# Expectation-based Linearization: Evidence from German Word-Order and Information Structure

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### Abstract

Languages with flexible word order, such as German, typically privilege canonical linearizations (subject-object), with non-canonical orders (object-subject) increasing processing costs. Discourse givenness, however, has been shown to mitigate this cost, in line with expectations that given information should precede new information. The present self-paced reading study investigates how expectation based on linearization preferences influence language comprehension, examining the interaction of word order with three levels of information status (given, implied, new). Results show robust word order effects and graded information-status effects on NP1: given referents were processed fastest, new referents slowest, and implied referents exhibited intermediate processing costs. Crucially, object-first structures were disproportionally facilitated when the object was given, as compared to the other two conditions. Effects on NP2 were largely shaped by expectations established at NP1. These findings indicate that comprehenders form early expectations jointly determined by word order and discourse accessibility, supporting expectation-based accounts of linearization preferences.

**Keywords:** SPR; Information Structure; Word Order; Expectation-based processing

## Introduction

While languages with flexible word orders can grammatically realize different linearizations, there are a range of syntactic, semantic and pragmatic constraints that influence which orders are preferred. German, for example, permits both Subject-before-Object (SO) and Object-before-Subject (OS) sentences, with the former being the canonical word order (see Table 1 below), with non-canonical OS realizations eliciting increased processing costs (e.g., Bader & Meng, 1999; Bader, Meng, et al., 2023; Bornkessel et al., 2002; Friederici et al., 2003; Konieczny, 2000; Pechmann, 1994; Rösler et al., 1998; Stolterfoht, 2005). Additionally, the given-before-new principle of information structure states that there is a preference to linearize constituents such that given information should precede new information (Arnold et al., 2013; Halliday, 1967; Krifka & Musan, 2012; Primus, 1993), where given referents are defined here as having been explicitly mentioned in the preceding discourse context.

Under expectation-based accounts of sentence comprehension (e.g., Hale, 2001; Levy, 2008), the influence of word order and information structural preferences on reading times can be viewed as reflecting the expectancy of constituents based on these constraints. More precisely, both word order and information structural preferences enable the formation of expectancies for the unfolding sentence: the former leads interlocutors to expect the first NP to be the sentence subject rather than an object, while the latter leads to expectations about the first NP being a contextually given referent, and not new.

Table 1: Example of Word Order realization.

Ein Bäcker ging auf ein Konzert. Ich habe gesehen, dass ...
*A baker went to a concert. I have seen that...*

| | | | |
|---|---|---|---|
| SO | der Bäcker<br>*the baker$_{[S]}$* | gestern dort<br>*yesterday there* | einen Piloten<br>*a pilot$_{[O]}$* |
| OS | einen Piloten<br>*a pilot$_{[O]}$* | gestern dort<br>*yesterday there* | der Bäcker<br>*the baker$_{[S]}$* |
| | | | ... angesprochen hat.<br>*... talked to has.* |

In this paper, we report results from a self-paced reading study designed to establish behavioral indices of word order (WO) and information status (IS) in German. We examine, firstly, whether the effects of word order and information structure can be fully replicated (e.g., Bader & Portele, 2021; Bornkessel et al., 2002). In addition, we systematically investigate the role of contextually implied entities, i.e., entities that are not explicitly mentioned in the context but whose existence may nonetheless be inferred from it (e.g., the presence of a musician in a concert). The aim of this manipulation was to examine whether implied entities would either pattern with new ones, or rather take an intermediate position resulting in effects of information structure reflecting the relative discourse accessibility, and thus graded expectancy, across the three levels of givenness.

Additionally, some studies have found an interaction of word order and givenness, such that object-first structures are less demanding when the object is given, potentially even licensing the dispreferred order entirely (Bader & Portele, 2021; Kaiser & Trueswell, 2004; Yano & Koizumi, 2018). More specifically, this means that dispreferred word orders can be made more – if not fully – acceptable when the context establishes the givenness of a clause initial object. While such a licensing account is not inconsistent with expectation-based accounts, the presence of such an interaction would imply that linearization expectations are jointly determined by the two factors.

As linearization preferences involve both NP1 and NP2, one might expect to see effects distributed across both constituents. The expectation-based approach, however, predicts effects will be differentially manifest across NP1 and NP2. For the processing of NP1, we expect effects of both Word Order and Inforamtion Status when comparing given and non-given entities (implied and new) such that the dispreferred realization (object-first / non-given-first) increase reading times, in line with expectancy-based accounts. Importantly, previous investigations of information status effects have focused on pairwise (e.g., Jachmann et al., 2024) or binary (e.g., Kaiser & Trueswell, 2004) comparisons, finding no evidence to support a difference between new and implied referents. However, by comparing given, implied and new referents in a single experiment, we may observe graded effects across these three levels of information status. This would be in line with findings by Burkhardt (2006), who argues that implied entities share properties with both given and new referents, leading to intermediate processing costs. Finally, to the extent that a given-before-new preference licenses the non-canonical order, as discussed above, an interaction between the two factors is predicted to reveal attenuated processing cost for object-first orders when the clause initial object is given (e.g., Bornkessel et al., 2002; Kaiser & Trueswell, 2004).

Importantly, to the extent that information about the linearization is conveyed by NP1, expectations regarding the grammatical function and information status of NP2 should be updated, thus attenuating processing difficulty induced by dispreferred ordering on NP2. Given that case marking in German can unambiguously signal subjects and objects on each NP for masculine singular nouns, such an account predicts strong effects on NP1 with reduced effects on NP2, since German grammar requires an overt subject (e.g., Eisenberg, 2016). With regard to information status, the predictions for NP2 are somewhat less clear: A violation of information structural preferences on NP1, does not entail any specific information status for subsequent referents. Specifically, if NP1 is realized as a new referent, which is dispreferred, this does not entail that NP2 should be a given referent by default. Indeed, it could be argued that if both word order and information status expectancies are violated simultaneously, a given subject in NP2 position could be highly unexpected. The reasoning for this would be that if a contextually given subject is realized in the sentence at all, both preferences predict this to be realized early on.

## Methods

Experimental items were created by combining descriptors into sets of three (e.g., baker, pilot, and musician). For each job descriptor, a location was chosen that implied the presence of each of them (e.g., bakery, cockpit, and concert, respectively). Context sentences were created by combining one job descriptor with the location of another job descriptor (e.g., A baker went to a concert, A pilot went to a bakery, A musician went to a cockpit). Finally, the full set of stimuli were created by employing all three job descriptors with each context sentence (e.g., A baker went to a concert: The baker (given), the musician (implied), a pilot (new); see Table 2 for comparison). Therefore, each combination of three job descriptors yielded three related items. To ensure that the chosen locations do indeed imply the presence of a certain entity, we conducted a pretest consisting of two steps: In the first step, participants were presented with the location only, and asked to write down up to three people they would expect to be present at any given location. We only accepted items for which the target completion occurred more than 60% (final item set average target completion 83.35%). In the second step, we presented all three job descriptors originally combined in the sets and asked participants to rate on a scale from 1 through 6 how likely it is for each of the three named people to be present at any given location. This was done to ensure that only the implied job descriptor was expected based on the location, avoiding any unintended expectations for the other two entities. Therefore, we only accepted items for which the ratings of the implied entity were above 5 (final item set average 5.95), and the other two entities were below 3.5 (final item set average 1.83). Overall, 120 items were created in this manner. It should be noted, as evident from Table 2, while there are only 6 unique NP1 conditions (Word Order x Information Status-NP1), this fully crossed design entails 12 distinct conditions on NP2 (Word Order x Information Status-NP1 x Information Status-NP2 nested under Information Status-NP1). For example, when NP2 is the implied object condition ("den Musiker"), it appears following either a given ("der Bäcker") or new ("ein Pilot") NP1.

As this would put a strong burden on the statistical analyses, we group the NP2 conditions in two ways: firstly, by the information status of NP1, and then by the information status of NP2 disregarding the information status of NP1, both resulting in a 2x3 grouping (Word Order x Information Status-NP1 and Word Order x Information Status-NP2, respectively). The former allows us to examine whether effects on NP2 are driven by NP1, in line with expectancy-based accounts. The latter grouping allows to investigate the isolated processing costs of NP2 as a function of its own status.

All target sentences required a sub-clause-introducing matrix verb to generate verb final sentences. This was crucial to avoid any semantic interference of the verb's content with the expectations for the second NP. Therefore, each target sentence start with "Ich habe gesehen, dass..." ('I have seen that...') or similar. This was followed by the first manipulated NP. This NP1 was followed by two adverbs (local and temporal) to introduce spill-over regions between NP1 and NP2 in order to reduce potential impact of lingering effects on NP2. NP2 was then followed by the past-participle and auxiliary verb of the sub-clause.

In addition to the 120 items, 60 fillers were created. 30 of these fillers maintained the same sentence structure as the experimental items, but changed one or both entities into their

Table 2: Example Item in all conditions.

Ein Bäcker ging auf ein Konzert. Ich habe gesehen, dass NP1 dort gestern NP2 angesprochen hat.
*A baker went to a concert. I saw that NP1 there yesterday NP2 had spoken to.*

| WO | IS | NP1 | NP2 |
|---|---|---|---|
| SOV | GI | der Bäcker<br>*the baker*$_{[S]}$ | den Musiker<br>*the musician*$_{[O]}$ |
| SOV | GN | der Bäcker<br>*the baker*$_{[S]}$ | einen Piloten<br>*a pilot*$_{[O]}$ |
| SOV | IG | der Musiker<br>*the musician*$_{[S]}$ | den Bäcker<br>*the baker*$_{[O]}$ |
| SOV | IN | der Musiker<br>*the musician*$_{[S]}$ | einen Piloten<br>*a pilot*$_{[O]}$ |
| SOV | NG | ein Pilot<br>*a pilot*$_{[S]}$ | den Bäcker<br>*the baker*$_{[O]}$ |
| SOV | NI | ein Pilot<br>*a pilot*$_{[S]}$ | den Musiker<br>*the musician*$_{[O]}$ |
| OSV | GI | den Bäcker<br>*the baker*$_{[O]}$ | der Musiker<br>*the musician*$_{[S]}$ |
| OSV | GN | den Bäcker<br>*the baker*$_{[O]}$ | ein Pilot<br>*a pilot*$_{[S]}$ |
| OSV | IG | den Musiker<br>*the musician*$_{[O]}$ | der Bäcker<br>*the baker*$_{[S]}$ |
| OSV | IN | den Musiker<br>*the musician*$_{[O]}$ | ein Pilot<br>*a pilot*$_{[S]}$ |
| OSV | NG | einen Piloten<br>*a pilot*$_{[O]}$ | der Bäcker<br>*the baker*$_{[S]}$ |
| OSV | NI | einen Piloten<br>*a pilot*$_{[O]}$ | der Musiker<br>*the musician*$_{[S]}$ |

IS - Information Status, WO - Word Order, G - Given, I - Implied, N - New, S - Subject, O - Object, V - Verb

female counterpart (e.g., der Bäcker - die Bäckerin). Female entities were not used as experimental items to avoid ambiguity introduced by their declension patterns: 'die Bäckerin' can both be in the nominative or accusative case. Another set of 30 fillers introduced a different sentence pattern in which the narrator of the sentences took the subject role (e.g., "Ich war heute in eine Abtei gegangen. Dort habe ich mich lange mit dem Abt unterhalten" - 'I went to an abbey today. There I talked to the abbot for a long time').

## Procedure

The experiment was implemented in PCIbex (Zehr & Schwarz, 2018) and conducted online without requiring participants' presence in the laboratory. We created 12 pseudo-randomized stimulus lists: 6 Latin-square–based lists and their reversed versions to control for carry-over effects. After providing informed consent, participants reported their native language, other languages spoken (including age of acquisition), age, and handedness.

In order to provide context and motivation for the first person personal pronoun in the sub-clause introducing main clauses ("Ich habe gesehen, dass..." / 'I have seen that ...'), a brief cover story introduced a neWord Lengthy appointed city council member from whose perspective the sentences were written. Participants were instructed to complete the experiment in a quiet, distraction-free environment. Each list was preceded by 10 practice trials.

Each trial began with a prompt to press *Enter*, followed by a context sentence displayed until the participant pressed *Space*. The target sentence was then presented word-by-word in the center of the screen, each word replacing the previous one upon pressing *Space*. A yes/no comprehension question probing the location, agent, or patient of the described scenario concluded each trial. The session lasted about 60 minutes, and participants received £10 compensation.

## Participants

Participants were recruited via Prolific (www.prolific.com). After data cleaning procedures, out of 87 tested participants (mean age = 30.37 years; median = 29; range = 19–47), the final sample comprised 60 native German speakers (mean age = 30.71 years; median = 29; range = 22–47). Participants with an accuracy below 70% on the attention questions were excluded. Next, participants were removed if fewer than 70% of their trials remained for any condition after outlier removal. A trial was discarded if the reading time (RT) in any of the four critical regions (NP1, NP2, and their respective spillover regions) was identified as an outlier. Outlier detection proceeded by first removing extreme RTs (<100 ms or >2000 ms), then computing participant- and region-specific standard deviations, and excluding RTs exceeding ±2.5 SD. Finally, standard deviations of the cleaned RTs were calculated across participants.

## Data Analysis and Results

As this fully crossed design entails a 2x3x2 design with the status of the second NP being nested under the first NP status as discussed above, to reduce burden on the statistic models, we focus on NP1 and NP2 separately. Therefore, the NP1 analysis conflates across all combinations sharing the same word order and NP1 status (2x3). The NP2 analysis is conducted in two alternative versions following a similar approach as for NP1: 1) using word order and NP1 information status as in the analysis of NP1, to investigate the claim that effects on NP2 are driven by NP1; 2) using word order and the information status of NP2 itself, to investigate whether it impacts comprehension.

Linear Mixed-Effects Models were fitted in Julia (Version 1.10.4) using the MixedModels package (Version 4.22.0). All models used effects coded word order (Word Order: [-.5 , .5]), the contrast of given vs. average of implied and new (Given vs. Implied and New: [-2/3 , 1/3 , 1/3]), and implied vs. new (Implied vs. New: [0 , -.5 , .5]) as predictors. Additionally, centered and scaled word length (Word Length-Scaled) was used as a covariate, so that the estimate can be interpreted as the difference from the shortest to the longest word in each region ([-.5 ; .5]) only considering the nouns in the noun phrases. All models were initially fitted with a maximal random structure without correlations and then reduced using rePCA and the VarCorr function until the models converged.[1] Models were compared based on their AIC. We report $\beta$-Estimate, standard error (Std.Err.), and z-value. The full statistical results can be found in Table 3.

Table 3: Summary of Statistics

| Region | Fixed Effect | $\beta$ | Std.Err. | z | sig. | Conf.Int. |
|---|---|---|---|---|---|---|
| NP1 | (Intercept) | 563.00 | 22.57 | 24.95 | *** | [518.49 ; 604.52] |
| | WLScaled | 192.12 | 16.67 | 11.53 | *** | [157.19 ; 223.51] |
| | WO | 44.60 | 8.47 | 5.26 | *** | [ 27.91 ; 60.93 ] |
| | GvIN | -26.79 | 7.11 | -3.76 | *** | [ 24.77 ; 54.14 ] |
| | IvN | 27.18 | 7.90 | 3.44 | *** | [ 11.52 ; 42.52 ] |
| | WO&GvIN | 21.66 | 9.51 | 2.28 | * | [ 3.59 ; 40.78 ] |
| | WO&IvN | 14.39 | 11.10 | 1.30 | .19 | [ -8.10 ; 35.68 ] |
| NP2 by NP1 status | (Intercept) | 536.33 | 19.71 | 27.22 | *** | [498.41 ; 574.97] |
| | WLScaled | 163.17 | 14.86 | 10.98 | *** | [134.41 ; 191.89] |
| | WO | 5.62 | 7.66 | 0.73 | .46 | [ -8.89 ; 21.14 ] |
| | GvIN | 18.87 | 5.63 | 3.35 | *** | [ 7.71 ; 29.82 ] |
| | IvN | 8.55 | 6.73 | 1.27 | .20 | [ -4.44 ; 22.13 ] |
| | WO&GvIN | 21.51 | 8.98 | 2.39 | * | [ 2.79 ; 38.22 ] |
| | WO&IvN | -0.10 | 10.81 | -0.01 | .99 | [ -21.44 ; 20.97 ] |
| NP2 by own status | (Intercept) | 536.23 | 19.65 | 27.29 | *** | [498.75 ; 575.22] |
| | WLScaled | 164.03 | 15.00 | 10.93 | *** | [136.39 ; 194.97] |
| | WO | 5.83 | 7.69 | 0.76 | .45 | [ -9.37 ; 20.76 ] |
| | GvIN | 0.55 | 5.63 | 0.10 | .92 | [ -10.89 ; 11.34 ] |
| | IvN | 7.05 | 5.68 | 1.24 | .21 | [ -4.42 ; 17.34 ] |
| | WO&GvIN | -22.20 | 11.08 | -2.00 | * | [ -42.74 ; -0.29 ] |
| | WO&IvN | -30.73 | 10.47 | -2.93 | ** | [ -51.18 ; -9.79 ] |

$* - p < 0.05$ , $** - p < 0.01$, $*** - p < 0.001$
WLScaled - Scaled Word Length , WO - Word Order, I - Implied , G - Given , N - New
Conf.Int. - 95% Condfidence Intervals computed on 10.000 iterations

## NP1

The first NP showed significant effects of Word Length ($\beta = 192.12, SE = 16.64, z = 11.53, p < .001$), Word Order ($\beta = 44.60, SE = 8.47, z = 5.26, p < .001$), such that Subjects were read faster than Objects, Given vs. Implied and New ($\beta = -26.79, SE = 7.11, z = -3.76, p < .001$) such that given entities were read faster than implied and new entities on averaged, and Implied vs. New ($\beta = 27.18, SE = 7.90, z = 3.44, p < .001$) such that implied entities were read faster than entirely new entities. Additionally, we found an interaction between Word Order and Given vs. Implied and New ($\beta = 21.66, SE = 9.51, z = 2.28, p < .05$), such that the difference between given and implied/new (i.e., non-given) was stronger in object-first structures. No significant interaction was found for Word Order and Implied vs. New ($\beta = 14.39, SE = 11.10, z = 1.30, p = .19$). Figure 1 shows the interaction plot of this region.


Figure 1: NP1 RTs Residualized by Word Length

## NP2

As mentioned above, we consider two analyses for the NP2 region. Firstly, we analyze effects on NP2 as a function of the information status of the preceding NP1 in line with expectation based accounts predicting that processing cost is induced by NP1. Alternatively, we present an analysis of NP2 based on its own information status, independent of the status of the preceding NP by averaging conditions that share the same word order and information status of NP2, regardless of the information status of NP1.

Based on the status of NP1, the second NP showed significant effects of Word Length ($\beta = 163.17, SE = 14.86, z = 10.08, p < .001$), Given vs. Implied and New ($\beta = 18.87, SE = 5.63, z = 3.35, p < .001$) such that noun phrases following a given NP1 were read faster than those following a non-given NP1. However, this effect seems to be qualified by the interaction between Word Order and Given vs. Implied and New ($\beta = 21.51, SE = 8.98, z = 2.39, p < .05$) showing that specifically subjects following given objects were read faster. No other effects were found in this analysis. Figure 2 shows the interaction plot for this analysis.

When analyzed according to its own status, the second NP showed significant effects of Word Length ($\beta = 164.03, SE = 15.00, z = 10.93, p < .001$), an interaction between Word Order and Given vs. Implied and New ($\beta = -22.20, SE = 11.08, z = -2.0, p < .05$), and between Word Order and

[1]Fitted LMM code as used in Julia: NP1: RT ~ 1 + WLScaled + WO * (GvIN + IvN) + (1 + WO + GvIN | Subject) + zerocorr(0 + WLScaled + IvN + WO & GvIN | Subject) + (1 + IvN | Item)+ zerocorr(0 + GvIN | Item))

NP2: RT ~ 1 + WLScaled + WO * (GvIN + IvN) + (1 + WO + GvIN + IvN | Subject) + zerocorr(0 + WLScaled + WO & GvIN + WO & IvN | Subject) + (1 + IvN | Item) + zerocorr(0 + WO + WO & IvN | Item))

NP2 Own: RT ~ 1 + WLScaled + WO * (GvIN + IvN) + (1 + WO + GvIN | Subject) + zerocorr(0 + WLScaled + IvN + WO & GvIN + WO & IvN | Subject) + (1 + GvIN + IvN | UniqueItem) + (0 + WO | Item))


Figure 2: NP2 RTs by NP1's Information Status Residualized by Word Length

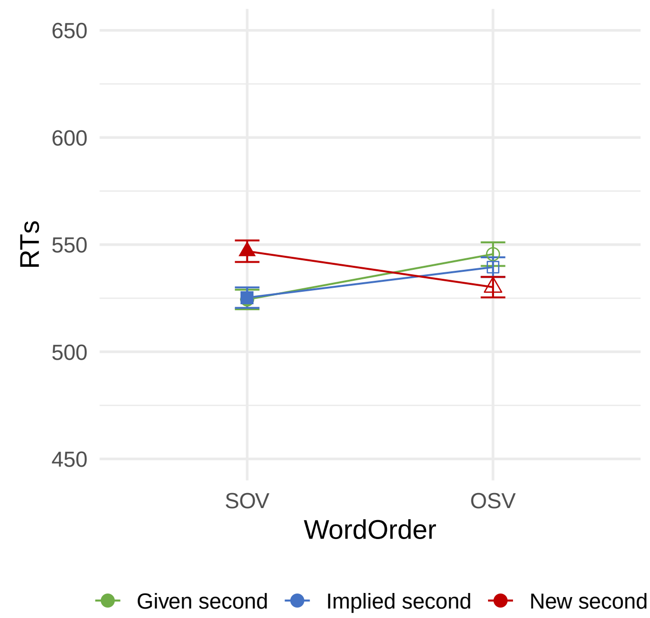


Figure 3: NP2 RTs by Own Information Status Residualized by Word Length

Implied vs. New ($\beta = -30.73, SE = 10.47, z = -2.93, p <$ .01), such that NP2 new objects were read slower than given and implied objects, while no such a difference was observed for subjects. This is not in line with the predictions from the information structural given-before-new principle, according to which new information is expected to appear later in the sentence. No other effects were found in this analysis. Figure 3 shows the interaction plot for this analysis.

## Discussion

In the present self-paced reading study in German, we investigated the interplay of word order and information structural preferences from an expectation-based perspective. Participants read short discourses in which the target sentence was realized either in the canonical subject-object order or in the dispreferred object-subject order. This factor was crossed with three levels of information status for both subjects and objects, which differed in their degree of contextual accessibility (explicitly given, contextually implied, entirely new).

The results for the clause initial NP provide clear evidence for expectancy effects driven by both syntactic and information structural preferences. Subject-first NPs were read faster than object-first NPs. Crucially, the information status of the initial NP produced a graded pattern, with given referents processed fastest, new referents slowest, and implied referents showing intermediate processing effort. Furthermore, we observed an interaction between word order and the contrast between given and non-given referents, indicating that dispreferred object-first structures were disproportionally easier to process when the object was given as compared to their non-given counterparts. This suggests that information-structural expectations can (partially) mitigate the costs that are otherwise associated with dispreferred syntactic words orders.

Under an expectation-based account of processing effort (e.g., Hale, 2001; Levy, 2008), the findings on NP1 demonstrate the simultaneous influence of both word order and graded information status on the expectancy of the initial noun phrase. Specifically, our results replicate word order effects that have been widely documented across languages with flexible word order (e.g., Bader & Meng, 1999; Bader, Meng, et al., 2023; Bornkessel et al., 2002; Erdocia et al., 2009; Friederici et al., 2003; Jachmann et al., 2024; Jeong et al., 2025; Kaiser & Trueswell, 2004; Koizumi et al., 2014; Konieczny, 2000; Mazuka, 2002; Miyamoto, 2002; Ono et al., 2020; Pechmann, 1994; Rösler et al., 1998; Tamaoka et al., 2005, 2024). In addition, they provide further evidence for the given-before-new principle of information structure (e.g., Halliday, 1967), according to which given information is expected to precede new information in sentence structure. The observed graded pattern of information status effects supports models in which accessibility – and thus expectancy – varies continuously as a function of discourse support (see, e.g., von Heusinger et al., 2024), such that the more given a referent is via the context, the more expected it becomes, and thus the easier it is to process. Furthermore, the intermediate processing difficulty observed for implied referents is consistent with ERP findings reported by Burkhardt (2006). In that study, while new and implied referents elicited similar P600 effects compared to given, a graded N400 response was observed across the three levels of information status. This pattern was interpreted as indicating that implied (bridged) referents share properties with both fully given and entirely new entities.

Importantly, the observed interaction of word order and information status suggests that expectancy is jointly determined by these two linearization preferences, not simply additively. This further supports discourse-based licensing accounts of non-canonical word orders, according to which the cost for object-first NPs is reduced when the referent is discourse-given (e.g., Bader, Meng, et al., 2023; Kaiser & Trueswell, 2004). Interestingly, the absence of an interaction of word order and the implied-new contrast provides evidence that implied referents, while more accessible than new ones, do not fully license non-canonical word order. This finding might appear to support a purely accessibility-driven account. Under such an account, the graded pattern for Information Status reflects referent accessibility in the discourse, rather than anticipatory expectations about explicit mention. However, the effects observed on NP2 challenge this interpretation.

The results for the second noun phrase are generally more complex. Analyses based on the information status of NP2 revealed interactions with word order that are difficult to explain using standard information-structural predictions. However, when analyzed as a function of the information status of NP1, NP2 processing appears to be largely governed by expectations established early in the sentence. That is, reading times for NP2 revealed an interaction such that NP2 subjects – i.e. the dispreferred order – are read fastest when the NP1 object was given, suggesting this order was licensed by the given-before-new preference.

Under a solely accessibility-driven account, graded processing patterns at NP2 would be expected to mirror those at NP1, since the contextual accessibility of information status remains unchanged across the sentence. However, no such gradedness was observed – neither for the analysis based on NP1 status, nor for the actual status of NP2. This pattern, however, is consistent with expectation-based accounts, according to which early cues regarding structure and discourse status guide subsequent processing and attenuate later effects. This interpretation is further supported by the absence of a word order effect on NP2 which would be expected if the realization of NP2 itself was driving effects found in this region.

In conclusion, our findings provide compelling evidence for expectation-driven linearization preferences involving both word order and information status. Comprehenders expect the first NP to be both a subject and a given referent, such that violations of either expectation incur immediate processing cost. The costs associated with non-canonical realizations, however, can be attenuated when discourse context supports such structures, suggesting that expectations are jointly governed by grammatical role and discourse accessibility. Importantly, effects on the subsequent NP appear to be driven by expectations established at the first NP, indicating that linearization expectations are fully updated on the basis of the initial constituent. Finally, information status effects are graded, reflecting the relative accessibility – and thus expectedness – of discourse referents, with implied referents sharing properties of both given and new information.

## Acknowledgments

Gefördert durch die Deutsche Forschungsgemeinschaft (DFG) — Projektnummer 232722074 — SFB 1102 / Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) — Project-ID 232722074 — SFB 1102.

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