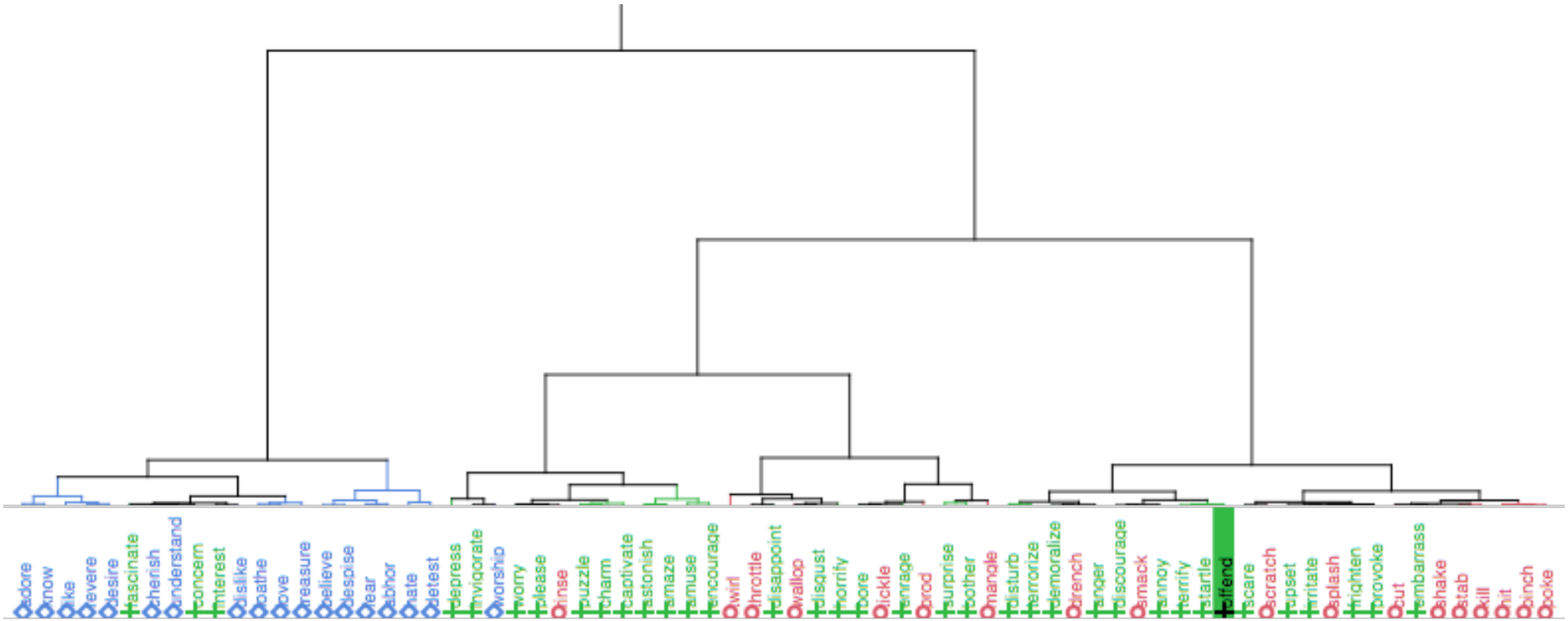


- Most SE verbs form a coherent and distinct group (along with 'non-agentive' fascinate, concern, and interest).
- While there is more variation among the Event verbs, most fall towards the more acceptable end, as do most of the OE verbs – even several purportedly 'non-agentive' ones (e.g., offend, horrify).

Acceptability study: Agent

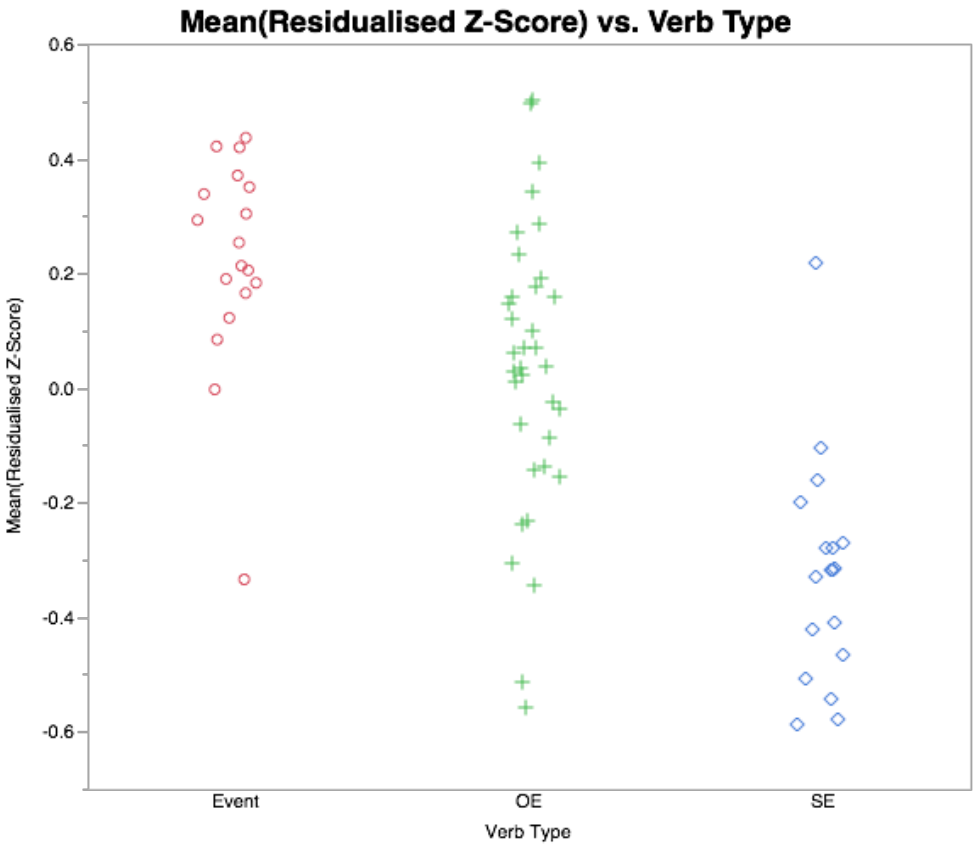


- Our 'middle' peak of OE verbs forms its own cluster between most of the Event and SE verbs, and mostly contains 'non-agentive' verbs (e.g., depress, please, amaze).
- The test seems to make a distinction between different types of OE verbs, but its effects differ compared to Event vs. SE. Outliers of the latter (rinse, worship) also suggest that there are additional factors.

Acceptability study: *What happened was...*

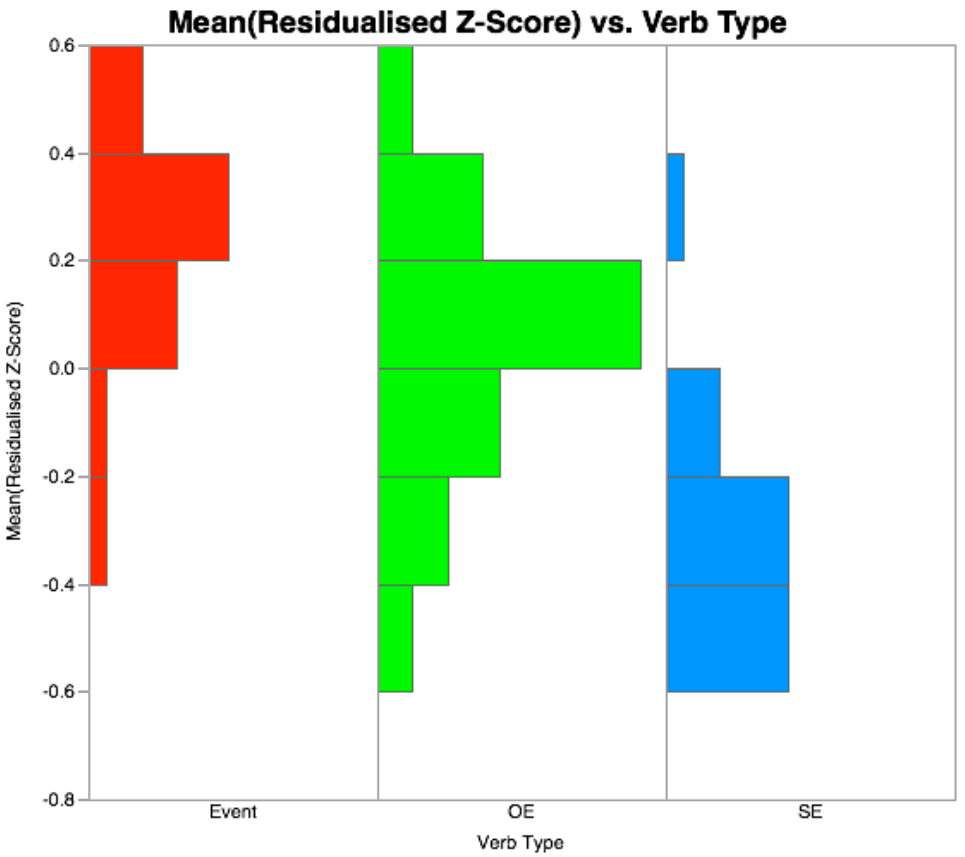
- For a significant number of participants (approx. 27%), this frame on its own was virtually ungrammatical (mean raw rating less than 2).
- For everyone else, *What happened was...* elicited reduced acceptability generally.

Acceptability study: *What happened was...*



- Again, variation in all groups, and patterns as expected, with Event verbs more acceptable, and SE verbs less
- But tails of Event and SE much closer, even barring outliers (diff. of 0.55 vs. 1.71 in Agent)
  - Similar intermediate rating does not entail same aspectual class
- More even distribution of OE verbs, and no clear dividing line
- But they tend to concentrate in the area between Event and SE verbs

Acceptability study: *What happened was...*



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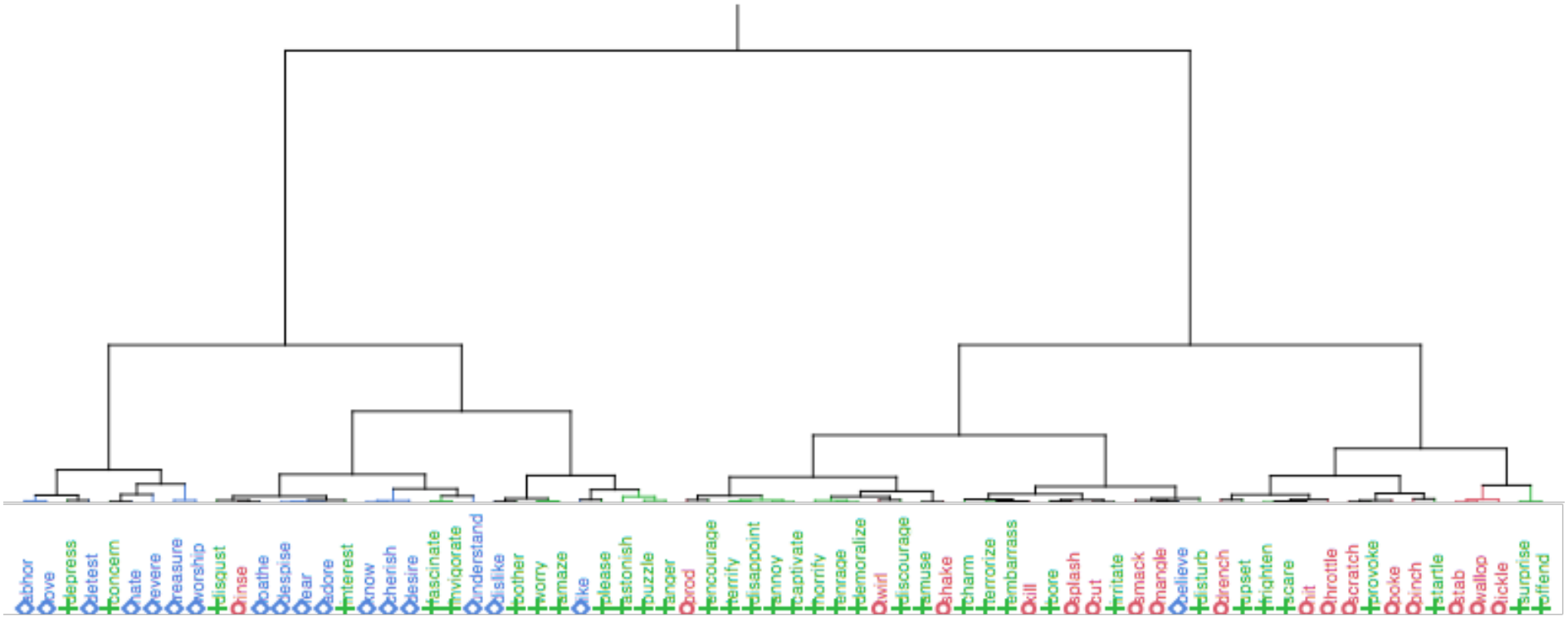
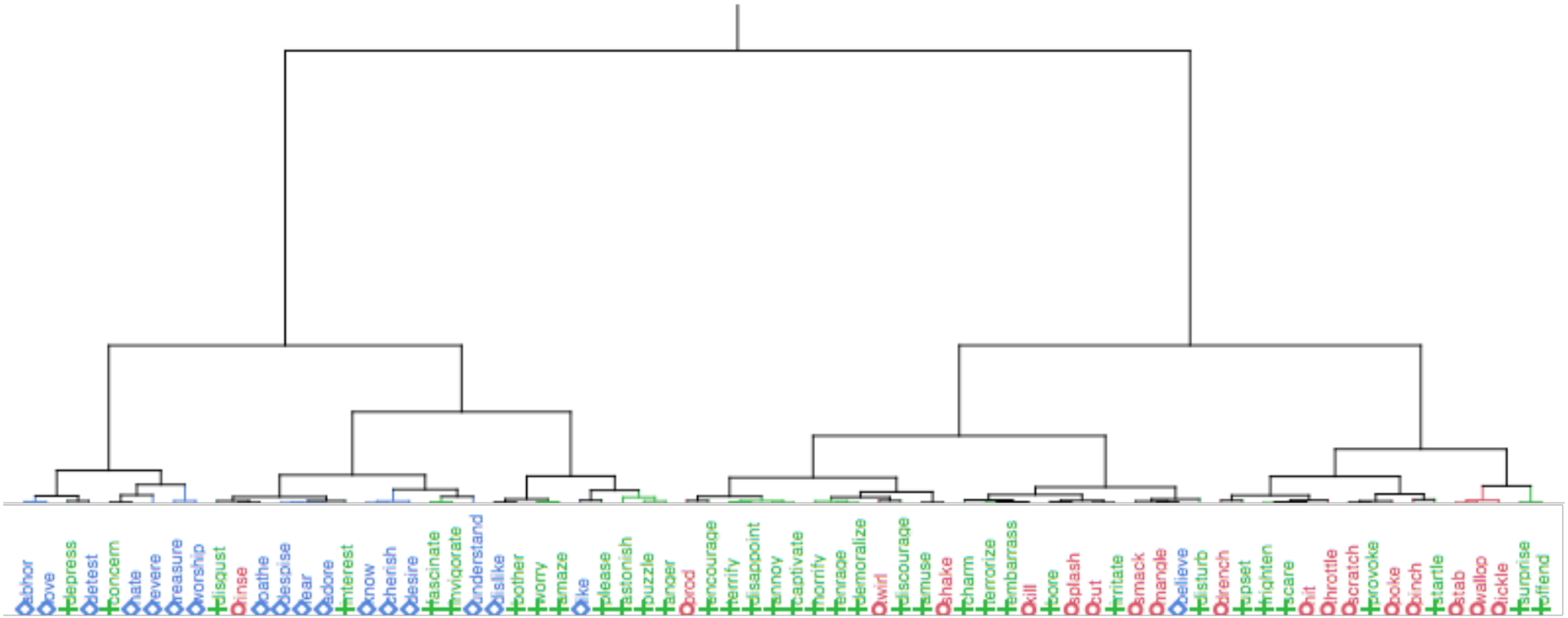


- The clustering suggests a more even division; but some outliers of Event and SE (rinse and believe).
- Again the 'stative/non-agentive' verb offend is on the higher end.
- Similar to before, the OE 'peak' forms a small cluster around the lower end of Event.

Acceptability study: *What happened was...*



- Interestingly, of the 11 verbs in the 'middle' Agent group, 7 of them are grouped with the SE group here (invigorate, worry, amaze, please, astonish, puzzle, depress).

Discussion: Causative states?

- OE **verbs are not all treated equally.** Although we see variation in even more coherent verb classes, OE **verbs do not simply behave like variable eventive and/or agentive verbs** (as suggested by Grafmiller) – they pattern distinctly differently.
  - They clearly fall into (at least) two classes according to their relative acceptability in agentive contexts. However, most of the less acceptable ones are still **better** than SE verbs like love.
  - While there is no division in the eventive context, OE verbs nevertheless group around an area of **lower** acceptability than Event verbs.
  - And most of the less agentive OE verbs behave more like SE states.

- These patterns are in line with the expected effects of **aspectual coercion** on processing.

Discussion: Causative states?

- In both conditions, we have clusters of verbs which elicit intermediate ratings:
  - **Greater difficulty → decreased acceptability**: The need for coercion means that interpreting the test sentences with these verbs requires more effort than with verbs easily read as agentive/eventive (e.g., Events).
  - **Successful intepretation → increased acceptability**: But in many cases, participants were eventually able to repair the sentence and construct a relatively acceptable interpretation.
  - This was not possible for most of the SE verbs, nor for some of the OE verbs.

- Further support may be found in the relatively higher ratings of SE verbs like worship and believe.
  - *deliberately worship* easily re-interpreted as 'performing activities associated with worship'
  - *What happened was Thomas believed his father* easily re-interpreted as 'began to believe his father'

Discussion: Causative states?

- If we assume that intermediate OE verbs are coerced, it seems that they are easier to coerce than SE verbs. Why should this be?
- Recall that most of the 'non-agentive' OE verbs were grouped with the SE verbs under the eventivity test.
- Furthermore, there is a strong correlation [Spearmans rho: 0.77, $p<.0001$] between a verb's rating with the adverb and in the event frame: a lower rating in one context is correlated with a lower rating in the other.
- This suggests that although these verbs are easier to coerce, they are not eventive (or achievements, as suggested by Landau 2010), but stative.

Discussion: Causative states?

- We follow others in proposing that these stative OE verbs are not simple 'mono-eventive' eventualities, but more complex **causative states** (Arad 1998; Pylkkänen 2000; Kratzer 2000; Rothmayr 2009).
- They describe a causal relationship between the co-temporal perception of a stimulus Subject, and the mental state triggered by this stimulus:

Stative Obj-Exp verb:

t_1----------t_n (e_1)

t_1----------t_n (e_2)

  - This is similar to verbs like *block/obstruct*: *The leaves blocked the drain*.
  - There is no change-of-state directly encoded in the verb; but as the type of state is usually short-lived, there is an implication that at some point that state does not obtain (Arad 1998; Kratzer 2000; Hartshorne et al. tted).

Discussion: Causative states?

- This interpretation is supported by both experimental work and stative verbs in other languages with overt causative marking (Pylkkänen 2000; Brennan and Pylkkänen 2010).
- These causative states may be easier to coerce into e.g., an accomplishment because they too involve two parallel eventualities which are causally related.
  - The causing eventuality can be re-interpreted as preceding the mental state and causing its beginning.
  - SE verbs, on the other hand, would require the **addition** of a causing eventuality – potentially a more difficult type of coercion (Bott 2010, 2015).
- Ease of coercion may also be related to a 'Causer' Subject (with causal force) being more similar to an Agent than SE's Experiencer, and thus easier to re-interpret as an Agent.

Conclusions and further thoughts

- OE verbs **do not** all seem to belong to one class, but seem to fall into (at least) two sub-groups according to their ability to be read agentively.
  - The less agentive ones also behave more like stative verbs.
- However, the acceptability data are complex, as distinctions may be blurred by the interacting influences of sentence processing and aspectual coercion.
  - The blurring of these distinctions in all verb classes suggests that gradience does not necessarily entail the lack of a distinction.
- In view of these factors, it is clear that the event and argument structure of OE verbs cannot be determined by individual introspection alone (further highlighted by incorrectly classified verbs like offend).

Conclusions and further thoughts

- **Some open issues:**
  - Need to apply tests to distinguish achievements from states, to confirm suspicions above
  - Need to clarify why the agentive adverb environment seems to be better at allowing coercion
  - Given the overlap and outliers observed in the 'control' groups with *What happened was...*, multiple tests for event/argument structure may be necessary for a clearer picture.
  - More work is needed to determine the possible contribution of ambiguity resolution (which may increase difficulty) and distinguish it from coercion
  - The competing influences of difficulty and success in interpretation can lead to high acceptability for some coerced structures – even if costs are visible under other experimental conditions (Brennan and Pylkkänen 2010; Bott and Hamm 2014).

Conclusions and further thoughts

- Finally, a take home message regarding experimental investigation – particularly relevant here:
  - Bornkessel-Schlesewsky and Schlesewsky (2007: 331): "[W]e have argued that linguistic judgements are inherently ambiguous in the sense that **they result from the interaction between a variety of language-internal and language-external influences**...it is important to recognise the limitations of individual methods and to capitalise upon **the insights that can be gained from their combination**."

Thank you!

- Comments/collaboration/discussion:
  - Artemis Alexiadou, Giorgos Spathas, Michael Walsh (SFB 732)
  - Nino Grillo, Gianina Iordăchioaia, and IfLA/ILG Research Seminar, Stuttgart
  - SFB 732 Area B Workshop and ExAS (ESSLLI) 2015
- Funding:
  - DFG, SFB 732

Appendix: WHW+Inanimate Subject

- **NB**: SE ratings from animate condition for comparison
- More overall variation in Event, and much more overlap with SE
- Closer grouping of OE verbs, more verbs closer to SE (but none at the lower end)
- No clear division in OE verbs (nor apparently in non-OE verbs)
- Mean rating clearly not definitive

Appendix: WHW+Inanimate Subject

- It would seem that OE verbs are more likely to behave statively when they have inanimate subjects.
- However, it's not clear whether lower ratings in this condition are due to stativity, or to a baseline preference for animate subjects (or both).
  - A baseline assessment of these verbs' naturalness with animate and inanimate subjects is necessary to disentangle these effects.
- Furthermore, different **types** of inanimate subjects may induce different readings (e.g., direct vs. indirect causers; cf. Alexiadou et al. 2013).

References I

Alexiadou, A. and Iordăchioaia, G. (2014). The psych causative alternation. *Lingua*, 148:53–79.

Alexiadou, A., Iordăchioaia, G., Cano, M., Martin, F., and Schäfer, F. (2013). The realization of external arguments in nominalizations. *Journal of Comparative German Linguistics*, 16:73–95.

Arad, M. (1998). *VP structure and the Syntax-Lexicon Interface*. PhD thesis, University College London, London.

Belletti, A. and Rizzi, L. (1988). Psych-verbs and θ-theory. *Natural Language and Linguistic Theory*, 6(3):291–352.

Bornkessel-Schlesewsky, I. and Schlesewsky, M. (2007). The wolf in sheep's clothing: Against a new judgment-driven imperialism. *Theoretical Linguistics*, 33(3):319–333.

Bott, O. (2010). *The Processing of Events*. John Benjamins, Amsterdam.

References II

Bott, O. (2015). Can semantic theories be tested experimentally? The case of aspectual coercion. In Joanna Blasczcak, Dorota Klimek-Jankowska, K. M., editor, *New approaches to Tense, Aspect, and Mood*. University of Chicago Press.

Bott, O. and Hamm, F. (2014). Cross-linguistic variation in the processing of aspect. In Hemforth, B., Mertins, B., and Fabricius-Hansen, C., editors, *Psycholinguistic Approaches to Meaning and Understanding Across Languages*, pages 83–109. Springer, Dordrecht.

Brennan, J. and Pylkkänen, L. (2010). Processing psych verbs: Behavioural and MEG measures of two different types of semantic complexity. *Language and Cognitive Processes*, 25(6):777–807.

Fanselow, G. and Frisch, S. (2006). Effects of processing difficulty on judgments of acceptability. In Fanselow, G., Féry, C., Vogel, R., and Schlesewsky, M., editors, *Gradience in Grammar: Generative Perspectives*, pages 291–316. Oxford University Press, Oxford.

References III

Featherston, S. (2007). Data in generative grammar: The stick and the carrot. *Theoretical Linguistics*, 33(3):269–318.

Grafmiller, J. (2013). *The Semantics of Syntactic Choice: An Analysis of English Emotion Verbs*. PhD thesis, Stanford University.

Grimshaw, J. (1990). *Argument Structure*. MIT Press, Cambridge, MA.

Haider, H. (2007). As a matter of facts – comments on featherston's sticks and carrots. *Theoretical Linguistics*, 33(3):381–94.

Hartshorne, J. K., O'Donnell, T., Sudo, Y., Lee, M., Uruwashi, M., and Snedeker, J. (submitted). Linking meaning to language: linguistic universals and variation.

Hofmeister, P., Jaeger, T. F., Arnon, I., Sag, I. A., and Snider, N. (2013). The source ambiguity problem: Distinguishing the effects of grammar and processing on acceptability judgments. *Language and Cognitive Processes*, 28(1-2):48–87.

References IV

Iwata, S. (1995). The distinctive character of psych-verbs as causatives. *Linguistic Analysis*, 25:95–120.

Jackendoff, R. (1983). *Semantics and Cognition*. MIT Press, Cambridge, MA.

Kratzer, A. (2000). Building statives. In *Proceedings of the Twenty-Sixth Annual Meeting of the Berkeley Linguistics Society: General Session and Parasession on Aspect*, volume 26, pages 385–99. Berkeley Linguistics Society.

Landau, I. (2010). *The Locative Syntax of Experiencers*. MIT Press, Cambridge, MA.

Miller, G. A. and Chomsky, N. (1963). Finitary models of language users. In Luce, D. R., Bush, R., and Galanter, E., editors, *Handbook of Mathematical Psychology*, volume 2, pages 419–93. Wiley, New York.

Moens, M. and Steedman, M. (1988). Temporal ontology and temporal reference. *Computational Linguistics*, 14(2):15–28.

References V

Pesetsky, D. (1995). *Zero Syntax: Experiencers and Cascades*. MIT Press, Cambridge, MA.

Pylkkänen, L. (2000). On stativity and causation. In Tenny, C. and Pustejovsky, J., editors, *Events as Grammatical Objects: The Converging Perspectives of Lexical Semantics and Syntax*, pages 417–42. CSLI Publications, Stanford.

Rappaport Hovav, M. and Levin, B. (1998). Building verb meanings. In Butt, M. and Geuder, W., editors, *The Projection of Arguments: Lexical and Compositional Factors*. CSLI Publications, Stanford.

Rothmayr, A. (2009). *The Structure of Stative Verbs*. John Benjamins, Amsterdam.

Verhoeven, E. (2010). Agentivity and stativity in experiencer verbs: Implications for a typology of verb classes. *Linguistic Typology*, 14(2-3):213–251.