

Mono-eventive Verbs of Emission and their bi-eventive nominalizations.

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I propose an analysis of a much-debated class of inanimate unergative verbs - so called Verbs of Emission (VoE) - at the syntax-semantics interface based on the parallel discussion of VoEs and their nominalizations. I argue that VoEs denote the *manifestation* of a disposition as an event but nominalizations of VoEs denote the *instantiation* of a disposition in an object. Because dispositions pertain to possible but not actual causality, they call into question established diagnostics for unaccusativity and event denotation in nominals which are based on actual causality.

1 Background

1.1 Unaccusativity

Main syntactic diagnostics in German:

- Unergative verbs appear in impersonal passives (1a); unaccusative verbs do not (1b) (cf. Perlmutter [1978] for Dutch).
- Unergative verbs select perfect auxiliary *haben* (have) (1c); unaccusative verbs select *sein* (be) (1d) (cf. Hoekstra [1984] for Dutch)

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|--|---|
| (1) a. <i>Es wurde gesungen.</i>
it be.AUX.PASS sing | d. <i>Das Bein ist gebrochen.</i>
the leg is.AUX break.PRS.PRF |
| b. * <i>Es wurde gebrochen.</i>
it be.AUX.PASS broken | e. * <i>Es wurde geblutet.</i>
it be.AUX.PASS bleed |
| c. <i>Peter hat gesungen.</i>
Peter have.AUX sing.PRS.PRF | f. <i>Peter hat geblutet.</i>
Peter have.AUX bleed.PRS.PRF |

Main semantic diagnostics:

- Dowty [1991]: telic and non-agentive verbs are typically unaccusative, atelic and agentive verbs are typically unergative
- Rappaport Hovav and Levin [1998]: Unaccusative verbs are bi-eventive/result verbs, unergative verbs are mono-eventive/manner verbs.
- What about atelic non-agentive verbs and telic agentive verbs?
- Focus of this paper: atelic non-agentive verbs, so-called 'Verbs of Emission'

1.2 Verbs of Emission

Verbs of Emission are a class of intransitive atelic non-agentive verbs describing an event in which the single argument emits sound, light, smell, substance or, of particular relevance to this paper, exhibits a certain behaviour:

- English: *germinate*, *radiate*, *ulcerate*, *hibernate* (in the original non-computer usage), *oscillate*, *pullulate*, *vascillate*, *shudder*, *twinkle*, *flicker*, *stink*, *bubble*, *gush*, *proliferate* ...
- German: *keimen* (to germinate), *strahlen* (to radiate), *bluten* (to bleed), *wirken* (to take effect), *strömen* (to stream), *knospen* (to pullulate), *quellen* (to gush), *wuchern* (to grow), *funkeln* (to twinkle) ...

Known problems with syntactic unaccusativity diagnostics for non-agentive verbs:

- According to the impersonal passive diagnostics, VoEs are unaccusative Perlmutter [1978] (1e).
- Levin and Rappaport [1986], Zaenen [1993]: Impersonal passives require protagonist control over the event described. Because Verbs of Emission are non-agentive, they preclude impersonal passives not because they are unaccusative but for independent reasons.
- Rappaport Hovav and Levin [2000]’s main evidence for the diagnosis of unergativity in VoEs is perfect auxiliary selection (1f).
- Rappaport Hovav and Levin [2000]’s other evidence for unergativity of VoEs is either based on rare data involving metaphorical meaning shifts, idiomatic constructions or particle verbs (resultative construction, X’s-way construction) or does not cover all VoEs (-*er* nominals).

Known problems with semantic unaccusativity diagnostics for non-agentive atelic verbs:

- Classification as either internally or externally caused is difficult:
- [Rappaport Hovav and Levin, 2000, cf. p. 287]: VoEs describe events which are internally caused because “some *property inherent* to the argument of an internally caused verb is responsible for bringing about the eventuality it describes” vs.
- [Reinhart, 2002, cf. p. 281]: VoEs describe events which are externally caused because “the event described by the unergative derivation *the diamond glowed* could not have just come about without some source of light - the ‘external cause’ of the glowing.”

1.3 The correlation between unaccusativity and event nominals; bi-eventivity and -ung nominals

Standard assumptions about nominalizations:

- Unaccusativity constrains event nominal derivation: it “has been noted in the literature that across languages event nominals are [...] derived from unaccusative predicates, but not from unergative ones” [Alexiadou, 2001, p.78]
- Bi-eventivity constrains -*ung* nominal derivation in German: “a verbal construction has an -*ung* nominalization if and only if the verb is constructed bi-eventively.” [Roßdeutscher, 2010, p. 106].
- Argument structure of nominals hinges on complex event denotation testified by ‘verb-like’ adverbial modification Grimshaw [1990], Alexiadou [2001] with *constant*, *frequent* ...
- A theme interpretation is always possible for the argument of a derived event nominal (e.g. Alexiadou [2001] for English, Ehrich and Rapp [2000] for German).

2 Observation: Nominalizations of VoEs

- Given that VoEs are unergative and mono-eventive (Rappaport Hovav and Levin [2000]) and event nominalizations are derived only from unaccusative verbs (Alexiadou [2001]), resp. -*ung* nominals are derived only from bi-eventive verbs Roßdeutscher [2010], we would not expect that VoEs have derived event nominalizations resp. eventive -*ung* nominalizations.
- The data in (2) shows that this expectation is not borne out.
 - (2a)-(2f) are examples of eventive -*ion* nominalizations derived from VoEs.

- (3a)-(3d) are examples of eventive *-ung* nominalizations derived from VoEs.
 - Similar event nominals from VoEs are discussed by Sichel [2010] for Hebrew (3e)-(3f).
 - Semantically, no theme interpretation of the genitive argument of a VoE nominal is possible, testified by the exclusion of agent/causer introduction with a *by-* resp. *durch-*PP.
 - Contrary to expectations in the literature, VoEs have event nominalizations.
- (2) a. the constant germination of the plant (*by-PP) d. the constant hibernation of the bear (*by-PP)
- b. the constant radiation of the caesium (*by-PP) e. the constant oscillation of the pole (*by-PP)
- c. the constant ulceration of the wound (*by-PP) f. the constant pullulation of the plant (*by-PP)
- (3) a. *die anhaltende Blutung der Wunde* (*durch-PP)
the constant bleed.NMLZ the.GEN wound (*by-PP)
- b. *die anhaltende Wirkung der Tablette* (*durch-PP)
the constant effect.NMLZ the.GEN pill (*by-PP)
- c. *die anhaltenden Strahlung des Caesiums* (*durch-PP)
the constant radiate.UNG.NMLZ the.GEN caesium (*by-PP)
- d. *die anhaltende Keimung des Samens* (*durch-PP)
the constant radiate.NMLZ the.GEN caesium (*by-PP)
- e. *ha-bi'abu'a Sel ha-marak be-meSex Sa'atayim hafax oto le-daysa*
the bubble.NMLZ of the soup for two hours turned it to porridge
The soup's bubbling for two hours turned it into porridge
- f. *ha-hivhuv Sel ha-televezia kol ha-layla lo hifri'a le-rina*
the flicker.NMLZ of the tv all night NEG bother to rina
The TV's flickering all night long didn't bother Rina

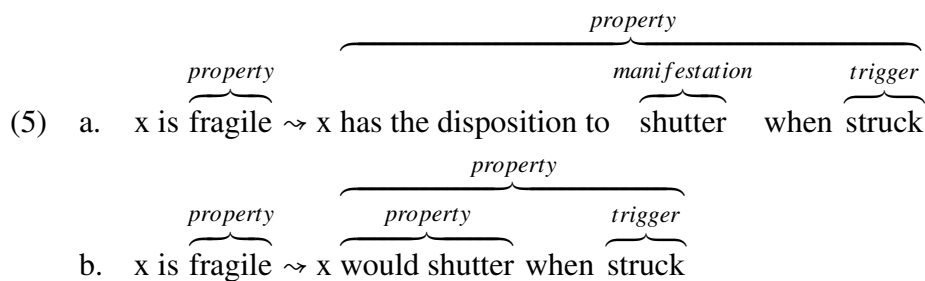
It should be noted that VoE event nominalization is productive in German:

- (4) *Für mein Brot mache ich eine Kühlschrank 'Gehung' über Nacht.*
for my bread make I a fridge prove.NMLZ over night
<http://bfriends.brigitte.de/foren/rezeptideen/55358-was-kocht-und-backt-ihr-zu-ostern-6.html>

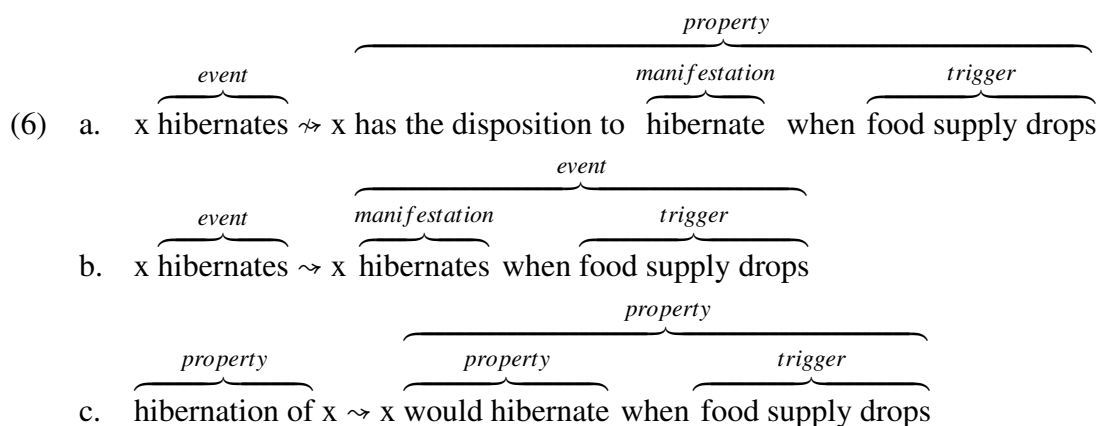
3 Proposal: VoEs describe dispositions

- Characterization of VoEs by [Rappaport Hovav and Levin, 2000, p. 287] (italics added):
 - For VoEs a “reaction of the argument is the source of the eventuality”
 - “some *property inherent* to the argument of an internally caused verb is responsible for bringing about the eventuality it describes”
 - The eventuality described by a VoE “comes about because of *internal physical characteristics* of its emitter argument.”
- Rappaport Hovav and Levin [2000] subsume VoEs under the class of internally caused verbs, but they ignore an important point in their description of VoEs:

- The eventuality described by a VoE does not come about *just* because of its internal physical characteristics.
- Instead, the eventuality comes about as a reaction to circumstances *external* to the emitter argument and the event described (recall Reinhart [2002]’s argument).
- That is, the semantics of VoEs involves a type of causality in which internal causation depends on external causation.
- Such relations of conditional causality instantiated as properties inherent to objects are called *dispositions*: a vase is fragile if it has the disposition to break if it were struck.
- VoEs denote manifestations of dispositions of their argument (i.e. an atelic event), i.e. they describe an event which results from triggering the disposition of the emitter argument by external circumstances.
- I call the argument of a VoE the *medium* of the disposition.
- Standard analysis of adjectival dispositions: the Simple Conditional Analysis (SCA) (5a)↔(5b) Choi [2012]



- But how do verbs figure within the SCA analysis?
- Conditional causal relation between dispositions and events in VoEs: a drop of food supply leads from a state in which a bear would hibernate if food supply drops (= a telic disposition) to a state of affairs in which the bear hibernates (= an atelic event)
- In (6a) the disposition manifests itself in the *linguistic* presence of the trigger so as to yield (6b) whereas in (6c) the disposition and trigger are causally separated and thus the disposition does not manifest itself.
- Difference between the relation of the inherent property described by the adjective *fragile* and the verb *break* on the one hand and the inherent property described by the nominalization *hibernation* and the verb *hibernate* on the other: there is no adjective describing the inherent property associated with the disposition to hibernate.



- Causal relation between VoE events and VoE nominalization dispositions:
(6c)→ [C](6b)

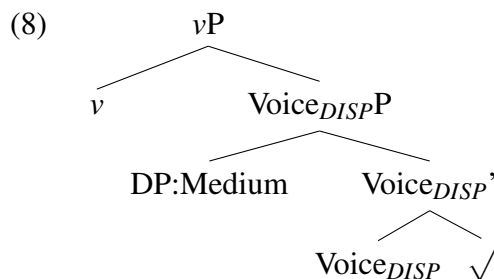
- Formalization with linear logic implication \multimap and the dynamic box operator $[]$ Steedman [2002]:
 - $[]$ represents a necessary causal accessibility relation between possible worlds
 - Linear logic implication \multimap can be exploited only once. After application, the antecedent and the implication is deleted.
- Using Lewis [1973]’s analysis of counterfactuals $\Box \rightarrow$ and representing the disposition trigger with C , we get (7) as the semantics of ’hibernate’.

(7) $\lambda p. medium(bear)(p) \wedge (C \Box \rightarrow hibernate(p)) \multimap [C] \lambda e. medium(bear)(e) \wedge hibernate(e)$
 ’if a bear would hibernate if food supply drops then - when food supply drops - it hibernates’

4 Putting things together: Syntax-Semantics-Interface

4.1 Syntax of VoEs

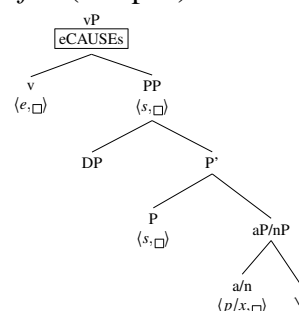
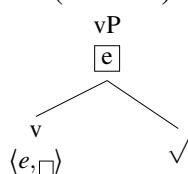
- “Syntax all the way down” approach à la Distributed Morphology Halle and Marantz [1993], Marantz [1997]
- Upside down arrangement of Voice and v (8): Verbalizer v selects for Voice, Voice merges with the root \checkmark
- Minimalist UTAH Harley [2011]: agent in spec, Voice; theme in spec, Comp, vP: Here: ’medium’ theta-role is assigned to DPs which are in the specifier of Voice *and* in the specifier of the complement XP of vP.
- Root merge with Voice explains Rappaport Hovav and Levin [2000]’s observation of strong restrictions on possible fillers of the single argument slot of VoEs if Voice is the domain of special meaning.



4.2 Semantics of VoEs

Roßdeutscher [2010]’s semantic interpretation of Marantz [2005]’s syntactic account of bi-eventivity:

- (9) a. mono-eventive, no *-ung* noun, non-empty v selects for atelic event description
singen (to sing), *schlafen* (to sleep), *arbeiten* (to work)
- b. bi-eventive, *-ung* noun, empty v selects for state-denoting XP
töten (to kill), *sperrern* (to block), *reifen* (to ripen)



(12b), (12e), adverbial modification of an event succeeds (12c), (12f)

- Modification presupposes that what is modified exists. What is modified is not the disposition itself but its manifestation, similar to the way VoEs react to the presence of a linguistic disposition trigger, see (6a).

- (12) a. **Die Wirkung der Tablette fand um Mitternacht statt*
the effect.NMLZ the.GEN pill took at midnight place
- b. ?*Die Wirkung der Tablette für/in drei Stunden*
the effect.NMLZ the.GEN for/in three hours
- c. *Die anhaltende Wirkung der Tablette*
the constant effect.NMLZ the.GEN
- d. *The hibernation of the bear at midnight
- e. ?The hibernation of the bear in/for one year
- f. The constant hibernation of the bear

5.2 Unaccusativity

- Why are diagnostics involving adjectival constructions easily misleading and inconsistent for VoEs?
- In general, the data is not easy to judge:
 - Unlike unergatives, no middle construction seems possible (13a),(13b)
 - Like unergatives, no adjectival use of the perfect participle seems possible (13c) - (13d)
 - Unlike unergatives, a reflexive in object position does not allow for a resultative construction (13e)-(13f)
 - Unlike unaccusatives, no resultative construction seems possible (13g), (13h), (13i), (13j)

- (13) a. **Die Tablette wirkt sich leicht.*
The pill takes effect REFL easily.
b. ?The bear hibernates itself easily.
c. **Die gewirkte Tablette*
the effected pill
d. ?The hibernated bear
e. **Die Tablette wirkte sich gesund.*
The pill took effect REFL healthy.
- f. ?The bear hibernated itself well rested.
g. **Die Tablette wirkte aus.*
The pill took effect out.
h. **Die Tablette wirkte den Patienten gesund.*
The pill took effect the patient healthy.
i. ?The bear hibernated well rested
j. ?Winter hibernated the bear well rested

- Dispositional causality originates from the adjectival domain and expresses a type of causality which is not defined in terms of unconditional states of affairs.
- Resultative constructions, adjectival use of the perfect participle or impersonal passives are tests which involve a conception of adjectival properties/states free of conditionality.
- Dispositions can not be approached in terms of their unconditional results.
- Thus, VoEs fail tests involving resultative adjectival constructions for independent reasons and consequently.

5.3 Causation

- In (14a) *by itself* denies the existence of another cause because the external cause is identified with the single argument of *break*. Rappaport Hovav and Levin [2000] observe that VoEs cannot appear with the phrase *by itself* in the 'without outside help' sense (14b), (14c). They conclude that VoEs are internally caused (vs. Reinhart [2002], who claims exactly the opposite)

- (14) a. The vase broke by itself
b. Her cheeks glowed (*by itself)/from the cold
c. Jane trembled (*by herself)/from anger

- Given the argument of this paper, there is another explanation for the exclusion of *by itself*: VoEs such as *glow* or *tremble* both describe manifestations of dispositions which have to be triggered by external circumstances, cf. Reinhart [2002] remark again: "the event described by the unergative derivation *the diamond glowed* could not have just come about without some source of light the 'external cause' of the glowing."
- But once VoE dispositions manifest themselves, their external cause is no longer relevant to the event described, because linguistically the argument of the VoE brings about the observed emission, so VoEs involve both internal and external causation.

6 Conclusion

- 'Verb of Emission' may be a term to narrow to capture the class of verbs discussed in this paper
- The class of verbs involving dispositions should not be taken on par with other verb classes such as verbs of motion, consumption etc.
- Instead, VoEs form a third class besides (or rather between) unaccusative and unergative verbs.

- The dualistic conception of internal vs. external causation dominant in contemporary syntax and semantics is too coarse grained to capture dispositional causation.
- The same is true of the dualistic conception of agent and theme; single arguments of VoEs are both agents and themes if these notions make sense at all in this context; I proposed to call them them a 'medium' in which disposition resides.
- The underlying problem with dispositional causation may be the focus of Neo-Davidsonian event semantics on actual causation which brings with it the assumption that actual events are all there is to causation. VoEs show that this type of semantics may need a refinement to deal with conditional causation as it occurs in dispositions.

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