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Thematic Arity Operations and Parametric Variations

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1. Introduction

The specific problem we address in this study is what explains the coherent cross-linguistic variation in the array of reflexive verbs. We show that a single parameter straightforwardly derives the variation. In addition, the parameter turns out to be responsible for parallel variations in other empirical arrays. Crucially, the parameter is applicable only if the grammar includes an active lexicon, which is more than a mere list of items, and allows the application of derivational operations. Evidence is presented that certain operations must take place prior to syntax. Our results cast heavy doubts on the plausibility of recent approaches that aim to eliminate the operative role of the lexicon altogether (Marantz 1997,2000, Borer in press).

It is a standard assumption in works on argument structure that the different thematic realizations of the same thematic concept are derived from the same basic entry via universal derivational operations. We name these operations arity operations, as they affect the arity (valency) of the predicate. We investigate these operations, focusing mainly on reflexives verbs. Roughly, by reflexive verbs we mean verbs denoting an action that the Agent argument applies to itself (1a) or in certain languages, as we will see, a state of mind the Experiencer argument has with regard to itself. The interpretation of reflexive verbs can be paraphrased through the use of a reflexive argument as in (1b). We use the term reflexive verbs (or simply, reflexives) to refer to verbs denoting this meaning without realizing a reflexive argumental object (1a). For the anaphoric relations in (1b) we use the term reflexive (or syntactic) binding.

(1) a. dan hitraxec. (Hebrew)
Dan washed

b. dan raxac et acmo. (Hebrew)
Dan washed ACC himself.

Reflexive verbs appear in a certain morphological form: a particular verbal template in Semitic languages, the fifth verbal template in Hebrew - the so-called *hitpa'el* template (1a); a clitic (*se* or *si*) in Romance (2a) and Serbo-Croatian (2b), or the suffix -s*'* in Russian (2c). English uses zero morphology with reflexives (see gloss to the examples in (1)).

(2) a. Jean s'est lavé.
Jean SE washed ('Jean washed')

b. On se oprao.
He SE washed (‘He washed’)

c. Ona pomylas'
She washed(refl) (‘She washed’)

Importantly, cross-linguistically the same morphology can also appear with other types of predicates: with reciprocals (3a) unaccusatives (3b), subject-Experiencer verbs (3c), middles (3d), impersonals (3e) and even passives (3f), as illustrated in Italian.[1] In certain grammatical traditions this morphology is known as the reflexive morphology, and in other traditions as the medio-passive morphology (or a similar term). Although this is just a label, it may have influenced the analysis given to the various diatheses this morphology encompasses. Thus, for instance, it may have brought forth the unaccusative derivation of reflexives, which we prove untenable in section 3. We briefly discuss the different predicates bearing this morphological form in section 6, and offer a unified account of its use.

(3) a. Giovanni e Maria si sono abbracciati.
Giovanni and Maria SI are hugged
‘Giovanni and Maria hugged each other’

b. La porta si è chiusa.
the door SI is closed
‘The door closed’

c. Giovanni si preoccupa di questo.
Giovanni SI worries of this

d. Questi vestiti si lavano facilmente.
These suits SI wash easily

f. Si mangia le mele.
SI eats the apples
‘One eats the apples’

e. Si mangiano le mele.
SI eat the apples
‘The apples are (being) eaten’

Although reflexive verbs across languages share certain basic properties, they split into two types according to a cluster of distinctions. In our view, arity operations are universal, but the level at which they apply is a parametric choice. Thus, while reflexives are derived through the

[1] The term incohative is sometimes used to refer to unaccusatives (or else it is used to refer to predicates denoting the beginning of an event). We will not use this ambiguous term here.

same type of operation universally, the considerable crosslinguistic variation they show follows from the fact that the level at which the operation applies is a parametric choice: it can apply either in the lexicon or in syntax, as discussed in detail in sections 4 and 5. We will argue that in Hebrew, English, Russian, Hungarian, or Dutch the parameter is set onto lexicon. In the Romance family, in Serb-Croatian, Greek and German it is set onto the syntax. The Lex(icon)-Syn(tax) parameter we propose is given in (4).

(4) The Lex-Syn Parameter

UG allows thematic arity operations to apply in the lexicon or in syntax.

The parameter is defined with respect to arity operations in general. We explore its working in detail regarding reflexives. However, as expected, the parameter turns out to be responsible also for the variation attested by other types of predicates, such as reciprocals and middles, as briefly discussed in section 6.

2. Reflexivization

2.1 Se is not an object clitic

First, let us motivate the claim that the Romance clitic *se* (*si*) indeed forms reflexive verbs. As the clitic is reminiscent of object pronominal clitics, an analysis that could come to mind is that verbs with *se* are transitive verbs taking a reflexive object clitic (5b), parallel to verbs taking pronominal clitics (5a) and unlike reflexive verbs in Hebrew (5c), Russian or Hungarian which are intransitive.[2] However, as already noted by Kayne (1975), there are good reasons to discard the object clitic analysis of the Romance clitic *se* (5b).

(5) a. Jean le_i lave t_i.
Jean him_{cl} washes
'Jean washes him'

b. An object clitic analysis: Jean se_i lave t_i.
Jean SE washes
'Jean washes himself'

c. dan hitraxec.
Dan washed(refl)

[2] Note that analyzing *se* as an anaphor syntactically bound by the local subject is incongruous with known observations (Pica 1987, Reinhart and Reuland 1993) that anaphors locally bound are universally complex elements of the 'himself' type and not simplex elements such as *se, sich* (German) or *zich* (Dutch). We resume this point in section 5 when we discuss German and Dutch.

Various arguments lead to the conclusion that *se*-verbs do not pattern with transitive verbs. The clitic *se*, then, cannot simply be the object of a transitive entry. We mention two arguments below. Consider first the context of expletive insertion in French illustrated in (6a). Kayne (1975) observes that while transitive verbs are disallowed in this environment (6b), reflexive verbs do occur there (6c).[3] If reflexives were transitive entries, we would expect them to be completely impossible in the postverbal position of expletive constructions, just like transitive verbs.

(6)a. Il est arrivé trois filles.
there is arrived three girls

b. * Il les_i a dénoncés t_i trois mille hommes ce mois-ci.
there $them_{cl}$ has denounced three thousand men this month-here

c. ? Il s'est dénoncé trois mille hommes ce mois-ci.
there SE is denounced three thousand men this month-here
'Three thousand men denounced themselves this month'

Even more solid is the argument based on French causative constructions. These constructions treat transitives and intransitives differently; reflexives pattern with intransitives (Kayne 1975). When the verb embedded under the causative verb *faire* ('make') is a transitive verb (7a), its subject must be introduced by the preposition *à* ('to'). When the lower verb is intransitive, its subject cannot be introduced by *à* (7b).[4] As is clear from (7c), when the direct object of the embedded verb is a pronominal clitic, the verb patterns with transitive entries. But when the lower verb is reflexive, its subject surfaces without the preposition (7d), just like the subject of intransitive verbs. Notice that the different positioning of pronominal clitics and reflexive clitics in the causatives of (7) suggests in itself that they deserve a different syntactic treatment.

(7)a. Je ferai laver Max *(à) Paul.
I will+make wash Max to Paul
'I will make Paul wash Max'

b. Je ferai courir Paul.
I will+make run Paul
'I will make Paul run'

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[3] Judgments vary among speakers. According to Kayne (1975), example (6c) is grammatical. Some speakers judge it as marginal. Importantly, speakers agree that there is a clear difference in grammaticality between transitives (6b) and reflexives (6c).

[4] The subject of intransitives is an accusative argument: when it is cliticized, the accusative clitic is used:

(i) Je le ferai courir.
I him_{cl} will+make run
'I will make him run'

c. Je le ferai laver à Paul.
I him_{cl} will+make wash to Paul.
'I will make Paul wash him'

d. Je ferai se laver Paul.
I will+make SE wash Paul
'I will make Paul wash himself'

Se-verbs, then, are not transitive verbs but rather reflexive verbs like their Hebrew equivalents. It has been suggested that reflexive verbs are derived by a lexical operation (reflexivization) that affects the internal θ-role, links it to the external θ-role thereby blocking its mapping onto the object position (Chierchia in press, Grimshaw 1982, Wehrli 1986).

2.2 Lexical operation: the Problem

Grimshaw (1982) suggests that the reflexive clitic *se* is a marker of lexical reflexivization, which is a lexical operation binding the internal θ-role by its external counterpart, rendering the former syntactically inaccessible. Similarly, according to Wehrli (1986), the reflexive clitic *se* absorbs the internal argument, which is consequently unavailable to syntactic processes. The lexical option is elaborated in Chierchia (in press). Chierchia assumes that an operation, which he names reduction, can operate in the lexicon on transitive entries to produce reflexive verbs. Reduction applies to a two place relation (predicate) and reduces the relation to a property. Reflexive reduction turns a transitive entry such as *wash* into a reduced entry (R(V)) whose single θ-role is the external θ-role (θ_1), as schematized in (8a). At the level of interpretation, reduction requires identification of two arguments, thereby capturing the reflexive reading. In Chierchia's system, it is obtained by a meaning postulate associated with the operation, which here is schematized in the simplified (8b).

(8) A lexicon operation of Reflexivization (e.g. Chierchia in press):

a. $V<\theta_1,\theta_2> \rightarrow R(V)<\theta_1>$

b. $R(V)(x) = \lambda x [V(x, x)]$

Marantz (1984) notes that a severe problem to the above view is posed by the possibility to reflexivize into Exceptional Case Marking constructions. Marantz illustrates the problem with Icelandic examples, but the same point can be made for French (or Romance, in general). Consider the ECM construction in (9a) and its reflexive equivalent in (9b). The matrix predicate *considère* does not take a DP as its internal argument, but rather a small clause. *Pierre* in (9a), to which *considère* assigns accusative Case, is the subject of the small clause, and receives its θ-role from the adjective *intelligent*. As it is not an argument of *considère*, a lexical operation on the θ-grid of the latter cannot affect it.

(9) a. Jean considère Pierre intelligent.
Jean considers Pierre intelligent

b. Jean se considère intelligent.
Jean SE considers intelligent

On the basis of such examples, Marantz concludes that the lexical operation of reflexivization must be affecting the external (not the internal) θ-role, and that the subject of reflexives must therefore be a derived subject. Sentence (9b), according to him, would receive an unaccusative derivation as schematized in (10): *Jean*, the subject, is the internal argument.

(10) Marantz' analysis: Jean_i se considère [t_i intelligent]
Jean SE considers intelligent

Note first that reflexivization of ECM predicates poses a problem to any lexical analysis independently of whether it reduces the external or internal θ-role. Reflexivization entails linking two arguments, identifying them. If it takes place in the lexicon, only two co-θ-roles (θ-roles of the same predicate) can be involved. In ECM constructions, the two relevant θ-roles are not co-θ-roles; in (9b) the two θ-roles the operation applies to are not θ-roles of the same predicate. In the lexicon, there is no relation whatsoever between them. To link the two roles, lexical analyses à la Marantz (see also Bouchard 1984, Grimshaw 1990), which reduce the external θ-role in the lexicon, have to impose a syntactic condition on an element (the external θ-role) which is not available in syntax as it was absorbed in the lexicon; such a condition is ad hoc and implausible.

This may be what led Kayne (1988), Pesetsky (1995), or Sportiche (1998) to prefer a syntactic version of the unaccusative derivation of reflexive verbs. Under the syntactic version the two θ-roles involved in reflexivization are present in syntax: *Se* bears the external θ-role and must be bound by the derived subject, which is the internal argument in (11) and the subject of the small clause in (10).

(11) Jean_i se lave t_i .
Jean SE washes

There is however decisive evidence against any unaccusative derivation of reflexive verbs whether lexical or syntactic. Reinhart and Siloni (in press) offer a critical review of the arguments proposed by proponents of the approach, and robust crosslinguistic evidence that the subject of reflexive verbs is not an internal argument. In the subsequent section we summarize this evidence. We then turn to solve the puzzle posed by ECM reflexives.

It is nonetheless important to note already here that although the problem posed by ECM reflexivization is indeed real, it does not represent a universal phenomenon. Reflexivization of ECM predicates is not universally possible. We do not find anything of the sort in Hebrew (12a), English (13a) (Hungarian or Russian). In these languages an anaphor must be inserted in the subject position of the embedded clause to obtain the relevant interpretation (12b, 13b).

(12) a. *dan mitxašev intiligenti.

Dan considers(refl) intelligent

b. dan maxšiv et acmo intiligenti.
Dan considers ACC himself intelligent

(13) a. *Dan considers intelligent.

b. Dan considers himself intelligent.

3. Against an unaccusative derivation

It is well known that the French quantitative clitic *en* can cliticize only out of the object position. It can thus serve as a test to discriminate between the internal and external argument in a postverbal position. (14a) contains an unaccusative verb; *en* cliticization is possible (15a), as its subject is an internal argument. (14b-c) constitute a minimal pair: (14b) is a reflexive verb, and (14c) is an unaccusative with the same morphology. While the latter allows *en* cliticization (15c), the former disallows it (15b).[5] This is straightforward if the subject of reflexives is an external argument, unlike the subject of unaccusatives.

(14) a. Il est arrivé trois filles hier soir.
there is arrived three girls yesterday evening
'There arrived three girls'

b. (?)Il s'est lavé beaucoup de touristes dans ces douches publiques, récemment.
there SE is washed many tourists in these public showers recently
'Many tourists washed in these public showers recently'

c. Il s'est cassé beaucoup de verres dans ce lave-vaisselle.
there SE is broken many glasses in this dish-washer
'Many dishes broke in this dish-washer'

(15) a. Il en est arrivé trois hier soir.
there of+them$_{cl}$ is arrived three yesterday evening

b. *Il s'en est lavé beaucoup dans ces douches publiques, récemment.
there SE of+them$_{cl}$ is washed many in these public showers recently

c. Il s'en est cassé beaucoup dans ce lave-vaisselle.
there SE of+them$_{cl}$ is broken many in this dish-washer

[5] Recall that certain speakers already find (14b) somewhat marginal (note 3). Nonetheless, for all speakers, (15b) is completely impossible, whether they judge (14b) as marginal or entirely acceptable.

According to Guglielmo Cinque (personal communication, cited by Grimshaw (1990:184n3)), the same pattern holds in Italian, as illustrated below:[6]

(16) a. Ne sono arrivati tre.
of+them$_{cl}$ are arrived three
b. *Se ne sono vestiti tre.
SI of+them$_{cl}$ are dressed three

Within the Semitic family, there is also evidence that the subject of reflexives is not an internal argument. In Hebrew, the subject of reflexives is decisively an external argument; it fails diagnostics of internal arguments just like the subject of unergatives and unlike the subject of unaccusatives.

Shlonsky (1987), among others, observes that there are two types of postverbal subjects in Hebrew. One type appears in triggered inversion also labeled stylistic inversion, which is licensed by an XP immediately preceding the verb [XP V S]. These postverbal subjects will not concern us here. Another type of postverbal subjects, which do not require a preverbal trigger, is found with unaccusatives (17a) and passives (17b); these postverbal subjects are internal arguments. External arguments do not allow simple inversion [V S] (17c). As shown below, reflexives cannot appear in simple inversion (17d) just like unergatives, while unaccusatives with identical morphology do allow it (17e), on a par with other predicates whose subject is an internal argument:[7]

(17) a. nišbar mašehu.
broke something

b. ne'ecru šloša xayalim ba-hafgana.
were+arrested three soldiers in+the-demonstration

c . *rakdu šloša yeladim ba-mesiba.
danced three boys in+the-party

d * hitlabšu šaloš dugmaniyot ba-knisa.
dressed three models in+the-entrance

[6] Italian speakers seem divided on (16b): some categorically ruling it out, and others accepting it. All the speakers accept (16a).

[7] Additional factors, such as focus, affect the choice of postverbal subjects, and may therefore make certain examples less acceptable than others. Arguably stylistic inversion involves V-raising out of IP (Shlonsky and Doron 1992), while in simple inversion, the subject stays in its VP-internal position, and SpecIP is filled by a null expletive. Hence, by and large simple inversion is a trait of pro-drop languages. If a null expletive is not selected, the subject has to raise to SpecIP due to the Extended Projection Principle (EPP).

e hit'alfu šloša xayalim ba-hafgana.
fainted three soldiers in+the-demonstration

Modification by possessive datives can also be used to detect internal arguments in Hebrew. Borer and Grodzinsky (1986) observes that possessive datives can only modify internal arguments. Hence, they can serve as possessors to subjects of unaccusatives (18a-b), but not to subjects of unergatives (18c). As expected, reflexives (18d) pattern with unergatives.

(18) a. šney sfarim naflu le-dan.
two books fell to Dan

b. ha-simla hitkamta le-dina.
the-dress wrinkled to-Dina

c. * ha-kelev šaxav le-dina.
the-dog lay to-Dina

d. *ha-xatul hitgared le-dina.
the-cat self-scratch to-Dina

In Russian, genitive of negation provides a test to detect internal arguments. When a predicate is negated, its internal (but not external) argument can bear genitive Case (Pesetsky 1982). The predicates in (19a-b) appear both with the same morphology. Importantly, while (19a) is grammatical as the predicate is unaccusative, and hence due to the sentential negation its subject can bear genitive Case, (19b) is ungrammatical, as the predicate is reflexive; its subject disallows genitive Case just like the subject of any unergative (19c):[8]

(19) a. Ne objavilos' studentov.
NEG showed up students(GEN)

b. *Ne pomylos' studentov.
NEG washed students(GEN)

c. *Ne tancevalo studentov.
NEG danced students(GEN)

Finally, even in English it seems that there is evidence that the subject of reflexives is an external argument. Agent nominals, also known as *-er* nominals, can be derived only from predicates with an external argument (as their name suggests); hence, the contrast between (20a)

[8] Thanks to Irena Botwinik-Rotem, Nora Goldshlach, and Léa Nash for the Russian data. Judgments vary among speakers as Genitive of negation is not equally productive for all Russian speakers.

and (20b). As expected, reflexives can give rise to Agent nominals, as their subject is an external argument (20c):[9]

(20) a. She runs so fast because she is an experienced runner.

b. *She moves so gracefully because she is an experienced mover.

c. She dresses slowly because she is an elegant dresser.

An unaccusative derivation of reflexive verbs, then, is simply impossible. The existence of ECM reflexive verbs must be accounted for in a different manner. We show that the view that reflexives across languages are derived by an operation that affects the internal argument is tenable and coherent. We reformulate the operation of reflexivization and propose it is subject to parametric variation. Our proposal predicts the behavior of reflexive verbs across languages. It accounts not only for why certain languages show ECM reflexives, but also for why other languages do not allow them. Moreover, we derive the notorious incompatibility of reflexivization with passive and raising predicates (often mentioned as an advantage of the unaccusative derivation), and reveal a cluster of distinctions, which follow from the distinct parametric setting.

4. The Lexicon-Syntax parameter.

Reflexive verbs across languages do not have a derived subject. They are the outputs of an operation that prevents mapping of a θ-role from the complement domain onto its canonical syntactic position. The answer to the question of why certain languages allow ECM reflexives and other do not lies in the realm of parametric variation. We suggest that UG arity operations, namely, operations that affect the thematic valency of the verb, are allowed to apply in the lexicon or in syntax. This is formulated by the Lex(icon)-Syn(tax) parameter (4) repeated in (21).

(21) The Lex-Syn Parameter

UG allows thematic arity operations to apply in the lexicon or in syntax.

The operation of reflexivization, then, can be lexical or syntactic. Among our sample of languages, the parameter is set onto Lexicon in Hebrew, English, Dutch, Russian and Hungarian. It is set onto syntax in Romance languages, in German, Serbo-Croatian and Greek.[10] It is crucial to bear in mind that when we talk of languages with syntactic reflexivization or briefly syntax languages, we mean languages that form reflexive verbs in syntax unlike lexicon languages that form them in the lexicon. Both types of languages can, in addition, form reflexive sentences by the use of reflexive anaphors (through syntactic binding). This option is orthogonal to our discussion and does not

[9] This does not mean, of course, that all reflexives nor all unergatives can form Agent nominals.
[10] For Serbo-Croatian see Marelj (forthcoming), and for Greek Papangeli (2002).

concern the lex-syn parameter.

In order to examine the workings of the lex-syn parameter, we must first be more precise about the formulation of the reflexivization operation.

4.1 The reflexivization operation

Let us look again at Chierchia's view of reflexivization as a reduction operation, (8) repeated in (22) (This view was adopted also in Reinhart (1996, 2000), Reinhart and Siloni (in press).) (22a) captures correctly the fact that only the external θ-role is realized in reflexive derivations. But, as we shall see directly, an operation like (22a) cannot be parameterized. Deletion of a θ-role can take place only in the lexicon, never in the syntax.

(22) The reduction view of Reflexivization:

a. $V<\theta_1,\theta_2> \rightarrow R(V)<\theta_1>$

b. $R(V)(x) = \lambda x [V(x, x)]$

Independently of this problem, there are questions regarding the semantics of the reduction operation. Technically, the operation eliminates the internal role (θ_2) altogether. However, the interpretation still requires identity of the bearers of the two roles, which can be obtained in this system only via the meaning postulate schematized in (22b). (22b) makes no reference to θ-roles, only to the arity (valency) of the verb, so it may seem to be capturing correctly the intended interpretation. However, the standard view in the semantics of thematic relations is that it is impossible to capture thematic information without assuming events variables and event semantics. To be an Agent or a Theme is to bear a certain relation to a given event. It is, in contrast, dubious that being an Agent can be defined as having the property of Agenthood. So a standard analysis of the verb entry *wash* is as given in (23b). The interpretation of the sentence (23c), which contains this entry is given in (23d).

(23)a. Verb entry: *wash* [Agent] [Theme]

b. Interpretation: $(\lambda x \lambda y \exists e$ (wash(e) & Agent(e)=x & Theme(e)=y))

c. Max washed the child.

d. $\exists e$ (wash(e) & Agent(e)=Max & Theme(e)=the child))

It is far from obvious, now, how Chierchia's semantics in (22b) could be captured in terms of event semantics. The reflexive verb *wash* is defined so far as in (24a). But how can we then understand (24b)? The conceivable candidate in (24c) is meaningless. The e-variable ranges over primitive events (so *wash* can be viewed as some name of an event e). But what type of event could *wash (x,x)* be?

(24) a. R (wash) = λx(wash x,x)

b. R (wash) [agent]

c. λx ∃e ((wash (x,x)(e) & Agent(e)=x)

There may be conceivable approaches to event semantics that could, technically, answer this question. But in any case, the event they could define would end up having two Agents. The crucial observation which underlies this problem is that the Theme role, which is not realized syntactically, is nevertheless present in the semantics, so we cannot view reflexivization as a simple reduction of the Theme.

An alternative conception that has been around in linguistic theory is the procedure of θ-identification, which, in effect, assigns two theta roles to one syntactic argument, and which is assumed to take place in syntax. (for a survey and extensive analysis of this procedure see Neeleman (1994)). Let us pursue here the view of lexicon reflexivization along similar lines.

4.1.1 Lexical Reflexivization We conceive of the lexicon as an inventory of coded concepts, a subset of which denote an event, take participants in the event (bear θ-roles), and can undergo arity operations as specified by UG. There is no syntactic structure in the lexicon; this would be a superfluous reduplication of the syntactic component. Hence, there is no relation whatsoever between predicates and their actual DP (or XP) arguments (nor is there any relation between distinct predicates, which will be very relevant in section 4.2).

If so, then the only way that lexical reflexivization can capture the fact that the external argument is to be associated with both θ-roles of the transitive source is if the valency reduction it involves is the result of θ-roles unification that forms a complex θ-role [Agent-Theme]. We will name this operation Bundling (25a). Bundling always involves the external θ-role (θ_1) and an internal θ-role (θ_2) and the resulting bundle is mapped externally. The operation reduces the verbal ability to check accusative Case (25b).[11]

(25) Reflexivization in the Lexicon

a. Bundling: Vθ_1, θ_2 ==> V[θ-θ]$_1$

b. Accusative Case reduction

Applying (25) to the verb entry *wash,* in (26a), we obtain the verb entry (26b). Note that the operation applies to the verb entry, which is a collection of features, and not to the semantic representation of the verb given in (23b). We assume that the semantic representation is associated

[11] As is clear, the lexical operation we propose make reference to the external θ-role. We assume verbal grids include information with regard to the external role, contra common assumptions that sever the external θ-role from the lexical verb and insert it syntactically via an additional verbal head (Bowers 1993, Chomsky 1995, Collins 1997 or Kratzer 1996). We refer the reader to Horvath and Siloni (2003) for a critical review of such approaches.

with the verb only during the derivation. The new entry (26b) has only one complex θ-role to assign, and this bundle will be assigned to an external argument, as in (26c).

(26) a. Verb entry: *wash* [Agent] $_1$ [Theme] $_2$

b. Reflexivization output: *wash* [Agent-Theme] $_1$

c. Syntactic output: $\text{Max}_{[\text{Agent-Theme}]}$ washed.

The next question concerns the interpretation of bundling. Technically, after the operation the verb is represented as in (27a), but the question is what it means to assign a bundle of two θ-roles to one argument, namely how the bundle in (27a) is interpreted. We take a bundle of θ-roles (clusters) to be interpreted as a distributive conjunction of θ-roles. So (27a) is interpreted as (27b). The interpretation of the syntactic output (26c) is given in (27c).

(27) a. $\lambda x \exists e$ (wash(e) & [Agent-Theme](e)=x)

b. $\lambda x \exists e$ (wash(e) & Agent(e)=x & Theme(e)=x)

c. Max ($\lambda x \exists e$ (wash(e) & Agent(e)=x & Theme(e)=x))

To be precise, we assume that θ-roles and the operations on them are not defined in terms of θ-roles labels, but rather in terms of their feature composition, as proposed in Reinhart (2003). Two atomic features compose θ-roles: [c(ause change)] and [m(ental state relevant)]. The composition of the Agent role is [+c +m] as it brings about a change and must be animate (its mental state is relevant). The Theme role is a [-c –m] cluster as it does not trigger a change; nor does it impose an animacy restriction.

Further, we assume the following mapping principles from the lexicon to the syntax. External mapping (merging) is preferred if possible. Hence, basic unary concepts merge their sole θ-cluster externally. For nonunary concepts, or derived unary concepts, the formal properties of the clusters determine the merging order. Feature clusters which contain only [+] features merge obligatorily externally; Clusters containing only [-] features merge obligatorily internally. Technically this is captured by a marking rule that assigns the former the external index (index 1), and the latter the internal index (index 2) largely assumed following Williams (1981). There are two mixed clusters: [-c+m] (Experiencer) and [+c-m] (Instrument). These are not assigned a merging index, and they can realize either externally or internally, depending on other specified conditions.

Lexical reflexivization, on this view, bundles (unifies) two clusters of features (θ-clusters), as illustrated in (28).[12] The complex role (28b) is mapped externally because it's possible.

[12] Note that an argument can bear both the relation [+c] and [-c] to the event, and the relation [+m] and [-m] to the event. As the features denote the type of relation an argument bears to the event, bearing both values is not contradictory.

(28)a. Verb entry: *wash*$[+c+m]_1$, $[-c-m]_2$

b. Reflexivization output: *wash*[[+c+m][-c-m]]

c. Syntactic output: $Max_{[[+c+m][-c-m]]}$ washed

d. Interpretation: Max(λx ∃e (wash(e) & [+c+m](e)=x & [-c-m](e)=x))

The above system is not motivated by the problem of reflexivization. Whatever we need here for the discussion of reflexivization can be captured in the traditional way, taking labeled θ-roles to be primitive units, somehow assigned indices 1 and 2, which mark external or internal merging. For the sake of simplicity, we will mostly continue to assume this traditional view in the presentation.

4.1.2 Syntactic reflexivization Let us turn now to the way the reflexivization operation applies in the syntax. The syntactic component, in contrast with the lexicon, is the engine that builds structure from certain elements selected from the lexicon. We assume the syntactic machine operates with the selected elements and the lexical-semantic information they bear and cannot change their basic properties. Syntax is limited to operate with the building blocks it has as inputs and cannot modify their content. More explicitly, as suggested in Siloni (2003), we assume that the syntax, unlike the lexicon, is not a component that forms new concepts. By new concepts we mean concepts whose derivation forms a new θ-grid, namely, a θ-grid that does not include the same number or type of θ-roles as the input grid. In the syntax the θ-grid of a predicate cannot be changed: elimination and modification of a θ-role as well as addition to the θ-grid are illicit after syntactic insertion. Such manipulation of θ-grids is only possible in the lexicon. Once a role is part of a the θ-grid of a predicate in the structure, it must either be merged as an argument or have a residue in the syntax or at the level of interpretation. This is stated in the Lexicon Interface guideline.

(29) The Lexicon Interface Guideline

θ-information cannot be changed by the syntactic component: Elimination, modification or addition of a θ-role are illicit in syntax.

Dimitriadis (2002a) suggests deriving the guideline in (29) from the basic properties of semantic representations. While lexicon operations apply to θ-clusters, the syntactic projections are associated with event semantic representations. Operations such as reduction of elements from the semantic representations are logically illicit.

At any rate, if the manipulation allowed by the syntactic component is constrained according to the guideline in (29), then an operation à la Chierchia, which reduces a θ-role, is licit in the lexicon, but not in syntax. An operation like (22a), then, cannot be parameterized. Reinhart (2003) argues that a reduction operation is active in deriving unaccusatives and subject-Experiencer verbs from their corresponding transitive alternate. In section 4.2 and 6.2, we will show that this operation is indeed not parameterized and can take place only in the lexicon, as predicted by (29).

While reduction is banned in syntax, bundling θ-roles is not excluded by (29). One difference, however, between the application of bundling in syntax and in the lexicon is that in syntax it is no longer possible to manipulate the verbal grid. Hence, it is impossible to unify two roles to form a new complex θ-role. But bundling can take place upon θ-assignment; the two θ-roles can be bundled to the extent that they are assigned to the same argument upon merge. Bundling thus obtains the same effect in the lexicon and in syntax although the specific device is different due to the different nature of the component. Lexical operations can act on items available in the lexicon, namely, predicates and their θ-clusters. Syntax operates on structure using structure-building mechanisms but cannot manipulate θ-information. Another difference between the lexical and syntactic operation concerns Case. The lexical operation involves Case reduction. Syntactic bundling cannot eliminate a Case feature of the verb. Hence it is only possible if a given language has the morphological inventory needed to reduce (or check) the relevant Case independently of θ-assignment.

Assuming gradual building of structure along minimalist lines (Chomsky 1995), we define the syntactic operation as follows. The choice of morphology (*se*/*si* in Romance) reduces accusative Case (or another Case as will be discussed in sections 4.2 and 6.3). We assume the clitic originates on V and then moves with the verb to I but nothing hinges on that. An internal θ-role is not mapped onto its canonical position due to lack of Case. The unassigned role is kept on the verb and retained on the verbal projection until the external argument is merged. The discharging of the unassigned role is parasitic upon merge of the external argument.[13]

(30) Reflexivization in syntax

a. Case reduction (Enabled by the Case reducing morphology, e.g. the clitic *se*)

b. Syntactic Bundling: External Argument[θ_i]+[θ_k].
Bundling applies upon merge. At the merge of an external argument, a stored unassigned θ-role is bundled with it so both end up assigned to the same argument.

Consider the derivation of the French reflexive in (31a). The derivation includes a two-place verb *laver* ('wash') with Agent and Theme roles, the clitic *se*, and the DP *Jean*. Choice of *se* reduces the verbal ability to check accusative Case (30a). The Theme role is not mapped onto the object position, but rather retained on the verbal projection. Thus, at the VP level (prior to Spec VP), the verb still has two unassigned roles. Upon merge of *Jean*, namely, at the stage of assigning the Agent role, the bundling procedure (30b) applies, as schematized in (31c). The interpretation given in (27d) is equivalent to that obtained by lexical reflexivization (27c).

(31) a. Jean se lave.

[13] If the internal role is merged in the canonical object position albeit lack of Case, it ends up associated with nominative Case. The external role, in that case, is not merged, but ought to undergo closure at the level of interpretation (Saturation), which is what happens in passives, middles and impersonals (as shortly explained in section 6.3). Note that indices (that is, the merging instructions) are vacuous if the role in not canonically merged.

Jean SE washes

b. VP: [se lave$_{\theta i\text{-Agent}, \theta k\text{-Theme}}$]]

c. IP : [Jean$_{<\theta i, \theta k>}$[$_{I'}$se lave$_j$[$_{VP}$ t_j]]]

d. Jean (λx $\exists$e (wash(e) & Agent(e)=x & Theme(e)=x))

Elimination or modification of a θ-role is impossible in syntax as stated in (29). θ-information that the verb carries must be assigned. Merge, however, is not the only available θ-assigning mechanism. Bundling, as just suggested, is another way θ-roles can be assigned (Saturation is an additional mechanism of θ-assignment to be mentioned in section 6.3; see also note 13). Bundling is not the conventional θ-assigning mechanism (nor is saturation). We suggest that noncanonical θ-assignment must be morphologically marked. The Case reducing morphology (*se* in Romance) marks the locus (predicate) where noncanonical θ-assignment takes place.

As syntactic bundling is enabled because an unassigned θ-role can be retained until the relevant merge, the question arises whether there is a maximal domain where merge should be encountered for bundling to be possible. The cycle is the plausible candidate as it is the domain of A-movement, that is, of θ-dependencies. As we shall see directly, limiting θ-assignment, and more particularly syntactic reflexivization, to the domain of the cycle has, indeed, the right empirical results. Moreover, as will become clear below, there are good reasons to believe that the Extended Projection Principle is a requirement of the cycle, too. That is, C cannot merge with a Specless IP. Hence, the projection of SpecIP is necessary to complete a cycle. Intermediate SpecIPs are optional. (32) states the EPP as a constraint imposed by the cycle. (33) sums up the principles of θ-assignment.

(32) EPP

Merging the outmost SpecIP of the cycle is obligatory.

(33) θ-assignment

a. θ-assignment must take place within the domain of the cycle.

b. Merge is the canonical mechanism of θ-assignment.

c. A predicate involving noncanonical θ-assignment, namely, bundling or saturation, must be morphologically marked.[14]

[14] Condition (33c) is reminiscent of condition B of Reflexivity (Reinhart and Reuland 1993), which requires that a predicate whose arguments are coindexed must be marked. Interestingly, condition B can be subsumed under (33c) if it is assumed that canonical θ-assignment requires merge of a referential DP (a +R DP in Reinhart and Reuland's terms). Anaphors are not +R under

Consider now the derivational options opened by this view of the EPP and θ-assignment for the ECM reflexive in (35a). The θ-role of the embedded verb *laver* is not assigned. The question arises what the projection is of the embedded clause. We assume it is an IP as in (35b). This is evidenced by the ability of the embedded clause to accommodate the sentential negation *ne pas* (34). Let us now follow the derivation of (35).

(34) Jean se considère ne pas être intelligent.
Jean SE considres NEG be intelligent
'Jean considers himself not to be intelligent'

(35) a. Jean se voit [laver Marie]
Jean SE sees wash Mary
'Jean sees himself wash Marie'

b. Embedded clause: [I [laver $_{<\theta i>}$ Marie$_{\theta m}$]]

c. Next VP: [se voit $_{<\theta k>}$ [I [laver $_{<\theta i>}$ Marie$_{\theta m}$]]$_{\theta f}$]

d. Top IP: [Jean$_{\theta k+\theta i}$ [se voit [I [laver Marie$_{\theta m}$]]$_{\theta f}$]]]

Through the derivation in (35), we mark θ-assignment by placing the assigned role as a label of the constituent it is assigned to, and an unassigned role in triangular parentheses. In the embedded clause, (35b), the Theme role of *laver* was assigned to *Marie* (θm), but its Agent role is not assigned (θi), hence it stays on the verb and can be carried along the projections. At this point, both the EPP (32) and the θ-assignment condition (33a) would allow us to either assign the external role within the embedded clause, or do nothing. Of course, if we merge a C projection and close the cycle at this stage, the derivation would crash. But this specific derivation proceeds as in (35c) to the next VP, still within the same cycle. The verb of that VP is associated with *se*, hence it has no accusative Case to check. This is what enables continuation of the derivation. Had we proceeded instead just with the verb *voit*, the derivation would crash on grounds of Case (no DP to check accusative) and θ-assignment (no morphological marking of the bundling which will take place upon the merging of *Jean*, contra (33c)).The matrix verb now assigns its Theme role to the IP clause (marked as θf in (35c)). Its external role θk still waits to be assigned in the next merge. At that stage, in (35d), two θ-roles need assignment: the unassigned θi of *laver,* which has been retained, and θk of *voit*. Upon merging of θk, bundling applies, namely θi bundles with the assigned θk so that both are discharged upon assignment (merge).

In Reinhart and Siloni (in press), we assumed covert complex predicate formation in order to account for the possibility to reflexivize in ECM examples such as (34-35). The present view allow us to do away with a special mechanism here. The final syntactic representation (35d) is directly interpretable as in (36), which appears to capture correctly the truth conditions of the

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reflexivity. It follows that a predicate assigning a role to an anaphor must be marked.

derivation.

(36) Jean(λx ($\exists e_1$ $\exists e_2$ (see(e_1) & wash(e_2) & Agent(e_1)=x & Theme(e_1)=e_2 & Agent(e_2)=x & Theme(e_2)=Marie)))

Importantly, the present account does not allow overgeneration. If *se* is associated with the ECM verb as in (35), then (35d) is the only possible derivation.[15] If se is associated with the embedded verb (37), then the only meaning is (37i) as *se* marks the locus of bundling (noncanonical θ-assignment), which means that the internal θ-role of *laver* must be bundled when the external θ-role is assigned upon merge of *Marie*. Obtaining the interpretation in (ii) would require skipping merge of the first external argument, *Marie*, contra (30b).

(37) Jean voit Marie se laver.

i. Jean sees Marie wash herself.

ii *Jean sees Marie wash himself.

Moreover, the account predicts that an unassigned θ-role ought to able to be carried along as long as the cycle is not completed. This prediction is born out. As can be seen in (38), the role of *stupide* (θi) can remain unassigned up to the highest predicate. This is possible as merge of an external argument is not encountered on the way nor a CP boundary. Not accidentally, this is very reminiscent of the conditions imposed on A-movement (the traditional Specified Subject Condition, and the Tensed Clause condition). Both A-movement and syntactic reflexivization (θ-assignment via bundling) form θ-dependencies. Both are limited to the domain of the cycle and sensitive to the presence of an external argument. A-movement, however, involves conventional θ-assignment followed by movement, while syntactic bundling involves noncanonical (nonlocal) θ-discharging and requires therefore in addition a morphological marking.

(38) Jean se croit paraître stupide$_{\theta k}$ (bien qu'il sache qu'il est intelligent).
Jean SE believes to+appears stupid (though he knows that he is intelligent)
'Jean believes himself to appear stupid (although he knows he is intelligent)'

Finally, the present proposal straightforwardly accounts for the notorious incompatibility of reflexivization with passive (Kayne 1975, Rizzi 1986) and raising predicates (Burzio 1986), as illustrated in Italian (39a) and French (40a) respectively. Note on the one hand that the reflexive interpretation is possible when a nonclitic anaphor (39b,40b) is used, and on the other hand that the predicates, of course, allow pronominal clitics (39c,40c).

[15] High register allows realization of the subject of the embedded ECM clause postverbally. Nonetheless, (35d) is the only possible derivation. The unavailable meaning 'Jean sees Marie wash himself ' cannot be derived since by (30b), bundling cannot skip merge of an external argument, *Marie*, which additionally would be lacking Case.

(39) a. *Gianni si è stato affidato.
Gianni SI was entrusted

b. Gianni è stato affidato a se stesso.
Gianni was entrusted to himself

c. Gianni gli è stato affidato.
Gianni to+him$_{cl}$ was entrusted

(40) a. *Jean se semble [être intelligent].
Jean SE seems to be intelligent

b. Jean ne semble intelligent qu'à lui-même.
Jean not seems intelligent but to himself

c. Jean leur semble être intelligent
Jean to+them seems to be intelligent

This incompatibility has often been mentioned as a prevailing argument in favor of an unaccusative derivation for reflexive verbs (Grimshaw 1990, Pesetsky 1995, Sportiche 1998). The unaccusative reasoning goes as follows. The reflexive clitic *se* absorbs the external θ-role (in the lexicon or in syntax). Hence, the incompatibility is to be expected, as the relevant predicates do not have an external θ-role. Under our account the incompatibility simply follows from (30b). There is no merge of an external argument. Hence, bundling cannot take place.

4.2. Parameter setting

The operation of reflexivization can apply in the lexicon or in syntax in accordance with the lex-syn parameter (21) repeated in (41). A cluster of distinctions will be shown to follow from the different setting of the parameter. In our sample of languages, we found the settings listed in (42):

(41) The Lex-Syn Parameter

UG allows thematic arity operations to apply in the lexicon or in syntax.

(42) Lexicon setting: Hebrew, Dutch, English, Russian, Hungarian.
Syntax setting: Romance, German, Serbo-Croatian, Greek.

As is clear from the definition of the lex-syn parameter, all things being equal, we predict it to be relevant for arity operations other than reflexivization, too. Indeed, the prediction is born out. The parameter turns out to be responsible for crosslinguistic variation exhibited by reciprocals (Siloni 2001), and middles (Marelj 2002). Moreover, the setting of the parameter seems to be coherent across different arity operations, namely, identical for reflexives, reciprocals and

middles. This, of course, facilitates parameter setting during acquisition, since evidence from various sources (operations) converges to set the choice. Section 6 summarizes evidence to that effect.

We expect gaps in the distribution of arity operations when characteristics of the operation are incompatible with the nature of the component. Thus, the operations forming unaccusative, subject-Experiencer and causative verbs cannot apply in syntax. This is so as the operations that derive them involve a change of the verbal grid contra the guideline in (29). Section 6 briefly discusses this as well.

We now turn to the cluster of distinctions that follows from the setting of the lex-syn parameter. We freely alternate between the languages in our sample when illustrating the distinctions. We have already noted one diagnostics for the parameter setting, namely, the split with regard to the existence of ECM reflexives. Lexicon languages do not allow ECM reflexives ((12-13) above, or (43) below). Syntax languages allow them ((34-35) above or (44) below).

(43) *Okosnak gondol-kod-t-unk. (Hungarian)
clever-dat think-*Refl*-Past-1pl+indef.obj.agr.
(Intended meaning:*We thought ourselves clever.)

(44) Peter se smatra [$_{AP}$ pametnim] (Serbo-Croatian)
Peter se considers intelligent-inst.
'Peter considers himself intelligent'

This puzzling linguistic variation becomes obvious in light of the lex-syn parameter. Reflexivization of ECM predicates involves θ-roles of two distinct predicates. In the lexicon, there is no relation whatsoever between these predicates. Only syntax puts them together. Hence, a lexical operation of reflexivization definitely cannot form ECM reflexives. The syntactic operation, in contrast, can bundle two θ-roles in the domain of the cycle. ECM reflexives are thus possible outputs. Notice that a grammar without an active lexicon would have hard time deriving this distinction in a natural fashion.

A second diagnostics is that a lexical setting allows reflexive nominalizations while a syntactic setting seems to disallow it. We find reflexive nominals showing reflexive morphology in Hebrew (45a) or Hungarian (45b). We do not find anything of the sort in Romance languages.

(45) a. hitraxcut ('self-washing')

b. mos-akod-ás (wash-*ref*l-nom 'self-washing')

It may be argued that the explanation for this fact is just morphological, namely that *se* is incompatible with nominal morphology. While this is indeed correct, French nonetheless allows unaccusative and subject-Experiencer nominalizations without *se* (46) although their verbal counterpart appears with *se* (47). So the question remains why we cannot find the same with reflexive entries.

(46) a. le rétrécissement du pantalon au lavage.

the shrinking of the pants in+the washing

b. l'intérêt de Marie pour ce livre
the interest of Marie for this book

(47) a. Le pantalon s'est rétréci au lavage.
The pants shrank in+the washing

b. Marie s'intéresse à ce livre.
Marie SE interest to this book
'Marie is interested in this book'

We assume reflexive nominalizations are derived in the lexicon from the corresponding verbs, along lines proposed by Siloni (1997). The above data, then, immediately follow from the lex-syn parameter. When reflexivization applies in the lexicon (as in Hebrew or Hungarian), it can feed the nominalization operation. When it applies in syntax (in Romance), there is no reflexive input in the lexicon to nominalize. Under our analysis, (46) is expected, because unaccusative and subject-Experiencer formation is a lexical operation even in Romance languages, as discussed in more detail in section 6.2.

Similarly, while Agent nominals in English allow a reflexive interpretation, their French equivalents do not have this interpretation. A *habilleur* must be someone who dresses other people and a *maquilleur* alike.

(48) a. She dresses slowly because she is an elegant dresser.

b. Jean est un excellent habilleur/ maquilleur
Jean is an excellent dresser/ make-up-er (of others only)

Again, this so, because in English reflexives are derived in the lexicon, and can give rise to nominalizations. In French they are formed in syntax, and hence there is no reflexive input to nominalization.

A third diagnostics is that in syntax languages reflexivization is a productive operation: any transitive verb whose external argument can be interpreted as bearing a [+m] feature (mental state relevant) can reflexivize.[16] That is, a transitive verb whose external argument is an Agent

[16] Greek (Papangeli 2002) and Serbo-Croatian (Marelj forthcoming) are of the Syntax type but they seem to be more limited with regard to Experiencer reflexivizations. In French or Italian, in contrast, even Experiencer verbs such as *plaire* ('please') and *déplaire* (displease) (i), which have unaccusative syntax (Belletti and Rizzi 1988, Pesetsky 1995, Reinhart 2001) allow reflexivization (Arad 1998, Landau 2001).

(i) Jean se plaît/déplaît sur cette photo.
Jean SE pleases/displeases on this picture
'Jean pleases/displeases himself on this picture'

This is the only case not captured by (30b). We believe this can be captured by a more precise

(49a), an Experiencer (49b), or even a Cause [+c] (which is unspecified with regard to the feature [m] but is compatible with a [+c +m] interpretation) can reflexivize. In lexicon languages reflexivization is limited: a subset of the set of transitive agentive verbs allows reflexivization. The set is approximately the same across languages. Its precise definition is yet unclear.

(49) a. Jean se dessine.
Jean SE draws
'Jean draws himself'

b. Jean s'aime.
Jean SE loves
'Jean loves himself'

c. Jean se cache.
Jean SE hides

(50) a. *dan mitrašem.
Dan draws(refl)

b. *dan mit'ahev.
Dan loves(refl)

Finally, reflexivization involving a dative argument is possible when the parameter is set onto syntax, but seems to be impossible when the setting is lexicon. The fact that this is impossible in lexicon languages could be a basic trait of lexical reflexivization or a side effect of the definition of the set of verbs allowing reflexivization. *Se* can clearly reduce accusative or dative Case. It is a general Case reducer, not selective regarding the Case. In section 6.3 we discuss cases where it reduces nominative Case.

(51) a. Jean s'est acheté une voiture.
Jean SE is bought a car
'Jean bought a car to himself'

b. Jean s'est envoyé une lettre.
Jean SE is sent a letter
'Jean sent himself a letter'

(52) *dan hištale'ax mixtav.
Dan sent(refl) letter

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analysis of the θ-clusters of such verbs. Note, incidentally, that the existence of these reflexives is completely unconceivable under an unaccusative approach to reflexives, which associates *se* with the external argument.

Crucially, whether the reduced argument is accusative or dative, syntactic bundling must take place upon merge of the external argument, even when the verb is a three place predicate, exactly as predicted by (30b). Thus, while it is possible for an anaphor in situ to be bound by an internal coargument as illustrated for French in (53a), the reflexivization operation cannot involve two internal coarguments, as in (53b).[17]

(53)a. ?Sur cette photo Jean n'a montré les enfants$_i$ qu'à eux-mêmes$_i$.
On this picture Jean not has shown the boys but to themselves

b. *Jean s$_i$'est montré l'enfant$_i$.
Jean SE is shown the boy

In sum, a cluster of distinctions follows from the setting of the lex-syn parameter. These distinctions provide the triggers for parameter setting at the acquisition stage. The setting onto syntax will be triggered by encountering reflexive ECM predicates, reflexives that do not belong to the universal lexical set, such as *se dessiner* ('draw'(refl)) or *s'aimer* ('love'(refl)), as well as reflexivizations involving datives, all of which characterize syntactic languages. By contrast, the existence of reflexive nominalizations is typical of languages forming reflexives in the lexicon and could set the right parameter value. As will become clear in section 6.1 additional triggers for the lexical setting are abundantly supplied by reciprocal verbs. We now turn to discuss the case of German and Dutch.

5. Dutch and German

As observed by Everaert (1986), the distribution of the element zich in local environments is limited in Dutch, unlike the distribution of the complex anaphor *zichzelf*. While it is possible in (54a), it is disallowed in (54b-c), for example. Notwithstanding *zich* can appear in environments where it is nonlocally bound, and in particular in ECM configurations (55).

(54) a. Max wast zich.
Max washes ZICH
'Max washes himself'

b.?? Max haat zich.
Max hates ZICH

c.?? Max hoorde zich.
Max heard ZICH

[17] The slight marginality of (53a) is due to the fact that French does not commonly use nonclitic anaphors, as well as other nonclitic pronominals (often, stress on the anaphor improves the example). The important point here is that (53b) is completely unconceivable.

(55) Max hoorde [zich zingen].
Max heard ZICH sing
'Max heard himself sing'

To account for that, Reinhart and Reuland (1993) propose that *zich* is possible in local environments (54a) only when the predicate is reflexive (what they call intrinsically reflexive). In our terms, then, *zich* can appear in local environments (54a) only when lexical reflexivization has taken place. Hence, it is possible with a closed set of predicates (54a). The other local occurrences, such as (54b-c), are excluded because they violate Reinhart and Reuland's formulation of the binding condition B, which requires that a coindexaction of co-arguments be reflexive marked, either in the lexicon, or by a complex anaphor.

But if reflexivization is impossible with the verb 'hear' in (54c), why is *zich* allowed in (55)? In the latter case, argue Reinhart and Reuland, *zich* occurs as a simplex long distance (SE) anaphor syntactically bound by a nonlocal (a noncoargument) antecedent; hence coindexation is allowed in concert with their condition B. That is, *zich* can appear in (55), because it is the subject of the ECM complement, not a θ-argument of the matrix verb. Hence, it is syntactically bound not by a coargument but by an argument of a distinct predicate, the embedding predicate *hoorde*. It is important to note that although (55) superficially seems to be analogous to the its Romance paraphrase (56), (55), under our approach, is an instance of syntactic binding, while (56) is the output of the operation of syntactic reflexivization, as extensively discussed in the previous section.

(56) Jean s'est entendu chanter.
Jean SE is heard sing
'Jean heard himself sing'

Dutch simply uses the same element (*zich*) in two sorts of contexts: when lexical reflexivization takes place (for more on its use there see section 7) and in the context of nonlocal syntactic binding. (54b-c) is impossible because the predicates are not of the set that allows lexical reflexivization. Still, a speaker can try and salvage the constructions by analyzing *zich* there as a simplex anaphor syntactically bound. But simplex anaphors reject local binding (condition B), and the constructions are thus not grammatical. Interestingly, the violations in (54b-c) are relatively mild. This is indeed due to the fact that speakers try to apply a simplex (long distance) anaphor analysis to the constructions. As observed by Reinhart and Reuland (1993), violations triggered by the insertion of a long distance anaphor in a local environment are milder than those arising by the insertion of a pronoun in the same environment. According to Reinhart and Reuland, this is expected, as the binding of a pronoun in local contexts violates the chain condition in addition to condition B, while the local binding of a long distance anaphor violates condition B only, which they view as a weak condition (see cited reference for discussion of the chain condition).

The comparison of German to Dutch is surprising. Albeit the apparent similarity, German, unlike Dutch, allows *sich* productively in local environments ((57) vs. (54)).

(57) a. Max wäscht sich.
Max washes SICH

b. Max hasst sich.
Max hates SICH

c. Max hörte sich.
Max heard SICH

If it were lexical reflixivization as in Dutch, productivity would be unexpected. One could then suggest that *sich* in (57) is simply an anaphor syntactically bound in a local environment. Analyzing *sich* this way would be incongruous with the well-known observation (Pica 1987 , Reinhart and Reuland 1993) that anaphors locally bound are universally complex elements of the 'himself' type and not simplex elements such as *sich* or *zich*. We will supply shortly further evidence against the analysis of *sich* in local contexts as an anaphor syntactically bound.

So why is the German *sich* productive in local environments unlike its Dutch counterpart, which can occur with a limited set of verbs? Given the lex-syn parameter, the explanation is straightforward. While in Dutch the parameter is set onto lexicon and therefore the set of verbs is limited, in German it is set onto syntax and hence the phenomenon is productive. *Sich* in local environments is, then, the result of the operation of syntactic reflexivization, just like in Romance languages. Additional evidence to that effect comes from the fact that Dative reflexivization is productive in German but not in Dutch.[18]

(58) a. Johannes hat sich einen Wagen gekauft.
Johannes has SICH a car bought
'Johannes bought a car to himself'

b. *Peter gaf zich een cadeau / een vrije dag.
Peter gave ZICH a present / a day off

Examples involving three place predicates provide strong evidence that *sich* in local contexts is the outcome of the operation of reflexivization in syntax and not a syntactically bound anaphor. Recall first that the reflexivization operation allows bundling only upon merge of the external argument (30b). In light of that, consider the difference in grammaticality between (59) and (60). If *sich* where an anaphor syntactically bound in local environments (similarly to *sich selbst)*, there would be no reason for why (60) is perfect, whereas (59) is not. But if *sich* in local environments is the result of an operation of reflexivization in syntax, (59) cannot be generated as it requires the application of the reflexivization operation to two internal arguments.[19]

[18] It is not clear that the relevant distinction regarding nominalizations can be found in Dutch and German.

[19] The order accusative dative (i) is also impossible. However, this order is independently impossible also with a complex anaphor (*sich selbst*) (ii); hence, it is irrelevant with regard to the

(59) ??Ich habe ihm sich gezeit.
I have him-DAT SICH-ACC shown

(60) Ich habe ihm sich selbst gezeit.
I have him-DAT himself-ACC shown

The impossibility of (59) parallels the ungrammaticality of (53b) repeated here in (61). Both are excluded as the reflexivization operation can apply bundling only upon merge of the external argument.

(61) * Jean s_i'est montré l'enfant$_i$.
Jean SE is shown the boy
('Jean showed the boy$_i$ to himself$_i$')

The sentence in (59) nonetheless gives rise to a milder violation in comparison with (61). In both French (Romance) and German the reflxivization operation cannot bundle two internal arguments. However, in German but not in French an alternative analysis is possible for such sentences, which yields a relatively mild violation. *Sich* can be analyzed by the speaker as a simplex (long distance) anaphor, which in examples of the kind in (59) would be locally bound; hence, their unacceptability. The violation is expected to be relatively mild, unlike a parallel violation with a pronoun. As already mentioned above, that is so because a pronoun in this environment would violate the chain condition in addition to the binding condition B, while a long distance anaphor violates binding only.

6. Arity operations and the lex-syn parameter

As mentioned above, all things being equal, we predict the lex-syn parameter to be relevant for other arity operations as well. The prediction is born out. The parameter turns out to be responsible for crosslinguistic variation exhibited by reciprocals (Siloni 2001), and middles (Marelj 2002). Moreover, the setting of the parameter seems to be coherent across different arity operations, namely, identical for reflexives, reciprocals and middles. This, of course, facilitates parameter setting, since evidence from several operations converges to set the choice.

There are arity operations that seem to apply in the lexicon only, namely, the operations

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issue at hand.

(i) *Ich habe ihn sich gezeigt.
I have him-ACC SICH-DAT shown
(ii) *Ich habe ihn sichselbst gezeigt.
I have him-ACC himself-DAT shown

forming unaccusative, subject-Experiencer and causative verbs. As we will see shortly, this is predicted by the lexicon interface guideline (29), since these operations involve a change of thematic information which the guideline prohibits.

Below we survey the various arity operations. As already mentioned, in our sample of languages, we find reflexives, reciprocals, middles, instances of passives, unaccustaives, subject-Experiencers, and impersonals (e.g. in Italian) with the same morphology. We believe this morphological form is typical of outputs of arity operations that reduce the syntactic valency of the verb. Reduction of syntactic valency means that the output of the operation merges one θ-role less than the source predicate (the input of the operation).

6.1 Reciprocalization

Siloni (2001) reveals a cluster of distinctions that splits reciprocal verbs across languages into two types ((62) vs. (63)). According to Siloni, the reciprocalization operation is reminiscent of the reflexivization operation; it prevents mapping of an internal θ-role, which gets associated with the external θ-role, but forms a reciprocal meaning. The exact formulation of the operation is not directly relevant here.[20] For our purposes it is important that the operation is subject to the lex-syn parameter, and that languages show the same parameter setting for reciprocals as for reflexives. In Hebrew, Russian, or Hungarian reciprocals are formed in the lexicon, while in Romance languages, German or Serbo-Croatian they are formed in syntax. (62) and (63) illustrate lexical and syntactic reciprocals in Hungarian and Italian respectively. In Hungarian type languages, reciprocals constitute a closed set of verbs, disallow ECM predicates (62b) and can give rise to reciprocal nominalizations (62c), unlike in Italian type languages. Siloni (2001, 2002) further shows that additional distinctions, particular to reciprocals, match the observed split. To give one example, lexical, but not syntactic, reciprocals allow the so-called discontinuous reciprocal construction, where reciprocity holds between the subject set and the set denoted by a PP argument ((62d) vs. (63c)) (see cited reference for more distinctions and analysis).[21]

(62) a. János és Mari csókol-óz-t-ak.
János and Mari kiss-*rec*-past-3pl
'János and Mari kissed '

[20] See Dimitriades (2002a), Siloni (2001, 2002) for discussion of the formulation of the reciprocalization operation.

[21] In syntax languages there can be instances of lexicalized reciprocals (showing the behavior of lexical reciprocals), for instance, *se battre* 'quarrel' in French, or *se sărutat* 'kiss' in Romanian. *Se battre* is an interesting example: when it is derived in the lexicon (shows the corresponding characteristics), it undergoes semantic drift ('fight'); when it shows properties of syntactic reciprocal. it keeps the original meaning of the concept ('beat'). As expected by the Lex-syn parameter, instances of syntactic reciprocals are not found when the setting is lexicon. That is so because when the phenomenon is syntactic it is productive.

b. *János és Mari okos-nak talál-koz-t-ak
János and Mari smart-dat find-*rec*-past-3pl
(Intended meaning: Janosh and Mary consider each other smart)

c. csókol-óz-ás; ölelk-ez-és
kiss-*rec-nominal.affix* hugg-*rec-nominal.affix*
'mutual-kissing' 'mutual-hugging'

d. János csókol-óz-ott Mari-val.
János kiss-*rec*-past Mari-with

(63)a. Gioanni e Maria si sono abbracciati
Giovanni and Maria SI are hugged

b. Giovanni e Maria si sono visti danzare.
Giovanni and Maria SI are seen dance
'Giovanni and Maria saw each other dance'

c. *Giovanni si è abbracciato con Maria.
Giovanni SI is hugged with Maria

6.2 Expletivization

According to Reinhart (2003), transitive verbs whose external role is a cause [+c] can undergo an arity operation that reduces their external argument. [+c] roles are unspecified with regard to the feature 'mental state' [m], as illustrated in (64a) and (65a). Reinhart labels the operation expletivization as it reduces the external role altogether. There is a residue of the role neither in structure nor in interpretation. When expletivization applies to a lexical entry whose internal argument is a Theme [-c -m], it derives an unaccusative verb, whose subject is an internal argument. When it applies to a lexical entry whose internal argument is an Experiencer [-c +m], it derives a subject-Experiencer verb, whose subject is an external argument.[22] French examples are given in (64) and (65) respectively.

(64) a. Le vent / Jean a cassé la branche.

[22] As mentioned in section 4.1.1, nonunary concepts map roles with only [+] specifications externally, roles with only [-] specification internally, and mixed [+/-] roles externally, if possible. We assume the mapping principles determine the syntactic position of arguments with regard to the maximal concept (namely, the concept with the maximal set of θ-roles). As the [-c –m] role left after [+c] reduction receives index 2, it must map internally, resulting in an unaccusative verb. The [-c +m] role, in contrast, is indexless, and hence merges externally after [+c] reduction (and internally before reduction, when the [+c] role merges externally). Indeed, Experiencer outputs of [+c] reduction fail tests of unaccusativity.

the wind / Jean has broken the branch

b. La branche s'est cassé.
the branch SE is broken
'The branch broke'

(65) a. Le bruit / Jean a fâché Pierre.
the noise / Jean has angered Pierre

b. Pierre s'est fâché.
Pierre SE is angered
'Pierre is angry'

A reliable test to detect the semantic presence of a nonprojected external role, which can be interpreted as an Agent[23] relies on the Instrument generalization.

(66) Instrument Generalization

In order to be realized syntactically, an instrument requires the presence of either an explicit Agent or an implicit argument interpretable as an Agent.

As can be seen in (67), [+c] reduction indeed eliminates the external role altogether. An instrument can be added neither to unaccusatives (67a) nor to subject-Experiencer verbs (67b).

(67) a. *La branche s'est cassé avec une hache.
the branch SE is broken with an axe

b. *Pierre s'est fâché avec cette musique
Pierre SE is angered with this music (as an Instrument)

As the reduction of [+c] eliminates a θ-role of the source predicate (of the input), the lexicon interface guideline (29) predicts that the operation ought to be illicit in syntax. Indeed, no crosslinguistic variation of the type attested by reflexives and reciprocals can be detected with regard to the outputs of the operation, namely, unaccusatives and subject-Experiencers. They are formed in the lexicon even in Romance, German or Serbo-Croatian, which form reflexives and reciprocals in syntax. French nominalizations provide evidence in favor of this claim.

As already mentioned in section 4.2 (examples (46) repeated in (68)), there are no reflexive nominalizations in French, but there are unaccusative and subject-Experiencer nominalizations in the language. This is exactly the expected state of affairs, if expletivization applies in the lexicon while reflexivization in syntax. Recall that nominals are morphologically incompatible with *se*. Hence, the nominalizations lack *se* unlike their verbal counterparts.

[23] That is, in addition to [+c +m], also [+c], which is unspecified for [m] and hence does not exclude a [+c+m] interpretation.

(68) a. le rétrécissement du pantalon au lavage.
the shrinking of the pants in+the washing

b. l'intérêt de Marie pour ce livre
the interest of Marie for this book

Causativization (discussed in Reinhart 2003) is an additional arity operation that can only apply in the lexicon, by the lexicon interface guideline (29), as it adds a θ-role to the θ-grid of the input concept and modifies one of the original roles. Application of causativization in syntax would violate the guideline, as the operation creates a new θ-grid.

6.3 Saturation : passives, middles and impersonals

Following Chierchia (in press) we assume passivization involves an arity operation labeled Saturation, which prevents mapping of the external argument onto the subject position, and saturates it by existential closure (for more on its semantics see Chierchia).The role targeted by saturation is thus present at the level of interpretation. Indeed, it licenses the addition of an Instrument (69). Recall that in certain languages, passive morphology is shared by reflexives and unaccusatives (Greek), while other languages have a particular passive morphology, alongside which there can be instances of passives bearing the reflexive-unaccusative morphology (French for instance (69)). It is not clear whether this morphological distinction reflects some more substantial distinction. We refer the reader to Siloni (2003) for some discussion of the level of application of passive saturation.

(69) a. Le crime a été commis avec un couteau.
the crime was committed with a knife

b. il s'est commis beaucoup de crimes avec ce pistolet
it SE is committed lots of crimes with this gun

Let us now consider middles briefly. As is well-known, middles are predicates that express some generalization with regard to some property of their subject.[24] It is, for example, a property of new ovens that they can be cleaned easily (70a). The use of middles necessitates some modification either by an adverb or by negation etc'. The Agent cannot be realized, but is available at the semantic level, and hence licenses an Instrument (70b). However, unlike with passives, here the Agent does not undergo existential closure. The interpretation is not that there exists someone for whom it is easy to clean new ovens, but rather that for anyone, cleaning new

[24] The term middle is sometimes used in a more general fashion to refer to any predicate that is not active neither passive, and whose subject is an internal argument (for example, unaccusatives) (Doron 2002, Glinert 1989). We think this usage that may have developed out of traditional terminology does not help distinguishing between the different types of predicates.

ovens is an easy task. The Agent receives an arbitrary interpretation (it is universally quantified).
Marelij (2002) argues that middles involve *arbitrary* saturation of the type proposed by Chierchia's (1995) for impersonal *si* constructions.(Chierchia defines a special type of ARB variable which ranges over groups of humans.)

(70)a. Les nouveaux fours se nettoient facilement.
the new ovens SE clean easily

b. Les nouveaux fours se nettoient facilement avec un chiffon humide.
the new ovens SE clean easily with a rag humid

Marelij argues further that ARB saturation in middles attests crosslinguistic variation that is derivable from the lex-syn parameter. Setting aside the precise formulation of the operation (see Marelj 2002), we only note that again the same group of languages that set the parameter onto lexicon for reflexives and reciprocals seem to produce middles in the lexicon. Languages forming reflexives and reciprocals in syntax also form their middles syntactically. When the parameter is set onto syntax the formation of middles is productive, and their subject is an internal argument that raises to the subject position (Roberts 1987), as is clear for instance from the fact that ECM middles are possible (71). When the setting is lexicon, the phenomenon is more limited, and the internal θ-role of the source predicate is externalized, as can be shown, for example, by the fact that the subject of Hebrew middles fails the test of possessive dative, which detects internal arguments (72).

(71) Ces problèmes se considèrent faciles ici.
these problems SE consider easy here.

(72) *sdiney kutna mitkabsim le-kitan be-kalut.
sheets cotton wash to-Kitan easily
(Intended meaning: 'Kitan's cotton sheets wash easily')

Finally, we argue that an arity operation is also involved in the formation of impersonal sentences in Italian (73). We thus have a unified account of the occurrence of the Romance morphological form *se*/*si*. Recall that in section 4.2 we have argued that the Romance clitic is a general Case reducer. It can reduce accusative, dative, or nominative Case.

Now, in rough lines, Cinque's (1988) study of *si*-constructions analyzes *si* in (73a) as associated with nominative Case and with the external θ-role. Associating *si* with the external θ-role is problematic. We have seen in the course of the paper that the clitic is not an argument, but rather a general Case reducer that marks reduction of syntactic valency. Modifying Cinque's approach, we can offer an integrated analysis of the occurrences of the clitic. In impersonal sentences *si* indeed reduces nominative Case, and saturation applies to the external θ-role (as usual[25]). Just like in middles, the type of saturation involved here is Chierchia's ARB saturation,

[25] An interesting question which we cannot address here for reasons of scope is why saturation

which endows the argument with a universal (arbitrary) flavor.

(73)a. Qui si mangia spesso gli spaghetti.
here SI eats often the spaghettis
'Here people eats spaghettis often'

b. Qui pro_{EXPL} si mangia spesso gli spaghetti.
here SI eats often the spaghettis

The construction thus poses neither a Case problem (*si* reduces nominative Case) nor a θ-problem (the external role is saturated). What about the EPP? Following Cinque (1988), Papangeli (forthcoming) suggests that the EPP in (73a) is satisfied by an expletive *pro*. Certain predictions immediately follow. First, Romance non-pro-drop languages (e.g. French) will not have *si*-impersonals. The prediction is born out, as already observed by Cinque. French uses *on* to express the same meaning (74). [26]

(74) Ici on mange souvent des spaghettis.
here one eats often spaghettis
'Here people eats spaghettis often'

Second, in lexicon languages such as Hebrew, where the relevant morphology imposes a lexical arity operation, such impersonals should be impossible as well. Although the language is pro-drop, it does not have such impersonals, as nominative case cannot be reduced in the lexicon, since it is not a Case feature of the verb. This prediction is borne out. The parallel constructions in Hebrew do not use the reduction morphology, but rather keep their regular morphology (75a), placing an arbitrary argumental *pro* in SpecIP, as schematized in (75c). This option is utilized in Italian too, alongside impersonal *si*-constructions (75b):

(75) a. šam son'im zarim.
there hate-3PL foreigners
'There they hate foreigners'

b. Lì odiano gli stranieri. (Cinque 1988)
there hate-3PL foreigners
'There they hate foreigners'

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which applies massively to the external θ-role, rarely applies to the internal role. The question is, in fact, more general: why are certain operations limited to certain roles? Partially, the reply follows from the definition of the operations. Expletivization, for instance, is defined to apply to [+c] roles , hence it cannot apply to internal arguments. Lexical reflexiviztion is at any rate limited. And syntactic reflexivization bundles roles upon merge of the external argument.

[26] Dobrovie-Sorin (1998) argues that Romanian, unlike Italian and Spanish, does not have a nominative *se* although it is a null subject language. For an alternative construal of the facts, see Papangelli (forthcoming).

c. there pro_{ARB} hate foreigners

The lex-syn parameter together with the veteran pro-drop parameter allow us, thus, a unified account of the occurrence of the *se*-type morphology across languages. The lex-syn parameter correctly explains the considerable linguistic variation attested by reflexives, reciprocals and middles. And finally, the lexicon interface guideline rightly predicts that expletivization as well as causativization are obligatorily lexical operations.

7. The structural case parameter

Though the lex-syn parameter explains a substantial range of language variations in the area of arity operations, the crosslinguistic variation with regard to auxiliary selection is not reducible to this parameter. In certain languages the formation of reflexives or unaccusatives does not affect auxiliary selection, while in others it triggers the selection of *be.* As we shall see, this variation is found in languages set for either values of the lex-syn parameter, so it must be determined independently. In this section we will argue that auxiliary selection is determined by Case considerations, and the relevant parameter regards whether in a given language the verb has structural accusative or not.

7.1. The problem of auxiliary selection.

The crosslinguistic variation with auxiliary selection is most notable if we compare French and Italian on the one hand, with Spanish on the other. As we saw, reflexivization operates in these languages in the same way using the *se*/*si* clitic, and they are equally set on the syntax value of the lex-syn parameter. Still, in French and Italian the application of reflexivization (76) and expletivization (which forms unaccusatives) (77) triggers a change in the auxiliary from *have* to *be*, but In Spanish it does not ((76c), (77c)). Romanian patterns with Spanish in showing no effect on the auxiliary (78).[27] English, too, uses *have* in reflexive and unaccusative sentences.

(76) a. Roberto si è lavato. (Italian)
b. Roberto s'est lavé. (French)
Roberto SE is washed

c. Roberto se ha lavado. (Spanish)
Roberto SE has washed

[27] In Romanian auxiliary selection is not affected by the relevant arity operations. In case the required auxiliary (for a specific tense) is *have,* it will remain *have* in the reduced entry, in case it is *be* it will remain *be*. Notice that we do not supply an exhaustive reply to the question of auxiliary selection, but rather to the question when the application of an arity operation affects auxiliary selection.

(77)a. La porta si è chiusa. (Italian)
b. La porte s'est fermée (French)
The door SE is closed ('The door closed)

c. La puerta se ha cerrado. (Spanish)
The door SE has closed ('The door closed)

(78)a. Maria s-a lovit. (Romanian)
Maria SE -has hurt
'Maria has hurt herself'

b. Uşa s-a deschis. (Romanian)
door-the SE -has opened ('The door opened)

Dutch and German show yet another pattern. Both use the auxiliary *be* with unaccusatives (79), but they use *have* with reflexives (80).

(79) a. Jan is gearriveerd. (Dutch)
Jan is arrived.

b. Johannes ist angekommen. (German)
Johannes is arrived.

(80)a. Jan heeft zich gewassen. (Dutch)
Jan has ZICH washed

b. Johannes hat sich gewaschen. (German)
Johannes has SICH washed

As we saw, the lex-syn parameter is set differently for Dutch and German. Yet, this difference does not effect auxiliary selection, where they pattern alike. All facts combined, it is obvious that auxiliary selection is not determined by the lex-syn parameter, and there must be another parameter governing this choice. Hopefully understanding that parameter should also explain why German and Dutch differ from French and Italian regarding where the auxiliary *be* is used.

Two lines are available regarding *be* selection with unaccusatives. It either marks the missing external θ-role, or the missing accusative Case. An interesting θ-based account is offered by Ackema (1995), who assumes that *have* has an external role to assign (via merging with the verb), hence it cannot be used when such a role is lacking. An alternative Case-based direction, also discussed by Ackema, is that *be* selection correlates with the fact that *have* has full accusative Case to assign (via merging with the verb), hence it cannot be selected with an unaccusative, while *be* has no accusative Case.[28]

[28] There is also a family of accounts attempting to explain *be* selection independently of either θ-requirements or case, in terms of aspect. Arguments against this line can be found in Ackema (1995)

As stated, the θ-based accounts hold only for unaccusative entries, where the external role is indeed absent, but they cannot extend to Italian or French, where the *be* auxiliary surfaces also with reflexives, in which, as we saw, the remaining argument is external. More generally, a θ-based analysis is less likely to account for the parametric variations in *be* selection. The thematic structure of reflexives is essentially the same in all languages; likewise that of unaccusatives. Hence, this is not a likely area for finding another parameter. Let us, therefore, further examine the area of Case.

So far we have assumed that arity operations always reduce not only the number of realized θ-roles, but also the accusative Case of the verb. If so, then there is not much room for parametric variations in the area of Case as well. But let us consider the option that this Case reduction is not identical in all languages, because the Case system is not identical. We will argue that some languages have a "stronger" Case system than others. In these languages, there is still an accusative residue left after arity operations apply, which needs checking. *Be* selection, found in these languages, is forced by the need to check this Case residue. Pursuing this line requires a closer look at the theory of Case. We present here a summary of work in progress by Reinhart, Reuland and Siloni.

7.2. Structural and thematic (inherent) Case.

A widely accepted distinction is that between structural and inherent Case. In descriptive terms, the first are e.g. nominative and accusative, and the clearest instance of the second is oblique Case such as instrumental often found within PPs. Genitive Case has been argued to have structural and inherent manifestations (Siloni 1997). Regarding dative Case, opinions are divided on whether it counts as structural or inherent. However, it is less clear what the precise characterization is of the two. Following Chomsky (1981, 1986), it is largely assumed that inherent Case is determined thematically, while structural Case is determined by syntactic relations such as government or Spec-head. In the case of the oblique argumental PP, it is assumed that the DP gets its θ-role from (or via) the P head. Nevertheless, in this area of PPs it is the least clear that the standard relation of the DP and the P head is thematic. Danon (2002) showed that there are several instances, most notably in Hebrew, where the sole function of the preposition is to assign structural Case, and the P cannot have any thematic content. Botwinik-Rotem (forthcoming) extends this observation also to prepositions that could be viewed as θ-assigners. She provides substantial evidence that all the prepositions associated with oblique Case (which she labels *small P's*) assign structural Case, and P does not take any direct part in θ-assignment, though it may seem to affect some aspects of the semantic interpretation of the given role.

An alternative view, which maintains the distinction, is that it is the PP that checks the inherent thematic Case of the verb, while the DP checks the structural Case introduced by P. On this view, it is not that the Cases themselves are divided to structural (e.g. accusative) and thematic (e.g. instrumental), but rather all Cases have these two components. Case thus encodes two different relations: that of a θ-argument, and that of a syntactic complement. We conceive of the

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and Everaert (1996).

former as the implementation of the θ-criterion - the requirement that each θ-role is assigned requires some formal checking, which is universally executed through the case system. At least when VP internal arguments are concerned, we assume the verb always checks directly the thematic Case, but the question is how the structural relation is checked. In the oblique (PP) case, a preposition is needed for structural Case. But accusative Case is a special instance, where the DP is a direct complement of the verb. In our terms this means that the verb should be able to check both the thematic and the structural Case, or that the accusative Case is composed, in fact, of two distinct components, which can both be checked directly by the verb.[29]

Let us illustrate the usefulness of this distinction between the thematic and structural components of Case with a long standing mystery of the distribution of *zich/sich* in Dutch and German. As we saw in section 5, this anaphoric element has two functions in Dutch and German (as in many other languages not in our present corpus). It occurs both with reflexive verbs and as a long-distance anaphor. The problem here concerns its function as a long-distance anaphor. As such, *zich* in Dutch can be bound into an embedded clause by a matrix argument, as in (81a-b). Still, it cannot occur in an accusative position of the embedded clause, as in (81c). This is a problem independent of our major concern here with reflexivization. Though Dutch and German are set differently regarding the lex-syn parameter, the facts of (81) are the same in German.

(81)a. Jan$_i$ hoorde [zich$_i$ zingen]
Jan$_i$ heard [ZICH$_i$ sing]
'Jan heard himself sing'

b. Jan$_i$ hoorde [jou tegen zich$_i$ argumenteren]
Jan$_i$ heard [you against ZICH$_i$ argue]
'Jan$_i$ heard you argue against him$_i$'

c. *Jan$_i$ hoorde [jou zich$_i$ critiseren]
Jan$_i$ heard [you ZICH$_i$ criticize]
'Jan$_i$ heard you criticize him$_i$'

This problem was left unsolved in Reinhart and Reuland (1993), since there were no tools available for tackling it. No binding account exists for this contrast, and it does not also follow from the movement analysis of simplex anaphors, assumed by Reinhart and Reuland and many others. (Nothing known could make this movement to matrix Agr easier out of the PP in (81b) then in

[29] Whether in fact further projections are needed, like AgrO or little-*v*, is orthogonal to our discussion. For simplicity we assume here that accusative is checked directly by the verb, though nothing hinges on that. The question regarding dative Case is whether the verb itself carries alongside the thematic Case also the structural dative Case, or a specific preposition-like element (*to*) is needed for that purpose. Languages seem to vary on that. We assume nominative Case also contains a thematic and structural component. The former is carried by the verb and transmitted to the relevant functional head (I), which checks it alongside the structural component.

(81c).) Nor is it a universal problem with long-distance (simplex) anaphors. The Japanese *zibun*, for instance, has no problem being bound in an accusative position as (81c). But the present distinction between the thematic and structural components of the accusative Case opens the way for an account.

Reinhart and Reuland (1993) noted that *zich*, like all anaphors, is a referentially defective argument (an -R expression). But an open question is what precisely it lacks.[30] One difference between, say, the Japanese *zibun* and Dutch *zich* is that the first can have a discourse logophoric function, while *zich* cannot, which suggests that *zich* is more deficient than *zibun*. A reasonable assessment of the specific deficiency of *zich* is that it cannot check thematic Case, although it can check structural Case.

With this assumed, the mystery of (81) is resolved. In (81b) *zich* is embedded in a PP. We argued, following Botwinik-Rotem (forthcoming), that a DP inside a PP does not have thematic Case to check. In oblique Cases, Case checking is split between the verb, which checks the thematic component, and P, which checks the structural one. The PP (*tegen zich*) in (81b) is the element checking the thematic Case of the verb. The complement of P only needs to check structural Case, which *zich* can do. With accusative Case, both Case components are checked directly by the verb itself. Still, it need not always be the same element that checks both components. In (81a), where *zich* is the subject of the embedded clause, the latter (IP) is the thematic argument of the matrix verb *horde* ('heard'), and, thus, checks the thematic component of the accusative Case. The subject of IP, *zich*, only needs to check the structural component of this Case, which it can do. But in (81c), *zich* occurs as the direct complement of the lower verb; hence it is the only element that could possibly check both the thematic and the structural components of the accusative Case of the verb. Since it cannot check the thematic component, the derivation crashes.

7.3. The parameter

We have assumed so far that accusative Case has two components to be checked, thematic and structural. But in fact, not all languages have both these accusative components. As mentioned, we believe the thematic component is the implementation of the θ-criterion. Therefore, it must be universal. On the other hand, Danon (2002) argues that structural accusative Case is parametrized. (He did not draw the same distinction between the thematic and structural components, but in his terms, the parameter regards whether the verb has structural accusative Case of its own.) Danon's point of departure is the definiteness effect in Hebrew. While an indefinite DP can occur as a direct complement of the verb (82a), a definite DP requires a special (semantically empty) preposition (82c).

(82) a. dan Ra'a yalda
Dan saw girl ('Dan saw a girl')

[30] Reuland (1996) argues that what makes anaphors of this type referentially defective is (possibly universally) the absence of the plural feature. Nevertheless, there may be further differences in the degree of defectiveness between anaphors in different languages.

b. *dan ra'a ha-yalda/dina
Dan saw the girl/Dina

c. dan ra'a et ha-yalda/dina
Dan saw ET the girl/Dina

The assumption in the minimalist program is that Case checking is a requirement of the checker. The DP has an uninterpretable feature, which we call feature α here for the sake of presentation. α makes the DP visible to the checker and must be deleted. We believe α is not selective and can be checked against the thematic component, the structural one or both. However, there are certain instances where a DP has an additional feature that requires checking specifically by a structural Case checker. Danon argues that in Hebrew, and some other languages he discusses, the syntactic property underlying this feature is definiteness. The intricate relations of definiteness, specificity, or animacy to Case have been widely observed and analyzed before (e.g. Beletti 1988), but Danon argues that these interface properties are relevant to the CS only if there is independent evidence that they are syntactically encoded, which is not the case in all languages. In Hebrew (and some other languages) definiteness is a syntactic feature (we call it feature β), and its checking is subsumed under structural Case checking. In other languages another property (specificity, animacy etc') may be syntactically encoded and therefore requires checking. Definite DPs in Hebrew, thus, must in addition always be checked for structural Case. Since the verb in Hebrew has no structural accusative Case, the DP cannot undergo structural Case checking, as seen in (83b), and a dummy preposition must be introduced. In our terms, definites and indefinites both bear α and are, thus, sufficient to check the thematic Case of the verb, hence (83a) raises no Case problem. But the problem surfaces when the DP bears β and needs, further, to be checked for structural Case. Danon provides more evidence for the claim that the verb lacks structural accusative in Hebrew from other contexts, most notably ECM structures.[31]

Assuming a structural Case parameter, we may note that in Spanish as well, some DP's require a preposition in an accusative position (83). In Spanish, the relevant DP property appears to be not just specificity, but also animacy. However, there is no problem in assuming that the syntactic properties that a language encodes may vary across languages. We may conclude that, like Hebrew, Spanish has no structural accusative case, and, a dummy Case checker is, therefore, required. French and Italian do not require that. Thus, in the later the verb has structural accusative.

[31] As mentioned, α is checked by the thematic component, the structural one or both. β is checked only by the structural component. Within PPs, α and β are checked by the structural component of P. As to nominative Case, the thematic Case of the verb is transmitted to I, which checks it alongside the structural component, which is 'full' in a tensed clause and checked against a lexical DP, but 'null' (as in Chomsky 1995) in control contexts and checked against PRO.

(83) Eduardo ha visto a Roberto.
Eduardo has seen A Roberto

We may observe now that there is a correlation between the structural Case parameter and auxiliary selection. Hebrew hardly ever uses its sole auxiliary, so it cannot serve for that purpose, but as we saw, Spanish differs from French and Italian also in its use of auxiliaries. While the later must select *be* when reflexivization or expletivization apply, Spanish keeps *have* in such environments. So the question is what could be behind this correlation.

We assume the accusative Case feature is inserted on the base verb entry in the lexicon. (For the precise conditions under which this happens, in terms of θ-cluster composition, see Reinhart 2003). It is then up to the Case parameter to determine what this feature consists of in a given language. In all languages it contains the thematic component (as required by the θ-criterion), but in languages set for the structural accusative Case, it contains, in addition, the structural component. We assumed, next, that the accusative feature of the verb is affected by arity operations. This can happen in two ways. If the operation applies in the lexicon, the operation itself reduces the Case. (See the discussion of (25b).) If the operation applies in the syntax, a special Case absorbing morphology is at work, as with the Romance *se*/*si* clitic. Once we distinguished between the two components of the accusative feature, more attention is needed to this mechanism of Case reduction. The minimum it should capture is the elimination of the thematic Case component. Since the original thematic argument of the verb is not realized syntactically, the thematic component can never be checked. Let us assume that is all it does in the two instances just mentioned.

The Romance se/si clitic, then, reduces the thematic component of the accusative. For Spanish, this settles the Case problem, since the verb only has the thematic component of the accusative Case. But in French and Italian, which also have the structural component, there is still the structural accusative residue to be checked. Our hypothesis is that the auxiliary *be* must be used whenever there is such an accusative residue.

The question why this is so, as well as the precise implementation of this hypothesis, are still open to several construals. It is reasonable to assume that it is not the auxiliary itself that checks the accusative residue, since the same residue is there also in derivations not using an auxiliary. So the choice of *be* is just a reflex of some checking procedure. Most likely, the accusative residue is handled in some inflection projection; namely, a checking element is present in that projection, regardless of whether an auxiliary is realized. The presence of this checking element excludes the selection of *have* when an auxiliary is needed. Possibly, this is for reasons of the type outlined by Ackema (1995) and Friedemann and Siloni (1997): The default auxiliary *have* has structural Case of its own to check. Hence, it is in conflict with the attempt of the derivation to get rid of a superfluous structural Case. Let us leave these questions open here, and move on to the next auxiliary puzzle.

The fact that Dutch and German use the auxiliary *be* with unaccusatives suggests that, just like French and Italian, they are set for structural accusative Case, namely there is an accusative residue after the arity operation reduces the thematic Case. (In the case of German, there is also independent morphological evidence for the existence of structural accusative.) But the puzzle they pose is why this is so only with unaccusatives. As we saw in detail, reflexivization has precisely the same effect on accusative Case, as the formation of unaccusatives, so we may expect the use of *be*, as in French and Italian.

We already have the answer at our disposal. As we saw in the discussion of (81), Dutch and German *zich/sich* are structural Case checkers. (While they cannot check thematic Case, they can check structural Case.) Unlike the Romance *se/si*, which is a clitic, *zich/sich* behaves as a standard DP, though it is referentially defective. Dutch and German, then, have the option of inserting this element in the position where it can check structural Case, just like with standard arguments. In the Dutch (84a), *zich* occurs in the complement position. This is not a θ-position, since the θ-role was bundled with the Agent by the reflexivization operation. But the verb still has its structural Case to check, which *zich* can do.

(84) a. Max $\text{wast}_{\text{ACC-S}}$ zich
Max washes ZICH ('Max washes')

b. Max heeft zich gewassen $_{\text{ACC-S}}$.
Max has ZICH washed ('Max has washed')

c. Max heeft Lucie gewassen $_{\text{ACC T+S}}$. (Max has washed Lucie)

In French and Italian, where the clitic only absorbs the thematic Case, the structural residue requires the insertion of some abstract Case absorber in the Inflection projection, which will then force the auxiliary *be*. But since there is no such residue in Dutch, no further checking is needed, and the auxiliary remains *have* (84c), just as with standard accusative arguments (84c). The only difference is that in (83c) the verb has both structural and thematic Case, both checked by *Lucie*, while in (84b), the verb has only structural Case, as reflexivization has reduced the thematic part.

With an unaccusative entry, the Case situation is identical. The arity operation that reduces the external θ-role, also reduces the thematic accusative, but since these languages also have structural accusative, the latter remains to be checked. (The unaccusative verb entry for *breken* ('break'), then, is *breken* $_{\text{ACC-S}}$ θ_2.) But here, the remaining argument must be realized internally (and then move to satisfy the EPP). Hence, there is no position where a *zich* type element can be inserted. In this case, Dutch and German have to resort to the same mechanism of inflectional checking, as in French and Italian, and the derivation will use the auxiliary *be*.

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