Two types of binding: Evidence from Tswefap pronominals

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Traditional accounts of semantic binding have relied on operators that bind individual variables (Heim, 1998; Heim and Kratzer, 1998). However, proposals motivated by e-type anaphora and similar phenomena have analyzed pronominals as containing situation variables which are instead bound by a class of sigma operators (Büring, 2004; Elbourne, 2001, 2005, 2013). In this paper, I will argue that situation binding is indeed necessary to account for certain binding phenomena crosslinguistically, but that binding of individual variables plays a crucial role as well. That is, binding of situation variables complements, but does not fully replace, binding of individual variables (Schwarz, 2009; Patel-Grosz and Grosz, 2017).

In support of this claim, I present novel data from Tswefap, a Narrow Grassfields Bantoid language of Cameroon. There are two third person singular subject pronouns in Tswefap, zheuk and yi, which differ in their distribution. Among other things, yi can act as a bound variable under the scope of a quantifier, while zheuk cannot, and zheuk can locally bind a reflexive, while yi cannot. Following recent work that attributes crosslinguistic variation in pronoun distribution to internal structural differences (Déchaine and Wiltzschko, 2002; Patel-Grosz and Grosz, 2017), I argue that these distributional differences result from different internal structures in a way that draws on two distinct binding mechanisms. Specifically, following Patel-Grosz and Grosz’s (2017) account of German personal and demonstrative pronouns, I propose that zheuk contains an individual variable (an index) and a situation variable, while yi contains only a situation variable. The presence of both types of variables within the structure of zheuk allows it to participate in both situation and individual binding. On the other hand, yi can participate only in situation binding. I also argue that the licensing of β operators needed to bind individual variables (Büring, 2004) is restricted in Tswefap to zheuk and definites, resulting in the unacceptability of yi with reflexives. These data thus suggest that both individual binding and situation binding are available crosslinguistically, and that the licensing of binding operators ranging over individuals (β) may be more restricted than has previously been claimed.

1 Two Types of Pronouns: zheuk and yi

Tswefap has two third person singular subject pronouns, zheuk and yi, which differ in their binding behavior. First of all, yi can be bound by a quantifier, as in (1a), while zheuk cannot, as seen in (1b).1,2

The following abbreviations are used in this paper: 3 = third person, COMP = complementizer, FACT = factative, PL = plural, POSS = possessive, INF = infinitive, SG = singular, TAM = tense/aspect/mood.

Tswefap pronominals are subject to Condition B, as formulated in the traditional binding literature (Chomsky, 1981, 1986), and must be locally free. Examples with bound pronouns are therefore given in biclausal structures. Reflexives are subject to Condition A, and are shown with a local binder within the clause.
The second crucial difference between the pronouns is that *zheuk* can bind a simplex reflexive, but *yi* cannot. This is demonstrated in (2).

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4. Both pronouns can occur as matrix subjects, and (7) shows *yi* in this capacity.

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2. Situation Variables and Sigma Operators

Following Elbourne (2005, 2013), I assume that pronouns are definite descriptions, which minimally consist of a definite determiner (*the*), a situation pronoun (*si*), and an NP. I follow the proposal of Patel-Grosz and Grosz (2017) for German by assuming that pronouns...
can differ in whether they contain an index. I propose that *zheuk* contains an index, while *yi* lacks one. The proposed structures for *yi* and *zheuk* are given in (5), following Patel-Grosz and Grosz’s (2017) account of German personal and demonstrative pronouns, respectively.

(5) a. \(yi = [[\text{the } s_i]] \text{NP} \) (cf. German *er*)

b. \(zheuk = [1[[\text{the } s_i]] \text{NP}] \) (cf. German *der*)

In these structures, the NP complement of the determiner within the pronoun may be deleted via NP ellipsis under identity with an antecedent NP.\(^5\) This ellipsis process is obligatory for *yi*, but optional for *zheuk*, accounting for *zheuk’s* ability to appear with an overt complement.

The crucial difference between *zheuk* and *yi* in the two structures in (5) is that *zheuk* additionally contains an index, while *yi* does not. Given that *zheuk’s* index must compose semantically with the rest of the elements of the pronoun, I assume that the denotations of the definite determiners contained within each of the two pronouns must differ. Specifically, I assume that the determiner in *yi* has the denotation of Schwarz’s (2009) unique definite, while the determiner in *zheuk* has the denotation of Schwarz’s anaphoric definite. These denotations are given in (6).

(6) a. \( [\text{the } \text{unique}]^g = \lambda s_r. \lambda P : \exists! x P(x)(s_r).\lambda x[P(x)(s_r)] \)  

b. \( [\text{the } \text{anaphoric}]^g = \lambda s_r. \lambda P. \lambda y: \exists! x P(x)(s_r) \land x = y.\lambda x[P(x)(s_r) \land x = y] \)

The additional individual argument of the anaphoric definite will be saturated by the individual variable in *zheuk*, its index. It is the presence of this index on *zheuk* and lack of index on *yi* which causes these two pronouns to pattern differently with respect to binding behavior. In particular, only *zheuk* is able to participate in individual binding, given that only this pronoun contains an index. Since both *zheuk* and *yi* contain situation variables, however, both may participate in situation binding.

### 2.1 Interpretation of *yi*

The referent of *yi* is established via the binding of its situation pronoun by one of a class of sigma operators (Schwarz, 2012; Elbourne, 2013).\(^6\) This can happen in a few different ways. First of all, the situation pronoun of *yi* can be bound to combine with the topic situation. This is the case for examples such as (7) where there is not a local binder within the sentence, but where there is a topical antecedent in the discourse. A simplified LF structure and interpretation for (7) is shown in (8).

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\(^5\)See Elbourne (2005) for discussion of why this account of NP-deletion must be further developed to account for the full range of English data. Some of the issues he raises must be addressed for Tswefap as well.

\(^6\)I assume the rules of Situation Binding given in Elbourne (2013). The rules relevant to the examples in this paper are given in (i).

(i) a. Situation Binding I:
   For all indices \(i\) and assignments \(g\), \([s_i, a]^g = \lambda s. [a]^{x_i}(s)\)

b. Situation Binding III:
   For all indices \(i\) and assignments \(g\), \([s_i, a]^g = \lambda x. \lambda s. \lambda s’. [a]^{x_i}(x)(s)(s’)\)
(7) Context: ‘A man arrived at my house...’

yi a khoh
3.5G FACT cough
‘He coughed.’

(8) a. [s\(_1\) [[[the s\(_1\) man] coughed]]]
   b. λs : s ∈ D\(_s\) & [∃! x is a man in s] . λx [x is a man in s] coughed in s

Due to the mechanics of the situation binding of yi, the sentence in (7) will be felicitous only if there is a unique man in the topic situation.

In addition to being able to be bound to combine with a topic situation, the situation pronoun within yi can also be bound to achieve an interpretation that covaries with a higher situation pronoun. I follow Elbourne (2005, 2013) in assuming that, like determiners, quantifiers introduce situation pronouns, thus quantifying over situations. When a situation pronoun occurs in the scope of a quantifier phrase, as in (9), it can therefore be bound to achieve a covarying interpretation. This is shown in the simplified LF representation in (10).\(^7\)

(9) [mbey weloh]i n-ghop nge yi:i a khoh
every one TAM-say COMP 3.5G FACT cough
‘[Every person] said that he/ she coughed.’

(10) [[[every s\(_1\) person] [σ\(_3\) [Q [said [[[the s\(_3\) person] coughed]]]]]]]

In (10), the situation pronoun introduced by yi, s\(_3\), will be bound by the sigma operator σ\(_3\). This will then allow s\(_3\) to covary with the situation pronoun introduced by the quantifier, s\(_1\). This achieves a reading where every individual who is a person in s', the set of situations introduced by s\(_1\), said that he coughed in s'', the covarying situation introduced by the bound situation pronoun s\(_3\).

2.2 Interpretation of zheuk

As with yi, the situation pronoun contained within the structure of zheuk can be bound; nothing prevents a sigma operator from binding it. However, the index on zheuk must also be mapped to an individual via an assignment function. Therefore, zheuk will pick out the unique individual in the situation picked out by its situation pronoun that both meets the descriptive content of the NP contained within the pronominal (either overt or ellided) and is the same individual denoted by the assignment function applied to its index. Note that the presence of the index immediately explains the availability of deictic uses for zheuk, on the plausible assumption that pointing acts to constrain assignments to the index.

\(^7\)I adopt Elbourne’s (2013) Q morpheme based on Büring’s (2004) morpheme, which allows quantifier phrases to compose with VPs. Q has the denotation in (ii).

(ii) \[ Q = \lambda f_{<s, st>} . \lambda x. \lambda s. \lambda s' \text{ there is a situation } s'' \text{ such that } s' ≤ s'' \text{ and } s'' ≤ s \text{ and } f(x)(s'') = 1 \]
It is the presence of an index on *zheuk* that rules out covarying interpretations, since (unless it is bound by a $\beta$ operator) the index is mapped to only one individual in the world. Recall that in sentences like (11), a bound interpretation of *zheuk* is unavailable.

(11)  
\[
\text{[mbey weloh], n-ghop nge } *zheuk_{i/j} \text{ a } khoh \\
\text{every one TAM-say COMP 3.SG FACT cough} \\
\text{‘[Every person], said that he$_{i/j}$ coughed.’}
\]

If we assume a simplified LF structure as in (12), we can make sense of this restriction.

(12)  
\[
[[[\text{every } s_1 \text{ person}] [\sigma_3 [Q \text{ said } [2 [[\text{the } s_3 \text{ person}] \text{ coughed}]底层]]]]
\]

In (12), a bound reading for *zheuk* is not possible due to its index. In this structure, *zheuk* will pick out every individual who is a person in $s'$ and who said that he coughed in $s''$ only if that individual is also equal to the individual denoted by the assignment function applied to the index 2. If our assignment function includes the mapping $[2 \rightarrow \text{Chimi}]$, *zheuk* in (11) will refer only to Chimi rather than covarying. This is the desired outcome, since *zheuk* is possible with a disjoint interpretation in (11), but cannot receive a bound interpretation.

### 3 Individual Binding and $\beta$ Operators

While the different internal structures of *zheuk* and *yi* account for the differences in how they can be bound, this proposal does not yet account for the difference in what they can bind. Of particular interest is the inability of *yi* to bind simplex reflexives.

Given the existence of both individual and situation variables, we must first ask which type of variables reflexives contain. Binding by quantifiers allows us to test this. Given that quantifiers can bind *yi*, but not *zheuk*, I proposed in §2 that binding by quantifiers is achieved through situation binding. We now see that quantifiers cannot bind simplex reflexives, as demonstrated in (13).\(^8\) This suggests that such reflexives do not contain only situation pronouns, which could be bound by a sigma operator.

(13)  
\[
\text{[mbey weloh], a } \text{yoh } *yi=ey_i \\
\text{every one FACT see self=3.SG} \\
\text{‘[Every person], saw himself.’}
\]

Instead, reflexives contain individual variables, and I argue that they must therefore participate in local A-binding. Following Büring (2004), I assume that binding through a-command (c-command from an A-position) can be achieved via a $\beta$ operator, adjoined at LF directly below a DP in an A-position. This $\beta$ operator will serve to bind any individual variables that a DP a-commands. Like *zheuk*, reflexives contain an index (an individual variable); this variable must be locally bound by a $\beta$ operator within the clause.

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\(^8\)The simplex reflexive in Tswefap is homophonous with the word for ‘body’, and was likely historically derived from this source. However, synchronically, the reflexive is subject to Condition A, while a possessor of ‘body’ is not. The fact that some sentences involving the binding of a reflexive by a quantifier are not categorically rejected seems to arise from a tendency to accommodate the reflexive due to the simultaneous availability of the grammatical ‘body’ reading. Sentences that are less compatible with a ‘body’ reading yield more categorical judgments of ungrammaticality.
I depart from Büring (2004) in arguing that the LF adjunction of $\beta$ operators is not freely licensed by all DPs in A-positions. Instead, only certain types of DPs can license $\beta$ adjunction. In Tswefap, it is specifically zheuk and bare definites which are able to license $\beta$ operators. This allows them to bind simplex reflexives, as seen in (14) for zheuk and (15) for the bare definite foh ‘the chief’.

(14)  
\[\text{zheuk, a kwohk nyi=ey}_i \]
\[3.\text{SG } \text{FACT like self}=3.\text{SG} \]
\[\text{\textquoteleft He, likes himself,\textquoteright.}\]

(15)  
\[\text{foh, a yoh nyi=ey}_i \]
\[\text{chief FACT see self}=3.\text{SG} \]
\[\text{\textquoteleft [The chief], saw himself.\textquoteright.}\]

Unlike zheuk and bare definites, Tswefap yi and quantificational DPs (QDPs) cannot license $\beta$ operator adjunction. This accounts for their inability to bind simplex reflexives. This fact is also able to account for why QDPs cannot bind the index on zheuk to achieve covarying interpretations. If QDPs were able to license $\beta$ operators, we would expect these operators to be able to bind zheuk’s index to allow zheuk to receive a bound interpretation under the scope of a QDP. We have seen in §2 that such covarying readings are unavailable for zheuk.

Here, however, we find an important difference between zheuk and simplex reflexives. Tswefap reflexives are fully subject to Condition A (Chomsky, 1981, 1986): the individual variable in a reflexive must be locally bound by a $\beta$ operator in the clause, and so reflexives are ungrammatical in any structure where the necessary operator cannot be licensed. This makes a reflexive ungrammatical with any quantifier as its binder, either universal, as seen previously, or existential, as shown in (16).

(16)  
\[\text{? [ta’ foh], a yoh nyi=ey}_i \]
\[\text{a chief FACT see self}=3.\text{SG} \]
\[\text{\textquoteleft [A chief], saw himself,\textquoteright.}\]

In contrast, zheuk is a pronoun subject to Condition B, which must be locally free. Like other pronouns, it can even be free within the entire utterance if it refers to a discourse antecedent or is used deictically. The incompatibility of zheuk with quantifiers arises from the fact that a covarying interpretation cannot be achieved through the binding of only its situation pronoun if its individual variable remains free and is mapped to only one individual via an assignment. This predicts that zheuk should be acceptable with an “antecedent” existential quantifier, on the condition that its index is mapped to the same individual that witnesses the existential quantification. This is, in fact, the pattern we find, as shown in (17).

(17)  
\[\text{[ta’ foh], n-ghop nge zheuk}_{i/j} \text{a khoh} \]
\[\text{a chief TAM-say COMP 3.SG FACT cough} \]
\[\text{\textquoteleft [A chief], said that he}_{i/j} \text{coughed.\textquoteright.}\]
The acceptability of a coreferential reading here, in contrast to what we see with reflexives in (16), demonstrates that reflexives, though they contain individual variables like zheuk, differ from pronominals in requiring local binders. Because the individual variables in Tswefap reflexives require local A-binding, reflexives can receive neither a bound nor even a coreferential reading under QDPs, which cannot license the necessary $\beta$ binding operators. Since zheuk is not subject to Condition A, it is ungrammatical in variable binding contexts but is compatible with QDPs that do not require a covarying reading, given the availability of a coreferential reading in the absence of a $\beta$ operator.

To express reflexive meaning with a QDP, an intensifier zhe ntswe nyi ‘he himself’ is used instead of a simplex reflexive, as seen in (18) with a universal quantifier. (The same pattern holds for existential quantifiers.)

(18) [mbey weloh], a yoh {?nyi=ey, / zhe, n-ntswe nyi} every one FACT see {self=3.SG / 3.SG.POSS PL-head body}

‘[Every person] saw himself.’

In this intensifier, I propose that the possessive pronoun zhe ‘his’, as a type of determiner, introduces a situation pronoun which can be bound by a sigma operator to covary. Crucially, this possessive differs from a simplex reflexive in that it does not introduce an individual variable that must be bound.

A context that has not yet been considered is one in which a bound pronoun occurs under the scope of a quantifier but must itself bind a reflexive. In such contexts, we expect that yi will be used as the pronoun, since only yi can receive a covarying interpretation under a quantifier. However, yi will not be able to bind a simplex reflexive. In such contexts, this intensifier zhe ntswe nyi is once again used instead of a simplex reflexive, as seen in (19).

(19) [mbey weloh], n-ghop nge yi, a kwohk {*nyi=ey, / zhe, n-ntswe nyi} every person TAM-say COMP 3.SG FACT likes {self=3.SG / 3.SG.POSS PL-head body}

‘[Every person] said he, likes himself.’

In this structure, the situation pronoun in yi and the situation pronoun introduced by zhe will both be bound by sigma operators, as seen in the simplified LF in (20).

(20) [[[every $s_1$] person] [$\sigma_3$ [Q [said [[[the $s_3$] person] [$\sigma_4$ [likes [[[his $s_4$] self]]]]]]]]]

To summarize the individual binding behavior we have seen, QDPs and yi do not contain individual variables and cannot license $\beta$ operators. In contrast, zheuk and definites, which can both be argued to contain indices (Schwarz, 2009), can license $\beta$ operator adjunction. This raises the prospect that, crosslinguistically, the presence of an individual variable within a DP may allow it to license an individual binding operator (a $\beta$).

4 Conclusion

We have seen that the distributional differences of Tswefap’s two third person singular subject pronouns zheuk and yi can be accounted for due to differences in their internal
structures and the availability of two different binding mechanisms. Crucially, zheuk contains an index and can license $\beta$ operators to bind reflexives, but cannot act as a bound variable under a quantifier. Yi does not contain an index and cannot license $\beta$ operators to bind reflexives, but it can behave as a bound variable under the scope of a quantifier.

These data provide evidence for two distinct types of binding in Tswefap. Individual binding is achieved through $\beta$ operators, which are only licensed by zheuk and bare definites. Situation binding is achieved through a class of sigma operators, which are optionally licensed at specific structural positions (Elbourne, 2013). We need both of these types of binding to account for the distribution of Tswefap pronominals and reflexives, suggesting that we cannot reduce an account of the range of binding phenomena that we find crosslinguistically, or even within a particular language, to only one binding mechanism.

References


