Logophors: looking outside of syntax
Evidence from real-time sentence comprehension

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This paper capitalizes on psycholinguistic evidence from real-time sentence comprehension to choose between two opposing positions on reflexivity: The syntax-only field on the one hand, and the syntax+discourse field on the other hand. The study presented here utilized a cross-modal paradigm to measure the amount of processing resources required for interpretation. The obtained data are in favor of a syntax+discourse approach to reflexivity, thus suggesting that logophoricity goes beyond syntax. The data reveal a significant contrast between so-called coargument reflexives (whose interpretation is purely syntactic) and logophoric reflexives (implying that their interpretation requires access to syntactic and non-syntactic information).

1. Introduction

From a representational perspective, there are two competing positions on reflexivity. One position does not distinguish between the interpretation of the reflexive pronoun in (1a) and (1b) (syntax-only position), while the other position does (syntax+discourse position).

(1) a. The lawyer$_i$ who was young defended himself$_i$.
b. The daughter$_i$ hid a present behind herself$_i$.

The availability of two conflicting analyses of the same phenomenon opens the door for psycholinguistic evidence to provide support for one or the other.

In the experiment presented here, we investigate the process of interpretation of two different types of reflexive elements (in particular the contrast between the reflexive in a construction as in (1a) vs. that in (1b)). Specifically, we are interested in discovering how these reflexive elements establish reference, i.e. how they select their antecedent.

This paper capitalizes on psycholinguistic findings from a real-time sentence processing study to choose between the two opposing positions. Crucial to this study is the observation that the language processor is extremely

sensitive to different kinds of linguistic representations, and the results of the study thus enable us to select one position on the nature of the interpretation of reflexive pronouns over the other.

2. Representational Considerations

So how is reflexivity represented within the two positions, and what is the nature of the contrast between the two assumed types of reflexive pronouns? The representational contrast between the two reflexives surfaces in a more obvious way when we consider their distribution with pronouns. According to Standard Binding Theory (Chomsky 1981), reflexives and pronouns are in complementary distribution. Consider the following pairs:

(2) a. The golfer$_i$ who beat Sue applauded himself$_i$.
    b. *The golfer$_i$ who beat Sue applauded him$_i$.
(3) a. The woman$_i$ wrapped a blanket around herself$_i$.
    b. The woman$_i$ wrapped a blanket around her$_i$.

The proclaimed complementarity is only true for the pair in (2), where the pronoun in (2b) cannot be interpreted as referring to *the golfer*. In contrast, the reflexive in (3a) can be replaced by a pronoun – as in (3b) – with both elements selecting *the woman* as their antecedent. This should not be possible.

In the following, two approaches to this dilemma are outlined. One approach, the syntax-only position, exploits syntactic mechanisms to account for the interpretation of both of the reflexive pronouns in (2a) and (3a). The other approach, the syntax+discourse position, claims that syntax does not suffice for interpretation in the case of (3a).

2.1. Syntax-only position

Within the syntax-only position, there have been a number of attempts to solve the problem of the non-complementary distribution observed in (3) above (e.g. Chomsky 1986, Huang 1983, Hestvik 1991). One of these approaches is the introduction of subjectless binding domains (Hestvik 1991), which provides an extension of the Standard Binding Theory.

In Binding Theory, the binding domain of α is the smallest XP containing α and either a SUBJECT or I that assigns nominative case to α; thus, the governing category must contain a SUBJECT. A governing category in Binding Theory then can only be IP or NP with a subject. Modifying these requirements, the extension suggested by Hestvik's proposal removes the reference to SUBJECT from the binding domain. For the purposes of this paper, prepositional phrases (PPs) are considered to represent such subjectless binding domains, which then can account for the non-complementarity of the reflexive and the pronoun in the PP in (3) above: If α is a pronoun, it can be free in the (subjectless) binding

domain PP; however, if α is a reflexive, it must be bound within its binding domain (for a detailed discussion see Hestvik (1991)).
Under this framework, the reflexive in (3a) must extend its binding domain to the containing clause, because there is no potential binder in the PP. It is hence proposed that the interpretation of the reflexive in (3a) involves LF-movement: The reflexive establishes a connection with its antecedent (*woman*) by moving at LF.[1]

The interpretation of both the reflexive in (3a) and that in (2a) is thus accounted for by syntactic operations *alone*. The syntax-only position therefore does not distinguish between the representation of the reflexive in (2a) and that in (3a). This suggests that the two types of reflexives should pattern alike during sentence comprehension.

2.2. Syntax+discourse position

By contrast, the syntax+discourse position, distinguishes between the two reflexives on representational grounds (Reinhart & Reuland 1993, Pollard & Sag 1992, among others). One approach within this position is the Reflexivity Theory (Reinhart & Reuland 1993). Here, reflexives are not defined on the basis of strictly local considerations (i.e. binding conditions), but in terms of conditions on predicates.[2] The following examples demonstrate the relevance of these conditions for the objectives of this paper:

(4) a. The lawyer$_i$ who was young defended himself$_i$.
b. The daughter$_i$ hid a present behind herself$_i$.

In (4a) the reflexive *himself* selects *the lawyer* as its antecedent; both reflexive and antecedent are arguments of the predicate *defend*, i.e. they are coarguments of the same predicate. In contrast, in (4b) the reflexive *herself* selects *the daughter* as its antecedent, but the reflexive is an argument of the predicate *behind*, while the antecedent is an argument of the predicate *hid*. This has been

[1] The proposed LF-movement of reflexives mirrors the operations involved in clitic-movement (as put forth by Kayne's (1975) analysis of French pronominal clitics). Along these lines, Chomsky (1986:175) has also suggested a LF-movement for English reflexives.

[2] In particular, condition A of the Reflexivity Theory states that a reflexive-marked predicate is reflexive. This assumes first that a predicate is *reflexive* if and only if two of its arguments are coindexed (definition (a)), and second that a predicate is *reflexive-marked* if […] one of the predicate's arguments is a SELF anaphor (definition (b)) (Reinhart & Reuland 1993). To illustrate these definitions of Reflexivity Theory, consider the following examples:

(i) *Max$_i$ criticized him$_i$.
(ii) *Max$_i$ criticized Max$_i$.
(iii) Max$_i$ criticized himself$_i$.

In all three examples, the predicate is *reflexive* because two of its arguments are coindexed [definition (a) above]. Furthermore, only the predicate in (iii) is *reflexive-marked*; the predicate in (i) and (ii) is not reflexive-marked, because *him* and *Max* do not represent SELF anaphors [definition (b) above]. Since both definitions must be satisfied, only (iii) is considered grammatical.

noted by Reinhart & Reuland who claim that "in the case of locative and directional PPs […], the P[reposition] forms its own predicate" (1993:686). The reflexive is therefore an argument of the preposition *behind* and not of the verb. Crucially then, the reflexive and the antecedent in (4b) are *not* coarguments of the same predicate.

The representational distinction that can be drawn from these observations is such that the reflexive in (4a), which is a coargument with its antecedent, can be interpreted on syntactic grounds alone (henceforth *coargument reflexive*). However, for the reflexive in (4b), which does not share the same predicate with its antecedent, syntax is not sufficient for interpretation. The latter requires information beyond syntax for the establishment of the correct referent. Such reflexives are known as *logophoric reflexives.*[3]

2.2.1. Discourse level

The remaining question is what constitutes the extra information that goes beyond syntax and that must be accessed in the course of the interpretation of logophoric reflexives. It is suggested that this extra-syntactic information is discourse-related (Reinhart & Reuland 1993:689, Sells 1987, et al.), where discourse is understood as a level of representation (e.g. Heim 1982, Avrutin 1999).

One discourse-oriented framework for the interpretation of (logophoric) reflexives is provided by Sells (1987). He suggests that at the level of discourse representation, certain discourse functions are accessed for interpretation, specifically the 'source', 'self', and 'pivot'/'point of view'. A logophoric reflexive thus establishes a link to a certain NP because this NP is associated with a specific internal perspective. The antecedent of a logophoric reflexive is hence conceived with particular reference to its point-of-view:

(5) SOURCE: one who is the intentional agent of the communication
SELF: one whose mental state or attitude the content of the preposition describes
PIVOT: one with respect to whose (space-time) location the content of the proposition is evaluated (Sells 1987:457)

The following examples from Icelandic ((6), from Sells 1987:450) and English (7&8) demonstrate these discourse notions:

(6) a. Hann_i sagði að sig_i vantaði hæfileika.
He said that self lacked ability
'He_i said that he_i lacked ability.'

[3] Now, the correspondence with pronouns, which has been pointed out with respect to the phenomenon of non-complementarity in the introduction, should become more apparent: logophoric reflexives are SELF anaphors that occur in non-reflexive (pronominal) contexts (i.e. they are free, such as pronouns, since they do not share the same predicate with their antecedents).

b. *Honum$_i$ var sagt að sig$_i$ vantaði hæfileika.
He was told that self lacked ability
'He$_i$ was told that he$_i$ lacked ability.'

In Icelandic, the logophoric element *sig* must refer to the entity that is marked as SOURCE at the discourse level. The semantics of the verb in (6) is such that the subject must be represented in the discourse as SOURCE, i.e. the one who intentionally says something. However, in the passive construction (6b), *honum* is not marked as SOURCE of the communication, and coindexation of *sig* and *honum* thus yields an ungrammatical interpretation.

(7) Max$_i$ boasted that the queen invited Lucie and himself$_i$ to the tea.

The example in (7) represents an instance of the discourse notion SELF. For the interpretation of the logophoric reflexive *himself*, reference to the mental state of *Max* is needed. Finally, the notion of PIVOT can be exemplified by the locative PP constructions that have been used in the study reported here:

(8) The woman$_i$ put a towel around herself$_i$.

The logophoric reflexive *herself* is interpreted with respect to *the woman's* spatial and temporal location. The action verb *put* depicts a motion of the antecedent whose perspective is required for complete interpretation.

To conclude, the common denominator of the (logophoric) reflexives in the examples above can be summarized in the observation that their interpretation incorporates a representation of the antecedent's thoughts, attitudes, or perspective. This has also been discussed by Hagège (1974), who coined the term 'logophoric', Cantral (1974), Clements (1975), and Banfield (1982), among others.

Assuming that the interpretation of logophoric reflexives involves non-syntactic operations, such as access to the discourse notions of point-of-view, while the interpretation of coargument reflexives is merely achieved via syntactic operations, the syntax+discourse position differentiates between the two reflexives (i.e. coargument and logophoric reflexive). This leads to the hypothesis that a contrast should also obtain in the course of processing these two types of reflexives.

3. Processing considerations

Before the divergent hypotheses of the two positions can be investigated on the basis of psycholinguistic findings, a number of assumptions about the language processor must be clarified. These considerations form the foundation for the predictions and interpretation of the results that will be postulated with respect to the processing of the reflexives.

3.1. Antecedent reactivation

Psycholinguistic studies have shown that an antecedent is activated during the interpretation of pronouns and traces in real-time sentence comprehension. In particular, priming experiments have greatly contributed to these findings, which capitalize on the notion that lexical decisions to related probes are faster than lexical decisions to unrelated probes at the position of the pronoun or trace, where the antecedent is expected to be assigned (e.g. Nicol & Swinney 1989, Bever & McElree 1988, MacDonald 1989). Consider the following examples:

(9) a. The boxer_i told the skier_j that the doctor_k for the team would blame $\text{him}_{i/j/*k}$ for the recent injury.
b. The boxer_i told the skier_j that the doctor_k for the team would blame $\text{himself}_{*i/*j/k}$ for the recent injury.

It has been found that in sentences such as (9) which have a number of potential antecedents (i.e. the NPs of the sentence: *the boxer*, *the skier*, *the doctor*), reactivation of *only* the structurally acceptable antecedent is observed. Thus, for instance (9b) elicits reactivation of the antecedent *doctor*, but not of *boxer* or *skier*. (This is measured by the visual presentation of a semantically related word (e.g. *nurse* for the antecedent *doctor*, or *snow* for *skier*) immediately after hearing the pronoun.)

For the purposes of this paper, it can then be assumed that in the course of interpretation, a reflexive must reaccess its antecedent for the establishment of reference. In addition, the evidence from reactivation of antecedents signals that the language processor is extremely sensitive to linguistic operations and constraints.

3.2. Levels of information in real-time

In order to choose between one of the two representational theories by drawing on observations from sentence processing, it is relevant to make certain assumptions on the architecture of the language processor. Since one characteristic feature of the interpretation of logophoric reflexives is the observation that they behave like pronouns in that they require access to discourse or extra-syntactic information, one question is how different levels of information are represented in the processing system. A second question is how the different levels interact with each other, i.e. how the language processor operates during real-time sentence comprehension.

A recent finding has been that the parser operates locally first (Abney & Johnson 1991). As a consequence, processes of interpretation that take place within the level of syntactic representation alone take precedence over interpretation that demand access to other levels of representation. As a result, a switch between different levels of information should be observable. And

indeed, we assume that such a switch takes place and is reflected by a cost to the processing system.

This assumption is supported by a considerably large body of psycholinguistic evidence for the existence of different levels of linguistic information. In particular, a contrast has been observed for the processing of syntactic versus extra-syntactic information. For instance, such a contrast has been found for semantic and syntactic information. In one study, it has been shown that the access of lexico-semantic content is costlier than that of lexico-syntactic content (Shapiro, Zurif & Grimshaw 1987, 1989).

A second study, which investigated a phenomenon known as aspectual coercion, has revealed that processing of combinatorial semantic operations is costlier to the processor in instances where it arises out of syntactically opaque (enriched) contexts - e.g. (10a) - than where it arises out of syntactically transparent ones - e.g. (10b) - (Piñango, Zurif & Jackendoff 1999):

(10) a. The tiger jumped for an hour.
b. The tiger slept for an hour.

For the verb phrase in (10b), syntactic information suffices in the process of interpretation. On the other hand, (10a) is semantically encoded and requires an (intrinsic) temporal component for its interpretation (in particular, the repetition function of the action *jump* for the time period of *one hour*). Semantically enriched sentences (10a) have been found to impose a higher cost on the processor than those in (10b).

Finally, a number of studies have investigated the contrast between the processing of discourse-linked (referential) wh-pronouns (11b) and that of non-discourse-linked (non-referential) wh-pronouns (11a) (De Vincenzi 1991, 1996, Shapiro 2000):

(11) The soldier is pushing the unruly student violently into the street.
a. Who$_i$ is the soldier pushing t_i violently into the street?
b. Which student$_i$ is the soldier pushing t_i violently into the street?

Processing data have shown that reactivation of related probes (compared to unrelated probes) is delayed for the discourse-linked *which*-NP in (11b). In particular, reactivation of non-discourse linked wh-pronouns (such as (11a)) – measured as reaction time to a secondary lexical decision (see below for a discussion of the dual task paradigm) – has been statistically significant at the position of the trace, while reactivation of discourse-linked wh-phrases (such as (11b)) has been found significant at a (later) post-gap position (after *violently* in the example above). These findings are understood to imply that an extra cost is exerted during the access of a level of discourse representation, which crucially is only required for the interpretation of the discourse-linked wh-phrase (11b).

All this evidence supports the notion that the architecture of the sentence processor consists of various levels of information, and that access to these

levels places a computational burden on the language processor. Sentence comprehension is thus a process that results in cost to the system as a whole, and it is possible to measure this cost, for instance, by implementing the cross-modal lexical decision interference paradigm (see below). In what follows, this notion is investigated through the window of logophoricity.

4. Reflexivity and real-time comprehension

The representational considerations and the processing considerations can now be brought together. The two competing positions on the representation of reflexivity make different predictions concerning the processing of coargument and logophoric reflexives. Under the syntax-only position, it is hypothesized that the two reflexives exhibit similar behavior; whereas in the context of the syntax+discourse position, a contrast is expected. These predictions are now examined from a processing perspective.

4.1. Method

4.1.1. Paradigm

We used the cross-modal lexical decision interference paradigm. In this paradigm, the subject performs two tasks: a comprehension task (primary task) and a lexical decision task (secondary task). The subject is presented auditorily with a sentence, and the primary task of the subject is to listen carefully and understand each sentence. To assure that the task is performed properly, the subject has to respond to comprehension questions at random points in the course of the experiment. At a certain point during the presentation of a given sentence, a letter string (probe), which is entirely unrelated to the sentence, is presented visually, upon which the subject has to decide (i.e. make a lexical decision for the probe) whether or not the letter string represents a word of English. The subject is instructed to perform this decision as quickly and as accurately as possible. The decision is indicated by pressing a 'yes' or 'no' button. The reaction time (RT) to the lexical decision is recorded (using Rtlab 11x, (Swinney 1979)).[4]The logic of the interference paradigm is the following: it is assumed that the two tasks – comprehending a sentence and performing a lexical decision – compete for the same processing resources. Accordingly, since the two tasks compete for the same resources, the RT to the lexical decision task is an indicator for the processing resources required during the primary task of sentence comprehension (Shapiro, Zurif & Grimshaw 1987, 1989).

[4] Note that there are two versions of the cross-modal lexical decision paradigm. The one used in the experiment presented here is the interference paradigm (where a lexical decision is made to an unrelated probe). The other one is the facilitation paradigm, which has already been mentioned above with regard to the antecedent reactivation studies (where a lexical decision is made to a semantically related probe).

4.1.2. Subjects

Forty-five students recruited at Yale University participated in this study (eighteen subjects for the control position and twenty-seven subjects for the experimental position). All were native speakers of English with normal (or corrected-to-normal) visual and auditory acuity (by their own report) and had no history of neurological disorder.

4.1.3. Materials

Twenty-five pairs of experimental sentences were constructed. Each pair consisted of a sentence with a coargument reflexive (12a) and one with a logophoric reflexive (12b). The latter included verbs that require an object (e.g. *bug repellent*) and a locative prepositional phrase introduced by *behind* or *around*. For each pair, the verbs were matched for frequency (Francis & Kucera 1982). In addition, the sentences were matched for total length, as well as for the distance between the antecedent and the reflexive. As an example, consider the following pair:

(12) a. The woman$_i$ who was arrogant praised * herself$_i$ ^ because the network had called about negotiations for a leading role.
b. The girl$_i$ sprayed bug repellent around * herself$_i$ ^ because there were many mosquitoes in the Everglades.

Two positions of the visual probe were tested (in two separate runs of the experiment). In the control position (*), the probe appeared before the reflexive; this position was tested to assure that no difference was observed up to the reflexive for both conditions in the sentence pair. In the experimental position (^), the probe was presented immediately after the reflexive. Twenty-five pairs of probes were constructed for the experimental sentence pairs. A probe was chosen so that it was not semantically related to the content of the sentence, nor generated a continuation of the sentence in any meaningful way. For each experimental pair, the probe pair was matched for length as well as frequency to avoid any unpredictable interference due to the lexical decision task. Furthermore, probes exhibited diverse phonological properties across experimental pairs (Shapiro, Brookins, Gordon & Nagel 1991). The presentation of probe and sentence within a pair was counterbalanced over all subjects (i.e. one half of the subjects was presented with one probe of a pair, while the other half was presented with the other probe). For instance, for the pair in (13) & (14) the probe pair was SESSION and TEACHER, and half of the subjects were presented with SESSION in the coargument condition and TEACHER in the logophoric condition and vice versa. Furthermore, (13) presents the experimental sentences with the control position, and (14) presents them with the experimental position:

(13) a. The woman$_i$ who was arrogant praised * herself$_i$ because…
SESSION

b. The girl$_i$ sprayed bug repellent around * herself$_i$ because…
TEACHER

(14) a. The woman$_i$ who was arrogant praised herself$_i$ ^ because…
SESSION

b. The girl$_i$ sprayed bug repellent around herself$_i$ ^ because…
TEACHER

In addition to the fifty experimental sentences, one hundred and nineteen sentences and probes were created as fillers for the final version of the script.[5] Forty-two of these sentences were assigned word probes, and seventy-five were assigned nonword probes. The nonword probes were constructed to comply with English phonotactic rules (e.g. PURSHIP, FESSON, DIRLING). Probe positions were randomly varied in these sentences to decrease guessing on the part of the subjects. A script was then created with a total of 169 sentences. The experimental sentences were put in a quasi-random order, and the sequencing of the sentences within a pair was controlled in such a way that for half of the pairs the coargument condition preceded the logophoric condition (12) and for the other half it followed the logophoric condition (13). Moreover, at least two filler sentences had to appear at the beginning of the script and between experimental sentences.

4.2. Predictions

Under the assumption that the two tasks (understanding a sentence and performing a lexical decision) compete for the same processing resources, the reaction time (RT) to the lexical decision task is taken as an indication for the amount of processing resources required for the primary comprehension task. Specifically, the more resources are needed by the primary task, the higher is the RT to the secondary task (i.e. lexical decision). As a consequence, the comparison of the RTs to the lexical decision in the two conditions (i.e. coargument reflexives and logophoric reflexives) can be employed to decide between the two opposing representational accounts of reflexivity.

If the comparison of the reaction times does not reveal a difference between the two conditions, the result might be taken to support the syntax-only position, which does not differentiate between the two reflexive conditions on a representational basis and claims that both reflexives are interpreted by syntactic means alone. This prediction follows from the observation that syntactic operations, no matter how complex they are or whether they vary in terms of their actual formation, do not impose differing degrees of

[5] The odd number of filler sentences with word probes resulted from the inclusion of another experiment in the final script that is entirely unrelated to the current experiment.

computational load on the processor.[6] The processing of either of the reflexive conditions should therefore not result in additional cost to the system.

If, however, the comparison of the reaction times to the two conditions results in a significant difference between coargument and logophoric reflexives, such an outcome can be considered supportive evidence for the syntax+discourse position, which distinguishes between the two reflexive conditions on representational grounds. Again, this prediction is based on the observation that an increase in processing load cannot reflect the need for more syntactic information, but rather signals the need to access information beyond syntax in the process of interpretation, which is assumed by the syntax+discourse position for only the interpretation of logophoric reflexives. Therefore, if a contrast obtains between the two reflexive conditions, it is expected to reflect an increase in processing load during the interpretation of logophoric reflexives, in comparison to the processing of coargument reflexives. This increase should surface as a higher RT to the lexical decision task in the logophoric condition.

The essential position to prove the predictions of the two representational approaches to reflexivity is then the experimental position, at which the probe was presented immediately after hearing the reflexive. This is considered the critical position, because at this point the resources that are required during the processing of the reflexive can be measured in order to determine whether the interpretation of reflexives exerts additional cost to the system or not.

4.3. Results

Results show that whereas in the control position (right before the reflexive) there was no difference in RT ($t(17)= -0.46$, $p=.32$), the experimental position (right after the reflexive) registered a higher RT for the logophoric reflexives (Table 1). Statistical analysis revealed significantly higher RTs for logophoric reflexives than coargument reflexives for both a subject analysis ($t(26)= 2.71$, $p=.005$) and an item analysis ($t(49)=2.11$, $p=.01$), thus indicating that the interpretation of logophoric reflexives is costlier to the processor than that of coargument reflexives.

[6] It has been found that an increase in the number or kind of syntactic transformations does not result in more cost to the processor and that there is no correlation between a rise in derivational complexity and the complexity of psychological processes during sentence comprehension (Fodor, Bever & Garett 1974).

Table 1: Mean RT for conditions.

	control position (before the reflexive)	experimental position (after the reflexive)
coargument reflexives	729.04	675.84
logophoric reflexives	722.72	701.52
significance	p = .32	p =.005

Moreover, in further statistical analyses, no sequence effects or other sources of interference were found. This is important as it indicates that the difference observed in the experimental position can be fully credited to the nature of the interpretation of the reflexive.

4.4. Discussion

In light of the two competing representational accounts of reflexivity presented above, the statistically significant difference, which has been found for logophoric reflexives over coargument reflexives, provides evidence for the representational framework of the syntax+discourse position. The difference suggests that the interpretation of logophoric reflexives poses a higher burden on the processor than that of coargument reflexives. Assuming that additional cost to the processor is an indication for a switch between levels of information, such a burden is in turn only compatible with the syntax+discourse position that claims that the interpretation of logophoric reflexives requires access to extra-syntactic (discourse) information. It is precisely this extra process that is reflected in the higher RT. The reasoning is the following: The comprehension and interpretation of logophoric reflexives (primary task) appears to require a higher effort, which reduces the amount of resources available for the secondary lexical decision task and thus causes a higher RT in this condition.The obtained results therefore support the predictions that can be made on the basis of the syntax+discourse position. They favor the notion that logophoric reflexives need additional linguistic levels for interpretation and are thus subject to processing above and beyond syntactic demands. They further demonstrate that the two types of reflexives do not pattern alike. The findings therefore also indicate that the predications made in the context of the syntax-only position are not borne out.

These results are further consistent with recent findings from language acquisition and neuro-imaging studies. In imaging, results have shown that errors involving the two types of reflexives yield different activation patterns of event-related brain potentials, thus suggesting the existence of syntactic and extra-syntactic processes (Harris, Wexler & Holcomb (to appear)). In language acquisition, it has been observed that children have more difficulties interpreting logophoric reflexives than coargument reflexives (Avrutin &

Cunningham 1997); these difficulties are considered to be caused by a resource limitation in connection with the processor's need for additional resources to access extra-syntactic information.

To conclude, the study presented here provides evidence for the extra-syntactic nature of logophoricity. It further demonstrates how psycholinguistic data can be used to decide between competing representational approaches in general and the two approaches concerning reflexivity in particular, as the distinction between levels of information (e.g. syntax vs. discourse) is reflected in the course of real-time processing.

Acknowledgements

The study presented in this paper has been part of an ongoing research program on real-time properties of anaphora at the Department of Linguistics at Yale University, New Haven, CT, with Maria M. Piñango and Sergey Avrutin (now Utrecht Institute of Linguistics OTS).

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