

# NARRATIVE REPORTED SPEECH INTERPRETATION BY OLDER ADULTS

Bachelorproject

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**Abstract:** This study investigates the interpretation of pronouns, by older adults, in a direct speech (*Zoidberg said, "I am a doctor"*) and indirect speech (*Zoidberg said that he was a doctor*) environment with a single source narrator. This study also investigates if there is a correlation between the performance of interpreting direct speech and the ability to engage in cognitive inhibition. We hypothesize, based on previous results with children that older adults will perform better in an indirect speech environment compared to a direct speech environment. We also predict that cognitive inhibitory performance will positively correlate with the performance of direct speech interpretation. We tested 14 healthy Dutch-speaking older adults between 64 and 83 in a Stroop task, Digit-span task and a direct and indirect speech interpretation task. We found that older adults performed better in a direct speech than indirect speech, rejecting our first hypothesis. In addition we have found differences between referents. The older adults performed at ceiling with pronouns referring to the reported speaker, in both direct and indirect speech. They performed the worst with pronouns referring to the addressee in indirect speech. No correlation was found between the Stroop interference score and the interpretation accuracy.

## 1. Introduction

Reported speech is the act of making an utterance the subject of another utterance. This phenomenon is possible in all languages and is considered a fundamental aspect of human communication (Coulmas, 1986). There are several ways in which speech can be reported.

At the most basic level we can divide reported speech into two kinds, *oratio recta* (or direct quotation) and *oratio obliqua* (indirect quotation). The former invokes a direct representation of the original utterance without any modification (Loos *et al.*, 2003), while the latter adapts a manner of presenting the original utterance with grammatical modifications (Loos *et al.*, 2003). Consider the following examples, the first illustrating direct speech and the others illustrating indirect speech:

- (1) Direct: Zoidberg said, "I am a doctor."
- (2) Indirect: Zoidberg said that he was a doctor.
- (3) Indirect: Zoidberg said that I was a doctor.

In the first two sentences the pronoun refers to the subject Zoidberg. However, as seen in (1), when the pronoun is embedded inside direct speech, the correct interpretation of this pronoun

requires 'shifting' (Köder, 2013): 'I' in this sentence does not refer to the current addressee, but to the original addressee of Zoidberg, which in this case is Zoidberg himself. The interpretation of the indirect speech sentence does not require this shifting: He in this case simple refers to the subject, Zoidberg. This is more clearly illustrated by sentence (3), in this instance 'I' now refers to the addressee instead of the speaker<sup>1</sup>, which it did in the direct speech example.

This paper aims to investigate the ability of older adults to correctly interpret pronouns in a direct speech environment compared to an indirect speech environment and to look for a possible correlation regarding the inhibitory abilities of older adults.

The participants did three different tasks: a Stroop task to test their cognitive inhibitory ability, a digit-span task to test working memory and a direct and indirect speech interpretation task. For the Stroop task we did not find a correlation between the cognitive inhibitory ability and the pronoun interpretation accuracy. Neither did we find one for the digit-span task. The direct and indirect speech interpretation test showed that the older adults performed better in direct speech than indirect speech. The older

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<sup>1</sup> For simplicity throughout the rest of the thesis 'speaker' should be interpreted as the reported speaker, and not the narrator.

adults seemed to perform at ceiling with pronouns referring to the speaker, in both direct and indirect speech. They performed the worst with pronouns referring to the addressee in indirect speech.

### 1.1. Background

Children have found to be able to correctly interpret both direct and indirect speech reports in a narrative setting (Köder, forthcoming). Children do however acquire direct speech before indirect speech (Ely & McCabe, 1993; Nordqvist 2001) and use it more often in natural interactions (Köder, 2013). It has been found that children do not clearly distinguish direct and indirect speech in comprehension. They tend to interpret pronouns in direct speech like as if they were presented in an indirect speech environment. Children seem to 'unquote' pronouns in direct speech reports (Köder & Maier, 2015).

Young adults have shown to make significantly more errors and have significantly longer reaction times when interpreting pronouns embedded in direct speech than in indirect speech (Köder, 2013). One explanation put forward by Köder is that in direct speech the young adults needed to shift context in order to interpret the pronoun correctly. Direct speech, in this case, would consist of the actual speech context, the context in which the sentence is uttered right now, and the original speech context, the context in which the sentence was originally uttered. The shifting between these two contexts increases the processing load and thus leads to longer reaction times. The young adults showed a strong tendency to avoid this costly context shift by evaluating pronouns with respect to the actual utterances context as it would in indirect speech (Köder, 2013).

As proposed by Köder, in order to evaluate pronouns in a direct speech environment, the current speech context needs to be suppressed. This suppression would then require cognitive inhibitory processes that would tune out the irrelevant current speech context and allow for a shift towards the original speech context.

The differences and similarities between direct and indirect speech do not only lie within the process of interpretation. Going back to the direct and indirect speech example we see that

both sentences contain the same verb "said" with the same subject "Zoidberg". Although the two sentences are of different form, they convey the same message. Due to these similarities early transformationalists proposed that the indirect sentences should be derived from the first, direct speech, sentence via what is called the "Indirect Discourse Formation" (Coulmas, 1986).

However there are several differences to be found; first, both sentences carry different pronouns, secondly the tenses are different (sequence of tenses) and finally the indirect sentence allows for the complimentizer "that" to be used. In the former sentence the pronoun "I" does not refer to the speaker, but to the subject himself, Zoidberg.

In written text punctuation and lexical cues are crucial for detecting when a narrator is going to directly quote another person. For spoken discourse prosody replaces the role of punctuation. Some of these prosodic features which are 'flags' of reported speech are shifts in the pitch register, which are often greater in range for direct speech reports, shifts in intensity and shifts in rhythm (Klewitz & Couper-Kuhlen, 1999). Furthermore direct speech reports are often accompanied by an intentional break between the reported utterance and the sentence that led up to it (Jansen, 2001).

Compared to English, Dutch has an extensive syntactic marking regarding direct and indirect speech and thus leaves little room for ambiguous reports. When considering syntax, the word order in Dutch differentiates between direct and indirect speech (Köder, 2013). Sentences such as '*Ik ben een piloot*' 'I am a pilot' are reported in a verb-second word order when reported using direct speech. In indirect speech however this sentence is transformed to a verb-final word order.

(4) Direct: Fry zei, "*Ik ben een piloot*".  
'Fry said, "I am a pilot".'

(5) Indirect: Fry zei dat hij een piloot was.  
'Fry said that he was a pilot.'

Previous research indicates that the use of reported speech increases with age, particularly when it has a narrative function; this agrees with the finding that narrative discourse is more frequent among older adults (Laforest et al.,

1996). This means that older adults have used and encountered narrative discourse more often in their life than younger adults and are thus more experienced with it. This might lead one to believe that older adults will interpret pronouns in direct speech comparable to the level of young adults as young adults already perform at ceiling.

However as proposed by Köder, direct discourse requires inhibition of the representation of the salient actual speech context and the shift to a representation of the original speech context. Thus having poor inhibitory control might lead to more errors with direct speech. We know that older adults have poor inhibitory control compared to young adults as one of the first studies to address Stroop interference has shown that cognitive inhibitory control remained constant across middle adulthood and then began to decrease in the 65- to 80-year-old group (Comalli et al. 1962). Later studies supported these findings in also finding a larger interference effect for older adults (Cohn et al., 1984; Hartley, 1993). Therefore it may be that older adults do poorly at interpreting pronouns in a direct speech environment compared to young adults.

Köder proposal thus predicts that that a high Stroop interferences correlates with a low performance in correctly interpreting pronouns in a direct speech environment as shifting in direct speech requires the inhibition of the representation of the actual speech context. The current work tests this hypothesis.

## 2. Methods

The participants of this study were 14 older adults (Mean Age: 71.64; Age range: 64-83; Female: 5; Dutch speaking: 12; Frisian speaking: 2). A written consent form was obtained prior to the experiment as well as a personal information sheet. The participants were recruited informally via friends and relatives of the author. All participants were tested individually, often in their homes.

Participants completed three tests. They were first given a computerized direct and indirect speech experiment. After the direct and indirect interpretation task the participants' cognitive inhibitory controls were tested using the Stroop task Van der Elst *et al.* /THE STROOP COLOR-

WORD TEST (2006). After the Stroop test the participants were given a digit-span task (forward and backward) to test working memory (Turner & Ridsdale, 2004). The digit-span memory test was executed verbally by the experimenter and consisted of a sequence of numbers that had to be repeated by the participant either in normal or reversed order.

The direct and indirect speech experiment was originally designed to be used by children and consisted of a game played on a tablet. The experiment was modified to run on a laptop.

The game starts with a short introductory period in which the two main protagonists, a monkey and an elephant are introduced. After the introduction the participants are asked to recall the names of the protagonists and the gender of the protagonists. The animals, as well as the questions are voiced by a single source male narrator in Dutch. In this story phase of the game the protagonists are taking a walk. During this walk they keep encountering items along the way as seen in figure 2.1. They recognize these objects as objects they have as well. Each time they encounter an object the narrator tells a story (excluding translations):

- (6) Anita Aap zei tegen Oscar Olifant, "Ik heb ook zo'n hoed."  
'Anita Aap said to Oscar Olifant, "I have such a hat, too.'
- (7) > Wie heeft ook zo'n hoed?  
> Who has such a hat as well?  
[Selection]

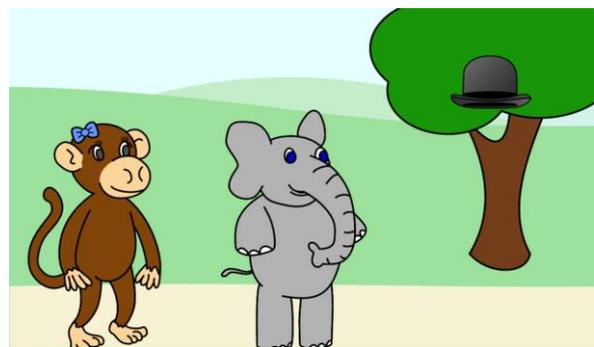


Figure 2.1: Example picture accompanying speech reports in the pre-selection phase.

The sentences can contain either direct speech such as the previous example or indirect speech:

- (8) Oscar Olifant zei tegen Anita Aap dat zij ook zo'n hoed heeft.  
'Oscar Olifant said to Anita Aap that she has such a hat, too.'
- (9) > Wie heeft ook zo'n hoed?  
> Who has such a hat as well?  
[Selection]

The participants had to select the right referent in the selection period by clicking on the correct protagonist with the mouse as seen in figure 2.2. When the participant was not able to work with the mouse he or she was allowed to point at the correct protagonist and letting the experimenter click on the chosen target.

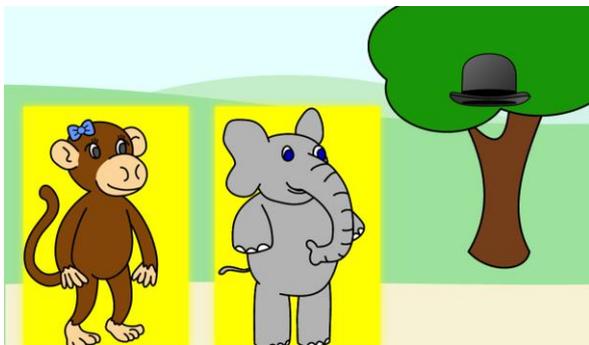


Figure 2.2: Example picture accompanying speech reports in the selection phase.

All 24 test sentences are accompanied by pictures containing two animals and an object at a certain location. There are 8 different locations in which an object can appear; in the grass, on the path, on the bridge, in the tree, in the lake, in the den, in the flower field and behind the dog. There are 3 test sentences per location which are either direct or indirect. Each location can contain either a first-, second- or third-person singular pronoun (*ik* 'I', *jij* 'you' or *hij/zij* 'he/she'). These pronouns use either the monkey or the elephant as a subject and can refer to either the speaker or the addressee. The participants were external observers and could not be possible referents of the pronouns themselves. All test items were randomized as well as the location of the protagonists (left or right of each other).

The entire experiment took approximately 15 minutes to complete, with the direct and indirect speech experiment being the longest at 10 minutes and the digit-span memory test being the shortest at 2 minutes.

### 3. Results

Looking first at the mean and the standard error for the current study, figure 3.1 shows the results

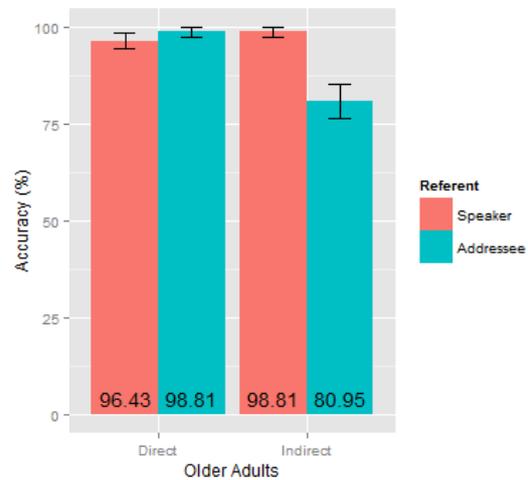


Figure 3.1: Accuracy of pronoun interpretation in direct speech and indirect speech, divided by condition (direct, indirect) and referent (speaker, addressee).

of the older adults' interpretation of pronouns in both the direct speech environment and the indirect speech environment.

In direct speech, the first-person pronoun *ik* 'I' can only refer to the speaker and not the addressee. This means that when, for example, Anita Aap tells Oscar Olifant, "I have such a hat as well", 'I' can only refer to Anita, the speaker, and not Oscar Olifant, the addressee. The second-person pronoun *jij* 'you' however only refer to the addressee in a direct speech environment. For this experiment, in the direct speech cases, only the pronouns *ik* 'I' and *jij* 'you' were used. Also recall that in the indirect speech cases both third-person pronouns *hij* 'he' and *zij* 'she' can refer to either the speaker or the addressee, depending on the gender of the subject in the main clause. For this experiment, in the indirect speech cases, the pronouns could only consist of the third-person pronouns *hij* 'he' and *zij* 'she'.

As shown by figure 3.1, the older adults performed, for the direct speech environment, at ceiling where no significant differences were found between the mean accuracy of the referent speaker cases ( $M=96.4$ ,  $SD=18.7$ ) and the mean accuracy of the referent addressee cases ( $M=98.8$ ,  $SD=10.9$ ) conditions;  $t(134)=-1.00$ ,  $p=0.315$ .

This figure also shows that the older adults performed, for the indirect speech environment,

at ceiling in the instance where the pronouns were referring towards the speaker. In the case that the pronoun was orientated towards the addressee (M=81.0, SD=39.5) the older adults performed significantly worse compared to when it was referring towards the speaker (M=98.8, SD=10.9) conditions;  $t(96)=4.00, p<0.001$ .

Comparing the direct speech results (M=96.4, SD=19.7) to the indirect speech results (M=98.8, SD=10.9) conditions;  $t(134)= -1.01, p=0.315$ , we find that when the reference is orientated towards the speaker there are no significant differences. However, when the reference is orientated towards the addressee, we do see a difference between the direct speech (M=98.8, SD=10.9) and indirect speech results (M=81.0, SD=39.5) conditions;  $t(96)= 3.99, p<0.001$ .

### 3.1. Regression model

We analyzed the data in the direct and indirect speech test using generalized linear mixed-effects logistic regression modeling. By comparing each model based on their Akaike information criterion score we kept adding fixed-effect factors and random intercepts until the lowest AIC was achieved. This means that we created a model in a step-wise fashion. The final model showed that the accuracy of pronoun interpretation was predicted by the condition (direct, indirect) and the referent (speaker, addressee). The final model also includes a random intercept for the subjects. All other factors (AGE (64-83), SUBJECT\_GENDER (male, female, neutral), PRONOUN (*ik* 'I', *jij* 'you', *hij* 'he', *zij* 'she'), PRONOUN\_GENDER (male, female), VERSION (a-b), EXPERIENCE (1-6), STROOP (16-107) and MEMORY (12-19)) did not aid in improving the goodness of fit of the model. With an index of concordance of 0.91 we validated that the predictive ability of the model is adequate (Baayen, 2008).

**Table 3.1: The best fitting logistic mixed-effects model: Correct ~ Referent \* Condition + (1|ID)**

Pred.	Est.	SE	z val.	p-val.
(Int.)	5.589e00	1.226e00	4.560	< .001
Indir.	-3.562e00	1.127e00	-3.160	< .001
Speak.	-1.222e00	1.208e00	-1.011	0.312
Indir. Speak.	-1.230e-07	1.458e00	0.000	1.000

We can see that the accuracy for the indirect-addressee cases is worse than that of the direct-addressee cases,  $p < .001$  and that the indirect-addressee cases were the most difficult cases for the older adults to interpret correctly. The model shows that no significant differences were found between the mean accuracies of the direct-addressee and direct-speaker case. Adding the interaction effect between the referent and the condition showed a decrease in the AIC value by more than 2, however no significant differences between the mean accuracies were found.

### 3.2. Multiple comparisons

We also ran a multiple comparisons of means using Tukey Contrasts using the "multcomp" package for R. We tested them on CONDITION type and REFERENT type. The results can be found in table 3.2.

The older adults made fewer mistakes in a direct speech environment than in an indirect speech environment, where, in both cases, the referent was the addressee. They seemed to perform worse with the indirect-addressee compared to the indirect-speaker and direct-speaker as well. No significant difference was found between indirect-speaker, direct-speaker and direct-addressee.

**Table 3.2: Multiple comparisons of means.**

Linear Hypoth.	Est.	SE	z val.	p-val.
Ind Ad-Dir Ad = 0	-3.562e00	1.127e00	-3.160	< .001
Dir Sp-Dir Ad = 0	-1.222e00	1.208e00	-1.011	0.733
Ind Sp-Dir Adv = 0	-1.230e-07	1458e00	0.000	1.000
Dir Sp-Ind Ad = 0	2.340e00	7.527e-01	3.108	< .001
Ind Sp-Ind Ad = 0	3.562e00	1.127e00	3.160	< .001
Ind Sp-Dir Sp = 0	1.222e00	1.208e00	1.011	0.733

### 3.3. Masculine vs. feminine pronouns

When comparing the difference in mean accuracy between the masculine and feminine pronouns in the indirect speech environment, figure 3.2 shows that the older adults perform at ceiling for both the masculine pronoun *hij* 'he' and the feminine pronoun *zij* 'she' when the pronoun referred to the speaker. The older adults performed worse in the instance that the pronoun referred to the addressee compared to when it was referring to the speaker. No significant difference was found between the masculine pronoun *hij* 'he' (M=85.7, SD=35.4) and the feminine pronoun *zij* 'she' (M=79.2, SD=43.1) conditions;  $t(79) = 1.11$ ,  $p = 0.272$ , when the pronoun referred to the addressee.

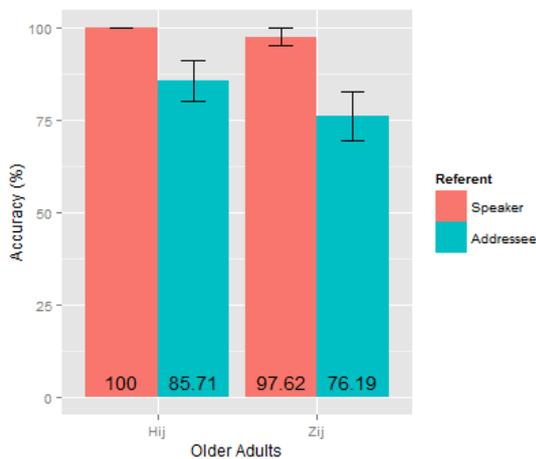


Figure 3.2: Accuracy of pronoun interpretation in indirect speech, divided by gender (*hij* 'he', *zij* 'she') and referent (speaker, addressee).

## 4. Discussion

Recall that Köder predicts that older adults might be worse at direct speech, and this might be related to lower inhibitory control.

However the model built using generalized linear mixed-effects logistic regression modeling showed that the Stroop interference score did not significantly influence the fit of the model. This means that no correlation was found between the cognitive inhibitory ability of the older adults and their ability to interpret pronouns in direct and indirect speech.

The mean interference score of the older adults was 40.8 (SD=20.3). A lower score meant less interference and thus better cognitive inhibitory control; a higher score meant more interference and thus worse cognitive inhibitory

control. Young adults, with an average education level, have a mean interference score of 36.2 (SD=11.2) (Van der Elst *et al.*, 2015). This means that the older adults did show worse cognitive inhibitory control than young adults. However it might have been that there were not enough participants to find a possible correlation between their cognitive inhibitory and their pronoun interpretation ability.

Instead we found, by comparing young adult data collected by Köder (forthcoming), that older adults performed similar to young adults.

This finding was especially reflected by the accuracy with the interpretation of pronouns in a direct speech environment. Both groups performed at ceiling. The older adults had a mean accuracy of 97.6% (SD=15.3) and the younger adults had a mean accuracy of 98.2% (SD=12.8) for the direct speech environment regardless of the referent with no significant differences the mean accuracies of these two groups; conditions;  $t(318) = -0.50$ ,  $p = 0.621$ .

During the direct and indirect speech experiment the participants were not on a time limit, nor was their reaction time measured. As there was no added time pressure it might have been that the older adults did not experience the increased workload that comes with interpreting direct speech (Köder, 2013).

Another explanation could be that the older adults are able to compensate for their decreased cognitive inhibitory control with their increased experience with direct speech. Recall that narrative discourse is more frequent among older adults (Laforest *et al.*, 1996) and that they are more experienced with it.

In the indirect speech environment the older adults performed worse than the young adults. However this finding was only supported by the difference between accuracy when the pronoun referred to the addressee, which had a mean of 81.0% (SD=39.5) for the older adults and a mean of 96.7% (SD=18.0) for the younger adults; conditions;  $t(107) = -3.41$ ,  $p < .001$ . When the pronoun referred to the speaker, in the indirect speech environment, the older adults had a mean accuracy of 98.8% (SD=10.9) and the younger adults had a mean accuracy of 99.2% (SD=9.1) and did not show any significant differences; conditions;  $t(158) = -0.25$ ,  $p = 0.806$ .

A possible explanation for these results is that the older adults had a preference for the case where the referent was the speaker, because it's explicit mentioning in the matrix clause, and therefore defaulted to this instance when the sentence they heard was ambiguous.

At the beginning of the experiment both protagonists were introduced by their name and gender. The participants had to recognize both protagonists by these names and genders. This eliminated the problem of not knowing which gender each character was. Furthermore, the participants had the option to rehear the dialog between the animals and the accompanying question.

It is possible that some of the participants were distracted, fatigued or could not hear well. This could cause them to be unsure about to who the pronoun was referring. In this case they might have preferred the speaker as their answer.

The third-person pronouns *hij* 'he' and *zij* 'she' are very similar in sound and are possibly more susceptible to mishearing due to lack of attention or hearing problems than the more salient first- and second-person pronouns *ik* 'I' and *jij* 'you'. This would explain why the mean accuracy, of the older adults, for the addressee cases was low only for indirect speech and not in the direct speech. Recall that, for this experiment, only in indirect speech the third-person pronouns occurred.

The hearing range of people decreases progressively as their age increases (Robinson & Sutton, 1979). The young adults might have been more able to hear and as a result misheard fewer sentences than the older adults. This would explain why the young adults did not show similar results for the indirect-addressee cases.

#### 4.1. Conclusions and Directions for future research

We investigated whether older adults would perform at ceiling, like the young adults, when interpreting pronouns in direct speech, or that they would do poorly. We also investigated if there was a possible correlation between cognitive inhibitory control and the direct speech pronoun interpretation.

We found that the older adults performed at ceiling, just like young adults, when interpreting

pronouns in direct speech. They also performed at ceiling in indirect speech, but only when the pronoun was referring to the speaker. In the case that the pronoun referred to the addressee the older adults performed poorly.

For further research it might be interesting to see how older adults perform in the same environment where their reaction time is also logged. This would require a setup that would not allow for unfair advantages over others, regarding reaction time, due to their proficiency at using a computer. It might also be wise to include some sort of auditory score to see how well the older adults are able to hear.

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