Binding without Identity: Towards a unified semantics for bound and exempt anaphors[1]

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Abstract. Expressions such as English *himself* are interpreted as locally bound anaphors in certain syntactic environments and are exempt from the binding conditions in others. This article provides a unified semantics for *himself* in both of these uses. Their difference is reduced to the interaction with the syntactic environment. The semantics is based on an extension of the treatment of pronominals in variable-free semantics. The adoption of variable free semantics is inspired by the existence of proxy-readings, which motivate an analysis based on Skolem functions. It is explained why certain anaphor types allow proxy-readings whereas others do not.

Keywords: Anaphors, exemption, proxy-readings, Skolem functions, variable-free semantics.

1 Introduction

One of the intriguing properties of the English anaphoric system is that members of one and the same class of elements – *himself*, and the other members of its paradigm – must be locally bound (they are subject to condition A of the binding theory) in one set of environments, and is exempt from this local binding requirement in other environments. In such environments the antecedent need not be local. In certain cases a linguistic antecedent may even be absent and a 'logophoric' interpretation obtains. This contrast has been discussed, among others, in Pollard and Sag (1992), Reinhart and Reuland (1991, 1993, henceforth R&R), and Reuland (2001, 2005a, 2008). A typical set of environments where the contrast shows up in given in (1) and (2):

> (1)　　**Alice* expected [the king to invite *herself* for a drink]

> (2)　　a. *Alice* expected [the king to invite [the Rabbit and *herself*] for a drink]
> b. *Alice* expected [the king to invite [no one but *herself*] for a drink]

(1) illustrates the canonical case of a condition A violation. *Herself* is an anaphor and must be bound in its local domain, roughly the minimal clause containing it (see Chomsky 1981 for a precise statement of the canonical binding theory). *Alice* is the

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only potential antecedent of *herself*, but is outside the latter's binding domain. Hence, (1) is ill-formed. However, in (2) *Alice* is even farther away from the anaphor than in (1), yet here *Alice* can serve as an antecedent for *herself*, and these sentences are well-formed. This is problematic for the canonical binding theory, not only technically, but also conceptually. As R&R show, these and other facts - for instance, the differences in distribution between simplex anaphors (henceforth SE-anaphors) and complex anaphors (SELF-anaphors) like Dutch *zich* and *zichzelf* and their cognates in other languages – follow if conditions A and B are essentially seen as conditions on predicates and stated as follows:

(3) *Conditions:*
     A: A reflexive-marked syntactic predicate is reflexive
     B: A reflexive semantic predicate is reflexive-marked

These conditions are based on the following definitions (from R&R):

(4) *Definitions:*
     a.   The *syntactic predicate* of (a head) P is P, all its syntactic arguments and an external argument of P (subject)
         The *syntactic arguments* of P are the projections assigned Θ-role or Case by P[2]
     b.   The *semantic predicate* of P is P and all its arguments at the relevant semantic level
     c.   A predicate is *reflexive* iff two of its arguments are bound by the same λ-operator[3]
     d.   A predicate (of P) is *reflexive-marked* iff either P is lexically reflexive or one of P's arguments is a SELF-anaphor

For the moment we will focus on condition A, and the definitions in (4a, c, and d). It is easily seen that in (1) *herself* is a syntactic argument of the predicate formed of *invite*. Therefore, it reflexive-marks it. Condition A, then, requires the predicate to be reflexive. This requirement cannot be met due to a feature mismatch between *the king* and *herself*, hence the sentence is ruled out. In (2a,b) *herself* is not a syntactic argument of *invite*. Rather, it is properly contained in one (*the Rabbit and herself* and *no one but herself*, respectively). Consequently, condition A does not apply, and the predicate is not required to be reflexive. Here the anaphor is *exempt*, to use Pollard and Sag's term. Hence, no violation of condition A ensues. Where syntactic principles do not enforce an interpretation as a reflexivizer, its eventual interpretation will be determined by general semantic and discourse principles. As is shown extensively by Pollard and Sag *himself/herself* may end up being bound by a higher c-commanding

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[2] The reference to P includes P's extended projection in the sense of Grimshaw 1991.
[3] The original definition is stated in terms of coindexing. *Being bound by the same operator* follows the definition of binding in Reinhart (2006). Note that this is not strictly speaking compatible with the variable free approach to be adopted in the body of this article, but for the present purpose this can be ignored.

antecedent, and, if none is available by a suitably prominent discourse entity, and receive a logophoric interpretation.

Summarizing, condition A expresses that the SELF- anaphor enforces reflexivity of the predicate in (1), but not in (2). The questions we need to address concern the way in which condition A is syntactically implemented, and how this affects the semantic interpretation.

2   The syntax of reflexive-marking

In a parsimonious theory of grammar, locality of binding should follow from the same general principles that give rise to locality in other domains. Ideally, the grammar should contain no statements specific to binding, except for a definition of binding itself. Similarly, also the interpretation of anaphors in various syntactic contexts should be determined by the same semantic principles applying in a uniform way. That is, also the semantics of anaphoric expressions should be as general as possible.

Reinhart and Reuland (1993) do not discuss a specific syntactic mechanism for reflexive-marking. Reinhart and Reuland (1991), however, suggested that the mechanism involves covert syntactic movement, with SELF moving onto the predicate head by head-movement. In line with earlier approaches such as Helke (1973), we assume that *himself* is syntactically complex, with SELF being an N projecting an NP, and *him* occupying a position in the left periphery as in (5a), where F is a functional projection, which we can assume to be Person.[4] When inserted in the proper configuration SELF can be attracted by the head of the predicate, and adjoin to the latter, as in (5b), which is transparently reflected in nominalizations such as *self-hatred* or *self-admiration*.

(5)   a. $[_{FP}$ him $[_{NP}$ SELF]]
         b.   DP $[_{VP}$ $[_{V}$ SELF V] $[_{DP}$ him $[_{NP}$ (SELF)]]]

This idea is elaborated in Reuland (2001, 2005a, and 2008). It is easy to see that the syntactic conditions on exemption follow without further stipulation if the relation between SELF and the predicate is indeed covert syntactic movement. If so, it is sensitive to standard island conditions on movement, specifically head-movement. In (2a) moving SELF onto *invite* would violate the coordinate structure constraint, in (2) the adjunct island constraint (independently of whether these constraints can be reduced to more fundamental principles of grammar). Hence SELF cannot move onto the predicate in (2a,b) and require it to be reflexive, which explains the exemption.[5]

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[4] R&R assume that *him* is in the D-position. For reasons discussed in Reuland (under contract) its position is in a functional projection below D, but for present purposes this issue can be put aside.

[5] It would lead us beyond the scope of the present article to go over all the cases of exemption. See R&R 1993 for detailed discussion. The reduction of reflexive-marking to SELF-movement has a range of non-trivial empirical consequences, which we cannot possibly go into here. They are discussed in detail in Reuland (under contract).

A crucial claim of this approach is that English has only one expression *himself*. And indeed, this is the most parsimonious way to derive the complementarity of exempt and bound uses of *himself*. However this claim naturally leads to the question of its semantics. Can we find a unified semantics of *himself* covering both its bound and its exempt uses? The matter is discussed in R&R (1991), and subsequently, in Reuland (2005a, 2008). The idea pursued there is that SELF is a predicate expressing identity. When adjoined to the predicate head SELF's extension is intersected with the extension of the predicate head, which intuitively conveys the intended meaning. It is less clear what happens in exempt positions. Since SELF is an identity predicate, one of its arguments will be the pronominal. The other argument will have to pick up its value from the context. However, it is not trivial to express the semantics in a compositional way. In the next section we will present a compositional semantics for *himself*. As we will show, this semantics is extendable to different types of reflexive markers. Many languages, for instance use body-part reflexives. As we will see, our approach naturally applies to such elements.

The basis for our semantics, however, is provided by the solution to another puzzle, which we will introduce first.

3 Binding and proxies

Our treatment of the semantics of *himself* is inspired by one of the well-known properties of reflexive pronouns: their ability to have "proxy readings". This is illustrated in (6) (Jackendoff 1992):

> (6) (Upon a visit in a wax museum:) All of a sudden Ringo started undressing himself.

Himself in (6) can refer to the "real" Ringo, but also to a statue of the Ringo denoted by the subject. As Jackendoff argues, the availability of proxy interpretations of reflexives (6) must be related to a general property of language: the ability to refer to various "proxies" of an individual concept. In that respect, the reflexive in (6) is not different from non-anaphoric NPs, which can also refer to "non-canonical" proxies (cf. *Ringo/the man is made of stone, whereas Yoko/the woman is made of wax*) (see also Safir 2004 for pertinent discussion).

Jackendoff has argued that there is an asymmetry between NP's and anaphors in their ability to carry a proxy reading, and claims that in (7) we cannot have an interpretation where *Ringo* is the proxy and *himself* the person.

> (7) *Ringo* fell on top of *him*self

However, it is not at all difficult to create contexts where such an interpretation is easily accessible. Consider a play where some actor plays a younger Ringo, and Ringo plays an older fan. It is no problem to interpret the sentence *Ringo stumbled and fell on top of himself* as true when the actor stumbled and fell on top of the real Ringo. Thus, the availability of proxy-readings represents a general property of

expressions for individual concepts. Hence the following generalization is expected to hold:

> (8)   *Generalization*: *The range of available proxies for a bound pronoun is the same range of proxies as for its antecedent.*

Thus, while strict identity between the referents of a pronoun and its antecedent is not mandatory even under binding, identity of the candidate proxy referents for the two expressions is mandatory. This generalization reflects the following observation: also non-reflexive bound pronouns allow a proxy interpretation. For instance:

> (9)   All of a sudden, every pop icon started taking off the shirt he was wearing.

In the wax-museum context of (6), sentence (9) has a bound reading where the pop icons took the shirts off their respective statues.

This leads to the question of the proper semantics of pronouns. In what one may call the standard analysis of pronouns and anaphors, as summarized in for instance Heim and Kratzer (1998), pronouns and anaphors are essentially variables. Their interpretation is given on the basis of assignments functions.

The fact that pronouns have proxy readings does not come naturally in the standard analysis or pronouns as variables. However, we will show that it is naturally accommodated in an extension of Jacobson's (1999) variable free semantics. Her approach to pronouns dispenses with assignment functions, and also with indices. Pronominals are interpreted as the identity function on entities. It is this conception that provides the basis for generalizing over the bound and exempt uses of *himself*.

To capture the availability of proxy-readings as in sentence (9) we propose the following natural modification in Jacobson's use of functions. Non-reflexive pronouns like *he*, instead of simply denoting the identity function on entities, as in Jacobson 1999, denote a *Skolem function*: a function from entities to entities that takes a relation as a parameter. The formal definition is given in (10):

> (10)   *A function f of type (ee) with a relational parameter R is a **Skolem function** if for every entity x: $R(x, f_R(x))$ holds.*

We propose that the context provides a *proxy relation* (PR), describing the possible proxies $\lambda y.PR(x,y)$ of any entity x referred to. This parameter determines the range for each possible entity argument of the Skolem function. We stipulate that any proxy relation must be *reflexive*. This guarantees availability of the standard interpretation, also in cases like (6) and (9), where the referents for the pronoun and its antecedent entity are strictly identical. This happens because when the relation R is reflexive, one of the Skolem functions f_R is the identity function. Thus, our account generalizes Jacobson's use of functions from entities to entities. Sentence (9) is now analyzed as (9'):

> (9') $\forall x[\ pop\_\ icon(x) \rightarrow take\ off\ (x, the\ shirt\ \_f_{PR}(x)\ \_\ was\ wearing)]$

Thus, for every pop icon x, the Skolem function f_{PR} picks up one of x's proxies in the set $\lambda y.PR(x,y)$, possibly x itself. Deriving this analysis is straightforward within Jacobson's framework.

4 Binding of SELF-anaphors

What do these considerations imply for reflexive pronouns, in particular SELF-anaphors? As indicated in (5), we decompose the anaphor *himself* into a pronoun *him*, and *self*. Since pronominals need not be bound, the relative binding requirement of *himself* must reside in the *self*-part. We treat English *self* (as its cognates in other languages) as a relational noun, denoting a relation between entities and their proxies (with the identity relation as the limiting case). This requirement amounts to assuming that *self* denotes a reflexive relation: an entity x can have more than one "self" in addition to x. In the decompositional semantics of *herself*, *self* replaces the contextual proxy-relation of the bare pronoun *her*.

A noun phrase like *Ringo's better self* is not substantially different from any other NP with a relational noun (e.g. *Ringo's better parent*), where the former NP may refer to one of Ringo's "better" proxies in the context of utterance. As noted in section 2, *self* can incorporate (Van Geenhoven and McNally 2005) with nouns and nominalized transitive verbs. In this it is similar to other relational nouns. For instance:

(11) a. *self-hater* denotes the predicate $\lambda x.hate(x, \uparrow self(x))$
          (x is a self-hater if x hates the property (indicated by the $\uparrow$-operator) coupled with x's proxies)
      b. *parent-hater* denotes the predicate $\lambda x.hate(x, \Uparrow parent(x))$
          (x is a parent-hater if x hates the property coupled with x's parents)

The only substantial difference we assume between *self* and other relational nouns is a syntactic one. The noun *self* is able to combine with Skolem functions denoted by non-reflexive pronouns independently of genitive case (viz. $^{??}$*his self*/*himself* vs. *his parent*/*him parent). There are two ways in which this can happen:

i. The unmarked option – the noun *self* composes with the Skolem function denoted by the pronoun through the binding mechanism. The noun *self* covertly incorporates into the transitive predicate (as happens overtly in *self-hater*) and contributes a proxy relation to the non-reflexive pronoun through Jacobson's Z function in its "proxied" version:

(12) $Z^{PR} = \lambda R.\lambda f.\lambda x. R(x, f_{PR}(x))$

In this version of the Z function, it provides the Skolem function f with its parameter. The denotation of a VP like *undress himself* in (6) is obtained using the structure *self-undress him*, analyzed as in (13):

(13) Z^{self} ($undress$)(him) = Z^{self} ($undress$)(f) = $\lambda x.\, undress(x, f_{self}(x))$
         = $\lambda x. x$ undressed one of x's self proxies (by definition of f as a Skolem function)

ii. A marked option – the noun *self* composes with the Skolem function directly. We assume that this marked option is only available in exempt positions, when the incorporation with the predicate is syntactically blocked, as discussed in section 2. e.g. *Max boasted that the queen invited [Lucie and himself] for a drink*. When formation of self-V is syntactically disallowed (as for instance by the the Coordinate Structure Constraint), direct composition with the Skolem function leads to the analysis in (14):

(14)   himself = f_{self} = a function mapping every entity x to one of its proxies in *self(x)*

Unlike what happens in the unmarked option, now there is no binding that is made necessary by *self*'s composition. As a result, the exempt reading of *himself* allows it to be interpreted as either bound or free, similarly to the non-reflexive pronoun *him*.

Hence, *self* has the same semantics in both cases. The difference resides in how the instruction associated with its semantics is applied. This in turn is determined solely by the syntactic context. The crucial advantage of Jacobson's approach is that it makes available an argument for *self* that has the proper type in both the bound and the exempt case.

Remains the question of why the option with *self*-movement is the unmarked case. In Reuland (2001, 2005a) it is argued that the simplest reason resides in a general economy principle, to the effect that encoding binding dependencies in the syntax is cheapest, hence preferred. For current purposes this suffices, see Reuland (under contract) for more extensive discussion.

5 Simplex anaphors and proxy-interpretation

Dutch (like the Scandinavian languages) has two anaphors, a SE-anaphor *zich*, and a SELF-anaphor *zichzelf*. *Zich* is an anaphor in the sense that it must be bound (although as its locality condition is less strict, see Reuland 2005b for discussion). R&R 1993 analyze it as a pronominal that is under-specified. It is not specified for *gender* and *number*, but only for the feature 3rd *person*. Given this, one would expect that it allows proxy-readings like any pronominal. However, there is a clear contrast between the following sentences:

(15)   a.   Ringo begon zich te wassen.
                "Ringo started to wash" *no proxy reading*
         b.   Ringo begon zichzelf te wassen.
                "Ringo started to wash himself" *proxy reading possible*

That is, again in the situation of the wax museum, suppose Ringo finds his statue dirty and wants to do something about it, we can say (15b), but not (15a). What is the source of the difference between the pronouns *zich* and *zichzelf*? As in the case of exemption discussed above we would like to find the answer in the syntactic environment, keeping the semantics uniform.

We will relate this to the lexical status of reflexives, coming back to the definition in (1d). A predicate can be reflexive-marked either extrinsically (by a SELF-anaphor), or lexically. Reinhart (2002) and Reinhart and Siloni (2005) present a theory of operations on argument structure (for details we refer to the works cited). One of the options these works allow is a lexical operation, reducing the internal argument and bundling its thematic role with the role of the external argument, as in (16):

(16)   Internal Reduction/Bundling R_s:
        a. $V_{acc}(\theta_1, \theta_2) \rightarrow R_s(V)(\theta_{1,2})$ (where $\theta_{1,2}$ stands for the
                bundling of θ_1 and θ_2)
        b. $R_s(V)(\theta_{1,2}) \leftrightarrow \theta_{1,2}(\lambda x (V(x,x)))$

The operation is available for a subclass of transitive/accusative assigning verbs, including verbs such as *wash*, *shave*, etc. Thus, English *wash* has two related entries, one intransitive and inherently reflexive in *John washed*, the other transitive in *John washed Mary/John washed himself*. The same contrast applies to Dutch. One of the cross-linguistic variables is how the reduction operation affects accusative Case. In languages of the English type the reduction also affects accusative Case. The reduced entry is not an accusative Case assigner, hence no further operation is necessary. In Dutch, with a somewhat richer Case system than English, structural accusative is preserved under reduction. Hence an element has to be inserted checking this Case. Crucially, the element to be inserted should not be interpreted as an independent syntactic argument. For reasons discussed in Reuland (2001) *zich*'s feature deficiency allows it to form one syntactic object with the subject, technically a *chain*.

Thus, our analysis of the chain in the intransitive usage of *waste* ("washed") in (15a) yields the interpretation in (17):

(17)   ‖ [Jan,zich] ‖ = f_{PR}(jan) = one of Jan's proxies.

That is, the proxy-function interpreting *zich* "skips" the predicate *waste*, and applies directly to the subject. The resulting interpretation is indistinguishable from the "simple" denotation "jan" of the name *Jan*, given the generalization (8) that any referential NP can be interpreted as any member of the relative set of proxies. Thus, interpreting *zich* by a proxy-function meshes well with the syntactic structure, without further assumptions being necessary.

By contrast, in (15b), similarly to (6), the reflexive pronoun fills in a separate (object) argument position of a transitive verb (here, the transitive reading of *waste*). As a result, the analysis of (15b) is similar to the binding with the English sentence *Jan washed himself*.

So, *zich* reflects what one may call *strict binding*. This tallies with the fact that in intensional contexts *zich* only allows a *de se* interpretation. In terms of Chierchia's (1989) discussion, *Pavarotti zag zich in de film, maar realiseerde zich niet dat hij het zelf was* "Pavarotti saw SE in the movie, but didn't realize it was he himself" has the air of contradiction, but the result of replacing *zich* by *zichzelf* is fine. For completeness sake, note that due to the defective nature of *zich*, the complex form *zichzelf* is always bound. For details we refer to Reuland (under contract).

Lexical reflexivization as in Dutch or English is limited to a subclass of transitive verbs. In other languages bundling applies productively. As argued by Reinhart (2002) and Reinhart and Siloni (2005), in such languages bundling applies in the syntax. That is, verbs to be reflexivized project two syntactic arguments. The class of languages of this type includes French, Italian, Czech, and others. Interestingly, bundling in the syntax is compatible with the availability of proxy readings. Russian, which has only restricted lexical reflexivization marked by the *s'a*-affix and Czech form a nice minimal pair as illustrated in (18) and (19).

(18)　a.　nedavno, posetivšij muzej, Ringo pomyls'a
　　　　　(=Ringo, *statue)
　　　　　recently, having visited the museum, Ringo washed-aff
　　　b.　nedavno, posetivšij muzej, Ringo pomyl seb'a
　　　　　(=statue, ?Ringo)
　　　　　recently, having visited the museum, Ringo washed himself
(19)　a.　Ringo se začal prohlížet (=statue, Ringo)
　　　　　Ringo started to look at himself
　　　b.　Ringo mluvil o svém vzhledu (=statue, Ringo)
　　　　　Ringo talked about his appearance

This contrast follows if syntactically projected argument positions have the same semantic status as pronouns.

6 Extending the approach

Many languages have yet different strategies of reflexivization. In the language sample studied in Schladt (2000) the most frequent reflexivization strategy used so-called body-part (BP) reflexives, as for instance in Basque (20), which uses the expression *his head* as an anaphor.

(20)　a.　aitak bere burua hil du
　　　　　father+ERG 3SGPOSS head+NOMDEF kill have+3SG+3SG
　　　　　The father killed himself
　　　b.　bere buruan txapela ipini du
　　　　　3SGPOSS head+LOCDEF cap+NOM put have+3SG+3SG
　　　　　He put the cap on his head

As illustrated in (20b) this expression can still be used in its literal meaning as well. The question is how the reflexivizing use of *his head* can be understood.

What body-part expressions have in common with *self* is that they are inherently relational. Just like any *self* is some individual's self, a body-part belongs to some individual's body. Pursuing the analysis established in section 4, we will claim that the head of the BP is able to combine with Skolem functions denoted by the nonreflexive pronoun in its POSS position (null or overt). If so, the denotation of a VP like *V PronBP* is obtained using the structure *BP-V him*, which is analyzed just like *undress himself* in (6). The relevant interpretation is therefore given in (21):

(21) $Z^{BP}(V)(\text{Pron BP}) = Z^{BP}(V)(f) = \lambda x.\ V(x, f_{BP}(x))$
        $= \lambda x.x$ V-ed one of x's body's proxies (by definition of f as a Skolem function)

It is an intriguing question to what extent and under what conditions body-part anaphors are subject to similar exemption effects as English SELF-anaphors. This is a matter for further investigation.

7 Conclusion

Our extension of variable-free semantics allows us to naturally accommodate proxy-readings. It generalizes over proxy-readings for pronominals and anaphors. It allows us to unify the semantics of bound and exempt anaphors, and it provides a natural extension from SELF-anaphors to body-part reflexives. Finally, it allows us to unify the semantics of *zich* where it tails a chain to check a residual case with the general semantics or pronouns. It provides us with a principled means to further investigate the cross-linguistic parameters determining the availability of proxy-readings.

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