

# Anaphoric Potential of Weak Definites contrasted with Implicit Entities and Indefinites in German

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Weak definites (WDs) as in *take the train* (Carlson & Sussman 2005) are formally definite but differ from anaphoric definites or definites that refer to a unique familiar entity. They have a number-neutral reading (cf. *Mary took the train to Paris* – could be one or more trains), they show sloppy readings under conjunctions (as in *Peter took the train and Mary too* – could be different trains) and they take narrow scope under quantifiers (as in *everybody took the train* – could be different trains). WDs appear to be similar to non-specific, narrow-scope indefinites (IDs) as *take a train*.

However, WDs differ from IDs in their potential to be taken up by anaphora. Schwarz (2014) argues that WD interpretations disappear when anaphoric uptake is present, as in *Every accident victim was taken to the hospital [both WD and SD interpretation] and discovered that it had a roof garden [only SD interpretation survives]*. Scholten & Aguilar (2010) investigate what they call the “questionable ability to set up discourse referents” in an experiment for Dutch. Assuming that pronouns and anaphoric DPs differ insofar as they prefer more vs. less salient discourse referents (DRs), they show that pronouns are more often selected after IDs (91%), but less so after WDs (yet still 59%).

We report on a series of experiments (some presented first in Modarresi, Fortmann & Krifka 2019) that investigate the anaphoric potential of WDs. Some of them make use of the fact that in German, WDs as objects of certain prepositions are formally distinct from anaphoric definites, as in *ins Kino* vs. *in das Kino* ‘to the cinema’. They are not distinct from familiar definites but this interpretation can be made unlikely by choice of examples.

**Exp. 1** followed the procedure of Scholten & Aguilar (2010) but with parallel sentence frames. In English translation, participants were presented with one condition of a text like ‘Luise likes to go out to a pub with friends. Last week she drank a bit more and took {a / the} bus home. Luckily, [it | the bus] waited in front of the pub when she came out’. They had to select the pronoun ‘it’ or the full DP ‘the bus’ (32 participants, 14 sentences). Although WD antecedents elicited slightly more full DP anaphors, the difference was not significant. As the choice might be affected by the length of the anaphor, in **Exp 2** we investigated uptake with slightly longer demonstrative pronouns vs. full DPs (e.g. German *dieser* vs. *der Bus*), again with no significant difference.

We also conducted **Exp 3**, a free sentence completion experiment (online, 15 items, 30 participants). Participants should complete

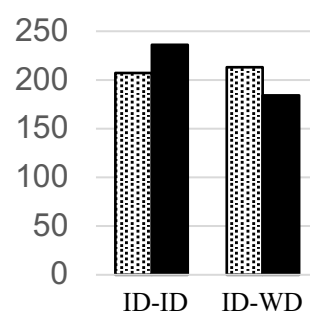
- (1) *Sophie ist wegen starker Bauchschmerzen {zum / zu einem} Arzt gegangen.  
Als erstes fragte...  
‘Sophie went because to the.WD / to a.ID doctor because of belly ache.  
At first she asked...’*

WD antecedents failed to be taken up slightly more often than ID antecedents (no uptake 48 vs. 40 times). Also, WDs were more often taken up by full DPs than by pronouns (94 vs. 81 times). However, these differences are not significant.

In **Exp 4** we used a novel technique that did not involve production but interpretation. We presented participants with antecedent sentences that contained an ID antecedent followed by a WD or an ID antecedent. The second sentence contained a pronoun compatible with either antecedent (in its gender and its plausible interpretation):

- (2) *Nora hat sich gestern ein Museum angeschaut, bevor sie {ins Kino / in ein Kino} gegangen ist. Es war gerade neu eröffnet worden.*  
 ‘Nora went to a museum yesterday before going {to the.WD cinema / to a.ID cinema}. It had just opened.’

The pronoun has two possible antecedents. We predicted that the selection of the second antecedent should be modulated by its form, with WDs being chosen less often than IDs. In an online survey (60 participants, 14 + 7 filler items), the participants read one version of the sample item, and then were asked, on a separate screen, to decide whether the pronoun refers to the first or the second antecedent (e.g., *Was ist gerade neu eröffnet worden?* ‘What was newly opened?’), followed by a selection between *das Museum* und *das Kino*). In the ID-ID case, we found a preference for the second antecedent, which is to be predicted as it is more recent, hence more salient (Ariel 1991). In the ID-WD case, the second antecedent was slightly disfavored. The difference between uptake of IDs and WDs in second position was significant (Chi-square  $p = 0,01$ ). But there were many cases in which the pronoun was interpreted as referring to the WD antecedent.



We take the results of Exp 4, and tentatively of Exp 1, 2 and 3, as evidence that WDs do introduce DRs but that they are less salient than DRs introduced by IDs in the same position. (These results are in line with a study by Brocher et al. 2020 which use a different technique, eye tracking).

There are a number of theoretical models that do not assume that WDs introduce DRs, hence appear in conflict with all the experimental results reported so far. If WDs are seen as instances of pseudo-incorporation, which is expressed by bare nominals in certain languages, this includes theories where they are interpreted as kind-referring (Aguilar-Guevara & Zwarts 2010, Schwarz 2014), as property denoting (McNally 1995), as involving predicate restriction instead of argument saturation (Ladusaw & Chung 2003, Dayal 2015), or as not involving any FRs in other ways (Farkas & de Swart 2003).

Such theories can resort to an explanation of anaphoric reference to WDs as an instance of bridging inferences or associative anaphora. However, if uptake were via bridging, we expect that WDs should prefer definite DPs over pronouns (cf. Garrod & Sanford 1982). We have seen in Exp 1 that WD antecedents do not differ significantly from ID antecedents in this respect. In **Exp 5** we directly contrasted associative anaphora with anaphora to WDs with experimental items as the following.

- (3) *Susanne ist Journalistin bei einem Nachrichtensender. Gestern ist sie {mit dem Flugzeug / Ø} nach Costa Rica geflogen.* ‘Susanne is a journalist working with a news agency. Yesterday she flew to Costa Rica {by airplane / Ø}.’

Participants should select a pronoun vs. a full DP as the best option to continue:

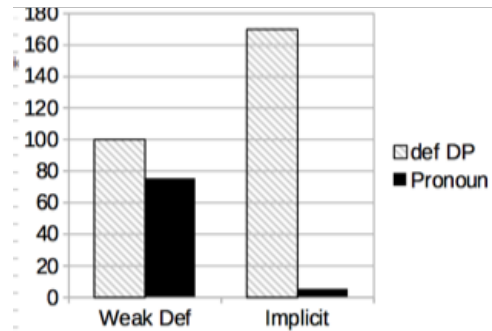
*Da über dem Atlantik starke Stürme herrschten, geriet [es | das Flugzeug] öfters in Turbulenzen.* ‘Since there were strong storms over the Atlantic Ocean, [it / the airplane] often ran into turbulence.’

The experiment (36 participants, 25 items, each participant saw one version of each item), revealed a clear difference: While participants continued implicit antecedents overwhelmingly with definite DPs as predicted, they picked up WD antecedents nearly

as often with pronouns. The difference is highly significant. We conclude that WDs must allow for anaphoric uptakes distinct from associative anaphora.

Our results show that WDs do introduce DRs, but that these DRs are less salient than those introduced by IDs. One modelling option would be to assume saliency values to antecedents, and assign higher values for IDs than to WDs.

However, this would neither relate to the definiteness feature of WDs, nor to their potentially non-unique and narrow-scope interpretation observed above.



Krifka & Modarresi (2016) propose a model for pseudo-incorporation in Persian that can be adapted to WDs, and explain their semantic and anaphoric properties (cf. also Yanovich 2008). It is formulated within Discourse Representation Theory (DRT) of Kamp & Reyle (1994). (3) represents the standard uptake of DRs introduced by IDs; here,  $d_2$  is introduced by *ein Kino* ‘a cinema’, and the DR of *it*,  $d_3$ , is identified with  $d_2$ . We assume a novel way of introducing event DRs via existential sub-DRSs.

- (4) *Nora ist in ein Kino gegangen.* ‘Nora went to a cinema’  
 $[d_1 d_2 \mid d_1=Nora, \text{cinema}(d_2), \exists[e_1 \mid e_1<\text{now}, \text{go-to}(e_1, d_1, d_2)]]$

*Es ist neu geöffnet worden.* ‘

- $[d_1 d_2 d_3 \mid d_1=Nora, \text{cinema}(d_2), \exists[e_1 \mid e_1<\text{now}, \text{go-to}(e_1, d_1, d_2)],$   
 $d_3=d_2, \exists[e_2 \mid e_2<\text{now}, \text{recent}(e_2, \text{now}), \text{open}(e_2, d_3)]]$

In contrast, WDs introduce a DR that is dependent on the event quantifier; *ins Kino* identifies the unique cinema of  $e_1$ . As a consequence, this DR is not directly accessible but can be recovered by a process of abstraction and summation, as in (4). This explains both the narrow-scope effects and the reduced anaphoric potential.

- (5) *Nora ist ins Kino gegangen.* ‘Nora went to the.WD cinema’  
 $[d_1 \mid d_1=Nora, \exists[e_1 d_2 \mid d_2 = \text{cinema}(e_1), e_1<\text{now}, \text{go-to}(e_1, d_1, d_2)]]$

*Es ist neu geöffnet worden.*

- $[d_1 d_3 d_3 \mid d_1=Nora, \exists[e_1 d_2 \mid d_2 = \text{cinema}(e_1), e_1<\text{now}, \text{go-to}(e_1, d_1, d_2)]]$   
 $d_3 = \Sigma d_2 \exists[e_1 d_2 \mid d_2 = \text{cinema}(e_1), e_1<\text{now}, \text{go-to}(e_1, d_1, d_2)],$   
 $\exists[e_2 \mid e_2<\text{now}, \text{recent}(e_2, \text{now}), \text{open}(e_2, d_3)]]$

Kamp & Reyle (1994) have introduced abstraction and summation for anaphoric uptake of IDs in the scope of quantifiers. This predicts that the anaphoric potential of such IDs is similar to WDs, as it relies on the same processes. However, there are also differences – in particular the nature of the quantifier involved, in particular their plurality compared with the existential quantifier. To investigate this, we designed **Exp 6**, a free text completion experiment, with prompts like (5).

- (6) *{Every hiker / The hiker} prepared a sandwich for the picknick. ...*

This was an online experiment on English with 15 items and 60 participants. We classified the various anaphoric uptakes. We found slightly more uptakes after singular subjects (*the hiker*) than after quantified subjects (*every, each, all* and definite plural DPs in sentences suggesting distributive interpretations, as in *The hikers prepared a sandwich*), but the difference was not significant (e.g. 48% uptake under *every*-DPs, 52% uptake under singular DPs). We take this as evidence that anaphoric uptake of indefinites under the scope of quantifiers is indeed easily possible.

In the same experiment, we also investigated the uptake under indefinites and weak definites, as in (6).

(7) *The woman went to {the hospital / a hospital} for treatment. ...*

We found slightly more uptakes of IDs (24%) than of WDs (21%), again not significant. We take this as further evidence that anaphoric uptake of WDs is easily possible. The fact that overall we found fewer uptakes in cases like (7) than in cases like (6) is probably a consequence from the fact that both cases of (7) describe more stereotypical situations, where the object does not matter as much as in (6). Also, while the differences between *every / the* cases in (6), and WD/ID cases in (7) were not significant with the number of cases and participants tested, these differences showed the expected tendencies.

We conclude that the results of the experiments lend support to the proposed representation of weak definites.

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