

The Acquisition of Argument-Roles in Nominalizations

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1. Nominalization

Beginning with Grimshaw (1990), several authors (Alexiadou 2019; Borer 2013; Bruening 2013; Roeper and van Hout 2009) have argued that nominalization is akin to passivization: in nominalization, as in verbal passives, external arguments are suppressed, but are optionally realized, as in the *by-phrase* in English, for example. Let us consider (1) and (2). In (1), the external argument (agent) of the verb *destroy* is *the enemy* and is expressed as a *by-phrase*. The examples in (2) show a similar pattern: the external argument (*the enemy*) is expressed as the *by-phrase*, and either *of* is inserted before the internal argument (*the city*) or the internal argument appears pre-nominally as a possessor, similarly to (1).

- (1) The city was destroyed by the enemy.
- (2) a. The destruction of the city by the enemy
b. City's destruction by the enemy

In this paper, we examine nominalization from a child language acquisition perspective. We show that data from a comprehension experiment provide support for the hypothesis that German deverbal nominalizations with the suffix *ung* share several properties with verbal passives, and that the acquisition of passives and nominalizations behave alike.

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2. German nominalization with *-ung*

There are different ways to nominalize a transitive verb in German. Some verbs (typically verbs of change of state) can be nominalized by suffixing *ung*, which bears feminine gender. Consider the example in (3). *Bemalen* 'paint' is a transitive verb, and as such, it obligatorily takes both an internal and an external argument.

- (3) Jan bemalt Anna.
 Jan paints Anna
 'Jan is painting Anna.'

Bemalen is nominalized by affixing *-ung*. When *bemalen* is nominalized, the arguments need not be overtly realized as in (4).

- (4) die Bemalung
 the.Fem painting
 'the painting'

It is possible to overtly express the arguments of the root verb in the following ways. We focus here on examples containing proper names, as in German only proper names can appear in pre-nominal position in noun phrases (Alexiadou 2001). If only the internal argument is realized, it can bear genitive case and be placed pre-nominally, as in (5a), or post-nominally introduced via the preposition *von* 'of', as in (5b).

- (5) a. Jans Bemalung
 Jan.Gen painting
 'Jan's painting' (Jan = patient)
- b. die Bemalung von Jan
 the painting from Jan
 'the painting of Jan' (Jan=owner, painter, or the subject of the painting)

External arguments of the root verb can be expressed post-nominally with a preposition *durch*. Unlike the external arguments of verbal passives that can be introduced either by *von* or *durch*, depending on the theta-role (*durch* is used with causers), the external argument of a nominalized verb can only be introduced by *durch*.

- (6) die Bemalung durch Anna
 the painting through Anna
 'The painting by Anna.'

When both the internal and external arguments are overtly expressed, there are two options: the internal argument is either placed pre-nominally, or post-nominally introduced via the preposition *von*.¹

- (7) a. Jans Bemalung durch Anna
 Jan.Gen painting through Anna
 ‘Jan’s painting by Anna’ (Jan = patient)
- b. die Bemalung von Jan durch Anna
 the painting of Jan through Anna
 ‘the painting of Jan by Anna’ (Jan = patient, Anna = agent)

Following Alexiadou (2001) and Borer (2013) among others, let us assume that some deverbal nouns retain much of the verbal projections associated with the verb they are derived from (see also Alexiadou (2019); Bruening (2013); Van Hout and Roeper (1998), among others). Specifically, we assume that there is a VP and VoiceP within the nominalization, and that the external argument is merged in VoiceP (Kratzer (1996)). Crucially, the mechanism behind overtly realizing the external argument of deverbal nouns parallels that of the verbal passive, following Alexiadou et al. (2015).

We furthermore assume that a pre-nominal Genitive argument is, in theory, ambiguous between expressing the internal or the external argument of the root verb, when the root-verb is not a change-of-state verb. When the external argument is expressed overtly as a *by*-phrase, however, the pre-nominal argument is necessarily interpreted as the internal argument of the root verb.

As reviewed below, young children have difficulties with the passive construction when the external argument is overtly expressed (Armon-Lotem et al. 2016). Our goal in this paper is to investigate whether we observe similar difficulties with nominalization. Even though it is possible to test the different structures shown above, in this paper, we constrain ourselves to cases where (i) there is a pre-nominal argument without an external argument of the noun overtly expressed, in which case, we assume that it has been moved there just like in passive constructions, and (ii) both internal and external arguments of the noun are overtly expressed.

3. Acquisition of Passives

Researchers have been investigating how children acquire the passive construction since the 1960s. The passive is a construction that involves (i) suppression of an external argument, (ii) use of passive morphology (either synthetic or morphological), and (iii) promotion/dislocation of internal argument to the subject position, or realizing it with Nominative case.

¹The full paradigm is possible only when both internal and external arguments are proper names, because only the proper name can be expressed pre-nominally.

There have been different observations across different studies regarding the acquisition of passives. Let us list some of the observations below.

- (8)
 - a. Active sentences are comprehended more accurately than passives sentences (Turner and Rommetveit 1967 and many others).
 - b. Full passives (with a *by-phrase* in English or its equivalent in other languages) seem to be harder for children to comprehend short passives (without a *by-phrase*) in various languages (Armon-Lotem et al. (2016) and references cited therein).
 - c. Passives with non-actional verbs are harder than those with actional verbs.
 - d. Adjectival passives are acquired earlier than verbal passives.

A recent study by Armon-Lotem et al. (2016) compared the comprehension of active and passive sentences, on the one hand, and the comprehension of full passives (across eight languages) and short passives (across 11 languages), on the other. One of the findings is that, across all eight languages that they tested for both full and short passives, 5-year-old children's comprehension of active sentences are more adult-like than that of passive sentences across languages, and that children's comprehension of short passives are more adult-like than that of full passives.

Another observation is that overall, the comprehension of active sentences were more adult-like than that of passives, either short or full, across languages. There are different analyses why passives are difficult: relative rarity of the construction used (Gordon and Chafetz 1990 and others), late maturity of necessary mechanism (for example, A-Chain Deficit Hypothesis (ACDH) of Borer and Wexler (1987)), and difference in constraints on certain type of movement (e.g. Universal Phase Requirement of Wexler (2004)). Given the finding by Armon-Lotem et al. (2016) regarding the relative ease that 5-year-olds have with short passives compared to full passives, those accounts that rely on maturation face difficulties.

Of particular interest to our study is the contrast between full and short passives. Full and short passives share the following properties: the external argument is suppressed, and the internal argument is promoted to the subject position. Why, then, is the full passive harder to acquire?

Regarding the difficulties associated with full passives, one of the most prominent analysis comes from Fox and Grodzinsky (1998). Fox and Grodzinsky (1998) argue that the problem that children have is specific to transmitting the external theta-role to the *by-phrase*. As far as we know, such questions have not been raised in the context of nominalization.

4. Predictions

Let us walk through our predictions. Some pre-nominal proper nouns are, in theory, ambiguous between patient and agent interpretations, unless the verb stem is a change of state verb. When there is a *durch*-phrase following the noun, however, the pre-nominal proper name should be unambiguously interpreted as having the patient role.

Assuming that children have more difficulties with full passives (with *by*-phrase) than with short passives, the difficulties may be the result of

- difficulties with movement of the internal argument, and/or
- difficulties with assigning the external theta-role to the post-verbal argument (*by*-phrase)

If Grimshaw and others are right that the nominalization involves suppression of the external argument of the nominalized verb, then we might expect that children's acquisition of the argument structure of nominalized verbs may resemble that of passives. If so, we predict that children should have more problems when the external argument of the nominalized verb is overtly expressed as a *durch*-phrase.

On the other hand, the *durch*-phrase with a noun can be only understood as the agent, hence, the only available interpretation of the pre-nominal expression would be that of patient. The unambiguous status of *durch*-phrase as the external argument may make it easier for children to reach the adult-like interpretation.

5. Experiment

We designed an experiment to compare the interpretation the children assign to the overtly expressed arguments of nominal expression with *ung*.

5.1. Method

5.1.1. Participants

We tested 22 monolingual German speaking children (3;7-6;2, $M=4;8$), and 10 adult monolingual German speakers as controls. Child participants were recruited from 2 kindergarten in Berlin, Germany.

Child participants were tested individually in a quiet room at the day care center that they normally attended. They received a sticker for their participation. Adult speakers were also tested individually, and received 5 euro for participation.

5.1.2. Procedure

We used a picture selection task. For each item, there were always two pictures on the screen. Participants were told that they will see a series of pictures, and will be asked to choose one of the pictures, according to the prompt. The prompt for choosing the picture was given in the form of *Zeig mir die Karte von ...* ‘Show me the card of ...’ as in (9) where ... were replaced by either the target expressions with a nominalized verb and pre-nominal proper noun with or without a post-nominal proper noun, or a filler noun (for example, *Bens Katze* ‘Ben’s cat’ that was clearly identifiable).

- (9) Zeig mir die Karte von Jans Bemalung
 show me.Gen the card of Jan.Gen darwing
 ‘Show me the card of Jan’s drawing’

Because the pre-nominal noun must be a proper name in German, characters (Anna, Lisa, Jan, Ben) that appear in the slides were introduced to the participants by their name at the beginning of the experiment. Even though the proper name was used in the pre-nominal position, there were always only one female and one male characters per slide, making it possible to identify the picture even if the participant didn’t remember the name of the character, as long as the participant knew which gender the name is associated with. The experimental sentences were read out by an experimenter, and the responses of the participants were recorded on a sheet of paper for each participant.

5.1.3. Materials

Each pair of pictures for the target expressions were identical except for the theta-roles that the protagonists have. For example, for a sentence like (9), one picture shows Jan painting Anna, the other picture shows Anna painting Jan.



Figure 1: Show me the card of Jan’s painting’

As our goal was to see whether the *durch*-phrase adds difficulties for children to comprehend the target expressions, we only used transitive verbs as the root verbs.

There were two conditions: (i) a deverbal noun with a pre-nominal proper name and a post-nominal *durch*-phrase, and (ii) a deverbal noun with a pre-nominal proper name without a post-nominal *durch*-phrase. There were six items each for these two conditions. Both conditions were included in the experiment. The items were pseudo-randomized so that test items were distributed evenly across the list.

After collecting many verbs that take *-ung* for nominalization, we selected the verbs/nouns that children are likely to know the meaning of.²

The forms that we used are shown below.³

Nouns, produced without *durch*-phrase

- (10) a. Fütterung ‘feeding’
 b. Bemalung ‘drawing’
 c. Bezahlung ‘paying’
 d. Rettung ‘rescuing’
 e. Entführung ‘kidnapping’
 f. Spiegelung ‘mirroring’

Nouns, produced with *durch*-phrase

- (11) a. Beobachtung ‘watching/observing’
 b. Belohnung ‘rewarding’
 c. Zeichnung ‘drawing’
 d. Überraschung ‘surprising’
 e. Messung ‘measuring’
 f. Vertreibung ‘chasing away’

In what follows, we call the picture that a participant would choose if they interpreted the pre-nominal proper noun as the patient (for example, for a sentence as in (9), the picture in which Jans was the patient of painting, being the person

²Even when a participant did not know the particular word, however, because of the uniqueness of the meaning associated with *durch*-phrase, the participant should be able to interpret the pre-nominal proper noun as being the patient argument, and hence, should be able to choose the correct picture.

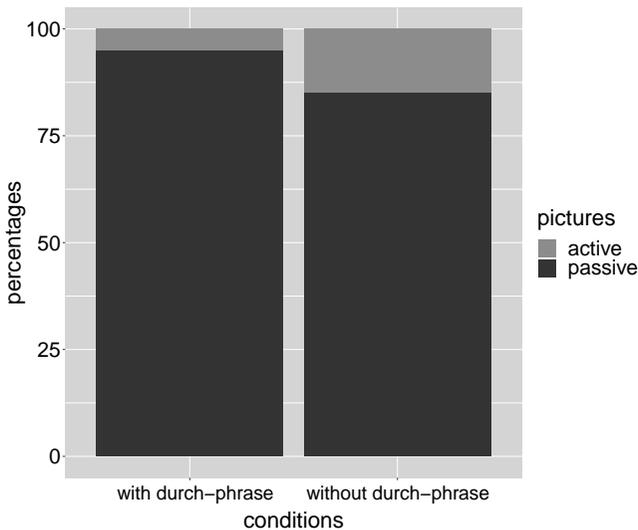
³We used different verbs/nouns for each condition, mostly for the reason to keep the experiment short by not having all the verbs tested in both conditions. We cannot rule out the possibility that one list was more likely to elicit one type of interpretation than the other. We will leave it for future work to verify whether there was a bias already when we created two lists of verbs/nouns.

drawn in the picture, not the person who is drawing the picture), *passive picture*, and the other picture, the *active picture*.

6. Results

6.1. Adults

Let us first discuss how adult speakers fared. Adult speakers chose the patient picture 51 out of 60 trials (85%) when the sentence was presented without the *durch*-phrase, and 57/60 trials (95%) when presented with the *durch*-phrase.



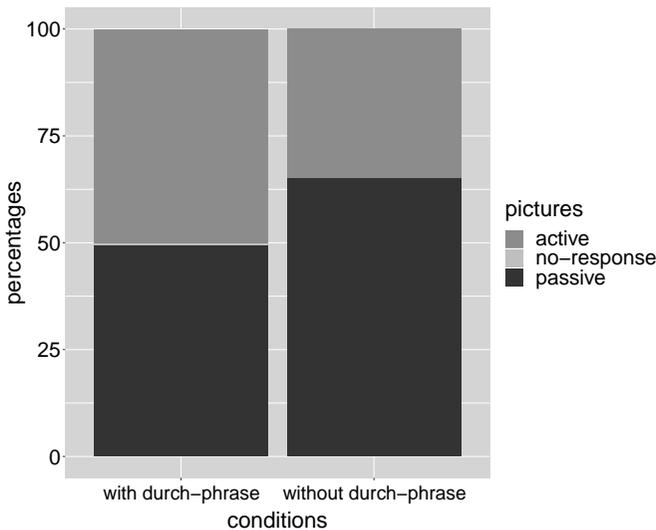
This result indicates that adult speakers assigned the patient-role to the pre-nominal argument for the deverbal nouns that we have used, with or without the *durch*-phrase, although in theory this position is ambiguous in the absence of a *durch*-phrase. The difference in ratio of choosing agent and patient pictures in two conditions was not significant (Fisher's exact test: $p = 0.2005$). While predominantly *-ung* nominalizations are formed out of change of state verbs, which would explain the patient preference, not all our nominalizations were derived from change of state verbs. This suggests that adults prefer the passive interpretation of *-ung* nouns.

6.2. Children

Let us now turn to data from children. As discussed above, if the acquisition of nominalization patterns with that of passives, we expect that children's responses for items without the *durch*-phrases to mirror that of adults' more closely. The items with the *durch*-phrase, on the other hand, should diverge from the response

pattern of adults', either by becoming at chance, or preferring to understand the pre-nominal argument as the agent/author of the nominal expression.

Child participants chose the patient picture 90 out of 120 trials (65.8%) when the sentence did not contain the *durch*-phrase, whereas they chose the patient picture 56 out of 120 trials (47.1%) when the noun was accompanied by the *durch*-phrase. Binomial test show that choosing the patient picture is not at chance for the condition without the *durch*-phrase ($p < 0.01$), but it is for the condition with the *durch*-phrase ($p = 0.5825$). The difference in the ratio of choosing agent and patient pictures in two conditions was significant (Fisher's exact test: $p = 0.01468$)



7. Discussion

When we compare children's responses to the items with *durch*-phrase and to those without, we see that children are more likely to choose the patient picture when the items did not contain the *durch*-phrase. Unlike adult speakers, children have more difficulties with assigning the passive-like interpretation to the deverbal nouns and their arguments, when the external argument is expressed as a *durch*-phrase. This is reminiscent to the acquisition of verbal passives: passives without *by*-phrase/*von*-phrase are comprehended more adult-like by young children.

This is significant, because in German, the *durch*-phrase does not have an authorship interpretation. That is, *durch* phrases unambiguously express the external/agent argument, unlike English *by* or German *von*. The *durch*-phrase clearly affects how adult speakers assign theta-roles to the pre-nominal and post-nominal arguments. Why does it not have the same effect on children? We think that this relates to the proposal in Fox and Grodzinsky (1998): the problem that children have is specific to transmitting the external theta-role to the *by/durch*-phrase. In

other words, our data suggests that the problem is the assignment of the theta-role to the PP for the external argument of the deverbal nouns. We think that this has clear implications on understanding the difficulties children encounter, when comprehending the passive.

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