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THE THETA SYSTEM: SYNTACTIC REALIZATION OF VERBAL CONCEPTS.

Contents:

0. Introduction: The concepts interface.[1]

The specific problem I address in this study is what makes it possible for the same lexical verb-entry to realize in dramatically different syntactic configurations. But it turned out impossible to resolve this question without touching the broader question of the relations between the systems of concepts and the computational system (syntax).

The general picture I assume is that the Theta system (what has been labelled in Chomsky's Principles and Parameters framework 'Theta theory') belongs to the systems of concepts: It can be viewed as the central system of the systems of concepts - the system whose outputs (or some of them) are legible to the computational system (CS).

To see what this means, it may be useful to recall the 'ape' thought-experiment of Chomsky (1998). Imagine an ape that, by some mystery of genetics, has developed all the cognitive and articulatory systems of humans, except language. He has the same innate system of concepts, a system of inference (logic), systems enabling contextual orientation, an articulatory system identical to humans, and a perception system enabling him to perceive the sounds it generates. But since he has no language system, all these innate abilities are useless. Since nothing links his concepts to sounds, he cannot communicate with his fellow apes. But worse, he cannot even communicate with himself, or think: He has both the concepts and the inference system that enables, in principle, constructing out of these concepts theories about reality. But these two systems cannot read each other, since the inference system operates on propositions, and not on concepts, and to generate propositions, one needs a language faculty. So our ape cannot make any use of even these two systems. The goal of linguistic-theory is to find out the minimum necessary to construct a computational system that enables the interface of all these cognitive systems.

In the modular view of Fodor and Chomsky, the cognitive systems operate independently of each other, and generally, the information processed in any given system is not legible to the others. But for the interface to be possible, each system should contain also some information that is legible to other systems. Possibly, a system can also pass on information that is not legible within that system, but which is legible to others. We may assume that for each set of systems, there is some central system that gathers information that may be legible to the other sets of systems, and it is this system that enables the interface.

As I said, I assume that the Theta system is the central system of the systems of concepts. The Theta system contains (at least) lexical entries, which are coded concepts, the θ-relations of verb-entries, and a set of operations on lexical entries. The inputs of the CS (syntax) are lexical items selected from the Theta system. Its outputs are representations legible to the Inference, Context,

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and Sound systems. My concern here is the concepts interface - the interface of the Theta system with the CS and, indirectly, with the Inference systems.

For the outputs of the Theta system to be legible to both these systems, they need to be formally coded. I will propose that the coding of θ-relations is a set of two binary features, of the kind assumed in phonology. These define eight feature clusters, which are what has been labelled θ-roles. These features are also legible to the Inference systems, and hence they are not erased in the CS, but are passed on through the derivation. (I discuss their legibility to Inference, namely their contribution to the meaning of sentences, in section 4.)

But other features of the Theta system may be legible only to the CS. The central feature enabling the interface between the Theta system and the CS is the accusative-case (ACC). I argue that this feature is coded already in the Theta system: Following Chomsky (1995), it is attached to two-place verb entries, as well as to a θ-argument selected within the Theta system. This feature may not be legible even to the Theta system itself, but it is legible to the CS, and enables it to determine the order of merging, as well as other properties of the derivation. Since it is not legible to the Inference systems, it must be erased during the derivation. In section 7., I discuss the effects this has on morphology and auxiliary selection.

With this general picture in mind, we may proceed to examine more local and specific questions.

1. Operations on lexical entries

As is well known, what appears to be the same verb, may often show up in very different syntactic realizations, as in the following examples.

1 a)   Max washed the child (Transitive)
   b)   The child was washed. (Passive)
   c)   The child washed.   (Reflexive)

2 a)   Max peeled potatoes
   b)   Potatoes were peeled.
   c)   Potatoes peel easily.   (Middle)

3 a)   Lucie rolled the ball.
   b)   The ball was rolled.
   c)   The ball rolled.   (Unaccusative)

4 a)   The coming exam worries Max.
   b)   Max worries.   (Subject-Experiencer)
5 a)   Jouw gedrag verbaast hem.
        (Your behavior surprised him)
   b)   Hij verbaast zich
        (He surprises SE = He is surprised)

In addressing such phenomena (or lexical properties in general), two distinct questions have been at times conflated: One is the question of the mapping (linking) of the thematic specification of

the lexical entry to syntactic structure, namely, which theta role should realize in which argument position. This is addressed by principles like the Theta criterion of Chomsky (1981), Baker's (1988) UTAH, or Grimshaw's (1990) mapping of argument-structure to syntactic structure, as well as many other linking proposals. Broadly, such principles are set to determine, first, the number of arguments that need to be selected from the lexicon for each selection of a verb. Next, mapping-hierarchy principles guide the order of merging these arguments into the derivation. Though the later question will come up as we proceed, it is not my major concern here. To avoid this issue, when it is not crucial for the discussion, I will follow the notation proposed in Williams (1981), where the mapping is built into the lexical entry: θ_1 stands for the external argument, and θ_2 for the internal (**patient/theme**) argument. The intuition underlying this notation is that these indices are generated within the Theta system (of concepts coded in a lexicon), and they are visible to the CS, as instructions for merging. Thus, the θ_2 argument is the first to merge, as the V-complement; θ_1 is the last, and other arguments are merged in between, according to their index. In sections 5.2 and 7., I argue that the 'merge first' property is the crucial link between the Theta system and the CS, and it is marked with the accusative feature already in the lexical entry. Hence the index (θ_2) is superfluous for a θ-argument with the accusative feature. But the other θ-arguments still raise questions of the order of merging.

The other question is the structure of the lexicon itself, e.g. do the verbs in each group above, which appear to have different thematic structure, correspond to one or more lexical entries. From the perspective of the first question, there is no problem in assuming massive ambiguities in the lexicon (e.g. that the three verb realizations in (1) correspond to three lexical entries), and all that is required is that the merging (mapping) rules associate each θ-role correctly with an index, i.e, with a syntactic position. The lexicon is finite, so conceptually it may seem possible to assume that no particular theory is needed for it, and that it consists of a large, possibly idiosyncratic, list of concepts. Nevertheless, in practice, work on the lexicon is guided by the perception that there are generalizations relating apparently distinct items, which could not be just an accident. Thus, it is taken for granted that the lexical entry underlying all three realizations of wash in (1) is the two place verb - wash ($\theta1$, $\theta2$).

Let me tentatively state one such generalization, in its strongest form, which could serve as a theoretical hope, when analyzing the lexicon. As just mentioned, I believe that (6) only states an implicitly assumed principle which guides, anyway, the research of lexical structure.

6)   Lexicon Uniformity Principle.
         Each verb-concept corresponds to one lexical entry with one thematic structure. ---> The various thematic forms of a given verb are derived by lexicon-operations from one thematic structure.

(6) assumes that each verb is associated with one and only thematic structure, from which other thematic forms can be derived by a limited set of lexicon operations. Obviously, this is only an initial statement. In any case, if it is impossible, empirically, to derive all different thematic forms of what appears as one verb, (6) leaves the option that these are, indeed, distinct entries, which code distinct verbal concepts, and are just accidentally, or historically, related (homonyms)[2].

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[2] Note that (6) is stated here only for the verb-category. It has been argued that category

For (6) to be feasible at all, the set of possible lexicon operations should be fully defined. In practice, various such operations on thematic roles are widely assumed, under various formulations, most notably, in the work of Williams (1985) and Grimshaw (1990). I believe that the various operations can be reduced to just two, which we may label 'saturation' and 'reduction'. (Another, more restricted, operation of causativization will be mentioned in section 3.4.2). Their most obvious instance is passivization, for the first, and (intrinsic) reflexivization, for the second, (the operations which Grimshaw (1990) labels 'suppression' and 'lexical binding', respectively). Their semantic effects are best analyzed in Chierchia (1989): The operation of saturation closes existentially one of the verb's arguments. Thus, it is realized semantically, though it does not project as a syntactic argument. Some (well known) tests for the semantic availability of saturated roles will be mentioned shortly. A reduction operation applies to a two place relation, identifies two argument, and reduces the relation to a property. The two operations are schematically illustrated in (7).

7)   Operations on θ roles.
    a.   <u>wash</u> θ_1, θ_2
    b.   **Saturation:** $\exists x$ (<u>wash</u> (x θ_2))
          Max was washed <---> Ex (x washed Max)
    c.   **Reduction**: <u>R(wash)</u> θ_1
          Max R(washed) <--> Max λx(x wash x)

When saturation applies, the interpretation always corresponds to that with two of the arguments being syntactically filled. E.g., with saturation applying to θ_1, and <u>Max</u> selected for θ_2, we get the passive derivation, which is interpreted as in (7b). Reduction creates an intransitive entry, with one role to fill syntactically. In the case of reflexives, reduction is interpreted as (schematically) in (7c). For more precise analysis of the semantics, see Chierchia (1989). The lexicon operations may require a morphological marking in syntax, or not. E.g. in Dutch, lexical (intrinsic) reflexivization still marks the original argument (<u>Hij wast zich</u>), while in English, it does not (<u>He washed</u>).

Reduction is much more restricted than saturation. Reinhart and Siloni (forthcoming) argue that it can apply only to a pair of roles one of which is the external role. (I return to this point, as well as to the interaction of reduction and saturation in section 2.2.) Saturation, on the other hand, is a broad operation, and it can apply either to the external role, or to the internal one[3]. I discuss here

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shifting may alter the thematic structure. E.g. Grimshaw (1990) argues that result nominals do not have an argument (theta) structure at all. Probably, adjectival passives (unlike verbal passives) also do not have the same thematic structure as their verbal form. Possibly, such category shifts could be reduced to general lexicon operations as well, but I will leave this open here, and concentrate on operations within the verb-category.

[3]Chierchia and others suggest that the optionality of the internal argument of many verbs (what used to be called indefinite object deletion) may turn out to be an instance of saturation of this role, as in (i).

only instances relevant to the subsequent discussion. Many other can be found in Williams and Grimshaw's work.

An instance where both external and internal saturation can apply is impersonal passives in Dutch. It is possible for transitive verbs to occur in such structures, with the object realized, as in (8). Saturation applies here to the external argument, and following the standard interpretation of saturation, these are interpreted as given in (8).

8)   Er werd een kind gewassen. ∃x (x washed a child)
         (There) was a child washed.

9)   Er werd gewassen. ∃x ∃y (x washed y)
         (There) was washed.

But the internal argument can also be just saturated, rather than syntactically realized, as in (9). We then have an instance of saturation applying to both arguments, interpreted as given in (9).

Though this has been extensively debated, I assume that middles are also an instance of saturation of the external role, i.e. the middle peel in (2c), like the passive in (2b), is derived in the lexicon from the transitive entry (2a), though middles differ from passives on other aspects.[4]. If true, this role should be available semantically, though it is not realized syntactically. The clearest test for an available agent role is the occurrence of an instrument role, which is licensed only if an agent role is present (overtly or implicitly). Indeed, this is possible as in (10). For comparison, the unaccusative verbs in (11), which clearly lack an external role cannot occur with

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i)   Max is reading
         Ex (Max is reading x).

With external arguments, the lexicon operation has a morphological marking (passive), and is quite free. With internal arguments, it is restricted. (While ?It is Max who hit first, is possible, with stretching, in the right context, *It's Max who threw first seems less so.) Further work on the lexicon may attempt to define the restrictions on saturation that would explain that. Another question which needs to be addressed before this can be maintained is what happens with the accusative case in such structures.

[4]Among the range of options proposed for the analysis of middles, one finds the idea that the external argument is realized as PRO, and the opposite, that it is absent altogether. Though space disallows going into the problems with these approaches, the analysis I follow is consistent with Roberts (1985), Ackema and Schoorlemmer (1995) and Ackema (1995), where these problems are discussed in detail. On this analysis, the external role is saturated. However, unlike in passive, the internal (patient) role is realized directly in external position, with no movement. Chierchia (1989) assumes a special kind of saturation for impersonal sentences, with a variable he defines as ARB(itrary). Possibly, similar semantics is involved in the saturation of the middle external role. There are many remaining problems to solve with middles, which I will not enter here.

an instrument[5].

10   a)   Potatoes peel easily with our new knife.
        b)   Hair combs better with a golden comb.

11   a)   *The ice defrosted with a hair-fan.
        b)   *The machine stopped with a stick.

Next, in both passive and middle the saturated role can control oneself, as in (12), or PRO, as in (13).

12   a)   Passive: Asparagus should never be cooked for just oneself.
        b)   Middle Asparagus never cooks well for (just) oneself. It definitely requires company.

13   a)   Passive: The potatoes will be peeled after PRO boiling them.
        b)   Middle: The potatoes will peel easily after PRO boiling them.
        c)   Unaccusative: Babies often roll/turn after PRO putting them in bed.

In both (13a,b) it is not necessarily the case that the peeler and the boiler are the same person, but it is a possible interpretation. Again, this is impossible in the unaccusative (13c), which cannot mean that the children are rolled by those who put them in bed. Typically, such control is possible only if the original role still exists, as with saturation.

This still leaves unexplained the unaccusative and experiencing alternations, illustrated in (3) - (5). Semantically, it may appear that The ball rolled is equivalent to something like Someone or something rolled the ball, and Max worries to Something worries Max. These readings could be derived if the external role of the transitive entry is saturated, as in middles. However, there is ample evidence that this cannot be true. All tests clearly indicate that there is no residue of an external role in unaccusative and experiencing verbs. For the first, this was illustrated in (11) and (13c), but the same is known for the second as well. As widely observed, these verbs also cannot occur in the impersonal passive structures above, which require the existence of an external role to saturate.

The standard view (until recently) has been, therefore, that unaccusative entries, and one-place

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subject-experiencing verbs are listed as independent entries. If a transitive entry for what appears to be the same verb also exists, this is just an accident. Thus, the verb <u>break</u> has in English the two separate entries, in (14)

14   a.   <u>break</u> $<\theta_1, \theta_2>$: Lucie broke the plate.
          b.   <u>break</u> θ_2: The plate broke.

If so, then such entries violate the uniformity principle (6) (which is why (6) has not, indeed, been explicitly assumed so far as a committal principle.)

However, I will argue that unaccusative and one-place experiencing entries do originate as two place predicates, and they are derived from their transitive alternate by a reduction operation, rather than saturation (as proposed, for the first, by Chierchia (1989)). For unaccusatives, I will do that in detail, and then I turn more briefly to experiencing alternations in section 5-6.

2. The unaccusative problems.

2.1. The questions:

Two apparently independent questions arise in the standard view that unaccusatives are listed individually in the lexicon (as verbs selecting an internal θ- argument only). Ideally, we would like the answer to both to follow from the same analysis:

Question A: Learnability and legibility. As pointed out in Levin and Rappaport (1992), and Borer (1994), if the set of unaccusative verbs is just an arbitrary list in the lexicon, this poses a certain learnability problem. This is particularly noticeable in a language like English, where there is no morphological marking of unaccusativity, and very little syntactic evidence for movement in unaccusative structures. The child has to learn that the sentences in, e.g. (15), have completely different syntactic structures.

15   a)   She dances gracefully.
          b)   She$_i$ moves t$_i$ gracefully.

If in activating the lexicon, the English speaking child has to determine individually for each one-place verb if it is unaccusative or not, it is not obvious what he could base his decisions on. This problem would be avoided if the set under consideration could be defined, namely there would be a certain semantic or lexical property which the child can use to identify a verbal concept as corresponding to an unaccusative verb.

We should note that the learnability problem here does not have the formal properties of that problem in syntax. Since the lexicon is finite, nothing excludes formally the option that the full information on lexical merging (mapping) is coded in the theta system for each verbal concept. If so, then as soon as a verbal concept is activated, this information is available. The problem is more analogous to that of word-level phonology, where it took some effort to prove that it is not learnt and stored as an arbitrary list, although the number of words in each language is finite.

The other side of the learnability coin is the problem of legibility: Unaccusative verbs determine a cluster of properties of the syntactic derivations in which they occur. So it is clear that the fact that the verb is unaccusative should be somehow legible to the computational system (CS). One property associated with these verbs is that they do not assign the accusative case (Burzio's generalization), so they do not carry the ACC feature. This is a property clearly legible to the CS, but the way this observation has been captured, it is not sufficient to determine the unaccusative properties of the derivation: Unergative verbs also do not assign accusative case, and still their derivational properties are dramatically different. Furthermore, I will argue that (contrary to the prevailing belief) reflexive and subject-experiencer derivations are also unergative, although they share with unaccusatives both the lack of accusative case, and some inflection and morphology properties[6]. So the question remains how the CS 'knows' when a derivation should have the unaccusative properties.

Question B: Reflexive morphology. It has been widely observed that in many cases unaccusative and reflexive verbs have the same morphology. In Italian, many unaccusative verbs occur with the reflexive clitic si, as in the examples in (16).

16)   *Italian*
        romper-si =break
        scontrar-si =collide

In Hebrew, intrinsic reflexivity, as well as most other lexical processes, is coded in the verb morphology. There are several verbal- morphology forms ('binian's) an unaccusative verb can take, but many occur in the same form of intrinsic reflexive verbs - the so called 'hitpael' verbal form.

17)   *Hebrew:*
        a.   <u>Reflexive verbs:</u>
                hitraxec,   hitlabesh,   hitgaleax,   histarek
                wash,   dress,   shave,   comb

        b.   <u>Unaccusative verbs:</u>
                hitgalgel,   hitmotet,   hitalef, hitkamet
                roll,   collapse,   faint,   wrinkle

In German and in Dutch, the common form of the unaccusative is just bare verb (similar to the

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[6]In fact, there are also empirical problems with the assumption that if a role is marked as internal the unaccusativity properties of the derivation necessarily follow. In (i) the derivation has an accusative case, although no external role is realized.

i)   It worried/angered/surprised him that I yawned.

I discuss such cases in section 6.3.

standard unergative intransitive). But we nevertheless find verbs of the unaccusative family which occur obligatorily in the reflexive form. Thus while <u>break</u>, in German, looks like a standard unaccusative, in (18b), <u>open</u> has only the reflexive form (18a).

18) *German*
    a.   Die Tur offnete sich /The door opened,
    b.   Die Tur zerbroch / The door broke

There are also cases where both a reflexive and an unaccusative form are allowed for the same verb, as in (19).

19   *Dutch*
    a)   De suiker is (onmiddelijk opgelost in de thee).
        The sugar BE dissolved
        The sugar (immediately dissolved in the tea.)

    b)   De suiker heeft zich opgelost.
        The sugar HAVE dissolved SE (itself)
        The sugar dissolved.

The reflexive form of unaccusatives is much rarer in Germanic than in Romance. Still, if the two are unrelated, it is not clear why we should find any intersection at all.

We should add another system of marking a reflexive process - the null-marking system of English. Though this may appear trivial, it still remains the case that in English, therefore, unaccusatives and reflexives end up having precisely the same form (<u>Max shaved</u>, <u>The stone rolled</u>).

In sum, a lexical reflexive process can be marked:
i. On the inflection system (Italian <u>si</u>).
ii. On the argument (Dutch <u>zich</u>)
iii. On the verb morphology (Hebrew)
iv. Nowhere (English).
The same marking is found in these languages also with unaccusatives, (though not necessarily in all unaccusative verbs). The question is why this should be so.

Both questions A and B have been widely addressed. Let me, first, take the time to argue that, nevertheless, neither is answered.

2.2. Question A: Can it be Aspect?.

There is a very lively line of research which attempts to define the set of unaccusative predicates by their aspectual properties (van Valin (1990), Borer (1994), van Hout (1994), to mention just a few)[7]. Borer and van Hout argue that unaccusatives are those one-place predicates which denote events (accomplishments or achievements)[8]. The strongest motivation comes from the case of directional predicates, like run to the park. In Dutch and Italian, such predicates select the auxiliary be, and show other syntactic properties characteristic of unaccusative derivations. This contrasts with, say, run in the park, which is unergative and selects have. Since the directional run is (aspectually) an event, and the other is a state, the aspectual definition of unaccusative verb predicts that the first is unaccusative, while the second is unergative.

If correct, the aspect approach would provide a satisfactory answer to question A above. The literature on the semantics of unaccusative predicates is ripe with ad-hoc semantic distinctions, which never got defined (in terms of truth conditions), hence are hardly useful. (It is always possible to provide an apparent explanation for everything, if one is free to invent one's informal semantics for each new problem.) This is not the case with the aspectual distinctions, which on the one hand, are known to be a real linguistic phenomenon, with a substantial role in determining the truth conditions of sentences, and on the other, they form one of the better understood areas in formal semantics. Let me review briefly some of the basics.[9]

Over the years it was discovered that the semantically relevant distinction is just between two classes (rather than the four of Vendler (1967)). Following Bach (1982), **states** include both statives (Vendler' states) and activities; **events** include accomplishments and achievements. Vendler's subdistinctions have no truth-conditional effects. As already stated by Vendler, the crucial semantic property distinguishing states and events is **homogeneity**, the same property that distinguishes mass-nouns from count-nouns. State predicates and mass nouns are homogeneous, event-predicates and count nouns are not. The most useful analysis of temporal homogeneity, in my view, is still that based on ideas in Bennet and Partee (1972)[10]: Events denote temporally only one interval i.e. they do not have sub-intervals, while states do: If an event E (a property instantiation of an event predicate) occurs in a given interval i, then there is

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[7]This was also the line first taken by Levin and Rappaport (1992), but they retracted in their (1995) book.

[8]To be precise, van Hout argues only that event one-place verbs are always unaccusative. This weaker claim may be true, but then no answer is actually given, in her approach, to the question which one-place verbs are unaccusatives.

[9]An excellent summary of the semantic literature can be found in chapter 2 of Hinrichs (1985).

[10]They do not state it precisely this way. This is the interpretation of Bennet and Partee proposed in Dowty (1986) and Reinhart (1986), although they state it in terms of truth of a proposition in an interval.

no subinterval of i, in which E can be said to occur. If a state S occurs in i, there must be also some subinterval of i at which S occurs. Let us see this with an example.

20   a)   Max lived in Chicago between 1928 and 1931.
      b)   Max drove his car between 8 and 12.

21   a)   Max wrote two novels between 1928 and 1931.

If (the stative) (20a) is true, then there must also be some time unit shorter than the given 3 years, in which Max lived in Chicago. Similarly, if (the activity) (20b) is true, then there must also be some time unit, shorter than 4 hours, between 8 and 12 in which he drove his car (even if he made many coffee stops). Thus, both sentences in (20) are states. But if the eventive (21) is true, then there is no possible entailment that at any time shorter than these three years Max wrote two novels. Abstracting away from intervals, the same distinction is found between mass and count terms. Given a piece of gold, there must be some subpart of it which is also gold. While there is no subpart of a man or a table, which is also man or table.

As is always the case with significant semantic generalizations, there are many semantic properties of sentences (entailments) that follow directly from this definition of states and events. For brevity, I will illustrate these later, together with my next point.

I should mention that along with the formal-semantics approach to aspect, there are other traditions, stemming from descriptive philology and discourse studies, whose key notions for defining events are 'end-points' 'delimitation' or 'measurements of events', under various formulations. Often, the drive behind this work are real shortcomings of the formal-semantics theory of aspect, namely, that it has not formulated so far the compositional derivation of aspectual properties. However, the notions used to solve this problem in the 'end-points' framework are undefined, and are, probably, undefinable. The reason is that these may denote properties of situations in the world, but not of predicates (or propositions). E.g. in both examples of (20a) and (21), the reported states of affairs are equally delimited, measured, or have specified endpoints (They happened between 1928 and 1931). Let us assume further that Max lived elsewhere before 1928, and died in 1931, so there is no doubt that the state of affairs reported in (20a) could not stretch beyond these delimiting years. Still, this does not make (20a) an event in any linguistically relevant sense. Specifically, it does not have any effect on the entailments we observed, or the others to be mentioned. The same is true for the activity-predicate in (20b). Though the motivation is a real problem, and research in these directions has found many important facts and generalizations, no real progress on this problem can come from replacing whatever little is understood already with undefined notions.

Assuming, then, the defined notion of 'event', we may return to the question whether unaccusative predicates are events. If we leave aside for the moment the problem with directional predicates, we can see that this claim is incorrect (See also Ackema, 1995, IV). Looking at the sample set of verbs normally classified as unaccusative, in (22), we find both events and states (activities).[11]

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[11]That the state-verbs are indeed unaccusative was tested for Dutch. One of the tests is the pre-nominal position of past participle, which is allowed only with unaccusatives. Thus, <u>grow</u>

22) **Events:** freeze, melt, blush, wither, wrinkle, open, break, drown, die, arrive, fall.
States: grow, develop, increase; blur, worsen; move, drift, slide; spin, swing.

As I mentioned, there are various entailments depending on the state-event distinction. We may observe them now, for the groups in (22). The conjunction in (23a) entails that the events reported are temporally ordered. If we reverse the order of the conjunction, as in (23b), we get the reverse temporal-order entailment. So, (23a) and (23b) are not equivalent. Same with (24). This is not a general property of conjunctions. Those in (25) do not have this entailment: (25a, b) are equivalent. Same with (26).

23   a)   The door opened and broke.
     b)   The door broke and opened.

24   a)   The leaves withered and dropped.
     b)   The leaves dropped and withered.

25   a)   The vacuum cleaner spanned and moved
     b)   The vacuum-cleaner moved and spanned.

26   a)   The child grew and developed.
     b)   The child developed and grew.

This is not a matter of some vague world-knowledge effects. A well established generalization (Kamp (1979), Partee (1984)) is that a temporal sequence is obtained when both conjuncts denote an event, as in (23), (or, at least one of them does, under certain circumstances). But when both are states, as in (25-26), no temporal entailment holds.

Another set of entailments (discussed in Reinhart (1986)) has to do with termination. While past tense events entail (loosely) that the event has ended, a past tense state does not:

27   a)   The vase broke ---> The vase is no longer (in the process of) breaking.
     b)   The apple dropped --> The apple is no longer dropping.

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patterns with <u>fall</u> in (i), as opposed to the unergative in (ii). (Examples are from Ackema, 1995: 177-178.) All activity verbs in (22) behave as in (i).

i   a)   de jarenlang gegroeide tegenzin (/toegenomen)
          the for-years grown   dislike (/increased)
     b)   de gevallen/gestorven pianist
          the fallen/ died

ii) *de gewerkte/ gelopen pianist
     the worked /walked

28) a) The tree grew ~----> the tree is no longer growing.
     b) He drifted (away) ~ --> He is no longer drifting.

Both the termination and the sequence entailments follow from the semantic definition of states and events above (and its interaction with reference-time). The way this works was outlined, e.g. in Dowty (1986), Reinhart (1986) and Hatav (1989, 1993), though space does not permit showing this here.

The only remaining motivation for the aspect approach, then, is that when an unergative verb occurs with a directional PP (like <u>run to the park</u>) it shows clear syntactic properties of unaccusatives[12]. However, a convincing alternative account for why this should be so, independently of aspect, is proposed by Neeleman (1994) and Ackema (1995). Very roughly, they argue that the thematic (predicative) properties of directional PPs enforce complex predicate formation, requiring that the PP subject must be identical to the matrix subject. This requirement can be best satisfied if the subject is merged (generated) in the internal position, and a chain is formed.

In conclusion, given the clear contrast in the entailments of the state and events unaccusative predicates above, nothing seems to be gained by grouping unaccusatives into one vaguely defined aspectual class. Question (a) - what are the semantic properties that defines the set of unaccusatives and enable the child to identify them - remains unsolved.

2.3. Question B: Reflexives are not unaccusative.

Turning to the second question - why we often find reflexive morphology on unaccusatives - an available answer is that it is, in fact, the other way around: Reflexive derivations are themselves unaccusative. Hence it could be argued that the morphology at question is unaccusative morphology, which is found also on reflexives, or in any case, that there is nothing surprising about their morphological similarity, given their syntactic identity. To judge by the list of its defenders, this appears to be the dominant hypothesis regarding the structure of reflexives. (- Marantz 1984; Grimshaw 1982, 1990; Bouchard 1984; Kayne 1988; Pesetsky 1995; Sportiche 1998 and others.). The starting point of these studies is reflexive clitics in Romance, as in (29b). What initiated this line was not so much the question of the morphological similarity of reflexives and unaccusatives, but the fact that the BE auxiliary shows up in Romance both in unaccusative and reflexive structures.

29 a) Jean l_i'a tue t_i
         Jean him$_{cl}$ has killed

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[12]It has also been suggested that directional <u>run</u> is not unaccusative, but auxiliary selection is, independently, determined by aspect, with events selecting <u>be</u>. However, many arguments against associating auxiliary selection with aspect are pointed out in Everaert (1994) (and see also references cited there). There is also additional evidence that unergatives with a directional PP do indeed have unaccusative syntax. (Neeleman and Ackema, below).

b)   Jean s'est tue
        Jean SE$_{cl}$ is killed /Jean killed himself.

c)   <u>Movement analysis:</u> Jean$_i$ s'est tue t$_i$.

Despite the superficial similarity of the pronominal and the reflexive clitics in (29), Kayne (1975) has shown unequivocally that the movement analysis standardly assumed for the first, is impossible for the second. So the clitic must be base-generated (merged) in its overt position. (Cinque (1988), argues that Italian <u>si</u> always resides in the head position of some I projection.) While that much, I believe, is shared by all approaches to clitics, the unaccusative approach assumes further that the subject in (29b) is base generated as object, and moves to its overt position, as in (29c). Regarding execution, there are two schools: In one, the external θ-role is absorbed in the lexicon, or is otherwise not there (Grimshaw, Bouchard, Marantz). In the other, the reflexive clitic itself realizes the external argument (Kayne, Pesetsky, Sportiche).

Though these studies are based on evidence from Romance clitics, most assume that the analysis extends universally to all forms of reflexives across languages. Thus, they argue against the more traditional assumption of section 1, that the reflexive entry is derived from the transitive one by a reduction operation that reduces the internal role[13].

Reinhart and Siloni (forthcoming) defend the traditional reduction- view of reflexives. Here I will only summarize some of the points. Let us first look at the two major arguments brought up against it and in favor of the unaccusative approach.

The strongest argument against the reduction view is Marantz' (1984) examination of reflexivization into small clauses, as in (30b). (Marantz illustrates this in Icelandic (his 4.76). But the same point can be made for French:)

30)   a)   Jean$_j$ le$_i$ croit [t$_i$ intelligent]
                (Jean$_j$ believes/considers him$_i$ intelligent)

        b)   Jean se croit [intelligent].
                (Jean believes/considers himself intelligent.)

31) <u>Marantz' analysis of (30b)</u>
        a.   DS: e se-croit [Jean intelligent]
        b.   SS: Jean$_i$ se-croit [t$_i$ intelligent].

With the pronominal clitic of (30a), no problem arises, since the clitic originates as the subject of

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[13]Grimshaw's (1990) execution is still compatible with the reduction operation, except that she assumes that it is the external role which is reduced (bound in the lexicon to the second θ-role, in her terminology.) She assumes that the reflexive clitic is a valency reducing morpheme which signals the process of lexical binding (reduction). Her analysis would not, therefore, handle the (Marantz) problem in (30) below.

the small clause and moves. However, as I mentioned, this was independently shown to be an impossible analysis for the reflexive clitic in (30b). Now, the reduction view would appear to work for (29b), assuming that a reduction operation took place in the lexicon, and se just marks that it took place. But it cannot work for (30b), since the two arguments it needs to operate on are not coarguments of the verb croit, and the complex predicate croit intelligent cannot possibly be listed as a lexical entry. By contrast, the unaccusative analysis assumes that the external role of croit is missing, as in (31a), and the sentence is derived as in (31b).

This is indeed a decisive argument against lexical reduction, but note that it holds only for clitic languages. We do not find, e.g. anything like (32a) in Hebrew, which reflexive-marks the verb, or (33a) in English, which uses no marking (as should be the case if reflexives are universally unaccusative). In these languages, a SELF-anaphor must be used here, as in (b).

32   a)   *Jean mitxashev inteligenti
            Jean self-considers intelligent

      b)   Jean maxshiv [et acmo inteligenti]
            Jean considers [himself intelligent]

33   a)   *Jean considers intelligent.
      b)   Jean considers [himself intelligent]

Reinhart and Siloni argue that a reduction operation can take place either in the lexicon, or in the syntax. In Hebrew, Dutch and English (my sample systems here), it is a lexicon operation, but when a clitic is available to absorb a Theta role (or case), as in the Romance-languages, it is a syntactic operation. This confirms Reinhart and Reuland's (1993) claim that clitics in Romance are not instances of intrinsic reflexivization (lexicon-reduction, in the current terminology). It also correlates with the fact that in clitic languages, reflexivization is a productive process, while in languages with a lexical process it is restricted to a fixed set of lexical items[14].

Nevertheless, Reinhart and Siloni argue that the reduction operations (whose full scope will be explored in the subsequent sections) obey precisely the same constraints when they apply in the lexicon and in the syntax. In any case, if reduction is a syntactic process in French, then (30b) does not constitute any evidence that the external role is the one which got reduced, namely that (30b) has unaccusative structure.

Another popular argument in favor of the unaccusative analysis is the incompatibility of reflexive clitics with verbs lacking an external argument, as in the (b) cases below. (Bouchard 1984, Grimshaw 1990, Pesetsky 1995, Sportiche 1998.)

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[14]Note that (as argued in Reinhart and Reuland (1993)), the Dutch zich is not a clitic, but it occurs in an argument position. It is never sufficient to reflexivize a verb, as seen in (ia). In (iib), it functions just as a standard SE anaphor, observing their condition B.
i   a)   *Jan hoorde zich /Jan heard SE
      b)   Jan hoorde [zich zingen] /Jean heard [SE sing]

34   **Passive**
        a)   Gianni gli   e stato affidato.
                Gianni to him was entrusted.

        b)   *Gianni si e stato affidato.
                (Gianni was entrusted to himself)

35   **Raising**
        a)   Jean leur   semble etre intelligent
                Jean to them seems to be intelligent

        b)   *Jean se semble etre intelligent
                (Jean seems to himself to be intelligent)

This would follow particularly well from the view that the reflexive clitic always realizes, itself, the external role. Since in passive and in raising there is no external role, there is nothing that the clitic can attach itself to,so the sentences cannot be derived.

However, the same generalization easily follows also from the reduction view: Reduction (whether lexical or syntactic) can only apply if two free roles are available (one of which is external). In the raising case (35b), there are no two available roles, to begin with. In the passive (34b), the role is there, but it has been saturated (-it is not free).

Furthermore, there are cases where the unaccusativity generalization fails, while the reduction generalization works: With all due respect to the claim that the unaccusative analysis of reflexives is universal, Dutch must be an exception. Dutch zich is not a clitic (see footnote 13). Like other languages where reflexivization is lexical, it can occur only with restricted (lexically reflexivized) verbs, as in (36b) (Reinhart and Reuland 1993). Nevertheless, it surfaces in object position. So it would be extremely hard to explain how it gets there, if it originates in subject, or I position, and if the overt subject is also originally merged in that same object position. (Also, reflexives in Dutch, unlike its unaccusatives, take the auxiliary have. See example (19).) The only realistic assumption is that the subject in (36a) originates in the external position (as in the reduction analysis) and zich is the residue of the reduced internal argument. (I return to this in section 7.) So if zich is still excluded in passive, this could not follow from a requirement that it is realized externally. This is indeed the case:

36)   a)   *Jan haat zich
                 Jan hates SE
        b)   Jan wast zich
                Jan washed SE (Jan washed himself)

8   b)   Er werd een kind gewassen / $\exists$x (x washed a child)
                There was a child washed.

9   b)   Er werd gewassen. / $\exists$x $\exists$y (x washed y)
                There was washed.

18

37)   *Er werd zich gewassen / ∃x (wash (x,x))
                (there was self-washing)

Impersonal passives in Dutch can saturate one or two arguments, as we saw in (8b, 9b), repeated. However, this is impossible when the verb is reflexive, as in (37). Given the reduction generalization, this follows the same way that the Italian passive (35b) did: Since there is no free external role, reduction cannot apply.

So far, then, there does not seem to be evidence for the unaccusativity hypothesis for reflexives. The next obvious move is to check whether reflexives have indeed the syntactic characteristics of unaccusatives (which was, surprisingly, not done in most of the literature cited above). The famous test for unaccusativity in Romance is ne/en cliticization:

38   a)   Sono arrivati tre ragazzi
            are arrived three boys /three boys arrived
      b)   Ne sono arrivati tre
            (of them arrived three)

      c)   Si sono vestiti tre ragazzi
            si are dressed three boys / three boys dressed
      d)   (*)Si ne sono vestiti tre.
            (of them dressed three)

39   a)   Il s'en est casse trois.
      b)   *Il s'en est lave trois.
            Three of them broke /*washed

While unaccusatives clearly allow this cliticization, as in (38b) and (39a), with reflexives things are less clear. Italian speakers seem divided on (38d), with some categorically ruling it out, and others ruling it in[15]. Though I cannot explain this variation of judgment, such results cannot be interpreted as showing that reflexives and unaccusatives are syntactically alike. At the moment, this is an equally unsolved problem for both the unaccusativity and the reduction analyses. (Other tests for Romance are discussed in Reinhart and Siloni, where complications regarding (39) are also further explored.)

But in languages with lexical reflexivization, it can be observed decisively that reflexives behave syntactically like unergatives, and not like unaccusatives. In English, it is known that unergative verbs can form er nominalizations, as in (40), but unaccusative verbs cannot, as in (41) - Only

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[15]Grimshaw (1990) mentions, as a problem, in footnote 3, p. 184, that Cinque informed her that they are out. Correspondingly, my informants are split the same way on word-order tests.

i)   a)   E' rotolata una pietra / rolled a stone.
      b)   ?Si e' vestita una donna / dressed a woman

While everyone accepts the unaccusative (ia), those rejecting the reflexive (38d), also reject (ib).

verbs with an external argument allow this nominalization. As we see in (42), reflexives are possible here, i.e. they pattern with the unergative, and not with unaccusatives.

40   She runs so fast because she is an <u>experienced runner</u>.

41   a)   *She moves so gracefully because she is an experienced mover.
       b)   *He is a rapid grower.

42   a)   She dresses slowly because she is an elegant dresser.
       b)   He shaves slowly because he is not an experienced shaver.

A crucial point about unaccusatives with reflexive morphology in Hebrew is that they still show all the syntactic traits of unaccusativity. But the reflexives with the same morphology behave as unergative verbs.The most striking trait of unaccusatives in Hebrew, as in Italian, is that the argument can remain in internal position overtly. Still it bears subject properties: It is the DP that the verb agrees with, and it is nominative, rather than accusative. Post verbal subjects can be derived in two ways in Hebrew and Italian: The one is via the so called 'stylistic inversion' which is believed to be verb -raising out of the S-V structure, yielding [V- S-t], (as argued e.g. in Friedemann and Siloni (1993))[16]. But in the other, found only with unaccusative verbs, the subject argument which is merged in internal position, just stays there. I.e. the movement of the subject of unaccusative (and passive) structures to external position is 'optional', and the order [V-S] is obtained for them when no movement applies[17]. The distinction between these two options of obtaining V-S order in Hebrew and Italian is not always easy, since in both unaccusative and unergative structures, the V-S order is preferred when the subject needs to be stressed for interface reasons. But it is more easily observable in embedded clauses: The operation of V-raising is extremely marked there, while arguments merged post verbally may easily remain in situ. Using this diagnostics, we see in (43) that the reflexive verbs cannot occur with the subject in post verbal position. But the unaccusative verbs with the same form can, as in (44).

43   ani xoshev she /I think that
       a)   *hitraxec mishehu /washed someone
       b)   *mitlabeshet isha /dresses a woman

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[16]An alternative view is that the subject moves in such cases, as argued in Shlonsky (1987).

[17]As have often been observed, this optionality is associated with pro-drop languages, where it may be argued that a null expletive is present when the subject does not move. Within the framework of the minimalist program, where checking of EPP features is separated from checking of case features, the most readily available way to explain this is to assume that the different derivations depend on whether a (null) expletive is selected in the numeration or not. If there is no expletive, the internal DP must move to check the EPP features. If an expletive is available, then it would be inserted in the checking position for the EPP (like the overt expletive <u>there</u> in English). The nominative features of the internal argument are checked covertly (again as with <u>there</u> sentences in English).

44   ani xoshev she /I think that
        a)   hitalef mishehu /fainted someone
        b)   hitgalgel sela /rolled a stone

Another diagnostics distinguishing unaccusative and unergative structures in Hebrew is that unaccusative allows possessive datives, as in (45a), which can generally modify only the internal argument (Borer and Grodzinsky (1986). Indeed, reflexives pattern here with unergatives, as in (45b).

45   a)   ha-simla hitkamta le-dina.
                the dress wrinkled to Dina
                (Roughly, Dina's dress wrinkled)

        b)   *ha-yeled hitraxec le-dina.
                the child washed to Dina
                (Dina's child washed)

In conclusion, we saw that the unaccusative analysis of reflexives cannot be true for Dutch, English and Hebrew. The syntax of reflexives in these languages is unergative, as entailed by the reduction analysis. Whether the unaccusative analysis is feasible for Romance or not, we saw that the same facts follow also under the reduction analysis. We are left with the question of auxiliary selection, to which I return in section 7. Assuming that this question can be answered, the linguistic facts do not justify abandoning the traditional unified analysis of reflexivization and assuming, instead, two so radically different syntactic systems across languages.

But this leaves us back where we started, with no answer to the morphology question B: We have just established that unaccusatives and reflexives do not belong to the same syntactic class, showing as substantial a difference as that between unergatives and unaccusatives. If so, why can they have the same morphology?

Our goal, then is an analysis that answers both open questions A and B.

3. The Theta system.

3.1. Question B: Unaccusative-reduction.

As we saw in section 1, the standard view has been that the two entries in (14), repeated, are listed separately in the lexicon, which goes against the lexical uniformity hypothesis (6).

14   a)   break $<\theta_1, \theta_2>$: Lucie broke the plate.
        b)   break θ_2: The plate broke.

To maintain (6), two lines are in principle available: One, proposed most notably in Pesetsky (1995), is that (14a) is derived by some causativization operation from (14b). I will address this proposal in section 3.4.2. The other, which I follow, is the other way around.

In a seminal paper, Chierchia (1989) argues that the morphological similarity between reflexives and unaccusatives would be explained if unaccusatives are also derived from a two place verb, by some sort of reduction. If so, we may assume that the morphology signals that an operation on the lexical entry took place: reflexive morphology is found when reduction applies. The actual reduction operation Chierchia proposes is very different than the reduction operation we observed in (7), and is rather complex. (It applies, in fact, to an invisible **cause** verb, assumed in lexical semantics). However, technical details aside, his basic insight, that (14b) is derived from (14a) by reduction, provides the clue for the solution of the unaccusative problem, as well as to maintaining the lexical uniformity hypothesis in (6).

Let us assume (unlike Chierchia) that there is just one reduction operation, which derives a one place predicate (a property) from a two place predicate. It operates on a pair of an external and an internal role and reduces either one. This is stated, schematically, in (46), where the remaining argument (θ_n) can be either θ_1, or θ_2.

46) *Reduction*:
     $\underline{V}(\theta 1, \theta 2) \dashrightarrow \underline{R(V)}(\theta_n)$

When reduction applies to the internal role in (46), the external role is syntactically realized, and the unergative - reflexive - structure is obtained. When the external role is reduced, the internal argument is syntactically realized, resulting in an ~~unaccusative~~ structure. Thus, ~~reflexive (unergative) entries are the output of reduction of the internal role; unaccusative entries are the output of reduction of the external role.~~

The next question would be how the outputs of reduction are interpreted, i.e. what is the semantics of R. So far we saw that when the internal role is reduced (reflexive reduction), the interpretation entails identity of the two original arguments of the lexical entry. (See the discussion of (7).) When the external role is reduced (unaccusative reduction), the interpretation appears to resemble more that of expletive verbs, lacking an external role (like ~~seem~~, or ~~rain~~). I return to the questions of interpretation, and how it is derived, in section 4.. For now, we take (46) to be just an operation of role-reduction.

The morphological realization of the transitive and the reduced alternates may vary. In Dutch, Italian, and English, the verb itself has the same morphology in both. Hebrew, which has very rich verbal morphology, marks them differently. The same verbal stem occurs in two different verbal patterns (templates - 'binian's) in the transitive and the reduced form. (~~kimet/hitkamet~~ - wrinkle; ~~heziz/zaz~~ -move; ~~patax/niftax~~ -open). I return to more specific questions of the morphological effects of the reduction operation in section 7.

The widely acknowledged pattern in (14) was assumed to hold only for a restricted set of verbs (known as the ~~incohative~~ alternation). However, if we look across languages, an overwhelming majority (possibly all) unaccusative verbs have, indeed, an active transitive alternate in some language or another. E.g. ~~come~~ and ~~die~~ don't have alternates in English. However, the Hebrew verb for ~~bring~~ is the transitive alternate of ~~come~~, with the same stem but a different verbal morphology (~~hevi~~ (brought)/ ~~ba~~ (come)). Same is true for ~~die~~ (~~met~~ (died) /~~hemit~~ (killed)). Chierchia notes that ~~grow~~, which in English has both entries, has only the unaccusative entry in

Italian (crescere). The absence of a transitive alternate in a given language does not pose a serious problem for the analysis. We may assume, as proposed by Chierchia, that unaccusatives with no transitive alternate are derived from some abstract transitive verb, with the result frozen. It should not be too surprising to find that the lexicon contains some frozen forms. This is familiar from the area of intrinsic reflexives. zich-schamen in Dutch (=be ashamed), or behave in both English and Dutch are frozen reflexives that cannot be used transitively. Levin and Rappaport (1995) claim that, nevertheless, not all unaccusative verbs are derived from a transitive verb. In section 2.2.3. I will argue that this claim is unfounded.

Given this unified reduction operation, we may also expect to find other similarities between reflexive and unaccusative outputs, besides morphological marking. We noted, e.g. that in Dutch, the two lexical procedures of saturation and reduction exclude each other, as in the case of the impersonal passive, discussed in (37), repeated. As is well known, one-place unergative verbs can occur in this construction, as in (47), but unaccusative verbs cannot as in (48).

47 a) Er werd gesprongen
        there was jumping
    b) $\exists x \, (jump \, (x))$

48 a) *Er werd gegroeid.
        there was growing
    b) $\exists x \, (R(grow) \, (x))$

37 a) *Er werd zich gewassen
        there was self-washing)
    b) $\exists x \, (wash \, (x,x))$

Though widely discussed, it is not obvious to me what the contrast between (47) and (48) is supposed to follows from, if unaccusatives are just one-place predicates, listed as such in the lexicon. As we saw in (9), existential saturation can apply also to the internal argument, so why couldn't it apply to the internal argument of the unaccusative verb?. Under the present assumptions, this correlates with what we saw for reflexives, in (37), repeated above: In both, reduction is excluded since it has no two free roles to operate on.

(46), of course, is just the first step. What we have now is an extremely powerful mechanism that allows us to derive for all transitive verbs a corresponding reflexive and unaccusative entry, which is obviously not what we want. The question is if it can be restricted to generate just the actual entries. Specifically, we need still to answer question A: what is the set of actual unaccusative verbs.

3.2. θ-features.

Lexical-semantics work on unaccusatives searched the answer to question A in the properties of the unaccusative verbs themselves. In our terms, it looked at the output, rather than the input of the reduction operation. Due to this intensive research, it seems safe to conclude that the outputs of reduction do not have significant shared properties (I return to Levin and Rappaport's alternative view in section 3.4.1). Under our assumptions, question A is restated: We have to look at the lexical properties of the set of transitive verbs which underlie the unaccusatives, and search for the generalization allowing the external role to be reduced in just this set.

Laying the grounds for answering question A, let us first digress into an independent problem of θ-selection, brought up in Reinhart (1991, 1996). The standard assumption about S-selection is that the lexical entry specifies not just the number, but also the type of thematic roles a verb selects. Some commonly assumed roles are agent, cause, experiencer, instrument, and theme (or patient), among others. This works nicely for many verbs, e.g. the verbs in (51) - (52) select an agent, and nothing else is compatible with the verb. However, there is also a very large set of transitive verbs which defy this system. Thus, open allows an agent as its external θ-role, as witnessed in (49a) by the purpose-control. But it also allows an instrument (49b) and a cause (49c). The same is true for the sample of verbs in (50).

49 a) Max opened the window (in order to enter).
  b) The key opened the window (*in order to be used).
  c) The storm opened the window (*in order to destroy us).

50 a) Max / the stick / the blast rolled the ball.
  b) The painter / the brush / autumn reddened the leaves.
  c) Max / the storm / the stone broke the window.
  d) The enemy / the waves / the bomb drowned the boat
  e) Max / the storm / the hammer enlarged the hole in the roof.
  f) Max /exercises /bicycles developed his muscles.

51 a) The father/*the spoon/*hunger fed the baby.
  b) Max / *the leash / *hunger walked the dog to his plate.
  c) Max / ?the whip / *the rain galloped the horse to the stable..

52 a) The baby/ *the spoon /* hunger ate the soup.
  b) Lucie/ *The razor/*the heat shaved Max.
  c) Lucie/ *the snow/ *the desire to feel warm dressed Max

The verbs in (50) are sometimes described as causative, but this does not help us very much, since those in (51) are also causative. There is a lively literature on the lexical semantics of the verbs in (50), to which I will return, but the problem we are dealing with here is not a problem of lexical meaning, but of stating selectional restrictions (ruling (50) in, and (51-52) - out). If all we have, to account for θ-selection, is what assumed so far, then a verb like open must be listed as three entries, each selecting a different external θ-role.

Alternatively, we should take the step taken a long while ago in phonology (from phonemes to

features) and search for a system of formal features that compose θ-roles, and define θ-selection. Let me define such a (preliminary) system, which will enable also the solution to the unaccusativity question.[18]

Let us abstract away from 'path roles' like source and goal which may fall under a separate system (Jackendoff's (1990) 'thematic tier'). What we are concerned with here is the linguistic coding of causal relationships (Jackendoff's 'actor' tier). Causality plays a crucial role in all discussions of thematic structure[19]. There is obviously an overlap between the role **cause** and **agent** - if an argument is an agent of some change of state, it is also a cause for this change. We may label the feature whose value they share [c] - cause change. The difference is that agency involves properties of volition and intention, which we label [m] - mental state. The same property distinguishes the **experiencer** role from **theme** or **patient**. Note that (as is standard) [+m] entails animacy, but not conversely. An animate patient of an event (say someone who got ridiculed) may have all kinds of mental-states associated with that event. But we are talking about linguistic features, and the linguistic coding does not consider these mental-states relevant for the argument structure.

In section 4., I turn to interpretative implications of this feature system, but in the meanwhile let us assume it just as a formal (technical) definition of thematic roles. Assuming binary features, the familiar θ-roles are, then, defined in (53).

53)   [c] = cause change.
        [m] = mental state involved.

	agent	**cause**/instrument	**theme**(patient)	**experiencer**
[c]	+	+	-	-
[m]	+	-	-	+

As we see, this system does not distinguish between the roles **instrument** and **cause**. There is, however, no reason to assume additional features for that, since there is a lexical generalization here:

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[18]The idea has been around, of course. In a way, this is what Jackendoff (e.g. 1987) has been assuming. Though the actual feature system I am using here is different than those proposed, I cannot dwell here on defending it in comparison to these others.

[19]Grimshaw (1990) assumes a different division of the two role-systems. She takes the thematic roles to include agent, experiencer, goal, source, location, and theme, while CAUSE is her major aspectual role. This is based on a common approach which attempts to reduce aspect to causal relations (or hidden causal predicates). Though space prevents discussing this here, I doubt that this is a useful approach to aspect. Aspect may interact with causal properties, but the latter are the basic defining properties of any thematic structure. Grimshaw's crucial argument for CAUSE as belonging to the aspectual system comes from experiencer alternations, on which, as well, I take a different line, in section 5.

54)   A **cause** role is an instrument iff an **agent** role is also realized in the derivation, or inferred in the interpretation.

The area where (53) leaves much open is within the [-c-m] role, which so far can stand for **theme**, affected **patient**, or in fact, any internal role, including **source** and **goal**. On the other hand, the system generates more feature-combinations than those in (53). Since the features are binary, the four additional features are [+c], [-c], [+m], [-m][20]. I return to some of these feature options in section 6. But here we may note that [+c] is the solution to the problem at hand.

The verbs in (50) select a [+c] external role, i.e. they are not specified for the [m] feature, while those in (52) select [+c +m]. So their lexical entries are as illustrated in (55)

55   a)   <u>break</u>($\theta_{1\,[+c]}$, $\theta_{2\,[-c\,-m]}$)
        b)   <u>shave/eat</u> ($\theta_{1\,[+c\,+m]}$, $\theta_{2\,[-c\,-m]}$)

I assume that when a verb selects a role specified only for one feature, this means that it can be interpreted with any value for the other feature. Thus, in (55a), the external role can be interpreted as either a [+c +m] argument, namely an agent, or a [+c -m] argument, namely a cause or an instrument. But the external role of (55b) can only be interpreted as an agent. (The verbs in (51) also appear to select [+c +m], but, as we shall note later, they are most likely derived from a one place verb, and the agency of their external argument should be determined uniformly by the operation deriving them.)

3.3. Question A: The unaccusative set.

It turns out, now, that the set of transitive verbs selecting [+c] is the set of transitive alternates of unaccusative verbs. All the verbs in (50) have an unaccusative alternate (<u>roll, redden, break, drown, enlarge, develop</u>), and none of the verbs in (51-52) do. Agent ([+c+m]) transitive entries allow only reflexive reduction, as with <u>shave</u> and <u>wash</u> of (52), for reasons I will return to. But [+c] verbs are the source of unaccusatives. There are hardly exceptions to the claim that if an unaccusative has an active transitive alternate, that transitive can occur with both agent and cause as external roles, namely it selects [+c]. (The only exception I know of in English is the verb <u>grow</u>[21]. No doubt there are more exceptions, but the correlation is overwhelming.) As I will argue, the stronger claim is also true: If we look across languages, there is hardly any unaccusative verb that does not have, in some language, a transitive alternate selecting [+c].

With this, then, we can pursue the strongest (iff)descriptive definition of the unaccusative set, as

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[20]This was pointed out in Kremers (1998), who also applies this system to Pesetsky's (1995) target/subject matter problem.

[21]E.g. (i) is incomparably worse than the standard with unaccusative alternates.

i)   ??The weather condition in Southern France grow good grapes.

follows:[22]

56)   A verb is unaccusative iff its verbal concept includes a [+c] role, and this role is reduced (is not realized).

In conformity with the lexical uniformity hypothesis (6), each verbal concept corresponds to one lexical entry. Upon encountering, say, a sentence like She moved, the child, (having activated the concept underlying move) knows that this concept includes a [+c] participant. Since it is not realized, the child knows (by (56)) that the verb must be unaccusative, namely the overt subject must originate as the internal argument. (56), thus, provides the (first step of the) solution to the learnability problem.

Our next goal is to derive this set (from principles of the Theta system) and to adress its consequences for the computational system. But before I do that, in section 3.5, let us compare (56) to other descriptive definitions that have been offered for the unaccusitive set.

3.4. Other approaches.

3.4.1. Levin and Rappaport's lexical semantics.

Levin and Rappaport (L&R, 1994, 1995) accept the assumption of Chierchia (1989), and Reinhart (1991) that (at least in many cases) the unaccusative entry is derived from a basic transitive entry, but they reject Reinhart's (1991) claim that the relevant set of verbal concepts entering this alternation can be characterized in terms of the θ-features of the underlying transitive verb (as above). Rather, they provide what they label 'a semantic account' for this set. For unaccusatives which do not fit their semantic definition, they argue that they are not derived, but listed as unaccusative in the lexicon.

As in the discourse approach to aspect (e.g. Smith 1990, mentioned in section 2), L&R's point of departure is not properties of verbs, but properties of the "eventuality which the verb describes" (e.g.p.91). They provide two properties characterizing the set of verbs showing the transitive-unaccusative alternation: The eventualities they describe are a. 'externally caused', and b. "can come about spontaneously, without the volitional intervention of an agent" (p. 102). (L&R attribute the basic spirit of this characterization to Smith (1970).) So far, this may seem just another way to express the fact that these verbs select a role which is [+c], but not [+m], as I argued[23]. But the crucial claim of L&R is that the property of external causation should be

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[22]Obviously, the strongest the commitment, the more falsifiable the claim is, which is how it should be. But (56) does not entail that we cannot find sporadic exceptions in the lexicon of a given language. Since we are talking here about universal innate verbal concepts, only systematic exceptions across languages count.

[23]L&R have some arguments that appear to support an approach based on world-knowledge and properties of eventualities, over a feature-based approach. E.g. They point out that whether an unaccusative entry is allowed may vary with the type of complement. E.g. they attribute the difference between (i) and (ii) (their judgments) to the fact that skirts cannot lengthen spontaneously (with no agent), while days
can (p. 105). Similarly, (iii) is out since promises cannot break of their own.

witnessed also in the unaccusative entry, and not just in its transitive source. Thus, even for derived unaccusatives, they still maintain that the set of outputs has a shared semantic property, contrary to my claim above. Only if we identify the 'eventuality described' by a given one place verb as externally caused, can we identify it as a derived unaccusative (with a transitive alternate). The crucial notion for their analysis, then, is 'external causation'. And we may check, first, whether this notion can be defined (independently of the feature [+c] of the underlying verb).

L&R define 'external causation' by comparing it to the complement property of 'internal causation' which is typically found with unergatives verbs: One place verbs 'describe an internally caused' eventuality if "some property inherent to the argument of the verb is 'responsible' for bringing about the eventuality "(p.91). With agentive verbs, this is the will of the agent, with others, like shudder, the internal cause is also some inherent property of the shudderer "typically an emotional reaction", and with "emission" verbs like glow or buzz it is other internal properties of the participant like being able to reflect light or generate noise.

The definition of the 'internally caused' set seems hardly objectionable. No doubt, in all eventualities there is some participant whose inherent properties enable it/him to either generate or undergo the eventuality, and, thus, we may describe these properties as "responsible for bringing about the given eventuality". (This is the enable-relation of section 4. below). Therefore, we will indeed find all unergative verbs in this set. The crucial task is to exclude from this universal set the verbs denoting external causation, like break. L&R acknowledge the difficulty: "Although it is true that an entity must have certain properties in order for it to be breakable. Although it might be possible to conceive of something as breaking spontaneously, even so, it is most natural to describe such a situation by a sentence like The vase broke by itself... In contrast, internally caused verbs such as glow, cannot appear with the phrase by itself" (p. 92). I actually do not share L&R's feeling that if I look at the top shelf and discover that my favorite vase is broken, though no one could possibly have touched it, my most natural way to report this would by the vase broke by itself. Nor would I use the boat sank by itself to report that I saw a boat sinking in a calm lake, with no one around. I would actually only use such sentences if I (or someone I care to defend) was just accused for being responsible for these events, or if someone suggests an implausible natural cause for the relevant event. Nevertheless, the linguistic fact

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    i)   The days lengthened.
    ii)   *The skirt lengthened.
    iii)   *His promise broke.

    iv)   Skirts lengthened since the sixties.
    v)   *The circumstances/ his dishonesty broke his promise.

The examples are not of the same type. In fact, (ii) is perfectly wellformed, as witnessed in (iv) and in the text of the previous paragraph. It is just hard to imagine the situation in which (ii) can be true. (iii) is out for the same reason that (v) is. break a promise selects [+c +m]. Hence (as we will see in section 3.5.), its external role cannot be reduced. Though I cannot explain why this is so, the feature approach faces no problem here.

remains that such sentences are possible, while ~~The amber glowed by itself~~ is extremely odd.

But what do such linguistic facts tell us? As far as the world is concerned, if a vase breaks, there is always some set of physical circumstances that lead to this event, though we don't always know what they are. But the same way, a piece of amber cannot just glow, without some source of light - the 'external cause' of the glowing. Though the physical relations are identical, we can still use by itself with the one, and not with the other. This can only serve to show that the distinction at issue is not between situations in the world, but between lexical entries -concepts coded in language. While L&M set out to define eventualities, they end up providing a gold-mine of linguistic tests and manifestations of a distinction which is indeed linguistically real, namely the distinction between verbal concepts which require a [+c] argument, and verbal concepts which do not. When the concept includes a cause argument, as with break, but not glow, we can refer to it, even if we selected a lexical representation which does not realize it. The moral here is precisely the same as observed for aspectual distinctions in section 2: It is impossible to define properties of the human language by defining properties of the world it can be used to describe.

The issue here is not just conceptual, but also empirical. L&R encounter a set of unaccusative verb that could not be possibly described as 'externally caused', even in the most impressionistic way. This is their group of "existence and appearance" with verbs such as exist, come, remain, exit, happen, arise. They conclude, therefore, that we need two types of unaccusative verbs: one which indeed derives from a transitive entry, and one which originates as unaccusative (and includes internally caused verbs listed as unaccusative). To substantiate this, they have to rule out Chierchia's suggestion that when no alternate is available in a given language, this is because the entry is frozen in the lexicon in its reduced form. Their argument is based on the claim that the same set of verbs lacks a transitive alternate universally (and it is not reasonable that all languages freeze the same entries). However, in Hebrew, these verbs do have a causative alternate. L&R argue (p. 124) that this does not count because the alternations of this verb-type are not in the 'pieel-hitpael' pattern (which is the morphologically reflexive form), but either in 'paal-nifal' or with the alternate in the 'hif'il' pattern: yacar /nocar (create/become, come to exist), maca / nimca - (find/exist - an alteration found in several unrelated languages), (yaca/hoci - (exit/take out), nish'ar/hish'ir (remain/leave something)). Note, first, that even if these are the facts, this only confirms what we knew all along - that unaccusatives can - but do not all have to - occur in the reflexive morphology (as, e.g. in Romance). Many of the most basic verbs in L&R's alternating ("externally caused") class occur in precisely the same pattern as these verbs: shavar/nishbar (break), hipil/nafal (drop/fall). Anyway, the facts are slightly different: Some of the most prototypical verbs of this group do occur in the reflexive pattern ('piel'-'hitpael'). Thus, the verbs corresponding to the nouns space (xalal) and time (zman) show this pattern: xolel/hitxolel (bring about/ happen), zimen/hizdamen (provide-invite/ happen to be). The same is found with kiyem/hitkayem (do(carry out)/ take-place,exist), romem, herim / hitromem - (raise (abstract, concrete) /arise.

The crucial fact, from the present perspective, is that the transitive alternates of the 'existence-appearance' set do not only exist, but also show the same [+c] selection, as witnessed in (57). So these verbs conform with the unaccusativity definition in (56)[24].

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[24]Note that not all of these verbs allow an instrument. ((57c) does not). Possibly, the verbs

57   a)   hamada /einstein /ha-microscop xolel   shinui b-a-olam.
              Science /Einstein /the microscope brought-about a change in the world.

       b)   ha-hitragshut /lucie hocia   oto me-ha-mita.
                                               exit (transitive) him from the bed.
              The excitement /Lucie got him out of bed.

       c)   ha-hatkafa /lucie mac'a oto lo muxan
              The attack /Lucie found him unprepared.

L&R point out, correctly, that a property shared by the unaccusative verbs of this set is that they select two internal arguments (one of which is locative or location-related). However, the same is true of their causative alternates, which means that these are unaccusative entries derived from a three-place (rather than a two place) verbal concept.

The set of 'existence' verbs, thus, confirm our assumptions that unaccusative verbs are uniformly derived from a [+c] verbal concept, and that there is no reason to expect that the outputs of reduction, would, themselves, share any semantic properties.

3.4.2. Pesetsky's causativization.

Our next question is whether the generalization underlying (56) cannot be captured the other way around, namely the transitive entries are derived from the unaccusative entries, as proposed by Pesetsky (1995). He argues that unaccusatives, reflexives and subject-experiencer verbs (like worry) are the underlying forms, and an affix CAUS enables deriving from them the transitive entry. Although he does not discuss the selection problem of section 3.2 above, it would be trivial to establish that the new role enforced by CAUS should be [+c], thus deriving the same selection-facts.

A lexical operation which causativises a verb, adding a θ-role, does exist (though I did not discuss it here). In Hebrew, for example, the transitive three-place verb dress, with causative morphology, is derived from the two-place verb wear (lavash (wear) ---> hilbish (dress - transitive). So it is reasonable to ask whether the transitive-unaccusative alternation may not, indeed, be an instance of this operation.

We should note that it is probably impossible to decide between these two hypotheses on the basis of morphological considerations, even in languages with rich causative morphology. Hebrew is a useful example: It has two causative verbal patterns: 'pi?el' and 'hif?il'[25]. Based on

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which disallow an instruments are specified for [+c -m]. If so, then even when they take an animate subject, it is not an agent. Since instruments are only possible with an implied agent, they are ruled out.

[25]To decipher the notation for verb patterns in Hebrew, note that the verb stems are always a sequence of three consonants (though they may be duplicated). The vowels are added with the

morphological considerations it is believed that the reflexive form 'hitpa?el' is derived from the causative form 'pi?el', e.g siben --> histaben (to soap (oneself)). (Berman (1978), Borer and Grodzinsky (1986)). We saw already that many unaccusative alternations occur in the 'pi?el' - 'hitpa?el' pattern, e.g. kimet (wrinkle-transitive) ---> hitkamet (wrinkle - unaccusative), the same is true for many experiencer alternations, e.g. rigesh (excite) /hitragesh (got excited). This may appear as evidence against deriving causatives from unaccusatives in Hebrew. However, with the 'hif?il' form it is the other way around. Based on morphological considerations, it is believed to be derived from the basic form 'pa?al'. As far as I know, this form is indeed obligatory whenever a causativization operation applies, as in the case of wear --->dress. Still, we find the unaccusative (and experiencer) alternation also with this morphology: hitbi?a (drown-transitive) / tava? (drown-unaccusative); hemis / namas (melt); hevi? (bring) / ba? (come), hirgiz / ragaz (anger). Does this entail, then, that in these cases the transitive entry is derived by causativization from an underlying unaccusative?

If we look at the syntactic realization of the intransitive entries of verbs with these two forms of morphological alternation, we find no differences. All unaccusatives verbs behave the same syntactically, regardless of how they are marked morphologically. As we will see in section 5., the same is true for all subject-experiencer verbs (though their syntax is not unaccusative.) Therefore, it is impossible to assume that the two morphological patterns correspond to distinct lexical operations (reduction and causativization), or otherwise reflect distinct syntactic processes. A more realistic conclusion is that the morphological process is, in fact, independent of the lexical operations. Causative morphology is strongly associated with a [+c] role, but it may be assigned at the final stage, after lexical operations apply. In any case, the morphological pattern of the verbal alternations can also be frozen in the lexicon[26]. Whatever generalizations may underlie the morphological association, it cannot, itself, indicate whether reduction or causativization has applied. So, we should look for other ways to decide between the two hypotheses.

Standard examples of causativisation are given in (58a-d).

58) a) They ran / galloped /walked ----> She ran /galloped /walked them.
     b) They worked hard ---> She worked them hard.

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morphology of the different patterns ('binyan's). The consonants used in the pattern-scheme are /p/ /?/ and /l/. These are the consonants occurring in the Hebrew word for 'verb' (po?al), and for the verb 'act' (pa?al). Phonological rules may apply to adjust vowels and consonants in a given stem. Hence, the relations between the scheme-pattern and the actual verb are not always transparent. The consonant ? is not pronounced in modern Hebrew. Hence I often omit it in the transcriptions of the patterns.

[26]E.g. in Hebrew there are even cases where the same causative pattern 'hif?il' is found on the intransitive (reduced) entry. As with hexvir (got pale), heedim (redden), (and all color-verbs) hexkim (made clever/got clever).

c)   Danny axal bananot.   ---> aba heexil et Danny bananot.
        Danny ate bananas. ---> Daddy fed (acc) Danny bananas.

d)   Danny lavash meil.   ---> aba hilbish et Danny meil.
        Danny wore (a) coat. ---> Daddy dressed (acc) Danny a coat.

e)   Max / *the leash / *hunger walked the dog to his plate.
f)   Max / ?the whip / *the rain galloped the horse to the stable..
g)   The father/*the spoon/*hunger fed the baby.
h)   *The cold weather dressed him with a coat.

i)   The rain made the horse gallop to the stable.
j)   The cold weather made him wear a coat.

This is a more complex operation than the others we examined. It may transitivize a one place verb, as in (58a,b), or derive a three-place verb out of a transitive verb, as in (58b,c). Typically, causativization involves also a change in the original thematic structure. E.g. Max in the one-place verb work of (58b) is an agent, but in the causative entry it looses its [+c] (or [+m]) feature. This already distinguishes it from the alternations we examined, which do not involve any change of θ-features. However, the crucial difference between the transitive alternates of unaccusative (and experiencer) verbs, and verbs derived by causativization, is in the features of the external role. Verbs derived by causativization allow only an agent, rather than any [+c] role. As we see in (58e-h), they cannot occur with a **cause** or **instrument** subject. This cannot follow from any lexical or semantic property of the verbs. The causative propositions expressed, e.g. in (58i,j) make perfect sense. They just cannot be expressed with lexical causativization.

If the transitive alternates of unacccusatives are also derived by this causativization operation, it is hard to see how the different selectional restrictions could be captured. In the absence of evidence to the contrary, I propose this as the general diagnostics for lexical causativization, across languages: Causativization adds a [+c,+m] role (**agent**) to a verbal entry. (Of course, we are talking about lexical causativization. Syntactic causativization selects [+c], as illustrated for English in (58i,j).) This generalization is independent of the θ-properties of the entry being causativised: Causativisation adds a [+c+m] role even if the original entry does not have it. E.g. in a equals b, a has no animacy restrictions (which means it does not have a [+m] in its feature composition). Still in the output of causativization She equaled a to b, the external role must be an **agent**. (Same with compare, and parallel).

If so, verbs selecting [+c] are not lexically derived, even if they occur with causative morphology. More differences between the causativization in (58) and the unaccusative alternation are pointed out in Levin and Rappaport (1995, 3.2.5).

Apart from the empirical issues, the causativization approach to unaccusative alternates just leaves us with the same problems we started with. First, the question of reflexive morphology surfaces again: Pesetsky assumes that reflexives are unaccusatives, and thus, their transitive alternates are also derived by the same causativization operation. But we saw already that reflexives cannot originate as unaccusatives. So the causativisation analysis is only conceivable for unaccusatives, while reflexives are derived by reduction. But if reflexives and unaccusatives

have such dramatically different derivational histories, why do they happen to have the same morphology? Next, while the set of verbs selecting [+c] is strictly defined, the unaccusative set is not, as we saw. So, under this view, the unaccusative property must be, again, listed individually for each relevant one-place verb.

3.5. Deriving the unaccusative set.

So far we identified the set of unaccusative verbs that we want to derive, as in (56), repeated.

56)   A verb is unaccusative iff its verbal concept includes a [+c] role, and this role is reduced (is not realized).

But we still have to derive this observation (to find out the principle that determines that this is the only possible set). We also have to guarantee that we capture the full range of the syntactic distinction between reflexive and unaccusative derivations, discussed in section 2.1.

3.5.1. A constraint on role reduction.

We assumed the free reduction operation in (46) which applies to a pair of an external and an internal role, and can reduce either the external or the internal one, thus generating both unaccusative and reflexive lexical entries. Recall that in our terms a reflexive entry is simply an unergative entry (since the internal role is reduced).

46)   *Reduction*:
            $\underline{V}(\theta 1, \theta 2) \dashrightarrow \underline{R(V)}(\theta_n)$

So far, this operation generates for each transitive entry, both an unaccusative and an unergative (- reflexive) entry, as in (59-60).

59)   a. $\underline{roll} <\theta_1, \theta_2>$: Lucie rolled the stone
        b. $R(\underline{roll})\ \theta_2$: The stone rolled
        c. $R(\underline{roll})\ \theta_1$: Lucie rolled.

60)   a. $\underline{wash} <\theta_1, \theta_2>$: Max washed the dishes
        b. $R(\underline{wash})(\theta_1)$: Max washed
        c. $*R(\underline{wash})(\theta_2)$

For (59), it has been often argued that, indeed, the unergative entry exists, or at least that it is in principle possible for unaccusative verbs to have also an unergative derivation. More worrisome, however, is that we also generate the unaccusative entry (60c) for verbs like $\underline{wash}$. (It will not be defined by (56) as unaccusative, but (56) is what we want to derive.)   As we saw, in section 2.2. $\underline{Max\ washed}$ can only have a reflexive (unergative) derivation, but not an unaccusative one. Ruling this unaccusative derivation out is the heart of the matter, since, as we saw, whether the external or the internal argument is reduced has substantial syntactic effect. This is what distinguishes, e.g. (61a, b) in Hebrew (previously illustrated in (44)-(45)).

61)   a.   ...hitgalgel yeled /Rolled a boy -
       b.   *..hitraxec yeled /washed a boy -

61)   c.   Max wast zich /Max washed himself
       d.   *Max wast
       e.   De suiker loste op /The sugar dissolved.

The problem is most easily noticeable in Dutch: Reflexive reduction is always marked with a zich, which fills the position of the internal role. Unaccusative reduction, by contrast, cannot realize a zich (since that position is occupied by the remaining argument) Unaccusative reduction, then, has in Dutch the same form as in English - just the bare verb, as in (61e). If (60b) was allowed, we should expect (61d) to be allowed, which is strictly not the case.

Recall that the external role of the transitive alternates of reflexive verbs (wash, dress, shave) is specified for [+c +m] (**agent**), and not for [+c] (see (50)). The generalization appears to be that an agent role cannot be reduced (which is hardly a surprising finding). However, as we shall see in the discussion of experiencers, this generalization as well, holds for θ-features, and not for θ-roles. Let us state this as the constraint on the reduction operation, in (62). (62) still entails that agents cannot be reduced (since one of their features is [+m].)

62)   Constraint on role-reduction:
       A thematic role specified as [+m] cannot be reduced.

We continue to assume that reduction is a free operation, that can apply either to the external or the internal role, subject only to (62). With this, all the facts summarized in (60)-(61) are derived, as well as the fact that the unaccusative set can only be as defined in (56). If the external role is [+m], then only a reflexive (unergative) entry can be derived, as in (60b). Hence, the unaccusative derivations (61b) and (61d) cannot be generated. To be generated, the external role would have to be reduced). On the other hand, (61a) and (61e) can be generated, since the external role of their transitive source is ([+c]) and not [+m]. (So (62) does not prohibit its reduction.) As far as I know, external roles of
transitive verbs are always specified for some combination of either [+m], or [+c]. Since [+m] roles cannot be reduced, it follows, more generally, that only if the external role is [+c] (or [+c -m]), it can be reduced.[27] Hence only such verbs allow an unaccusative entry, which is what the definition of the set in (56) states.

On the other hand, the system poses no restrictions on reducing internal roles (which are not [+m]). Hence, nothing excludes deriving also an unergative entry for a transitive verb like roll. We saw already that it is indeed not impossible for a [+c] verb to have both an unaccusative and a reflexive entry, as in (19), repeated.

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[27]The entailment of the system is that if there is a transitive verb which selects a role which is neither [+c] nor [+m], it also can be reduced, yielding an unaccusative structure. I am not aware of such verbs.

19   *Dutch*
a)   De suiker is (onmiddellijk opgelost in de thee).
      The sugar BE dissolved
      The sugar (immediately dissolved in the tea.)

b)   De suiker heeft zich opgelost.
      The sugar HAVE dissolved SE (itself)
      The sugar dissolved.

Reflexive-unaccusative alternates are also possible when no reflexive morphology is present. Thus, it has often been claimed that many unaccusative verbs across languages have also an unergative alternate. In our terms, this unergative alternate is just the reflexive alternate obtained by reducing the internal rather than the external role.   E.g. Borer (1994) noted Hebrew alternations like (63).

63   a)   hayeled nishar li   ba-park
            the-child remained cl(to me) in the park
            =(roughly) My child remained in the park

b)   hayeled nishar lo   ba-park
      the-child remained cl(to him) in the park.

As mentioned, the possessive dative-clitic li of (63a) is possible only with internal arguments. The dative-clitic of (63b) usually associates with external roles. In (63) we see that the same verb can occur with both clitics, So, it must have two entries.   This follows now, since the unaccusative entry (63a) is derived by reduction of the external role of the transitive input (hish'ir -left), while the unergative entry, in (63b), is what we get if the internal argument is reduced.

Nevertheless, internal role reduction deserves more attention.

3.5.2. Reduction of the internal role.

It is often assumed that unaccusative verbs are rather free with their unergative alternates. Chierchia (1989) and Levin and Rappaport (1990, 1995) argued that this is always an option with animate arguments, which can either realize as the theme, in an unaccusative derivation, or as the agent, in an unergative one: That the subject in (64) can be an agent is presumably witnessed by the agenthood tests.

64   a)   Lucie rolled in order to impress us
      b)   Lucie rolled on purpose.

65)   a)   *Lucie rolde zich om indruk op ons te maken / opzettelijk
            Lucie rolled zich in order to impress us/ on purpose

b)   Lucie rolde om indruk op ons te maken / opzettelijk

But if this is true, we run into a problem easily noticed in Dutch. As noted, a verb with a reduced internal argument is necessarily marked in Dutch with a zich. If an unaccusative verb can freely have a reflexive entry, we should expect to find (38a), which is, in fact, strictly out. Only the unaccusative entry in (65b) is possible.

On the other hand, the puzzle posed by (65b) is how a standard unaccusative can show these agentive properties, given that it lacks an external argument. Lasnik (1988) (following the spirit of Williams regarding implicit arguments) argued that many cases which appear to involve agent control, are, in fact, instances of event control. The value of PRO in (66) is not the agent (the one who broke the vase), but the event of breaking the vase. So the in order to phrase means something like (66b).

66   a)   The vase was broken in order to hurt us.
       b)   (In order for) the breaking of the vase to hurt us.

The reason why volition seems to be involved in such cases, is because the adverbials (in order to, on purpose) imply the existence of an agent. Such adverbials, then, can be used also if an implicit agent can be semantically implied, rather than syntactically realized. (So the structure ends up meaning something like 'someone has generated the event e, on purpose / in order for e to hurt us). We may leave open here the question whether in passive structures, a standard agent control is also possible, along with event-control (given that under our assumptions a variable with agent role exists in the semantic representation of these sentence)[28]. In any case, in the unaccusative structures under consideration, there is no available agent role, so sentences like (65) could only be accounted for as instances of event-control. It is the event of rolling that was on purpose, or in order to impress us. Since an animate participant is involved, agency and volition could be implied implicitly and license the volitional adverbials.

This view of control in unaccusatives can be further checked, based on thematic features. Since the value of PRO is an event, rather than an agent, the verb predicated of PRO must be of the type that selects [+c], but not [+m] or agent ([+c +m]). This seems on the right track:

67)   a)   Lucie fell (to the pool) in order to attract attention
       b)   */?Lucie fell (to the pool) in order to swim.
       c)   Lucie undressed in order to swim.

68   a)   *Lucie fainted in order to rest.

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[28]Lasnik argues that passive allows only event-control. He uses sentences like (i) to show that no agent is available.

i)   *The structure of DNA was investigated in order PRO to be awarded the Nobel Prize.

The reason the sentence is out is that the agent (investigator) is unavailable, and the value of the PRO must be the event (of investigating the DNA), and events cannot be awarded prizes. Roeper (1987) argues that arguments satisfied in the lexicon (saturated in our terms) must be available to control, and (i) is out because of the passive in the in order to clause.

b)   Lucie washed in order to rest.

Verbs like swim or rest require an animate (agent) subject, Since in reflexive predicates the agent role is syntactically realized, it can control the PRO of such verbs, as in (67c) and (68b). But given that no such argument exist in the unaccusative cases, (67b) and (67c) are impossible.

So, there is no independent (control) reason to assume massive availability of an unergative alternate for unaccusative verbs. Nevertheless, the fact remains that with no further assumptions added, it is generated by our system. Furthermore, it does not matter at all whether the argument is animate. Reduction can generate an unergative entry also for The stone rolled, The sugar dissolved, or The door opened. The fact of the matter is that this entry exists indeed in Dutch, for dissolve, in German for open and in none of them for roll. This ties in with the fact I mentioned already that, in languages where the reduction operation is lexical, reflexive reduction is a much more restricted operation than unaccusative reduction. It is not the case, e.g. that if a transitive verb takes an agent it automatically allows reflexive reduction. There is a fixed set of verbs that have a reflexive entry in many languages. The set of unergative alternates of unaccusative verbs is probably even more restricted and idiosyncratic. The reflexive-marked unaccusatives in Dutch and German (like Die Tur offnete sich) is sufficiently restricted to assume it is frozen in the lexicon, and the alternations like (63), in Hebrew are also not productive.

In conclusion, the system as we have it allows freely both the reduction of an external [+c] role, and the reduction of internal roles (which are not [+m]). In the first case, this seems extremely productive - It is difficult to find [+c] transitive verbs that do not have an unaccusative alternate across languages. In the second, it is much more restricted. In languages with syntactic reflexive reduction, like Romance, this operation is completely free. But where reduction is lexical, only a restricted set of verbs allow it universally, and there is also much idiosyncracy across languages regarding which verbs allow both external and internal reduction. Finding the generalization lurking behind internal-role reduction must remain a future project.

4. What does it mean?

4.1. The interpretation of θ-features (Theta meets Inference).

It is common in lexical semantics to assume that capturing lexical meaning requires abstract semantic representations which contain predicates invisible in the overt structure. Thus, in the tradition of Dowty (1979), both Chierchia (1989) and Levin and Rappaport (1995), assume, in different styles, that transitive <u>break</u> has a semantic representation like (69). (Chierchia's unaccusative reduction is stated to be applicable, in fact, only to the abstract representation in (69).)

69)   <u>break</u>:
      a)   [[y do something] CAUSE [x become BROKEN]] (L&R)
      b) $\lambda x \, \lambda y \, \exists b$ [CAUSE (_b(y), _BROKEN(x))]
             (Some action b of y caused BROKEN (x)) (Chierchia)

69i)   Max broke the glass ---> The glass broke.

We should note, however, that despite the formal appearance of (69b), this is not a formal logical formula. As is well known, CAUSE is not a logical relation. The only definable entailment that can be associated with the CAUSE relation is precedence: If CAUSE holds between an action b and an instance i of the property $\lambda x(BROKEN(x))$, then b precedes i (and by standard inference, i holds, since <u>b&i</u> holds). This should be sufficient to guarantee the entailment in (69i), which is indeed crucial. But no further truth conditions (entailments) can be associated with (69b). E.g. we cannot logically infer from (69b) that if not b, then not BROKEN(x).

With this in mind, then, we can ask how representations such as (69) get associated with verbs or sentences. The view in lexical-semantics is that these are listed as part of the verb's entry, or that they represent the structure (logical syntax) of concepts. On some views, this structure is reflected in derivations of the CS, and verbs like <u>break</u> realize in syntactic structures that corresponds to (69). If so, then the inference systems, presumably, reconstruct the information in (69) from the syntactic representation of a sentence with the verb <u>break</u>. Leaving aside the question whether any independent evidence can support such hypotheses, we should note that it is not, in fact, necessary for just the purpose of associating verbs with whatever information is expressed in (69).

Causal relations are imposed by humans on the input from the world, and the linguist's task is to understand what it is about language that enables speakers to use it to describe their causal perception. An alternative to the search in the realm of invisible abstract structures, is to look at the block stones that we know already that sentences are composed of. The θ-roles associated with verbal concepts are such block stones. We know they are included in the minimum necessary to relate verbal concepts to syntactic derivations, hence to sound. (This is what is captured by whatever version of the θ-criterion). So we may ask what other work they do in relating derivations to the cognitive systems.

In the terms assumed here, the question is what properties of the concepts-system enable its

interface with the inference system. For this to be possible, the formal θ-features of the central concepts-system (which is what we call the Theta system) should be legible also to the inference systems. The later, thus, can read both the structural information of the computational system (which provides the basis for logical representations) and the formal features of verbs, which provides the basis for causal interpretation.

First we need some approximation of what causal perception is. (Note that now I am, indeed, talking about perception of eventualities in the world and not about language.) Shen (1985), based on work on causality perception by Rumelhart (1975) and Miller and Johnson-Laird (1976), defines three causal relations that humans use to organize their perception of events: The relation **enable** holds when one event is perceived as a necessary condition for the occurrence of the second. In (the events reported in) (70), Max could not have drowned unless he had entered the swimming pool. But it is not a sufficient condition, since many people enter swimming pools without drowning. The relation **cause** holds when the first event is conceived as a sufficient condition for the second. The glass falling in (71) is sufficient condition for it to break, keeping in mind that this is a perception-driven, and not the logical concept of sufficient conditions. But this is not a necessary condition, since there are other ways a glass could break. **cause** holds also when one event is both a necessary and a sufficient condition for another.

70)   Max entered the swimming pool and drowned.
71)   The glass fell on the floor and broke.

73)   Max was depressed, so he jumped from the roof.

The relation **motivate** holds when either **enable** or **cause** hold, and in addition, a mental state mediates the events. In (73), being depressed is a sufficient condition for suicide (**cause**) but it is a mental-state condition.

We may note now that there is a certain correlation between these relations and the θ- relations we have been assuming: Suppose I want to peel an apple. The availability of an apple is a necessary condition for the execution, but not a sufficient one - the **enable** relation (an apple alone does not lead to its peeling). The availability of a knife, on the other hand, is a sufficient condition. (More precisely, it is a subset of the sufficient conditions, which need to include also me as the an agent.) So this is the **cause** relation. But the fact that I am, say, in the park at the time of my desire, and that it is morning, are neither necessary, nor sufficient conditions for the execution.

Now let us look at the sentence ~~She peeled an apple with a knife in the park~~. In our feature system, the instrument argument is [+c]. Generally, this (loose) correspondence holds between **cause** and all arguments specified [+c]. The theme argument (apple) is [-c -m], and it is interpreted here as an enabling condition. **enable** is the broadest relation: All internal arguments of the verb are associated with necessary conditions for the denoted event to take place. Since they are not sufficient conditions, they have the feature [-c]. I assume that no additional feature is needed to mark the enabling status of these arguments. The mere fact that they are selected arguments, i.e. have any features at all, signals them as enabling conditions. So, all internal arguments have the feature [-c] (or they may be unspecified for [c], as we shall see). The locative

PP in our sentence has no features, and is not part of the argument structure. The relation of the participant denoted by she to the reported eventuality is the closest we find to **motivate**: Combined with a knife, her existence is a sufficient condition for the apple being peeled, and, unlike the knife, her mental state determined that this should also happen. The agent argument she is specified [+c +m].

Obviously, this all is far from formal. But, as mentioned, lexical semantics is dealing precisely with the non-logical aspects of meaning. So, returning to break, I cannot see what information is provided by the CAUSE predicate (69), beyond the direct interpretation of the [+c] feature as (what is perceived by human users of the sentence to be) a sufficient condition for the event that took place. Furthermore, unlike abstract predicates, the θ-features system is visibly at work in generating sentences, namely, there are other things, except for causal relations, that are determined by these features, as I tried to show. So, we know that they are there, and we might as well use them at the interface.

In what follows, I will use the names initiate, as a shortcut for the relations that [+c +m] and [+c] bear to the reported events, and undergo for the relation of [-c -m] arguments. These are used only to facilitate the discussion and have no other status but shortcuts for whatever little I stated about what these relations are. If desired, we may represent the lexical semantics of break using this notation (e.g. as $\lambda x \, \lambda y$ (initiate x [undergo y (break (y)])). But it is also possible to derive representations like (69) (representing λy (y undergo (break(y)) as BROKEN(y)). So the minimal entailment we observed in (69i), will hold, to the same extent as it does for (69).

4.2. The interpretation of reduction.

We may turn, now, to the outputs of reduction. We assumed just the one operation in (46). So, so far what we get, applying it to break and wash, are lexical entries like (74).

46)   *Reduction*:
             $V (\theta 1, \theta 2) \dashrightarrow R(V) (\theta_n)$

74)   a) $R(break (\theta_{2 [-c -m]})$
       b) $R(wash (\theta_{1 [+c +m]})$

We do not know yet what the semantics of R is, hence, what the verbs in (74) denote, but we do know their relation to their remaining argument, so the glass R(broke) now states that the glass underwent R(break). Max R(washed) states that Max initiated R(wash). Now the question is what is R. For the reflexive operation, as stated in (7b), R(V) was defined as denoting a property which is, semantically, indistinguishable from the two place relation $\lambda x \, (V(x,x))$. Let us call this R the SELF function, and describe it with the funny notation in (75), where θ_i stands for the argument that will realize, eventually, this θ-role.

75)   SELF(V) (θ_i) $<\dashrightarrow \theta_i (\lambda x (V (x,x)))$

Now Max washed states that Max initiated SELF(wash) (and it entails Max (λx(x washed x)). Can R be the same function in unaccusative reduction like (74a)? One potential objection, discussed in Chierchia (1989), appears to be the following: (76a), with a lexical reflexive is equivalent to the non reduced version (76b). But the unaccusative (77a) does not seem equivalent to (77b), and is, furthermore funny, implicating agenthood of the door.

76   a)   Lucie dressed.
     b)   Lucie dressed herself.

77   a)   The door opened.
     b)   The door opened itself.
     c)   The door λx (x opened x).

This, however, is far less surprising, once the θ-causal relations are considered. In both (76a) and (76b), Lucie is the [+c +m] argument. So using our shortcuts, (76a) states that Lucie initiated SELF- (dress(ing)) and (76b), that Lucie initiated dress(ing) herself. But in (77) the door bear different roles. In (77a), the output of unaccusative reduction it is the [-c -m] argument, while in the transitive (77b) it realizes the [+c] external argument. So (77a) states that the door underwent SELF-opening, while (77b) states that the door initiated opening itself. In terms of causal relations, these is no reason to expect that they should mean the same thing. (The reason why (77) is funny is that it depicts the door as an initiating factor, i.e. as a sufficient condition for opening a door.)

The crucial question, however, is whether (77a) entails (77c). Since if R is defined as in (75), this is an entailment independent of causal relations, namely of the question whether the door underwent or initiated the self-opening described in (77c). (It is important however, to read (77c) as a formula and not as an English predication with an external argument.)

In reinhart (1996), I argued that nothing, in fact, rules out accepting this as an entailment. Causal chains leading to an open door can be long and complex. At their tail, however, we find a slight movement of the door, that led to the next, that led, eventually, to the door being open. This last stage, then, is the entailment we are considering. Suppose we are sitting in the room and the door opens. Our knowledge of the world tells us that such an event could not initiate itself. There must be someone at the door who did that, or the wind, or some cosmic vibrations. We could choose to be precise about causality matters and say Something or someone opened the door, or more efficiently, we could keep the external causer in the picture by choosing the passive The door was opened. But alternatively, we can abstract away from all these and describe just this last link in the causal chain, where the initial state was a door closed, and the final is a door open. Stated this way, choosing an unaccusative form (applying reduction) means that we select out of the causal chain only these last steps in which the event did cause itself. This is probably the intuition Chierchia had, when, although aware of the apparently wrong entailment (77c), he described (77a) as some property of the door causing it to open (which has precisely the same entailment).

These, however, are delicate matters. I would like to point out that another account is available, albeit more complex. We need to assume two reduction operations (both turning a two place relation into a property, one for the external role, and one for the internal role, with different

interpretations: (78a) is what we assumed so far, but now it needs to be restricted to apply (to a pair of free external and internal roles, as before and) reduce only the internal one. (This is, essentially, what Chierchia assumes for this operation). For this operation, R_s is the SELF-function, with the semantics of (75), repeated in (78b). (78), thus, derives the reflexive entries.

78   Internal role reduction -SELF-function
       a) $V (\theta_1, \theta_2)$ ---> $R_s(V) (\theta_1)$
       b) $R_s(\theta)$ <---> $\theta (\lambda x (V (x,x)))$

79   External role reduction -Expletivization
       a) $V (\theta_1, \theta_2)$---> $R_e(V) (\theta_2)$
       b) $R_e(V) (\theta_2)$ <---> $V(\theta_2)$

62)   Constraint on role-reduction:
       A thematic role specified as [+m] cannot be reduced.

The external reduction (79), which derives unaccusative entries, eliminates the role altogether. It does not require any non-trivial semantic definition - Its output will denote just the property corresponding to $V(\theta_2)$ $(V(x))$. So, it is semantically null. I borrow Chierchia's name 'expletivization' for it, though (79) is not his expletivization operation[29].   Both reduction

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[29]Chierchia assumes two reduction operations: One is (78), which he calls R, the other- R_i - reduces the internal role, as in (79), thus generating unaccusatives. However, Chierchia still assumes the same semantics for the two operations. i.e. both his R and R_i are SELF-functions. Further, unlike R, the unaccusative R_i applies to the complex CAUSE predicate. At least the way I read him, the reason why he finds necessary to do this is the semantic problem we discussed in (76)-(77). (Note that at the time the semantic problem was more serious, since, without the semantic spell-out of θ-roles introduced here, (77a, b) do end up indistinguishable. However, as I mentioned, this move does not solve the problem.)

Chierchia's expletivization operation is an altogether different function from propositions to properties. It is independently needed for seem type verbs. The VP seems that Max sneezed denotes, semantically, a proposition (since it contains no variables, or open properties). If we assume that predication (function application) must apply to combine it with the expletive subject, this is disabled, since the VP is not the right type. So expletivization applies to turn it into a property which can be predicated of the dummy expletive argument. (Chierchia assumes that this operation also introduces the expletive (a dummy semantic element), since in Italian it is not overtly available. This leads to some complicated assumptions that predication is required in the semantics, independently of syntactic requirements like the EPP. However, as we saw in pro-drop languages, there is a null expletive, so no further semantic justification is needed, beyond compositionality: Do not leave visible parts of the derivation uninterpreted.)

Now, after unaccusative reduction R_i applies, the same situation is obtained: If the DP does not move, the VP sank the boat (in Italian) ends up denoting a full (saturated) proposition. So to enable function application, expletivization applies and turn it into a property. When the unaccusative DP moves, this is not necessary, since the VP remains a property (due to the trace), so function application applies it to the moved subject in the standard way.

operations are subject to the constraint on role reduction (69). Since both operations reduce a role, this still is the basis for an account of their morphological similarity.

Unaccusatives - the outputs of (79) - end up with properties resembling those of the verb <u>seem</u>. The syntactic effects of this operation will be that either the remaining DP has to move to satisfy the EPP, or an expletive is inserted, as with <u>seem</u>. As mentioned already, this later option is realized, indeed, in pro-drop languages, like Hebrew or Italian, which have phonologically null expletive. In Hebrew, e.g. both <u>seem</u> and unaccusatives can occur in this form, as in (80), where the subject is a null expletive.

80   a)   nir'ee li   she-hu lo codek.
                seems to-me that he not right (It seems to me that he is not right.)
        b)   higia shaliax
                arrived messenger (A messenger arrived.)

As stated, the reduction operations still entail that reduction of the internal argument is reflexive. This means that the unergative alternates of unaccusative verbs discussed in section 3.5.2 are still derived by (78), the same way we assumed before. If one finds the semantic consequences bothersome for this set, no technical problem will arise if we allow (79) to operate freely on any role, so the internal role could be reduced either by expletivization (unergative alternates of unaccusatives), or by reflexivization (reflexives). However, as we saw there, internal-role reduction is highly restricted, and in the case of unergative-alternates, it is also language specific (frozen entries), while external role reduction seems completely free. So we might as well take advantage of the machinery just introduced, and restrict the problem of over-generation to just reflexivization - (78), which anyway requires further restrictions.

5. Experiencer alternations.

5.1. Reduction.

Pesetsky (1995) discovered that arity alternations in the realization of the same verbal concept are very productive also in the case of experiencing verbs, as in (81). (81a) is often referred to as an 'object-**experiencer**' derivation, and (81b) - as 'subject -**experiencer**'.

81   a)   Something worries Lucie.
        b)   Lucie worries.

It is obvious therefore that Chierchia's expletivization is not a lexical operation, but a type-shifting operation applying to syntactic derivations, to enable function-application. The reduction expletivization R_e I defined in (79), is a lexical operation with no semantic content. At the syntactic derivation, if the subject does not move, Chierchia's expletivization will apply the same way. I nevertheless find using the same name attractive, since R_e 'generates' the expletive, in the sense that it enforces a selection of an expletive (or movement of the DP).

82   a)   This excited/ scared /surprised Max.
       b)   Max was (got) excited / scared / surprised.

In English, this alternation is hard to observe, since the intransitive alternates occur usually in adjectival forms, as in (82b). (Verbal alternates, as in (81b), are rare. Pesetsky lists also puzzle, grieve and delight.) However, in many languages the intransitive entry is standardly realized as a verb. In our sample languages, this is the case in Hebrew, Dutch and Romance. In Hebrew, we find, again, the same stem occurring in a different verbal pattern ('binian'), as in (83b), though an adjectival (passive) alternation exists as well, as in (84). The Dutch and Italian pattern will be exemplified directly.[30]

83   a)   ha+olam hidiig / hirgiz/ rigesh /hivhil / hiftia et Max.
              The world worried/ angered / excited /scared /surprised (acc) Max.

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[30]The alternation under consideration has been often conflated with the pair in (i), where both alternates contain a transitive verb assigning accusative.

i   a)   Violence frightens Max.
      b)   Max fears violence.

The fact is, however, that cases like (1) which appear to involve the same verbal concept are very rare, at least in our four sample languages. The discussion of such structures (e.g. Belletti and Rizzi (1988)) usually considered pairs which do not derive of the same verb, as in (ii) (from B&R), or (iii).

ii   a)   Questo preoccupa Gianni. (This worries Gianni.)
       b)   Gianni teme questo. (Gianni fears this.)

iii)   a)   The movie pleased / disgusted Max.
       b)   Max liked / hated the movie.

This was relevant, since (i) and (ii)-(iii) appeared to pose the same problem to the mapping (linking) from the lexicon to syntax: Assuming that the verbs in (a) and (b) have the same thematic structures, how is it possible to have two distinct mapping of the same roles? However, Pesetsky has shown that the roles are not identical: In the (a) cases they are Cause and Experiencer, while in (b) they are Experiencer and Theme (or Target, in Pesetsky's proposal). Assuming a mapping hierarchy with Cause higher than Experiencer, there is no mapping problem here.

If so, there is no need (or evidence) to assume that the structures of (i) are derivationally related. I assume that frighten and fear are listed as two distinct lexical items, just as, say, please and like. Given that this type of variation is rare and idiosyncratic, rather than systematic or productive, this does not pose a problem to the lexicon uniformity principle in (6).

b) Max daag / hitragez / hitragesh / nivhal/ hufta.
     Max worried /angered / excited /scared /surprised.
      (got angry / excited /scared /surprised)

84) Max haya mudaag / nirgash / mevohal / mufta.
    Max was worried / excited / scared / surprised.

Belletti and Rizzi (1988) proposed that the transitive (object-**experiencer**) entries ((a) in (81)-(83)) are, themselves, unaccusative verbs (with two internal arguments), and their subject originates as the theme. Pesetsky shows extensively that by all syntactic tests, this cannot be true for the relevant set of verbs (though other verbs with this structure do exist.)[31] Furthermore, he shows that the external argument in these transitive entries bears the role **cause** and not **Theme**. In the terms developed here, they show no selectional restrictions, and can be realized by virtually anything, as in (85), which is the characteristic property of an external role specified only for [+c].

85) a) Fred/Fred's behavior/the discussion/the storm surprised Lucie.
   b) Fred/Freds gedrag/de discussie/de storm verbaasde hem

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[31]Pesetsky argues that B&R conflate two classes of experiencing verbs: preoccupare (worry) and piacere (appeal-please). Only the second shows indeed the traits of unaccusativity. E.g. it takes the auxiliary essere (be) in both of its syntactic realizations, as in (i), while the first (and larger) class selects avere (have).

i a) A Gianni e piaciuta la musica.
     to Gianni is appealed the music (The music appealed to Gianni.)
   b) La musica e piaciuta a Gianni

The two classes exist also in English, with the piacere class corresponding to (iiia). Pesetsky goes through all the tests of unaccusativity to show that the verbs in (iiia) are indeed unaccusative in both Italian and English, but those in (iia) are not. E.g. (ii) allows passivization, while (iii) does not.

ii) a) The news worried / surprised /excited Max.
   b) Max was worried/ surprised /excited by the news.

iii a) The solution appeals to me /escapes me.
   b) *I am appealed by /escaped by the solution.

The unaccusative analysis of B&R, then, holds for the verbs in the appeal-piacere class, which are unaccusatives originating with two internal arguments. Indeed, this class does not show the intransitive alteration considered here. But for the class under consideration (exemplified in (ii)), the hypothesis that their subject originates as an internal argument is unfeasible.

The strongest argument Belletti and Rizzi had for their analysis was the anaphora patterns of object-experiencing derivations. (E.g. bound anaphora is permitted in His health worries every patient, which would follow if the subject originates as an internal argument.) I will argue in section 6.3. that a derivation similar to what they proposed does, indeed, exist for (certain instances of) the object-experiencer structures, though this derivation is not unaccusative. But in any case, these verbs clearly allow also a derivation merging the [+c] argument externally, which we will assume as the only derivation for the sentences in (85), until section 6.3.

The subject/object experiencer alternation exemplified in (81)-(83) bears, then, the traits of the unaccusative arity alternation: A transitive verb that selects a [+c] external argument can realize in a reduced form without that argument. Furthermore, as in the case of unaccusatives, the reduced form may (but does not always have to) bear reflexive morphology:

The subject-experiencer entry in Hebrew often occurs in the 'hitpael' verbal pattern, which, as we saw, is obligatory with reduced reflexives, and possible with unaccusatives: hitbalbel/ got confused, hitragesh /got excited, hitbayesh /was ashamed, hictaer /was sorry. But, as in the case of unaccusatives, it can also occur in other forms, as with worry, anger, scare, and surprise of (83b). A similar pattern is found in Romance. As we saw, reflexive clitics are obligatory with reflexive reduction and often found also with unaccusatives. The same clitic is found in the experiencing alternation, as in (86).

86   a)   Questo ha entusiasmato il presidente
            This has excited   the president

      b)   Il presidente si entusiasma
            The president cl excites
            (The president is/gets excited)

In Dutch, where reflexive morphology is associated only with reflexive (unergative) derivations, we still find many experiencing alternates that occur in this form, as in the surprise alternation in (87). Other examples are vervelen/zich vervelen (bore), amuseren/zich amuseren (amuse), vermaken/zich vermaken (amuse) and opwinden/zich opwinden (excite).

87   a)   Jouw gedrag verbaast hem.
            your behavior surprises him
      b)   Hij verbaast zich.
            He surprises se /(=He is surprised)

Pesetsky offers the same account for the experiencing alternation as he does for the unaccusative alternation: The underlying verb-entry listed in the lexicon is the subject-experiencer intransitive entry (in the (b) examples above). This entry is a reflexive verb (which, in Pesetsky's framework means it is unaccusative). The transitive object-experiencer realization is derived by an operation of causativization. For the reasons discussed already in section 3.4.2, let us explore here the same insight in the other direction: The intransitive form (b) is derived from the transitive (a) by reduction.

The relevant reduction here must be of the type of accusative reduction: The lexical entry of the transitive worry is as given, temporarily, in (88a). (As we shall see in section 6., the verbs has a third (optional) θ-role, which is Pesetsky's **target**.) Recall that (62), repeated, allows reduction only of arguments not specified as [+m]. So the experiencer argument -θ_2 - cannot be reduced. However, θ_1, which is [+c], as in the transitive alternates of unaccusatives, can be reduced, as in (88b).

88   a)   worry ($\theta_{1[+c]}$, $\theta_{2[+m-c]}$ (...))
           b)   **Reduction:** R_e(worry) ($\theta_{2[+m-c]}$(...))

62)   Constraint on role-reduction:
           A thematic role specified as [+m] cannot be reduced.

79   External role reduction.
           a)   V (θ_1, θ_2)---> R_e(V) (θ_2)
           b) R_e(V) (θ_2) <---> V(θ_2)

Given the distinction between internal and external role reduction, introduced in section 3.4, the reduction in (88b) is, thus, of the external role, namely (79), repeated.

However, although reduced experiencing verbs share properties with unaccusatives, their syntactic realization resembles that of reduced reflexives, and not unaccusatives: They can only occur in the unergative structure (i.e. with the subject merged externally). This is most directly visible in Dutch, where they can occur with zich, as in (87). As we saw, reduction with zich in Dutch entails an unergative realization, since zich occupies an argument position, and hence it is impossible for the subject to originate in that position as well, prior to movement. In fact, reduced experiencing verbs show unergative syntax in all our sample languages, given the syntactic criteria discussed in section 2.3. In Hebrew, e.g. they do not allow (neutral) post verbal subjects, as in (89), nor can they take possessive datives, as in (90).

89   a)   *hitragshu kama yeladim.
                 got excited some children

           b)   *mitbayeshet isha.
                 is ashamed a woman.

90)   a)   *hayeled hitragesh lax hayom
                 the child got excited to you today (=your child...)
           b)   *hakelev nivhal li
                 the dog got scared to me (=my dog...)

So, if the output of experiencing reduction is (88b), it may appear that we get the wrong syntactic prediction here. Addressing this issue requires a closer look into the question of merging order than we had so far.

5.2. The order of merging

A question I left open in section 1.,is the mapping principles which determine the merging order of arguments (i.e. the relations between the lexical θ properties of arguments, and the syntactic position in which they project). As mentioned there, it is not realistic to assume that this is captured individually for each verb in its lexical entry (with indices on the θ-roles) as I assumed throughout. In practice, several generalizations have been assumed for the merging hierarchy.

So far, there was no need to address this question, since the mapping seemed trivial. The most noncontroversial mapping generalization is that stated in (91).

91)   An argument bearing the **agent** role is realized in the external position (i.e. merges last).

For the purpose of capturing the syntactic properties of lexical reflexives, (91) was all we needed. Since in these verbs the argument left by reduction is always an agent ([+c +m]), it must be merged externally, i.e. with the unergative structure. Similarly, in the unaccusative cases, where the remaining θ-role is patient ([-c-m]), it is unproblematic to assume they are mapped into an internal position. But in the experiencer cases under consideration, the remaining argument is not an agent. At first glance, it seems trivial to modify (91) to give the right result here, as in (92).

92)   Merging principle.
         A θ-argument bearing a [+m] role is realized in the external position.

Since the experiencer arguments which survived the reduction are also [+m], (92) determines that they must realize externally.

This, however, raises an immediate problem: For the transitive entry (93a), (92) entails, incorrectly, that we should derive (93c), rather than (93b).

93)   a)   worry $(\theta_{1[+c]}, \theta_{2[+m\,-c]} (...))$
         b)   Something worries her.
         c)   *She worries something.

Let us start, then, with the alternative question: What forces the **experiencer** to realize internally in (93b)? The answer lies in the realm of case. It has been widely acknowledged that the accusative case plays a crucial role in linking the Theta system with the Computational system. I will discuss this in detail in section 7. The way I propose this linking is captured, is that the accusative feature is selected already in the lexicon, and it is, thus, a feature legible to both systems, though not, say, to the Inference system. First, the arity of a two place verb is marked with an accusative feature (ACC) on the verb. Next, computation internal to the Theta system selects a θ-argument that also carries this feature. This is the argument which the CS then selects to merge first (as a sister to V) and which will eventually check (and eliminate) the ACC feature of the verb. The precise principles of the Theta system which guide the selection of the θ-argument associated with the ACC feature may require further study, but only θ-arguments bearing the feature [-c] are candidates for this selection.

Under these assumptions, then, the θ-argument that is associated with the ACC feature in the entry of <u>worry</u> in (93) is the **experiencer**, since it is a [-c] argument ([-c+m]). The full output of the Theta system for this entry, then, is represented in (93.1a). Since now we are looking at the actual details of the principles governing the merging order (mapping), we may omit the θ-indices, which were the notation used to avoid this question so far.

93.1   a)   <u>worry</u>$_{acc}$ ($\theta_{[+m-c],acc}$, $\theta_{[+c]}$ (...))
       b)   <u>R(worry)</u> ($\theta_{[+m-c]}$ (...))

Given this output, there is only one merging option: the **experiencer** must merge first, as the internal argument; the remaining **cause**, then, is merged in the external position.

Turning now to the reduced entry <u>R(worry)</u>, I argue in section 7. that the uniform effect of all reduction operations is to eliminate the ACC feature in the lexicon. The reduced entry, then, is (93.1b). Here there is no longer any entry-specific instruction for the order of merging. So in this case, merging is subject only to the general principles of merging-hierarchy. Specifically, we assumed the merging principle (92):

92)   <u>Merging principle</u>.
       A θ-argument bearing a [+m] role is realized in the external position.

This principle now determines that for the reduced entry (93.1b), the **experiencer** must be realized externally, since it is a [+m] argument ([+m-c]).

The view underlying this discussion is that there are two types of computations guiding the interface of the concepts-Theta system and the CS. The first is the selection of the θ-argument associated with the ACC feature, which determines a fixed order of merging for this argument. Next, when no fixed order is imposed on any given θ-arguments, general hierarchy principles determine their order of merging. In other words, hierarchy principles rank only 'free' θ-arguments, whose merging order is not predetermined.

Since the **experiencer** role is the cluster [-c+m], its merging order is sensitive to both these computations. When the ACC feature is present on the verb, its [-c] feature determines that it should be associated with the ACC feature, hence its order of merging is fixed. Otherwise, its [+m] feature determines that it must obey (92). The **agent** role, by contrast, is sensitive only to the hierarchy computation: Since its feature cluster is [+c+m] (i.e. it has no [-c] feature), it can never be selected for association with the ACC feature. Hence agents always realize only externally.

Possibly, there are some principles of cooperation between the two types of merging computations of the Theta system. E.g. verbs like <u>love</u> or <u>hate</u> have two [-c] roles: The **experiencer** is [-c+m] and the **patient** is [-c-m]. By what I said so far, any of these could be associated with the ACC feature, but if the **patient** is selected, this still enables the [+m] **experiencer** to satisfy (92) and merge externally. Indeed this is the option realized. The Theta output of such verbs is (93.2a), which enables derivations like (93.2b)

93.2   a) $\underline{love}_{acc}$ ([-c-m]$_{acc}$, [-c+m])
           b)   Max loves music.

Alternatively, the fact that (93.2a) is the unique output of the Theta system is determined not by cooperation of its two merging computations, but by the full specification of the computation selecting the ACC argument out of the set of [-c] candidates. I left this specification open here.

I should mention that although I assume here a specific implementation of the mapping generalizations, for our given problem the same empirical results follow also under more familiar implementations. A common practice in studies of the mapping from lexical entries to syntactic derivations is to assume a detailed (role specific) hierarchy of merging order (See, e.g. Grimshaw (1990), among many others). Pesetsky (1996) assumes, for the portion of the hierarchy relevant to our discussion, the ranking **agent**>**cause**>**experiencer**... This can be stated in the features notation as in (94).

94)   Pesetsky's mapping hierarchy: [+c] > [+m] ...

This means that when a **cause** role exists it must be projected externally. Similarly, when an **agent** role exists, it must be external, since it is [+c]. (This hierarchy thus, entails the **agent** mapping generalization (91)). But when neither of these exist and a [+m] argument is present it is the one which must be external. The later is the case with reduced experiencing entries.

For the specific problem at hand, our merging generalization (92) (combined with ACC-association) can do the job of (94). But (92) only determines the merging order of [+m] arguments. It remains a fact that **cause** arguments ([+c], [+c-m]) are also realized externally. There are also other instances of merging order not covered by what I said so far. So, I assume, that some further hierarchy principles exist, with (94) as a possible instance. I return to this question briefly in section 7.

6. Roles and features

6.1. The target (subject-matter) problem.

Subject experiencing verbs (-the outputs of reduction of the [+c] role) can occur with a complement, as in (95).

95   a)   Max worried about his health.
       b)   Max was scared of the noise.

Pesetsky (1995) labels the role of these complements **'target** of emotion' (or **'subject-matter'**) and shows in detail that it is distinct from the external **cause** ([+c]) role of the correlating object-experiencing verbs. E.g. his (96a) does not, in fact, entail (96b).

96   a)   The article angered Bill.
              cause   experiencer

       b)   Bill was angry at/about the article.
              experiencer   target

A possible construal for (96a) is that the article made Bill angry at something else, say the government, while in (96b), it must be some properties of the article itself that Bill is angry

about. Under both the reduction and the causativization views, these facts must mean that the verb <u>anger</u> selects, in fact, three θ-roles, rather than the two we assumed so far.

A mystery, which Pesetsky labels 'the T/SM (target/subject-matter) problem' is that these three θ-roles can never be realized together, as in (97).

97   a)   *The article angered Bill at the government.
         b)   *The doctor's letter worried Lucie about her health.

98)   a)   The article made Bill angry at the government.
            b)   The doctor's letter made Lucie worry about her health.

Logically, the two roles are compatible, and the content intended in (97) can be easily expressed with different structures, as in (98). So there must be some linguistic generalization ruling (97) out. Pesetsky offers a syntactic account in terms of conditions on movement. However, this rests on a radical change in the view of syntax, assuming a dual system, where derivations are processed in parallel trees. Leaving this broader issue aside, it is not obvious to me that the problem at hand is syntactic. Let us explore how it could be handled in the feature system developed here[32].

6.2. Feature generalizations.

As noted in section 3.2, the θ-features system assumed here, allows the eight feature combinations in (1), of which we have used so far only the first five.

99   a)   [+c+m] -   **agent**
        b)   [+c-m] -   **cause** / **instrument**
        c)   [-c+m] -   **experiencer**
        d)   [-c-m] -   **theme** / **patient**
        e)   [+c]   - Unspecified for [m]; consistent with either (a) or (b).
        f)   [-m]
        g)   [+m]
        h)   [-c]

We assumed that the unary specification leaves unspecified the value of the argument with respect to the other feature. Given the correlation suggested in section 4. between these features and causal relations, if a verb selects a [+c] argument, this argument represents a sufficient condition for the event (possibly a subset of sufficient conditions, as in the case of **instrument**). If [+c] is unspecified with respect to the [m] feature, it is left open whether the condition 'motivate' holds. Hence the verb is consistent with either a **cause** or an **agent** interpretation of the relevant argument.

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[32]Pesetsky mentions briefly the option of capturing this problem with feature restrictions (footnote 60), and dismisses it on grounds which are irrelevant in the present framework.

Let us look now at the relation a **target** role bears to the event represented e.g. in Lucie worries about the state her health. An obvious feature it has is [-m]. But what is its [c] status? Although this role is distinct from cause, it is still possible to view Lucie's health as a cause for her worrying. Having some state of health is a necessary (enabling) condition for worrying about it. But it can also be a sufficient condition - the direct cause for worry. More broadly, in our perception of the world it is possible that the target of emotion is itself the cause of this emotion. Whether it is or not for a given situation depends just on whether there is another condition we perceive as causing it. In feature terms, this means that the **target** role is consistent with either a [+c] or a [-c] value. So it is just [-m].

The lexical entry of worry, then, is given in (100).

100)   worry (θ_1[+c], θ_2[-c+m], θ_3[-m])

Now the question is why the [+c] and the [-m] role cannot be realized together. A generalization which is largely assumed is that a θ-role cannot be realized twice. Kremers (1998) proposes to restate this generalization as in (101).

101   Feature distinctness:
    a)   Two indistinct θ-roles cannot be both realized on the same predicate.
    b)   Distinctiveness of feature sets: α is distinct from β iff α and β are counter-specified for a certain feature f.

By (101b) two features sets are distinct if, say, α is specified as [+f] and β as [-f], for some f. Under this definition, [+c] comes out as indistinct from [-m], since there is no feature for which they are counter-specified. By (101a), then, they cannot be both realized in the same predicate, as in (97b), repeated.

97   b)   *The doctor's letter worried Lucie about her health.

(101b) is probably too strong, as stated[33]. But let us assume it for this expository discussion, and pursue some further implications.

It was noted by Pesetsky (1995) that some experiencing verbs do allow all their three θ-roles to be realized in their non reduced form (object-experiencing), and, in fact, some even require this. This is illustrated in the (i) sentences of (102). If the external [+c] role is reduced, the result is

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[33]As stated, (101b) will also disallow a [-m] role to be realized together with a patient/theme role [-c-m]. This does not seem true, as can be seen in the sustain example (105) below. Next, it will disallow a [+c] role to cooccur with an instrument role [+c-m], which we assumed to be the case in e.g. Max opened the door with a key. (We assumed that the instrument role forces an agent interpretation on a role which is lexically unspecified for m.). For the time being, we may assume that (101b) holds only in the case of singleton feature sets, namely if both α and β are specified for only one feature (while for any other configuration, α and β are distinct in the standard way -if they are not identical).

the two place (subject-experiencing) entry, exemplified in the (ii) sentences. In the Hebrew (102c), we see that the reduced form bears the morphological marks of reduction, as with the other experiencing (and unaccusative) verbs.

102 a i)   The press biased the judge against the defendant.
        ii) The judge was biased against the defendant.

     b i)   This alienated her from her colleagues.
        ii) She was alienated from her colleagues.

     c i)   ze hirgil oto le-oni. (This accustomed him to poverty.)
        ii) hu hitragel le-oni. (He accustomed to poverty.)

Other examples of such three-place verbs, listed by Pesetsky (p.216), are: arouse, incline, provoke, stimulate, estrange, habituate. In Pesetsky's framework, these pose a problem which necessitates a certain amount of stipulations. In the features approach, we should search the answer in the properties of the θ-roles of these entries.

The third role in the (i) entries bears, again, a [-m] feature. However, there is no reason to assume it is unspecified for [c]. In events instantiating these verbal concepts, the bearer of this role cannot be easily viewed as the cause of the event (i.e. a sufficient condition for it). In any case, this often-obligatory role is sufficiently different than the previous instances of the optional 'target' role, to require a different feature assignment. Given our assumptions here, it must belong to the set of [-c-m] roles. In this case, the three lexical entries for, say, bias in (103) are defined by (101b) as distinct, so they are permitted to be all realized.

103)   bias (θ_1[+c], θ_2[-c+m], θ_3[-c-m])

Note that the system of features assumed here defines sets of possible θ-roles, and not necessarily what was conceived to be actual roles. E.g. [+c-m] is the feature combination of both the traditional **cause** and **instrument**. The specific interpretation selected for a given entry is determined by considerations of the surrounding feature combinations. If a [+c+m] role is present (or inferrible), then a [+c-m] role is an instrument. Otherwise, it is a cause (see section 3.2.). The feature combination [-c-m] defines a large set including themes, patients (affected or not), and, given (102), also goals or targets of emotion. More work is needed on how a specific interpretation is selected from this set, and possibly some of these roles fall under [-c], rather than [-c-m].

Once [-m] is recognized as a feature defining a set of roles, we may expect to find other instantiations of this feature set, namely other roles with this feature. **Locative source** is one. Doron (1999) noted that the same pattern we observed with worry-type experiencing verbs is also found with Hebrew verbs selecting a **locative source**. An example is verbs of providing nutrition or living: kiyem (sustain), pirnes (provide/support), hezin (nurture).

104 a)   ha-ikar kiyem/pirnes   et mishpaxt-o.
          The-farmer sustained/supported (acc)-his-family

b)   ha-mishpaxa hitkaima/hitparnesa me-ha-sade.
        The-family   sustained   from-the-field (got its living from the field).

c)   *ha-ikar   kiyem/pirnes   et mishpaxt-o me-ha-sade.
        *The-farmer sustained/supported (acc)-his-family from/of-the-field

Under the present analysis (which differs from Doron's), the morphology marks the verbs in (104b) as the reduced (unaccusative) form of (104a). This reduced form takes a **locative-source** complement. This means that this role must be part of the θ-specification of the underlying verb (in (a)). But still this complement cannot occur in the non-reduced form, as witnessed in (104c). So the pattern is precisely the same we observed with worry (in (96)-(97)), though no **target** role is involved. (Other verbs with this pattern include hishir (shed leaves), hizil (drip), hidif (emanate).)

Doron notes that the locative-source is interpretable similarly to a cause. This is, again, analogous to what we saw with worry. It means that this role is not specified for [c], and whether it is viewed as a cause or not, depends on whether another [+c] role is realized. So this is another instance of a [-m] role[34]. The verbal entry under consideration, then, is (105).

105) kiyem/pirnes (sustain) (θ_1[+c], θ_2[-c-m], θ_3[-m])

Since the external role of these entries is [+c], the feature generalization prohibits the realization of the [-m] role in (104c). But when the [+c] role is reduced, as in (104b), it is allowed to be realized.

6.3. Further implications (and experiencer anaphora).

The verbal pattern in (104) includes one more member, which we have not yet considered.

106)   ha-sade kiyem/pirnes   et ha-mishpaxa.
        The-field supported/sustained acc-the-family.

107)   ha-ec hishir et al-av.
        The-tree shed (acc)its-leaves.

The verb morphology in (106) is the same as in the causative (transitive) form of (104a,c). This, in our terms, means that no reduction took place. Still, the argument that surfaces in external position is the internal [-m] role. This is even clearer in (107) (from Doron 1999).

Upon closer examination, this pattern is found also with experiencing verbs selecting the [-m] role. So far we assumed that in object-experiencing derivations the subject always realizes the

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[34]Given the two instances of a [-m] role we observed, a plausible hypothesis is that a role with this feature is interpreted as 'target / subject matter' with verbs selecting a [+m] complement (experiencer), and as a source otherwise.

external [+c] role of the verb, as in (96a), repeated.

96   a)   The article angered Bill.
                cause   **experiencer**
          b)   Bill was angry at/about the article.
                experiencer   **target**

This was based on Pesetsky's observation that (96a) does not entail (96b), since it is possible to construe (96a) such that the article made Bill angry at something else (rather than at some properties of the article itself, which is the only construal of (96b)).

Nevertheless, it is also possible to construe (96a) as equivalent to (96b), namely that Bill got angry about some properties of the article itself. The sentence, then, has two semantic construals, depending on whether the article is viewed as the **cause** ([+c]) or as the **target** ([-m]). Contextual considerations may enforce disambiguation of the two construals. E.g. in (108a) it is easiest to interpret Lucie's health as the target of her worry, while in (108) the **cause** construal is more natural, namely that the doctor's letter made Lucie worry about something else.

108   a)   Her health worried Lucie.
                target[-m]
          b)   The doctor's letter worried Lucie.
                cause[+c]

This already suggests that experiencing verbs allow also a derivation more on a par with (106-107), namely that in (108) her health realizes the internal [-m] argument. But there are also more robust indications in this direction:

It is widely believed that backwards bound anaphora, as in (109a), is always found with object-experiencing derivations. But, in fact, it is worse in (109b) than in (109a).

109   a) His_i health worried every $patient_i$.
          b)   ??His_i doctor's letter worried every $patient_i$.

The contrast in (109) is not decisive (because (109b) can also be construed with the subject as the target of emotion). It is more crucial to observe that this type of anaphora is natural only with the worry-class of experiencing verbs selecting a [-m] complement, and not with the bias-class, which selects a [-c-m] complement. E.g. in (110), there is no doubt that the external role can realize only the [+c] role, and anaphora is much worse here. (Note that this is an instance of 'weak-crossover' which is usually weak, namely not that bad in all contexts.)

110   a)   ?/*His_i upbringing biased every $juror_i$ against the defendant.
          b)   ?/*His_i musical taste alienated every $pianist_i$ from the $audience_i$.

Another difference between the two classes is that only the worry type allows for an expletive subject, as in (111a).

111   a)   It worried/surprised/scared/excited him that he won.

b)   *It alienated/habituated/estranged/biased/inclined Max (...) that he was always winning.

These facts follow if verbs selecting [-m] allow also the derivation in (112), where the argument bearing that role originates internally and moves to subject position -a derivation of the type proposed in Belletti and Rizzi (1988).

112   a)   The field$_i$ sustained the family e$_i$. (in Hebrew).
    b)   Her health$_i$ worried Lucie e$_i$.

This would provide a straight-forward account for the anaphora facts: It is only derivations like (112b) which allow bound anaphora in experiencing contexts, and for these, Belletti and Rizzi's analysis still holds. In the expletive derivations of (111a), the clause bearing the [-m] role stays in-situ, and an expletive is inserted to satisfy the EPP.

But the question is what licenses derivations like (112). As we saw, the verb morphology, which is explicit in Hebrew, does not show marks of reduction of the external [+c] role in these derivations, so the first puzzle is what happens with this role. For this, we have an answer available already. These derivations are possible only with verbs with the θ-specification in (113). In such cases, the feature-distinctness generalization (101) determines that, since θ_1 and θ_3 are indistinct, only one of them can be realized, in any given derivation. So we have the options of realizing either (113a), or (113b).

113   V (θ_1[+c], θ_2, θ_3[-m])
   a)   V (θ_1, θ_2)
   b)   V (θ_2, θ_3)

The hierarchy of mapping (94) determines that if option (a) is selected, θ_1 must be realized externally, as is always true for a [+c] role. If (b) is selected, the [-m] θ_3 is internal. It will then have to move to satisfy EPP, as in (112), or an expletive must be inserted to do the job, as in (111).

If true, then there are, in fact, two ways to avoid the syntactic realization of an external [+c] role. The major one we examined all along, is by the reduction operation, which reduces the verb's arity and is reflected in the morphology in the relevant languages. The other is entry-specific: In case a role cannot be realized, as in (113), no operation on the verb's arity is needed and it can just be invisible to the syntactic mapping (possibly still inferrible from the verbal concept, pretty much like with 'optional' θ-arguments).

But this appears to raise some questions. First, we saw in section 5.2. that in the case of reduction of the [+c] role, the mapping hierarchy determines that the **experiencer** realizes externally. But in (112b) (Her health$_i$ worried Lucie e$_i$), where the [+c] role is also absent, it still must be realized internally. Next, if the VP-internal merge of both the **experiencer** and the **target** is available, as in (112b), it may appear that we could also choose to move the **experiencer** rather than the **target**. This, in fact, is the derivation Belletti and Rizzi propose for all subject-experiencing structures. But this is strictly impossible, as we see in (114). This

problem (though not the previous one) arises just the same with the ~~sustain~~ type verbs, as in (115).

114)   *Max$_i$ [$_{vp}$hirgiz e$_i$ al ha-maamar].
              *Max$_i$ [$_{vp}$angered e$_i$ at the article]

115)   *ha-mishpaxa$_i$ [$_{vp}$mekayemet e$_i$ me-ha-sade]
              *the-family$_i$ [$_{vp}$sustains e$_i$ from-the-field]

Note that the inappropriateness of these derivations is directly visible in Hebrew, because of the verb's morphology. If the verb is replaced with its reduced entry, the same string of words is appropriate (but the derivation is different, and it will be given in (119b) below).

The answer to both these questions follows from the status of the accusative case in the relevant derivations. Note, first, that derivations like (111a), repeated, actually violate Burzio's generalization (to which I turn in section 7.): No external role is assigned, and still the verb assigns accusative case.

111)   a)   It worried/surprised/scared/excited him that he won.

To see why this should be the case, and more broadly, why the options we considered are the only ones that can be derived in the present framework, let us compare more closely the derivations assumed. It is useful to exemplify this with Hebrew, because of its morphological ques (though the same holds for English and the other languages examined here).

In section 5.2. I argued that the accusative feature (ACC) is associated with two place verbs already in the lexicon, and the argument selected to eventually check it is also marked with this feature. As we saw there, in the relevant two place experiencing verbs, the **experiencer** (as the [-c] argument) is associated with ACC. So the underlying entry is (116).

116)   ~~hirgiz (anger)~~$_{acc}$ ([+c], [-c+m]$_{acc}$, [-m])

117)   ~~No reduction, [+c] realized:~~
       Merge: ha-maamar [$_{vp}$hirgiz et Max]
                     the-article [$_{vp}$ angered acc-Max]

118)   ~~No reduction, [-m] realized:~~
       Merge: [$_{vp}$ hirgiz et Max ha-maamar]
                            [$_{vp}$ angered acc-Max the-article]

       Move: ha-maamar$_i$ [$_{vp}$ hirgiz et Max e$_i$]
                     the-article$_i$ [$_{vp}$ angered acc-Max e$_i$]
                           _____|

This means that whatever we choose to do next, the **experiencer** must first merge as the V-complement. (If the **experiencer** merges in the external position, the derivation will crash, since the accusative feature of the verb cannot be checked and erased.) Next, the feature-distinctness

generalization (101) determines that only one of the features [+c] and [-m] can be realized. We assumed that the mapping hierarchy determines that a [+c] argument realizes externally, but [-m] realizes internally. If [+c] is realized, then, we obtain (117). If the [-m] argument (**target**) is realized, it is merged as in (118a), and subsequently moves. Alternatively, if [-m] is realized by a clause, it may stay in situ, and an expletive is inserted to check the EPP, as in (111a). This explains how the accusative case can be realized even though no external role is assigned. No other derivation is possible if [-m] is selected: If we move the **experiencer** instead, (as in (114)), the same DP has to check both the accusative and the nominative/EPP features, which leads to a crash. Finally, in the derivation (118), the [-m] argument checks the nominative case (and the EPP), so no preposition is inserted for it.

With no reduction, then, the verb-entry (116) enables the two derivations in (117) and (118). If reduction applies to that entry, we obtain the new entry in (119a), which is a two place verb.

119)   Reduction:
        a)   R(hirgiz) (=hitragez)([-c+m], [-m])
        b)   Merge: Max [$_{vp}$ hitragez al   ha-maamar]
                        Max [$_{vp}$ got-angry about the-article]

92)   Merging principle.
        A θ-argument bearing a [+m] role is realized in the external position.

As mentioned in section 5.2 (and will get clearer in the next section), reduction operations have the effect of eliminating the accusative feature of their transitive input. So, if we select the entry (119a), the accusative computation does not impose any order of merging. In this case we need to consult the merging principles. (92), repeated, determines that the **experiencer** should merge externally, and we, thus, derive (119b).

In conclusion, then, the feature system assumed here allows for verbs of the worry type two object-experiencing derivations: (117) and (118). Their movement derivation (118) explains why backwards bound-anaphora is possible with these verbs. It also explains why it is possible sometimes to find the accusative case also when no external role is assigned. But crucially, this is a very restricted type of derivation, which is determined by specific feature-configurations of the relevant verbs.

7. Theta meets case.

(The introduction and section 7.1. will be extended and modified, respectively.)

I argued already (in sections 5.2 and 6.3) that the accusative feature plays a crucial role in the interface of the Concepts system and the CS. It is common to view the accusative case as an arity (valency) marker, indicating that the verb takes two syntactic arguments. In the minimalist framework, this means that two place verbal entries are associated with an ACC feature that must be checked, usually by a DP with the same feature. The ACC feature plays a role only in the CS,

and is not legible to the Inference systems, hence checking means erasing it. What we assumed, further, is that the ACC feature is associated with the verb already in the Theta-system, and that principles of that system also select a θ-argument (with the [-c] feature), which is marked with the accusative feature. Although these features are not necessarily legible to the Theta system itself, they provide vital information to the CS. This marking determines, first, that when the CS selects this verb for the derivation, it must also associate the feature ACC with one of the DPs it selects, and that this DP must be merged first.

In this section I examine further CS-implications of the selection of ACC in the Theta-system, and specifically its interaction with arity operations.

7.1. Arity operations and the accusative case.

All arity operations, whether they apply in the Theta system (lexicon) or in the CS, have a uniform syntactic effect on the accusative case: They exclude accusative checking by a DP, which entails that this case must be either eliminated altogether or 'absorbed' in the derivation. Let us see this in some detail.

Independently of the Theta system, or the verb's arity, the computational system (CS) requires that at some point of the syntactic derivation the D - EPP (Extended Projection Principle) features must be checked. I.e. there should be an argument, of the relevant category, which checks the D features of (some) I head, and, thus, serves as a subject. As noted, two-place verbs also bring with them from the Theta system the accusative feature on the verb and the specification that one of the DPs in the numeration must carry this feature as well. A standard two place verb, then, is associated with two functional features that need to be checked for the derivation to converge. For convenience, let us assume that selected items are first collected in a numeration, and the relevant subset of the numeration associated with a selection of a verb of type (120a) is represented schematically in (120b). (Actual numerations contain words and not V's or DP's).

120 a) V_{acc} (θ_1, $\theta_{2\text{-acc}}$ (...))
  b) <u>Numeration:</u> {...$I_{D(EPP)}$ ... V_{acc} (θ_1, $\theta_{2\text{-acc}}$), {$DP_{i\text{-acc}}$}, {DP_j}...}

Now let us check how applying an lexicon operation to (120a) may effect the functional features. It should be obvious that no such operation can touch the EPP feature, since this is not a feature of the verb, to begin with, and (on conceptual grounds) since it is a crucial stone-block in all derivations - what eventually defines the predication relation. So it cannot be eliminated. This leaves us, then, only with the option of checking what happens with the ACC features.

Given our assumptions here, the operation of saturation (applying in passivization) cannot effect the ACC feature of the verb in the lexicon: Saturation does not eliminate a role: the verb remains a two place verb, though the θ_1 role is now an existentially bound variable (which is not syntactically realized, i.e. it does not enter the numeration). So, if ACC is a arity marker, the arity of the predicate remains the same. On the other hand, it does effect the ACC features of the DP. No θ-argument with this feature can be realized. This means that the numeration contains the elements of (120b), but only one DP. That single DP will have to check the EPP feature, so something should be done about the accusative case on the verb, in the syntactic derivation. I

assume that, as in Chomsky (1981), the passive morpheme absorbs (or checks) the accusative case (rather than relating to the missing θ_1 role).[35] If the relevant morphology for checking this case does not enter the numeration, the derivation will crash (-the verb's accusative feature remaining unchecked). Since (passive) saturation cannot cancel accusative case, it is entailed that all languages should mark passive morphologically somehow, which appears to be the case. Even the morphologically poor English, which, as we shall see, does not mark reduction operations, marks its passive operation.[36]

Now let ut us look at the effects of reduction. Since the verb's arity has been reduced, only one DP is selected into the numeration, as represented in (121). (So in this respect, there is no difference between reduction and saturation.)

121   a)   <u>Internal-reduction numeration:</u> $\{...I_{D(EPP)} ... R(V_{ACC??} (\theta_1)), \{DP_i\}\}$

        b)   <u>External- reduction numeration:</u> $\{...I_{D(EPP)} ... R(V_{ACC??} (\theta_2)), \{DP_i\}\}$

Note that the potential effect of both types of reduction (unaccusative and reflexive) is precisely the same: They can only effect the fate of the accusative case. The single DP in both numerations must check the EPP features. So in both there can be no DP with the ACC feature. We are left with the question of the accusative feature on the verb. The difference between saturation and reduction is that, reduction does, in fact, reduce the arity of the verb. So, in principle, it is possible for that feature to be eliminated in the lexical entry, before even entering the numeration. Hence the question mark on the verb's ACC feature in (121). In section 7.2. I argue that languages, indeed, may vary on this question.

What we saw, then, is that all lexical operations have a unified syntactic effect of cancelling a DP case-checking, and in the languages we are examining, the relevant case is always the accusative. We may broadly refer to this process as <u>the elimination of the accusative case</u>, though technically, this can be obtained by actual elimination in the lexicon, or by 'absorption', namely checking the accusative residue by some other morphological means. We thus get something very close to Burzio's generalization, in (122).

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[35]The alternative view which has been around is that passive morphology absorbs the external θ role. Baker, Johnson and Roberts (1989) argue even that it is actually a clitic type argument, which gets the external role (in I), while also checking the ACC. Under the present system, which follows Williams and Grimshaw on that matter, this role cannot be either satisfied or absorbed, since it is there.

[36]There must be, however, some other means available to deal with the accusative left by other instances of saturation. I have assumed here that middles and impersonal structures (In Italian) are also derived via some process of lexical saturation, but there is no morphological marking of the accusative there. It could, perhaps be argued that the adverb or negation, which are necessary in middles is doing that. Or that the generic air of such structures indicates that another type of lexical operation is involved. If 'indefinite object deletion' is also an instance of saturation, it is also not clear what takes care of the accusative case.

122) Burzio's generalization:
    If the verb does not assign an external role, it does not assign accusative case.

Burzio (1986), (1994) assumed that the lack of accusative is directly associated with the lack of an external θ role, which appears to be true for most cases. However, we saw that it does not matter which role is reduced. In reflexives, the external role is assigned, and still the accusative case is eliminated. The crucial factor, rather, is whether a lexical operation applied. Furthermore, on the present view, in many outputs of lexical operations, the verb still does carry an accusative feature which must be absorbed. Burzio's basic insight, then, needs to be extended, as in (123).

123) Mapping generalization for Lexical-operations:
    If a lexical operation applies to a two place verb, the accusative case must be eliminated (or absorbed).

While in the languages we examine here (of the Nominative-Accusative type), (123) effects the accusative (V-internal) case, in the framework of the minimalist program, there is no conceptual reason why this should be the only option available for UG. Once EPP features are separated from case features, there is no principled reason why both case-features cannot originate on the verb, as arity markers (assuming e.g. that the external case can be checked covertly in the given language). It is thus possible that a lexically internal argument ends up checking the EPP feature on the one hand, and the internal case on the other. An account for the ergative-absolutive languages can be sought along these lines, as pointed out, under a different execution, in Burzio (1994). As he argues, in principle, it could also be possible to find a nominative - accusative language that nevertheless allows the single DP to check the accusative, rather the nominative case, as appears to be the case in Icelandic.[37]

With this assumed, we can turn to the way the languages under consideration realize the generalization in (123) in the cases of reduction.

7.2. Auxiliary selection.

As I just mentioned, when a reduction operation applies in the lexicon, the arity of the verb is reduced. In principle, it is possible that this operation itself eliminates the accusative feature of the verb, so no accusative feature enters the numeration. This, indeed, is the case in English, which just does not show a morphological, or any other trace of the original (lexical) accusative feature in either reflexive or unaccusative structures (Lucie fell, Lucie washed).

[37]A common assumption about ergative-absolutive languages is that the absolutive case appears always on the subject of unergative verbs. However, Burzio (1994) argues (based on previous literature) that, in fact, only unaccusative subjects occur obligatorily with the absolutive case, (while unergative subjects may have any of the two cases). This is consistent with the view of lexical reduction as forcing the elimination of the external, rather than the internal case in these languages. Burzio also argues that a similar process (coached under a different terminology) explains the Icelandic data. These issues are extensively discussed in Chomsky (1994), chapters 3, 4.

However, the three other languages under consideration all have some morphological (or other) traits characteristic of a reduction operation. There are two ways these various ways of marking could be viewed: One is that case in these languages is more resistant to lexical operations. So, the accusative feature is not fully reduced, but some 'trace' or some residue of the original accusative feature is left. This residue may be weaker than the original accusative left in passive, which requires special morphology. But it nevertheless needs to be addressed in the numeration and in the syntactic derivation. The other option is that the morphology is independent of case. E.g. what it marks may be not the residue of case, but the residue of the thematic-role. Namely, the morphology may signal that a lexical operation took place, or more generally, reflect lexical properties of verbs. It is, in principle, possible that some languages mark the one and others mark the other, depending on whether reduction eliminates the accusative case.

Hebrew, as mentioned, marks lexical processes on the verb's morphology. However, there is no evidence or reason to assume that this verbal morphology is related to case in any way. As we saw, the reduced verbal entries can occur in three verbal patterns: hitpaʔel (which is largely obligatory with reflexive reduction), nifʔal, and paʔal. The first two are indeed incompatible with the accusative case. (The nifʔal pattern is not restricted to reduced verbs, but it never occurs with an accusative complement.) But the paʔal form is not restricted this way. Along with reduced verbs (like nafal (fell) and daag (worried)), there are many verbs in this pattern which take accusative complements (like ahav (loved), lakax (took))). I conclude that in Hebrew, just like in English, the accusative case is fully eliminated (in the lexicon) when lexical reduction takes place.

Dutch and Italian, on the other hand, are both instances of the 'accusative residue' option. Comparing them is of particular interest because of their different patterns of auxiliary selection. As is well known, Italian uses the auxiliary be (essere) with both reflexives and unaccusatives. (In fact, this holds not just for reduction, but for all lexical operations, including middle and impersonal structures.) Dutch uses the auxiliary be with unaccusatives, but not with reflexives. So let us look at them more closely.

As argued in section 2.3, based on Reinhart and Siloni (forthcoming), in Italian, and Romance in general, the reduction operations take place in the syntax, rather than the lexicon (but they obey precisely the same θ-conditions as the lexical operations). If so, it is not even an option that the accusative case is eliminated in the lexicon, since the verb enters the numeration in its standard two-place form. The superfluous accusative case must, therefore, be addressed in the syntax. We argue that this syntactic process is possible because the si clitics are available to absorb the reduced argument. It is possible, in principle, that this clitic itself absorbs the accusative case, namely, that syntactic reduction eliminates the accusative feature. But this does not seem the case in Italian. Since all reduced verbs in Italian require also the auxiliary be, we should pursue the option that be selection is related to the checking of the superfluous accusative.

As in the case of the passive morpheme, there are two lines available on AUX selection in unaccusatives: It either marks the missing external θ-role, or the missing accusative case. (That Aux selection is sensitive to case considerations, rather than to θ-roles, is argued in Everaert

(1994).[38]) Several lines attempt to relate the fact that be is itself unaccusative to its obligatory selection in the case of unaccusative verbs, again, along the two lines of theta or case. An interesting θ-based account is offered in 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. The theta based accounts hold only for unaccusative entries, where the external role is indeed absent, but they cannot extend to Italian, where the be auxiliary surfaces also with reflexive entries, where, as I argued, the remaining argument is external. The case-based approach, by contrast, is independent of the portion of the argument, and, thus, more broadly applicable.

Within the prevailing view of unaccusatives, case-accounts of auxiliary selection face a serious difficulty: On that view, unaccusative verbs are listed as entries with just one internal argument, and, thus, enter the numeration with no accusative feature. But then, there is no case property which distinguishes these verbs from the standard unergative verbs that also lack this feature. The problem would be, then, why be is not selected also for these verbs. But on the present view, it is actually the other way around: unaccusatives, and all reduced entries, do carry a residue of the accusative feature (in the relevant languages), so a selection of be is forced when this feature needs checking, and only then. For the present, we may assume that the be auxiliary itself is just a reflex of some checking procedure. The accusative residue is handled in some inflection projection which also checks the verb-auxiliary complex. A checking element must always be present in that projection, regardless of whether an auxiliary is realized. If an auxiliary is selected, it must be be, perhaps for the reasons pointed out by Ackema. Under this assumption, then, we expect all instances of arity operations in Italian to select be (since the accusative feature is never eliminated in the lexicon)[39].

Recall that in Italian, unaccusative verbs are found also without the clitic si. This means that

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[38]There is also a family of accounts attempting to explain it independently of either of these, in terms of aspect. Arguments against this line can also be found in Everaert (1994).

[39]An unsolved problem for this account is that in impersonal structures in Italian be (just like si) can occur also when the accusative case is fully realized, as in (i), from Cinque (1988, (43a) and (72b)). We may assume that impersonals of this sort involve some sort of lexical saturation of the external role. (as made explicit in Chierchia (1989), (1995).) The EPP feature is possibly checked with an empty expletive. The result is that the accusative argument of a transitive verb may remain intact. Still, both si and be occur. In (ia) be is selected although a full internal argument remains. In (ib) this internal argument is an accusative clitic. For an approach relating both si and be to the effect of lexical operations on θ-roles, rather than on case, this is the predicted result.

i   a)   Oggi, a Beirut, si e ucciso un innocente
                  Today in Beirut, [one] si be killed an innocent.
     b)   Qui, li si mangia specco
                  Here si often eats them (acc).

unaccusative reduction can apply either in the syntax, or in the lexicon (for a lexically fixed set of verbs). The clitic (as the role absorber) is associated only with the syntactic applications of reduction. But the auxiliary be is equally found with unaccusative derived in the lexicon or in the syntax. In our terms, this means that lexical reduction does not eliminate the case. Thus,in Italian all arity operations equally force be-selection, whether they take place in the syntax or in the lexicon.

In Dutch, unlike Italian, the reduction operations apply in the lexicon. (As we saw in section 2.3., this is witnessed by the fact that reflexivization is much more restricted in Dutch, as is always the case when it applies in the lexicon.) Nevertheless, it shows be selection in unaccusative contexts. We are assuming that this selection applies when a superfluous accusative case needs checking, so this must mean that the lexical operation in Dutch does not fully eliminate the unaccusative case, but leaves a residue that must be checked. The obvious question then, is why Dutch (and German) differ from Italian in this respect: Why do reflexive verbs in Dutch always select have, unlike its unaccusative verbs?

I suggest that the difference lies in the lexical inventory of the two languages. Dutch has an anaphoric argument zich which surfaces in the object position, when lexical reflexivization applies. As argued in Reinhart and Reuland (1993), zich has, on the one hand, some (weak) inherent case, which is why it can occur in a syntactic argument position at all, but on the other hand, it lacks full specification of phi-features, which is why it does not induce a chain-violation when it forms a chain with a co-argument[40]. This distinguishes zich from the Italian si, which, as mentioned, is not an argument, but a clitic originating on I (- AGR). Under the case view, the availability of a semi-case argument, enables Dutch to use it to check the accusative residue left by reduction. In a reflexive structure, the external argument is merged on the V-external position. Hence, the V-internal position is available, and can be occupied by the zich. The external argument checks the EPP, while the pale case-feature of zich checks the pale accusative-residue on the verb.

So, with reflexive entries, Dutch has an alternative means to check the accusative residue, hence there is no need to further check it in an I projection, and the standard have auxiliary will be selects. However, in the unaccusative structure the DP must be merged in V-internal position (so there is no room for a zich argument there). When the DP moves to check the EPP, the accusative residue remains unattended. For such derivations to eventually converge, the same Inflection device as in Italian must be introduced in the numeration. Its existence will be, again, overtly noticeable when AUX is present, forcing a be rather than have.

This view of the case-functioning of zich sheds light on a long standing mystery of reflexivization in Dutch (not addressed by Reinhart and Reuland (1993)). Since zich is a (semi) argument, it is not restricted to reflexive predicates, and can occur as an anaphor. The binding domain of zich is that of SE anaphors, namely, it can be bound from inside a small clause, by a matrix argument, as in (124). Still, it cannot occur in an accusative position of a small clause, as in (124, and it must be embedded in a PP.

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[40]Reuland (1996) argues that what makes anaphors of this type referentially defective is (possibly universally) the absence of the plural feature.

124   *Jan$_i$ hoorde [Lucie zich$_i$ critiseren]
           *Jan$_i$ heard [Lucie criticize SE$_i$]

124)   Jan$_i$ hoorde [Lucie tegen zich$_i$ argumenteren]
         Jan$_i$ heard [Lucie argue against SE$_i$]

No binding account exists for this contrast, and it does not also follow from the movement analysis of SE anaphors, assumed by R&R and many others. (Nothing known could make SE movement to matrix AGR easier out of the PP in (124) then in (124). But under the assumptions here, we may conclude that zich's pale case features are sufficient to check the accusative residue (left by a reduction operation), but not a full-fledged accusative feature, as in (124. In the PP context (124), the case is inherent, hence the pale zich features are sufficient.

Concluding this section, we saw, following Siloni and Reinhart (forthcoming), that languages may vary, first, on whether arity operations apply in the lexicon or in the syntax, and next, on whether the reduction operations eliminate the accusative feature that the verb carries in the lexicon. Both these settings-options have visible implications (and thus their values are learnable): Only the syntactic operations allow free reflexive-reduction, including reduction into small clauses. Only if the accusative case is not eliminated by reduction there will be visible case-absorption devices, such as aux-selection. Obviously, these setting options determine many more possible variations. E.g. it is possible that a language has syntactic reduction, but it allows this reduction to eliminate the accusative case (in the syntax). If so, we will find the clitic doing the job of reduction, but still the auxiliary have will show up in both unaccusative and reflexive derivations. This seems to be the case in Spanish.

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Reinhart, T. (1991)

CHECK IF THE FOLLOWING ARE INCLUDED IN THE FINAL DRAFT:
Parsons 1990, Pesetsky 1987, Tenny 1994, Verkuyl