Cataphoric pronoun dependencies in Dutch: An ERP study

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The processing of cataphoric pronouns has been shown to follow the same mechanisms as the processing of wh-dependencies in that the parser actively searches [1]for an antecedent to interpret the pronoun within the sentence, except in those cases where the pronoun must obey principle C of the binding theory(a name cannot be c-commanded by a nominative pronoun) [2]. This is the case for the Gender Mismatch (GMM) effect, a slowdown effect that shows that the parser tries to link an antecedent to a preceding pronoun only when the pronoun can be bound by it [3,4]. The present study uses the GMM paradigm used by [4] in order to test if encountering a pronoun triggers the search for an antecedent in the upcoming context.

This study aims to test whether the binding principle constrains the antecedent-search process in Dutch employing Event Related Potentials (ERP). If the parser attempts to bind the pronouns *zijn* and *haar*in (1a) and (1b) to the masculine antecedent *Lodewijk*, we expect a GMM effect at the position of the potential antecedent in (1b). On the other hand, if the parser respects the Binding Principle C we do not expect to find any ERP difference at the position of the potential antecedent *Lodewijk*in (1c) and (1d), showing that the parser does not try to link the pronouns *hij*and *zij* to the name.

We conducted an ERP experiment where EEG was continuously recorded while 24 native speakers of Dutch read silently 36 sentences such as (1a-d). Results show that there is a central anterior negativity in the 200-600ms window in (1b) condition with respect to (1a) at the point of the potential antecedent *Lodewijk*(significant 3-way interaction between factors Condition, Hemisphere (left, Right, Central) and electrode position (Anterior, Middle, Posterior); F(12,276)=2,05, p=0.045)). On the other hand, comparison between conditions (1c) and (1d) yielded no significant difference in the ERP waveforms.

The long sustained negativity generated at the antecedent *Lodewijk*for (1b) condition suggests that the parser attempts to link the antecedent to the preceding pronoun *haar*andfails to interpret it due to the gender mismatch between the feminine pronoun and the antecedent *Lodewijk*– a masculine name. This effect is absent in the other conditions. This indicates that the principle C blocked the parser from linking the antecedent with the preceding pronoun in (1c) and (1d).Overall results support the idea that there is the active search mechanism started for an antecedent whenever there is a pronoun that must be bound locally as in (1b), while grammatical constraints such as Principle C are immediately respected.

1a./b.	Zijn$_j$/Haar$_i$	assistenten	kwamen	erachter	dat	**Lodewijk$_j$Boer**	geen	prijswinnaar			
	His/ Her	*assistants*	*realized*		*that*	*Lodewijk$_{masc}$Boer*	*no*	*prizewinner*			
	geselecteerd	had,	maar	**Mirjam$_i$**	had	geen	interesse	in	de	roddel.	
	selected	*had*	*but*	*Mirjam$_{fem}$*	*had*	*no*	*interest*	*in*	*the*	*gossip.*	

1c./d.	Hij$_i$/Zij$_i$	kwam	erachter	dat	**Lodewijk$_j$Boer**	geen	prijswinnaar	
	He/She	*realized*		*that*	*Lodewijk$_{masc}$Boer*	*no*	*prize winner*	
	geselecteerd	had,	maar	**Thomas$_i$/Mirjam$_i$**	had	geen	interesseinderoddel.	
	selected	*had,*	*but*	*Thomas$_{masc}$/Mirjam$_{fem}$*	*had*	*no*	*interestinthegossip.*	

References

[1] Clifton, C, & Frazier, L. (1989).

[2] Chomsky, N. 1981.

[3] Van Gompel, R.P.G., &Liversedge, S.P. (2003).

[4] Kazanina, N., Lau, E., Lieberman, M., Yoshida, M., & Phillips, C. (2007).