

# **An event structure approach to passives and its implications for acquisition**

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## **1 Introduction**

*Common view:* **Passivization as an operation on argument structure**

- Inverse mapping of argument type and syntactic relation in actives and passives:
  - The internal argument (the understood object) is in (syntactic) subject position.
  - The logical subject is demoted and (optionally) surfaces in a *by*-phrase.

*Our proposal:* **Passivization as an operation on event structure**

(Gehrke and Grillo 2007, 2009; Grillo 2008)

- A lower VP shell, which is semantically associated with a consequent (inchoative or resultative) state subevent, moves to a discourse-related position at the edge of VP.
- Event structure as a crucial ingredient in the representation and processing of passives

→ **Relevance of the type of verb for passivizability**

→ **Potentially new insights into the acquisition of passives**

### **Structure of the talk:**

Section 2: NP movement approaches to passives

Section 3: Proposal

Section 4: Passivizing states

Section 5: Event structure and acquisition

## **2 NP movement approaches to passives**

- The external argument is still present in verbal passives: Evidence from Strong Crossover effects, subject-controlled infinitival clauses, subject-oriented modifiers, depictives, binding, purpose adverbials (Manzini 1980; Roeper 1983; Roberts 1985; Baker 1988; Baker et al. 1989, among others).<sup>1</sup>
- In this way verbal passives contrast with middles (e.g. Baker et al. 1989) and adjectival passives (e.g. Kratzer 1994); in both external arguments are truly absent.
- Baker et al. (1989) (elaborating on Jaeggli 1986):
  - The external argument is the passive participle suffix, which is a clitic base-generated in the IP head that later on in the derivation is lowered down to adjoin to the verbal stem.
  - This operation ‘absorbs’ the case assignment capacity of the verb making it necessary, given Case Theory, for the internal argument to move to the subject position.
  - The NP in the *by*-phrase receives its theta role from the clitic via a non-movement chain, in analogy to clitic doubling.

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<sup>1</sup>For a critical review on implicit arguments in passives see Williams (1987); Bhatt and Pancheva (2006).

*Problem:* Violation of the Uniformity of Theta Assignment Hypothesis (UTAH) (Baker 1988): The external  $\theta$ -role is assigned in different fashions in active and passive constructions.<sup>2</sup>

- Merchant (2007, 2008): VP ellipsis is possible despite Voice mismatches (passive antecedent VP / active deleted VP and vice versa) (see there for examples).  
→ At some level of the derivation, which includes both internal and external argument, the structures have to be identical.

### Collins's (2005) smuggling approach

- The passive morphology does not absorb the external theta role or accusative case.
- The external theta role is assigned in Spec  $v$ P in line with UTAH.
- ACC is checked by the *by*-phrase (*by* itself being the head of VoiceP) merged directly above  $v$ P.
- *Immediate problem:* Movement of the internal over the external argument should create a minimality effect.  
→ 'Smuggling' of the VP over the  $v$ P makes the internal argument the closest to Spec TP allowing for its promotion to subjecthood without violating locality.

### Smuggling

- Suppose a constituent YP contains XP. XP is inaccessible to Z because of the presence of W, an intervener that blocks any syntactic relation between Z and XP. If YP moves to a position c-commanding W, we say that YP smuggles XP past W.

- (1) a. Z ... XP ... W ... [YP <XP>]  
└──────────────────┘  
NOT OK
- b. Z ... [YP <XP> ] ... W ... <[YP XP]>  
└───┘ └──────────┘  
OK smuggle YP

### Phrasal movement of the participle to the left of the *by*-phrase:<sup>3</sup>

- (2) a. The coach summed up the argument.  
The coach summed the argument up.  
b. The argument was summed up by the coach.  
\*The argument was summed by the coach up.

### Problems of a smuggling approach to passive formation:

- What is the status of smuggling in the theory?
- What are the limits of smuggling and more generally of look-ahead computations? Doesn't smuggling massively over-generate? Can it be used to avoid minimality effects with other potential interveners, for example in A'-movement?
- How do we explain sentences like (3), where passivization applies independently of movement of the internal argument to the subject position?

- (3) There was a man killed.

<sup>2</sup>See also Emonds (2006), who discusses evidence that neither the external argument assigning capacity, nor the capacity to assign case are suppressed in passives.

<sup>3</sup>Collins (2005) argues convincingly against alternative analyses in terms of right specifiers or extraposition of the *by*-phrase to the right (see there for details on this point and on the formation of the participle).

### 3 An alternative proposal: From arguments to events (Gehrke and Grillo 2009)

**Main idea:** The promotion of a consequent state subevent of a complex event to a position above VP is the fundamental ingredient of passive constructions.

#### Background assumptions about event structure

- Decomposition of events into subevents  
(Moens and Steedman 1988; Parsons 1990; Pustejovsky 1991; von Stechow 1995; Higginbotham 2000; Rothstein 2004; Kratzer 2005; Arsenijević 2006; Ramchand 2008, among many others)
- The ontology contains a transition into a state, a **consequent state** (in the sense of Moens and Steedman 1988)
  - Captures the semantics of predicates involving change, a (durative or instantaneous) change from  $\neg\phi$  to  $\phi$  (accomplishments and achievements)
  - Consequent states are related to (an atemporal version of) Dowty's (1979) **BECOME**-operator in the representation of accomplishments and achievements.  
(see, for instance, McIntyre 2006, for an atemporal definition of **BECOME** in event semantic terms)
- Lexical (achievements and) accomplishments, e.g. *kill* (4)

(4) John kills Bill. (Dowty 1979, 91)  
[[*John does something*] CAUSE [BECOME  $\neg$ [*Bill is alive*]]]
- Syntactically created accomplishments<sup>4</sup> (5), (6)

(5) *Secondary (resultative) predicates*
  - a. Davide took off his hat.
  - b. Boban hammered the metal flat.
  - c. Kriszta and Balázs danced into the house.

(6) He sweeps the floor clean. (Dowty 1979, 93)  
[[*He sweeps the floor*] CAUSE [BECOME [*the floor is clean*]]]

*NB:* We are not necessarily concerned here with telic events but rather with complex event structures that rely on **BECOME**.<sup>5</sup>

#### Travis's (2000) VP shell account for the syntactic representation of event structure

- $V_1$  corresponds to the causing sub-event and introduces the external argument ( $DP_{ext}$ )
- $V_2$  introduces the theme argument ( $DP_{int}$ ) as well as the endpoint of the event

→ A consequent state is structurally represented as a lower VP shell with  $DP_{int}$  in its specifier.

#### 3.1 The proposal

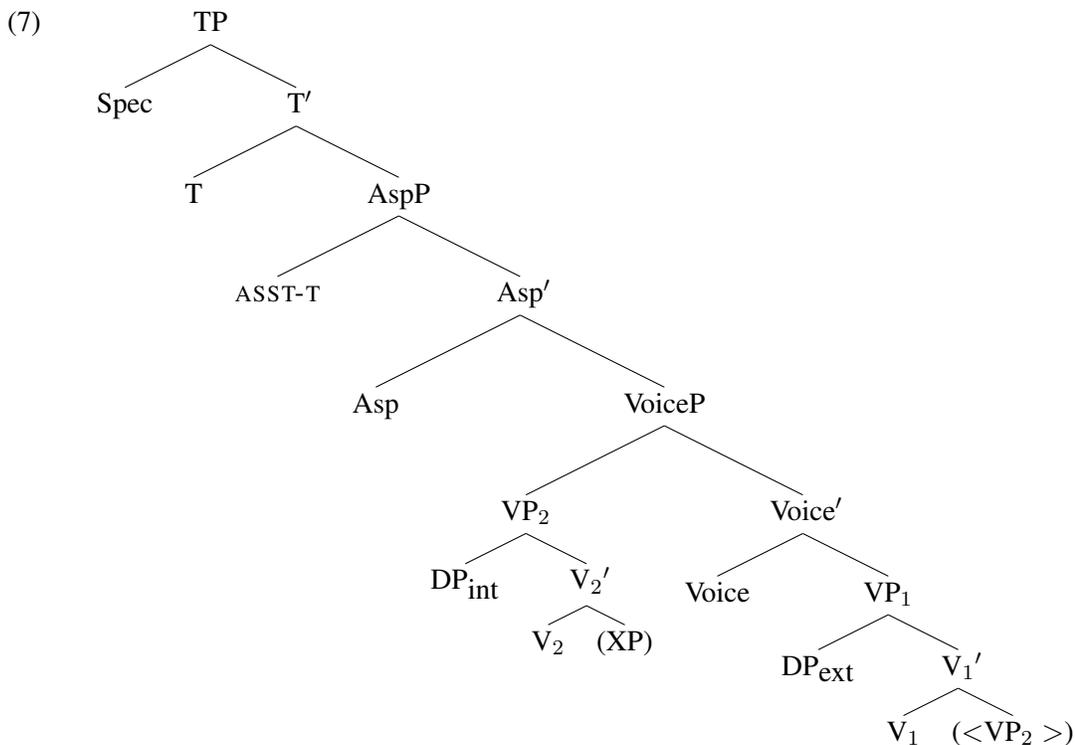
- Passivization involves the zooming in on a consequent state subevent (result of a transition into a state), represented as a lower VP shell.

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<sup>4</sup>See von Stechow (1995); Doetjes (1997); Rothstein (2004); Gehrke (2008), and literature cited therein, for different proposals how the two predicates in syntactically created accomplishments are combined semantically to form one complex predicate and refer to a single event.

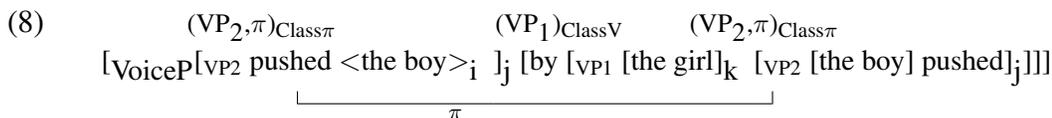
<sup>5</sup>With Rothstein (2004); Arsenijević (2006); MacDonald (2006) and others, we separate the theory of event types and the creation of such types at the VP level, from the effect that the quantificational properties of the internal argument DP can have on the interpretation of the VP as bounded or unbounded.

- The lower VP shell (a consequent state) is endowed with a feature that determines its movement to a discourse-related projection at the edge of the VP phase, VoiceP.
- Voice is responsible for grounding the event time in a particular way (see appendix for details).
  - With passives: The event time is anchored within the consequent state subevent.
- Two properties of the feature that triggers movement to VoiceP:
  - Discourse-related: chooses the element of the event that needs to be singled out.
  - Quantificational: makes it readable to the next phase.



### 3.2 No minimality effects with verbal passives

- The relevant feature defines the lower VP as a member of  $\pi$ 's class and drives its movement to [Spec, Voice], without generating a minimality effect (see Grillo 2008, for more detail).  
**NB:** This feature at the edge of the VP is similar in nature to those that project at the edge of the clause or the DP; the distinction between these is given by the syntactic environment in which they are projected.



#### What kind of feature is $\pi$ ?

- The main job of the feature:
  - To single out an element of the atemporal event structure associated with the VP and to enrich its semantics by introducing temporality
  - This makes it available to the temporal domain (and ultimately the discourse domain) of the clause (see Gehrke and Grillo 2009, for further motivation and details).

→ **Aboutness** (see Rizzi 2006; Rizzi and Shlonsky 2007, for a preliminary distinction between topichood and aboutness)

- e.g. Arsenijević (2006): Functional verbal projection that basically picks out that part of the complex event structure that something is asserted about
- Whatever is asserted about (the part of) the event (the focus lies on) moves up.
- Passives: The consequent state moves up to serve as a basis for the event time.

### **Contrast with argument structure based approaches:**

- Movement of the lower VP shell is independent of the promotion of the internal argument to subject position and motivated by interface requirements.

### **3.3 Empirical support**

**Not all transitive verbs form passives** (see also Postal 2004, for extensive discussion)

- Only transitive verbs associated with an acc/ach event structure (involving BECOME) passivize (9), those associated with a simple event structure do not (10).

- (9) a. The lion killed the antelope.  
The antelope was killed (by the lion).  
b. He put the card on the table.  
The card was put on the table (by him).
- (10) a. This laptop weighed two kilos.  
\*Two kilos were weighed (by this laptop).  
b. This chair cost 50 euro.  
\*50 euro were costed (by this chair).

**Word order restrictions with secondary resultative predicates** (see also (2))

- (11) a. Jutta was spoken to by Eric.  
\*Jutta was spoken by Eric to.  
b. Tom zipped the sleeping bag all the way up to the top.  
??The sleeping bag was zipped by Tom all the way up to the top.

- (12) a. The table was wiped clean by John. *(from Postal 2004)*  
??The table was wiped by John clean.  
b. The metal was hammered flat by John.  
??The metal was hammered by John flat.

### **Passive existential constructions (PECs)**

- Problem for NP movement approaches: Why does the internal argument have to appear in pre-verbal position (13-a), whereas the postverbal position is ungrammatical (13-b)?

- (13) a. There was a man killed.  
b. \*There was killed a man.

- Our account: Regular passives involve two independent operations:
  - First, the lower VP shell moves to Spec VoiceP to form a basis for the event time.
  - Second, a DP moves to Spec TP to satisfy the EPP.

- EPP requirements on T can be satisfied either by movement of the closest argument (here:  $DP_{int}$  given prior movement of  $VP_2$ ), or by expletive insertion (13-a).<sup>6</sup>

Collins (2005) makes the wrong prediction: \**There was by the police a man killed.*

### Floating quantifiers

- Floating quantifiers are banned from the post-verbal position in passives (14); both word orders are grammatical in the active counterparts (15) (first observed in Sportiche 1988).

- (14) a. The boys were both given a good talking to.  
b. \*The boys were given both a good talking to.

- (15) a. Ad gave the boys both a good talking to.  
b. Ad gave both the boys a good talking to.

- This is unexpected under NP movement approaches to passives: The quantifier should be stranding in postverbal position where it is originally merged.
- Our account:  $VP_2$ -movement is independent of DP-movement to satisfy the EPP.  
→ The floating Q moves together with the internal argument in Spec  $VP_2$  and remains stranded after the movement of the internal argument to Spec TP.

### Trace reactivation in passives

Conflicting empirical findings in the psycholinguistics literature on antecedent reactivation at the alleged trace position in passives questioned the psychological reality of NP traces.

- Visual Probe Recognition task (VPR) (MacDonald 1989)  
A sentence is presented on a screen, after which a word appears on the screen and the subject has to say if the word was present in the sentence.
  - The probe word with passives is the head noun of a subject DP like *mayor* in (16).  
(16) The terrorist wanted to disrupt the ceremonies.  
[The new mayor at the center podium]<sub>i</sub> was shot *NP-trace*<sub>i</sub>.
  - Reaction times were compared to reaction times with predicate adjectives (17).  
(17) The terrorist wanted to disrupt the ceremonies.  
The new mayor at the center podium was furious.
  - Prediction: Facilitatory effect should obtain only in verbal passives.  
Borne out: Probe recognition was faster after verbal passives than after adjectives.
- Cross-Modal Priming task (CMP) (Osterhout and Swinney 1993)
  - Sentences are presented auditorily while strings of letters appear on the screen at specific time points and have to be recognized by the subject as being words or non-words.
  - Given that a previous presentation of a semantically related word reduces the reaction time in word recognition it can be tested whether a word present in the sentence is active at specific points during processing.
  - Findings: No reactivation at the alleged trace position in passives until one second after the alleged trace.

<sup>6</sup>Law (1999) notes that PECs are ambiguous between an eventive and a noneventive reading, but we analyze the eventive reading as involving a proper matrix passive. This is supported by the fact that under the eventive reading it is possible to extract out of the clause (which should not be possible if it were a reduced relative, as claimed by Law) (i) (see also Rezac 2004).

(i) To whom there was a present (\*which was) given?  
Thus, the claim that two independent movements can be involved in passive constructions in general, and that only the first one takes place in sentences like (13), is still valid.

- These findings are in conflict under NP movement analyses but not under our approach:
  - Facilitatory effect in VPR found by MacDonald (1989): The lower VP is reactivated at its trace position.
  - Absence of reactivation found by Osterhout and Swinney (1993): In the structure proposed in (7), there is no trace in the position tested (i.e. in postverbal position).

#### 4 Passivizing states

- States do not involve BECOME; (if at all), they consist of only one sub-event, a state.
- Potential problem for our proposal: Many stative predicates passivize (18).
 

(18) a. The house is owned by Louise.  
       b. The answer / myth is known / believed by the pupils.  
       c. Toni is loved (by Stefan).
- *BUT*: The availability of passivization is not a common property of stative predicates in general.

##### 4.1 Passivizing psych-verbs and the eventive nature of passivized states

- Three kinds of psych-verbs (Belletti and Rizzi 1988)
  - *fear*-type (*temere*): Derive eventive passives (19-a).
  - *worry*-type (*preoccupare*): Only derive adjectival passives.
  - *appeal*-type (*piacere*): Do not passivize at all (19-b).

(19) a. Giorgos feared Roberta.  
       Roberta was feared (by Giorgos).  
       b. The solution escapes me.  
       \*I am escaped (by the solution).
- Intuitive difference between *appeal*-verbs / psych verbs that do not allow passivization vs. *fear*-verbs / psych verbs that allow passivization as well as other stative predicates in (18):
  - Only the latter can have an inchoative meaning of the state denoted by the verb (20).

(20) a. Shakuntala got to know the answer.  
       b. Louise got to own a house.  
       c. Nino got to fear sharks.  
       d. ??The solution got to escape Berit.

→ The state denoted by the verb is re-interpreted as a consequent state, a state having come into existence, which is predicated over the internal argument.

##### Previous observations about the role of event structure in the passivization of psych-verbs

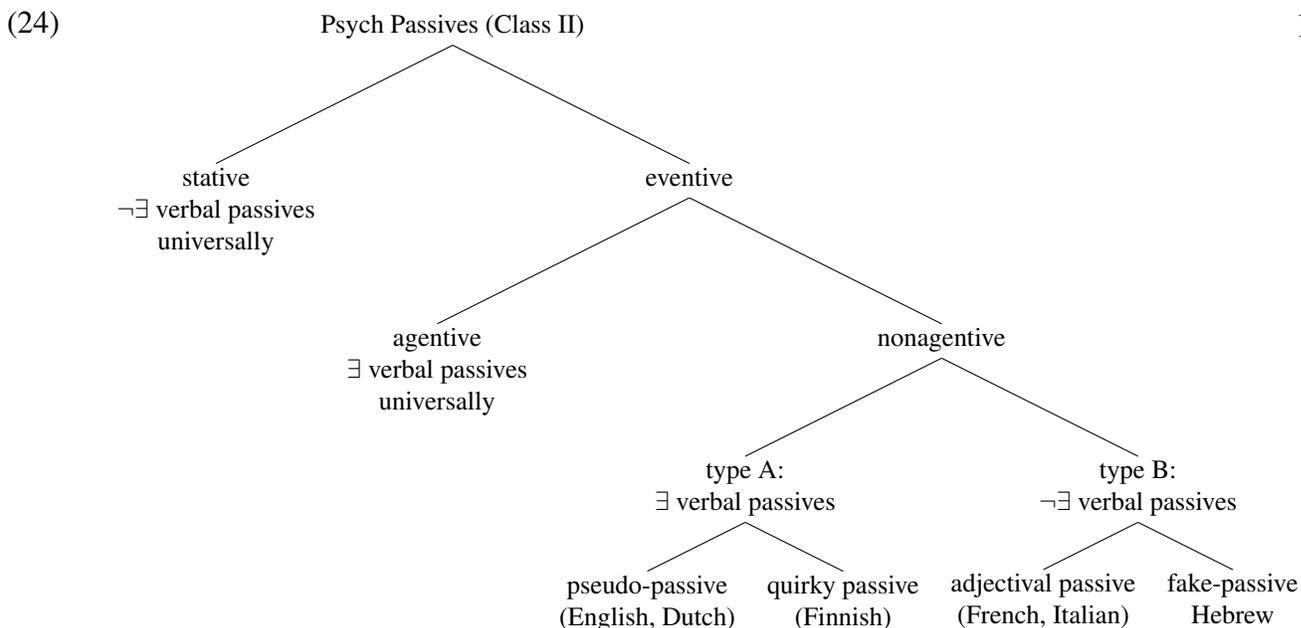
- The *needs* + *Participle* passive in Pittsburghese English (Tenny 1998)<sup>7</sup>
  - This construction is restricted to eventive predicates (21).

(21) a. The dog needs scratched hard / for an hour.  
       b. The car needs washed very carefully / in a hurry / by the owner.  
       c. The car has been needing washed for a long time.

<sup>7</sup>Tenny argues convincingly that this construction is a verbal and not an adjectival passive. For example, it regularly combines with event-related modifiers and the Progressive, as indicated in the examples in (21), and it does not allow primary adjectives, *un*-prefixation or adjectival degree modification.

- It can also be used with psych-verbs (with non-agentive *by*-phrases) (22).  
(22) Nobody needs angered/irritated/discouraged/dismayed by the truth.
- It can only be used with a subset of psych verbs: The more ‘eventive’ the verb the more acceptable it will be with the construction (23).<sup>8</sup>  
(23) a. The actor needs fascinated by the play.  
b. Young people shouldn’t need depressed by life.  
c. The local farmers need concerned by the worsening drought.

- Landau (2010, 64): The Psych Passive Typology (24)



#### 4.2 Our proposal: States are coerced when undergoing passivization

- Reinterpretation involves coercion of the underlying event type (a state), which is shifted into a more complex event type, by adding a BECOME predication.
- This secondary predication over the internal argument, represented by a lower VP shell with the internal argument in its specifier, makes passivization possible.
- Semantic/pragmatic constraint: The state has to be interpretable as a consequent state.

#### Similar coercion operations proposed in the literature

(see also Partee 1987; Pustejovsky 1995; Asher 2007, for more general proposals for type shifts and coercion)

- Inchoative states (de Swart 1998)
  - French stative predicates are coerced into ‘events’ (accs / achs) to meet the input requirements of the *passé simple* or point adverbials like *soudain* ‘suddenly’.
  - Semantic effect: The state is interpreted as an inchoative state.<sup>9</sup>

<sup>8</sup>Tenny’s comments: ‘A complex of factors influences the degree of eventiveness, including not only agentivity, but also volitionality, punctuality, and the affectedness or change of state in the experiencer. A loose gradient can be defined from the purely stative ascription of property to the most eventive verb type.’

<sup>9</sup>Following upon de Swart’s analysis of this type shift as involving covert aspectual operators, Travis (2010) proposes to represent these operators in the syntax by means of a VP shell account.

- Progressive Achievements (Rothstein 2004)
  - Achievements are coerced into accomplishments when combined with the Progressive (e.g. *Jonathan was reaching the summit*), by adding an activity (associated with Dowty’s DO predicate), which is interpreted as a preparatory process.
  - Pragmatic constraint: It has to be possible to construe an appropriate activity.

### 4.3 More restricted availability of passivization in the nominal domain

- Chomsky (1970): Only a subset of derived nominals can form passive nominals (25), (26).

- (25)
- John destroyed the computer.
  - The computer was destroyed by John.
  - John’s destruction of the computer
  - the destruction of the computer by John
- (26)
- John feared flying.
  - Flying was feared by John.
  - John’s fear of flying
  - \*the fear of flying by John

#### Restricted availability of nominal passives follows from an event-structure based approach.

- The nominal in (25) derives from a verb that is lexically specified for a complex event structure; the nominal in (26) does not, but instead derives from a stative verb.
- The only possible way to introduce BECOME with state predicates is the formation of a complex predicate in the syntactic structure via merge of additional verbal structure.
- Merging additional verbal structure with nominal heads is not possible:
  - Nominals cannot take SC as complements (see also Haegeman and Guéron 1999).

- (27)
- I consider [Rick a good musician].
  - \*my consideration [Rick a good musician]

- Nominals cannot assign accusative case to a DP in the Spec of their complement or incorporate the complement’s head.

- (28)
- I consider [Sharon to be a good writer].
  - \*my consideration (of) [Sharon to be a good writer]

- Nominals cannot combine with particles.

- (29)
- Andrea gave the book away.  
Andrea gave away the book.
  - \*the gift of the book away  
\*the gift away of the book

→ The only option for nominals to undergo passivization is to be lexically endowed with a complex event semantics.

#### The restrictions do not follow from the ability to absorb an external argument.

- It is often claimed that only verbs with an external argument, which gets absorbed in the course of the derivation of a complex event nominal (CEN), derive active and passive nominals (Grimshaw 1990; Picallo 1991; Alexiadou 1999).

- Grimshaw (1990):
    - Complex Event Nominals (CEN): Nominals with event (and argument) structure (30-a)
    - Simplex Event Nominals (SEN): No event structure (30-b)
    - The external argument is suppressed with CENs, but it is still present and in this way it behaves exactly as in verbal passives; e.g. it is capable of controlling PRO (30).
- (30) a. Only observation of the patient to PRO collect the critical evidence is allowed.  
 b. The observations (\*to PRO collect the critical evidence) are allowed.<sup>10</sup>
- The suppressed argument can be realized in a *by*-phrase as an adjunct.
  - Suppression of the external argument is argued to explain the (supposed) unavailability of CENs of intransitive verbs; it follows that passive nominals are also unavailable.
- *BUT*: Intransitive CENs are available in Polish (Rozwadowska 1995) (see also Schoorlemmer 1995, 1998, for similar facts from Russian):
    - These nominalizations pass Grimshaw’s tests for their status as CENs.<sup>11</sup>  
 E.g. the argument in the possessor can control into purpose clauses.
    - Yet, the only argument cannot appear in a *by*-phrase, but only as a possessor.  
 ⇒ These are CENs with syntactically active external arguments, which still do not derive passives.
    - Similar facts hold for Italian (31).
- (31) La corsa (di Gianni) per PRO vincere la coppa non è finita bene.  
 the run of John to PRO win the cup not is finished well  
 ‘John’s run to win the cup was not successful.’

⇒ Absorption as an explanation for the restricted availability of passive nominals is unmotivated and leaves unexplained selective Control of PRO and the availability of intransitive CENs.

#### 4.4 No extent reading with verbal passives

- Some spatial expressions (verbs and PPs) display an ambiguity between an eventive movement reading (32-a) and a stative spatial extent reading (32-b) (see Gawron 2005, for discussion).
- (32) a. The army surrounded the city.  
 b. Trees surrounded the city.
- Under verbal passivization only the eventive reading survives (33).
- (33) a. The city was surrounded by the army. *(verbal or adjectival passive)*  
 b. The city was surrounded by trees. *(only adjectival passive)*
- With nominalizations, a *by*-phrase is available only with the eventive reading (34).
- (34) a. The surrounding of the city by the army  
 b. \*The surrounding of the city by the trees

<sup>10</sup>That (30-b) is a SEN is signaled by plural marking (one of Grimshaw’s own criteria to distinguish between the two types of nominals). Note also that the examples use the same root, *observation*, which means that an alternative explanation of the availability of control in terms of the semantics of the predicate is excluded.

<sup>11</sup>Schoorlemmer (1995, 298-300) shows that Russian nominals derived from unergative verbs allow agent-oriented modification (to the extent that the underlying verb allows it) as well as modification by ‘constant’ without deriving a plural, *for*-adverbials, and purpose clauses; in addition, they can be objects of a verb like *nabljudat’* ‘observe’.

## 4.5 Processing of eventive and stative predicates

### Gennari and Poeppel (2003) (GP)

- Self-paced reading technique and a lexical decision paradigm
- Compare the processing speed of eventive (*inspect, explore, criticize, invent*) versus stative (*dislike, appreciate, admire*) verbs.<sup>12</sup>
- The rationale of the experiment: Eventive predicates have a more complex semantics and syntactic structure (see Table 1).
  - Eventive predicates entail simpler conceptual units such as CAUSE, BECOME or CHANGE and resulting STATE, corresponding to the event’s internal dynamics they denote.
  - Stative verbs lack any such causal entailments.

Type	Lexical entailments
EVENTS	break → $x$ CAUSE(BECOME ( $y$ be-broken))
	discover → BECOME ( $x$ knows $y$ )
STATES	deserve → $x$ deserve $y$
	possess → $x$ possess $y$

Table 1: Examples of Lexical Entailments (Gennari and Poeppel 2003)

- Stimuli were controlled for word frequency, word length, argument structure, frequency of syntactic frames, and plausibility.<sup>13</sup>
- Results:
  - Eventive verbs took 27 ms longer to process than stative verbs.  
Repeated measure ANOVAs comparing reading times at the verb position revealed a significant word type effect ( $F(1,29) = 10.66, P = 0.003; F(1,43) = 8.9, P = 0.004$ ).
- Implications (according to GP):
  - The outcome of the experiment sheds light on ‘the manner in which semantic or conceptual structures contained within the lexicon are processed’.
  - ‘Accessing verb meanings entails accessing properties of the corresponding event representations such as the initial state, the change and resulting state’.

### Pilot study: Does the difference disappear with passives?<sup>14</sup>

#### 4.5.1 Goal

- To form verbal passives, stative predicates must undergo an additional operation of coercion to become eventive; this operation could have a processing correlate.

<sup>12</sup>To distinguish between eventive and stative event types GP employ standard tests like the (in)compatibility with the Progressive and with *in*-adverbials. This implies that they are mainly interested in the contrast between states and accomplishments, in the sense of Vendler (1967), and have not much to say about activities or achievements.

<sup>13</sup>The mean log frequency for both verb types was 3.96 according to Collins Cobuild corpus; the mean word length was 6.11 characters for events, and 5.82 for states. Number of syntactic arguments and most frequent syntactic frames were obtained using the Schulte im Walde (1998) automatic parses (calculated from the Bank of English corpus 320 million written and spoken words). Each matched verb pair had the same number of possible syntactic frames and for the most frequent frame, the same number of arguments. Each verb was matched with another one of similar frame frequency and frame distribution.

<sup>14</sup>The following experiment is partially supported by a Canadian Social Science and Humanities Research Council grant to Yosef Grodzinsky (SSHRC 410-2009-0431).

- There is psycholinguistic evidence that coercion and type shifting operations in other domains add additional processing complexity.

(Piñango et al. 1999, 2006; de Almeida 2004; Pickering et al. 2005; Traxler et al. 2005; Pickering et al. 2006; Brennan and Pylkkänen 2008; Bott 2008a,b)

→ The contrast found by GP between stative and eventive predicates in the active should disappear (reverse, or at least be diminished) in the passive.

#### 4.5.2 Methods:

- Stimuli:
  - 20 stative and 20 eventive predicates were selected from those used in GP: Predicates used by GP which do not passivize (e.g. *exist, stink, comprise, owe*) were omitted.<sup>15</sup>
  - 2 series of actives and passive sentences were produced using these predicates for a total of 160 sentences.
  - Each DP in each sentence contains an adjectival modifier, for two reasons:
    - i. to follow the structure of GP and to ensure that the results can be compared,
    - ii. to have longer sentences and in this way to be able to check reading times at different time points (e.g. *by the doctor* vs. *by the old doctor*).

	Active	Passive
Eventive 20 (verbs) x 2	<i>The renaissance philosopher criticized the famous violinist.</i>	<i>The famous violinist was criticized by the renaissance philosopher.</i>
Stative 20 (verbs) x 2	<i>The renaissance philosopher admired the famous violinist.</i>	<i>The famous violinist was admired by the renaissance philosopher.</i>

Table 2: Example sentences from pilot study

#### 4.5.3 Analysis

- Mixed Effects Model Approach in open-source code *R* (Bates and Sarkar 2007):
  - Subjects and Items are treated as random effects and Independent Variables as fixed effects.
  - This has the advantage of considering covariates that contribute to the structure of the data (other than the Independent Variables) including those associated with both items (e.g. frequency, complexity) and subjects (e.g., age, sex).
- Passive experiment analysis: Mixed model regression analysis, with a Fixed effects factor for Verb Type (stative or eventive) and random intercepts for subjects and items (Baayen et al. 2008).

#### 4.5.4 Results<sup>16</sup>

- The Verb Type factor significantly accounted for variability in acceptability judgments:
  - Passives of states had a lower acceptability rating:  $b = -0.13853$  Std. Error =  $.05496$   $t = -2.52$ ,  $p = .0119$
- All sentences were judged grammatical.

<sup>15</sup>This fact is interesting in itself because it tells us that GPs stative predicates do not constitute a natural class when it comes to passivizability.

<sup>16</sup>Each error bar in Figure 1 is constructed using 1 standard error from the mean.

- Behavioral results showed a significant effect of Verb Type, with higher scores for eventive than for stative predicates.
- There was no significant difference in Reaction Time between the two types of predicates.
- Analysis with *R* produced the same results (as did a standard ANOVA).

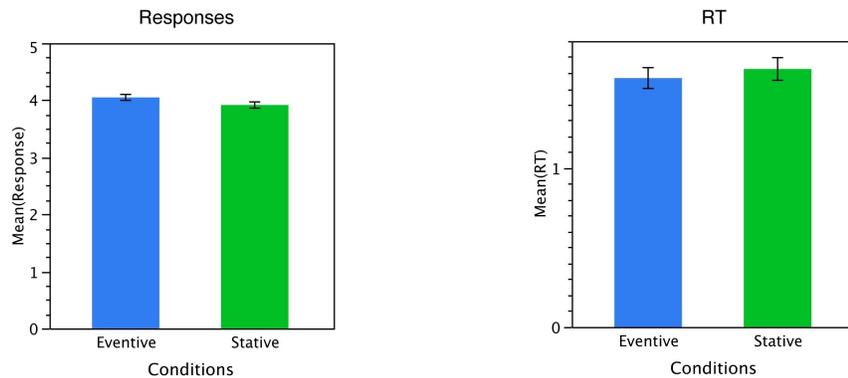


Figure 1: Pilot study's results

#### 4.5.5 Implications

- As expected, both sentence types are acceptable. This result is important because it shows that the materials are fit to be included in further experimental work.
- The processing advantage for statives over eventives in active sentences, as reported in GP, disappears in passives, as predicted by our hypothesis.
- The results indicate a significant preference for passives of eventive predicates over stative ones.
  - Speculation: Acceptability rating can be taken to partly mirror processing complexity.<sup>17</sup>
  - From this perspective the results could be taken to constitute initial support of (or at least not to work against) our initial hypothesis.

#### 4.5.6 Potential problems

- Passives of statives, even with a *by*-phrase (see, for instance, (33-b)), can still be ambiguous between a verbal and an adjectival passive (see also Gehrke 2010).
  - Stolterfoht et al. (to appear) show for German that (at least some) adjectival passives take longer to process than verbal passives.<sup>18</sup>
 → Additional processing costs might be due to the adjectival nature of (some of) the passives with stative predicates.
- Different ways to force an eventive reading of the passive, e.g. adding a verbal modifier like *suddenly*, would probably also force an eventive reading in the active.
  - It would not be clear that additional processing load is due to passivization.
    - Brennan and Pyllkänen (2010) use this option to force an eventive reading of psych-verbs in active sentences in a self-paced reading study and with MEG. → Significant effect of 'inchoative coercion': Active sentences containing statives with punctual temporal modifiers were read more slowly than their eventive counterparts.

⇒ More experimental work needs to be done, preferably also with languages that morphologically distinguish between verbal and adjectival passives, such as German or Spanish.

<sup>17</sup>Some support for this view comes from an experiment about the processing of subject and object relative clauses, run by Nino Grillo, Andrea Santi and Michael Wagner, with the same set-up as this one.

<sup>18</sup>Although it seems that they mainly tested adjectival passives with verbs that do not readily allow adjectival passives and need additional pragmatic licensing.

## 5 Event structure and the acquisition of passives

### Two main issues in the acquisition literature on passivization:

- **Verbal passives are problematic** in children until after 4;0 (Bever 1970; Horgan 1978; Maratsos et al. 1985; de Villiers and de Villiers 1985; Borer and Wexler 1987; Meints 1999) (see Guasti 2004 for an overview of the literature, and Hyams and Snyder 2008 for a discussion of different results in O'Brien et al. 2005)
- Children do better with comprehension and production of **actional passives** (35-a) than with passives of **non-actional** verbs (35-b).  
(see Maratsos et al. 1985; Borer and Wexler 1987; Fox and Grodzinsky 1998, among others)

- (35) a. Anca was kicked/pushed (by Christina).  
b. Roberta was feared (by Giorgos).

### 5.1 Maturation accounts and their problems

**A-Chain Maturation Hypothesis** (Borer and Wexler 1987): At early stages of their development children cannot form A-chains.

- The structure of adjectival passives is projected instead of their verbal counterpart.
- Adjectival passives are, by assumption, generated in the lexicon and do not require A-movement of the internal argument.
- Additional support: Tendency to omit *by*-phrases
- Only actional predicates readily form adjectival passives.

**Problem: Apparently, not all A-chains mature equally** (see Guasti 2004, and reference cited therein)

- Young children correctly place **subjects** before finite verbs in active sentences, which is a problem given the VP internal subject hypothesis (e.g. / as first proposed by Zagana 1982; Sportiche 1988; Koopman and Sportiche 1982, and afterwards by many others).

⇒ Borer and Wexler (1992): Only 'non-trivial' chains (those involving more than one theta position) are problematic; but this will not work either:

- Children master **unaccusative predicates**, in which the subject originates as the internal argument and is successively A-moved to Spec IP (36-a); these should also involve 'non-trivial' chains under Borer and Wexler's (1992) proposal.
- Borer and Wexler (1987, 1992) incorrectly predict the production of sentences like (36-b).

- (36) a. Mina arrived.  
b. #Arrive Mina.

**External Argument Requirement Hypothesis (EARH) (Babyonyshev et al. 2001)**: Children disallow clauses in which there is no external theta-role assigned to Spec, vP.

- Baker et al. (1989): In verbal passives the external theta-role is assigned to the clitic *-en/ed* (the passive participle morpheme), an  $X^0$  by definition.  
⇒ Children do not allow verbal passives.

**Problem for the EARH:**

- Children's good performance with **raising** (a raising verb like *seem* does not assign a theta role to Spec, v) (Wexler 2002) (37).

- (37) It seems to Silvia that Paolo is playing the piano.

**Universal Phase Requirement (UPR)** (Wexler 2002): *v* always defines a strong phase for children under approximately 5 years.

- The direct object DP is inaccessible to T (see Wexler 2002, for details).
- (In addition: movement of the internal argument in passives has no interpretive effects.)

**Problem for the UPR:** Children's good performance with reflexive clitics in Romance

- Given Marantz's (1984) analysis of the reflexive-clitic construction, the UPR incorrectly predicts children to fail with this structure (see Hyams and Snyder 2006, for discussion).
- Marantz: This construction is similar to passives in that it also requires movement of the internal argument to the subject position.
- This movement should be banned by UPR given that it also has no interpretive effects.

## 5.2 Our proposal

- The difficulties with verbal passives are part of a more general issue with the representation of 'non-local' chains, i.e. movement that generates inversion of the canonical order of arguments of a predicate.
- Similar problems are found in different populations, such as agrammatic aphasics, children, or adult speakers in stressful situations (see Grillo 2003, 2008, 2009; Garraffa and Grillo 2008, for more details).

### Generalized Minimality (GM) (Grillo 2008)

- The projection of scope/discourse features is more costly than that of argumental features.
- This projection is problematic in populations with reduced (syntactic) processing capacities (possibly because of their slowed-down activation of morphosyntactic information).
- A minimality effect arises as a consequence of this feature impoverishment.  
→ This explains the comprehension deficit with particular structures (i.e. structures displaying a non-canonical order of NPs).
- Structural similarity between the traditional minimality effects captured by Relativized Minimality (Rizzi 1990, 2004; Starke 2001) (38), and the intervention effect in movement of the object NP over an intervening subject (39).

(38) \*How do you wonder who behaved <how>?

(39) Show me the boy that the girl kissed <the boy>.

- Movement of *how* in (38) is blocked by the intervention of another *wh*-element *who*.
- Underspecification of the morphosyntactic feature set associated with the moved NP in (39) would also lead to a minimality effect given the structural similarity between this element and the intervening subject NP.

### GM accounts for comprehension asymmetries in agrammatic aphasia and acquisition:

- Comprehension asymmetries between subject and object relatives, clefts, *wh*-movement
- Absence of difficulties with unaccusatives, verb movement

## Problems with verbal passives

- Recall: A scope/discourse-related feature drives the movement of the secondary predicate over the intervening VP.
- Absence of minimality effects in standard passives: A feature encoding ‘aboutness’ [ $\pi$ ] is associated with the lower VP and drives its movement to [Spec, Voice].

$$(40) \quad \text{VP}_2 \underset{\pi}{\text{VP}_1} \langle \text{VP}_2 \rangle \pi$$

$$(41) \quad \begin{array}{c} (\text{VP}_2, \pi)_{\text{Class}\pi} \quad (\text{VP}_1)_{\text{ClassV}} \quad (\text{VP}_2, \pi)_{\text{Class}\pi} \\ [\text{voiceP}[\text{VP}_2 \text{ pushed } \langle \text{the boy} \rangle_i ]_j \text{ [by } [\text{VP}_1 \text{ [the girl]}_k \text{ [VP}_2 \text{ [the boy] pushed}]_j]]] \\ \hline \pi \end{array}$$

→ The moved  $\text{VP}_2[\pi]$  in (41) is not blocked by the intervening  $\text{VP}_1$ , since the latter does not qualify as a member of the  $\pi$  class.

- GM: Children have trouble with the projection of scope/discourse features (in the absence of strong contexts as the one provided in O’Brien et al. 2005).
  - Impoverished representation of  $\text{VP}_2$ , in which the  $\pi$  feature is missing;
  - Inactivation of  $\pi$  makes  $\text{VP}_2$  indistinguishable from  $\text{VP}_1$ , which ultimately generates a minimality effect whenever the former is moved above the latter (42).

$$(42) \quad \text{VP}_2 \text{ VP}_1 \langle \dots \rangle$$

## The actional / non-actional distinction

≈ Distinction between states and events (activities, accomplishments, achievements)

- Recall:
  - Passivization operates on the event structure of a predicate: Only those predicates which involve a BECOME component should allow passivization.
  - State predicates do not involve BECOME and need to be coerced into achievements in order to be able to passivize (semantically/pragmatically constrained type shift).
- Coercion requires both a revision of the semantic properties of the predicate (which also requires checking if the predicate can have an inchoative meaning) *and* a revision of the syntactic structure generally associated with that predicate.
- A child’s capacity for processing, which is already limited in dealing with ‘normal’ actional passives, is exceeded by the necessity to operate these extra-computations.

## 6 Conclusion

- Problems with argument structure/DP perspective on passive formation
- Shift to an analysis based on event structure: Passivization involves the movement of  $\text{VP}_2$  (a consequent state subevent) to a discourse-related position at the edge of the VP (Spec, VoiceP).
- Different kinds of predicates behave differently with respect to the availability of passives.
- The approach offers new insights into the acquisition of passives.
- Future tasks:
  - Investigate the precise discourse properties of the stipulated VoiceP
  - Test for trace position, aspectual coercion, likeliness of availability of inchoative state readings with particular state predicates

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