UCL Working Papers in Linguistics 10 (1998)

Aphasic evidence for the syntactic determination of unaccusativity[*]

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Abstract

In this paper I introduce some data from an aphasic patient who demonstrates a robust effect of grammatical class; he is unable to read any function words, and makes characteristic 'within-category' substitution errors. These errors extend to the class of unaccusative verbs, and this leads to a consideration of the functional nature of unaccusativity. Existing accounts of unaccusativity as a syntactic reflex of some semantic property are discussed, and a proposal for a syntactic account of unaccusativity is outlined. The aphasic deficit as we understand it seems to provide evidence in favour of a purely syntactic determination of unaccusativity.

1 Introduction

There is a contrast between single-argument verbal predicates which assign only an external thematic role to their subject, and those which assign an internal thematic role to a single argument, which may surface as a pre-verbal subject. In some languages, the subject of such a predicate may be realised post-verbally. The nature of this distinction has been widely debated, since Perlmutter's (1978) original statement of the Unaccusative Hypothesis. It has been claimed that the distinction can be accounted for in syntactic terms (e.g. Rosen, 1984), in semantic terms (e.g. Van Valin 1990), and by using a combination of syntactic and semantic properties (e.g. Levin and Rappaport Hovav 1995).

In this paper, I present data from an aphasic patient, MC, who has a specific function word reading deficit, which apparently extends to the reading of unaccusative verbs. I will show that, as far as we have been able to ascertain (Druks and Froud, submitted), MC's deficit is not semantic but syntactic in nature, so that assuming a syntactic account of unaccusativity would yield a parsimonious account of his pattern of performance. I will argue that his reading deficit provides evidence to support the view of unaccusativity as syntactically determined (though the possibility

[*]I would like to thank MC for all his hard work. Many thanks are also due to Neil Smith, Judit Druks, Annabel Cormack and Eric Mathieu for many helpful discussions and suggestions.

that there is a semantic trigger for unaccusative syntax is not denied). I therefore propose a syntactic account of unaccusativity based on suggestions by Reinhart (1997) and Pesetsky (1995), whereby unaccusative syntax is the realisation of a lexical process of abstract affixation of a functional morpheme to an underlyingly transitive verb. Such a view of unaccusativity permits a parsimonious account of the verb reading data obtained from the aphasic patient.

The data under discussion here all come from *single-word reading tasks*, and I assume that single words project syntactic structures which are determined by their feature specification in the lexicon. I also assume Grimshaw's (1991) account of extended projections, whereby lexical categories select certain functional projections, rather than vice versa. Following these assumptions leads to a slightly different view of the underlying nature of this patient's reading deficit to that taken in Druks and Froud (submitted). However, in following these assumptions more closely than in our previous work, I hope to show that data from aphasia may provide evidence for (or against) particular aspects of syntactic theory. It is difficult at times to detect the link between strongly competence-based proposals in theoretical syntax, such as those comprising the Minimalist Program of Chomsky (1993, 1995), and performance deficits observed in aphasia (but see Caplan and Hildebrandt 1988, Grodzinsky 1990, Ouhalla 1993, Druks and Marshall 1995); however, I subscribe to the view that any theory of language implicitly makes predictions as to the ways in which language may break down (cf. Grodzinsky and Finkel 1998).

In our original investigations of MC's reading deficit, we turned first to neuropsychological frameworks for an explanation; however, in the face of a syntactic deficit like that under investigation, we found that neuropsychological theories alone did not provide the necessary theoretical machinery to capture the observed patterns of performance. It seems, then, that there is a need for neuropsychological investigations of aphasic deficits to refer to syntactic theory in order to achieve an explanatory (rather than descriptive) level of analysis. In our studies of MC, and in this paper, I hope to show that, by making use of syntactic theoretic approaches, we may be taking a step closer to understanding the underlying nature of some acquired language disorders.

The paper is organised as follows. First, I shall introduce the aphasic patient, MC, and summarise the nature of his deficit as we understand it at present. Then I shall consider some aspects of syntactic and semantic accounts of unaccusativity. Finally, I shall propose an outline account of the lexical representation of unaccusative verbs and the syntactic reflex of such a representation, and attempt to show how the aphasic evidence discussed provides support for the syntactic determination of unaccusativity.

2 MC: an aphasic patient with a function word[1] reading deficit

2.1 Background information

MC is a 74 year old right handed male, who suffered a left hemisphere embolic cerebrovascular accident in June 1990. He is neurologically stable, with a right sided hemiplegia, moderate articulatory dyspraxia and a diagnostic profile on the Boston Diagnostic Aphasia Examination (Goodglass & Kaplan 1983) which characterises him as similar to a Broca's aphasic (though with greater articulatory agility and a wider range of syntactic structures in spontaneous speech than would be expected for a true Broca's). MC's reading of sentences and connected prose tends to be agrammatic (that is, he omits functional morphemes), though in his spontaneous speech he is able to use a relatively wide range of grammatical morphemes and syntactic structures. There is, then, a clear dissociation between MC's inability to use grammatical morphemes in reading and his relatively intact use of these same items in speech.

Investigations of MC's reading of single words revealed a pattern of performance similar to that known as *phonological dyslexia*[2] (first reported by Beauvois and Dérouesné 1979): he is unable to read nonwords (that is, letter strings which represent accidental 'gaps' in the lexicon, for instance *blick*, *leabows*), producing instead real words which are visually similar to the target. He performs very well on single-word reading tasks involving substantives, even those that are highly abstract and of low frequency; however, he is extremely poor at reading function words, including pronouns, complementisers, auxiliary verbs, prepositions[3], anaphors, conjunctions, quantifiers and determiners. The contrast between MC's relatively intact reading of substantives and his very impaired reading of function words is illustrated in table 1 below, which summarises MC's reading of various word lists.

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[1] I use the term 'function words' throughout this paper as a general term denoting all members of closed lexical classes. This is a far from homogeneous group, and I do not intend to imply that function words are uniformly represented; the use of this term is simply a shorthand.

[2] The term 'phonological dyslexia' refers to an inability to read nonwords, explained by the presence of a deficit in mapping between graphemes and phonemes. This process of Grapheme-Phoneme Conversion (referred to as the GPC Route) is supposed to bypass the mental lexicon and the so-called semantic system (where meaning representations are stored), and is used for reading of nonwords or unfamiliar real words.

[3] It is not uncontroversial to include prepositions in this list of 'function words'; however, the data from MC are very clear, and he treats prepositions in exactly the same way as he treats other function words. This has led us to assume that, at least for MC, characterisation of prepositions as part of the functional lexicon is justified. Further, in accounting for MC's selective reading deficit, we make use of Grimshaw's (1991) feature classification of lexical and functional items; on that view, prepositions do receive a positive specification of their F(unctional) feature, because of their selectional characteristics. For some further discussion of this problem, see Druks and Froud (submitted).

Reading List	**n**	**Number read correctly by MC (% in brackets)**
Mixed Lists (comprising words from various word classes, including nouns, verbs and function words)		
Coltheart et al (1979)	78	62 (79%)
Parkin (1984)	120	101 (84%)
Glushko (1979)	86	62 (72%)
Howard (1991)	100	90 (90%)
Noun Lists		
Concrete Nouns	140	134 (96%)
Abstract Nouns	104	80 (77%)
Verb Lists		
Mixed: concrete/abstract verbs	200	170 (85%)
Concrete	140	134 (96%)
Abstract	59	42 (71%)
Function word lists		
Mixed with concrete verbs & nouns	137	12 (8%)
Mixed with abstract verbs & nouns	60	5 (8%)

Table 1: Summary of MC's reading performance on function words and substantives

The most striking thing about MC's selective reading deficit is the difference between the *type* of errors he makes on substantives and on functional categories. When reading substantives, he makes few errors, and these are usually affixation errors, or visual / phonological errors (in which a visually or phonologically similar word is substituted for the target). Very rarely, he makes semantic errors; that is, he substitutes a word similar in meaning to the target word (e.g. reading *propellor* as '*aeroplane'*). When reading function words, however, he reads only about 8% correctly[4], and makes *within-category* substitution errors; that is, he produces another function word, which is not usually phonologically or visually related to the target. This effect has proved very robust - MC *never* makes any other kind of error when reading function words - even to the extent that it may be construed as support for the notion that prepositions (which MC treats as if they are function words and not substantives) should be viewed as functional categories (e.g. van Riemsdijk 1990).

[4]Across many word lists: MC has read a total of 1192 function words in various lists for us, over two years of testing.

2.2 Accounting for MC's function word reading deficit

When trying to account for MC's function word reading deficit, we initially turned (as mentioned above) to descriptions of similar patients in the neuropsychological literature. Two kinds of phonological dyslexia have been described: in the first type only nonword reading is affected, and in the second, reading of both nonwords and function words is impaired (Friedman 1995). MC falls into the latter category.

There has been some debate as to whether the function word and nonword reading deficits in phonological dyslexia are linked, or have separate causes. Friedman (1995) suggested that there could be two possible underlying causes of phonological dyslexia: either there is a deficit in recoding between orthography and phonology, which would mean that nonwords and function words are both impaired, or phonological representations in the lexicon are damaged, causing an impairment of nonwords but sparing function words. Friedman assumes that the representations of function words in the lexicon are associated with very little meaning ('words with less densely interrelated associative networks' - p.198), and the presence of a phonological deficit causes the aphasic patient to rely very heavily on meaning representations in order to 'activate' lexical entries. A patient with this kind of disorder, then, would be able to activate lexical entries for substantives, because they have strong meaning representations; but he would not be able to read nonwords or function words, since the former have no lexical entries in any case, and the latter (on this view) do not have enough meaning to be activated well enough for reading.

Patterson (1982), on the other hand, suggested that the function word and nonword reading deficits were linked, and were both caused by a problem in recoding orthography to phonology. Patterson's proposal entails that function words are not lexically represented, but are always read (even in the undamaged language system) via some non-lexical route. This position was argued against by Funnell (1983), whose patient WB had a severe reading impairment for nonwords despite a retained ability to read function words.

MC's pattern of performance is not readily captured by such accounts of phonological dyslexia. Firstly, MC demonstrates good comprehension of written function words that he is unable to read - for instance on sorting tasks which require recognition of plural morphology, sentence completion tasks which require the selection of appropriate function words, and word-picture matching tasks requiring the appropriate selection of a preposition, quantifier, pronoun or determiner to go with a picture (all these experiments and more are detailed in Druks and Froud). This seems to suggest that MC is still able to 'activate' his meaning representations of function words that he is unable to read, however the nature of their semantic representation is understood. Secondly, MC's errors on nonwords are very different to those he makes when reading function words, suggesting that, far from using the same route for nonword as for function word reading, he utilises very different

strategies for each. His errors on nonwords tend to be lexicalisations - that is, MC produces a real word which is visually related to the nonword target (for example, he read *cug* as *'cup'*, *lat* as *'lattice'*, *birl* as *'girl'*). When attempting to read function words, however, he makes his characteristic 'within-category' substitutions (e.g. *in* → *'across or because'*; *by* → *'at'*; *every* → *'before, and'*; *him* → *'it or before'*[5]). If the deficit were due to a lack of semantic activation (as on Friedman's account) or to a breakdown on a common reading route used only for nonwords and function words (as on Patterson's acount), then we would expect MC to treat functional categories and nonwords in exactly the same way as each other.

This pattern of errors suggests that MC is, at some level, able to identify functional categories - perhaps simply as 'category-less' - and, though he cannot distinguish between the individual members of this natural class, he can still draw the distinction between functional and substantive.

Further evidence that MC's deficit really is syntactic (rather than semantic) in nature comes from an interesting dissociation observed during testing: MC showed that he was able to interpret inflectional morphology associated with nouns (i.e. plurality), but not that associated with verbs (i.e. tense and agreement)[6]. In trying to account for this deficit, it became evident that a syntactic view was required. As suggested by Hale and Keyser (1993), it could be assumed that single lexical entries can be associated with a great deal of structural information, even to the point that the positions they can occupy in the syntactic derivation are absolutely determined by features on the lexical entry:

> As a matter of strictly lexical representation, each lexical head projects its category to a phrasal level and determines within that projection an unambiguous system of structural relations holding between the head, its categorial projections, and its arguments (specifier, if present, and complement).
>
> Hale & Keyser 1993:53

Taken in combination with Grimshaw's view of extended projections, this leads us to propose that lexical entries also contain information about the extended projection

[5] MC's errors on function words are not consistent across testing sessions; so, for instance, he does not always read *in* as *'across or because'*. The within-category substitutions appear to be random, inasmuch as any other function word may be produced in place of a function word target.

[6] This was demonstrated via a series of sorting tasks which required MC to identify written words as singular vs. plural nouns (e.g., *flower, flowers; knife, knives; louse, lice*), and as past vs. present tense verbs (marked with *-ed* and *-s* respectively). In the nouns (singular vs. plural) sorting task MC performed at above chance levels, carrying out the task quickly and efficiently and making only a few errors (90% correct). In the verbs (past vs. present) sorting task, in contrast, MC carried out the task slowly and hesitantly, and performed at a level no higher than chance (43% correct responses: 26/60 present tense verbs,10/30 regular past tense verbs and 15/30 irregular past tense verbs).

of a particular item. For example, a verb requires an extended projection of IP, in order for its tense features to be checked and interpreted and for its subject to be case-marked in Spec,IP. Using these theoretical constructs, it is possible to straightforwardly capture MC's function word reading deficit in terms of the selective availability of lexical entries, and their associated structural and categorial information. Specifically, it is proposed that MC is unable to retrieve from the lexicon any category with a positive specification for Grimshaw's [F] (functional) feature. His lexical representations are assumed to be intact. The modality specific nature of the deficit (since MC both understands and uses in spontaneous speech many function words that he is unable to read) suggests that, figuratively speaking, MC's access to the lexicon via some dedicated reading route has been damaged in such a way as to prevent any item associated with positive [F] features from being Selected *when he is reading*. Lexical access via other routes (e.g. for spontaneous speech) is relatively unimpaired.

To illustrate, when MC is given a substantive item to read, he is able to access structural and categorial information about it, including the nature of its extended projection. Hence, when reading a noun he can project a DP; when reading a verb he can project to IP. Support for this is provided by some of his errors. When reading bare nouns, for instance, he occasionally inserts a determiner (usually the indefinite article - e.g. *door* → *'a door'; hammock* → *'a hammock'*). When reading a verb, he sometimes produces a pronominal subject, and (very occasionally) even an auxiliary (e.g. *shaving* →*'he is shaving'; laughing* → *'she laughs'*). When he is given a functional element in isolation to read, however, he is not able to project the structure he needs, because he cannot access the categorial and structural representation of these elements from the lexicon. In this situation, he can only identify the word as 'categoryless', and he searches for any categoryless item to produce - hence his apparently random but consistently within-category errors on function words.

It seems that there is a second deficit, however, apart from this access difficulty. Recall that MC is able to interpret number morphology on nouns, but not tense morphology on verbs. Recall also that Chomsky (1993, 1995) views interpretation of tense at LF as dependent on (covert) adjunction of V to T in order to attach to abstract tense features. MC's inability to interpret tense morphology on verbs suggests that he is unable to carry out this kind of abstract affixation in the syntax. This could be understood as a kind of processing (i.e. computational) or derivational deficit which accompanies MC's access deficit. Number on nouns is interpretable for MC, on the other hand, because it is checked inside the DP (which MC is able to project for a noun) and because it does not require any process of abstract affixation to take place in the syntax.

So it seems, given these assumptions, that syntactic theory provides a parsimonious way to capture the underlying nature of MC's deficit: an inability to access, when reading, any categorial or structural information about lexical entries for functional categories, in conjunction with an inability to carry out abstract affixation (at least, covert adjunction of V to T) in the syntax.

3 MC's unaccusative verb reading deficit

3.1 Testing MC's verb reading

While investigating MC's reading, it was noted that certain verbs were sometimes treated as if they were functional categories. This effect was not understood at the time, and the verb lists utilised in our original investigations did not control for transitivity, so that it was not clear what feature(s) of the verbs concerned may be causing MC to misidentify them as functional categories. In following up this observation, a reading list was prepared which comprised four conditions. Firstly, there were 25 unaccusative verbs with no transitive alternation (e.g. *depart, ensue*), and 50 unaccusative verbs with a transitive alternation (e.g. *bounce, hang*). Secondly, 25 intransitive verbs (e.g. *cringe, meditate, complain*) were included. Finally, 25 low imageability and low frequency transitive verbs with no unaccusative alternation (e.g. *worship, declare, adjudicate*) were added to the list. Imageability and frequency were controlled for to rule out the possibility that MC was making function word errors on so-called 'nonspecific' verbs (Funnell 1983); that is, verbs with reduced semantic content, or those which may be difficult to 'activate' because they are used very infrequently in the language.

All the verbs included in the list were presented as bare (uninflected) stems, so attempts were made to include only those verbs which are not orthographically identical to nouns. The list was randomised and, in order to generate more data, it was presented to MC on three separate occasions. The whole list is given in the appendix.
MC's performance on this reading list provides the subject matter for the rest of my discussion. The results are provided in table 2:

	Unaccusatives (n = 25 x3)	**Unaccusatives with transitive alternation** (n = 50 x3)	**Intransitives** (n = 25 x3)	**Low imageability / frequency transitives** (n = 25 x3)
Correct	**47 (62.67%)** e.g. arise, persist	**121 (80.67%)** e.g. scatter, accumulate	**50 (66.67%)** e.g. decide, complain	**51 (68%)** e.g. hallow, engross
Function word substitutions	**9 (12%)** e.g. remain → 'because, and'; linger → 'before'	**12 (8%)** e.g. gather → 'before, after'; begin → 'because'	**0**	**0**
Word class changes	**5 (6.67%)** e.g. thrive → 'thrift', reverberate → 'reverberation'	**4 (2.67%)** e.g. bend → 'bent'; resolve → 'resolute'	**11 (14.67%)** e.g. convalesce → 'convalescent'; agree → 'agreement'	**0**
Affixation errors	**7 (9.3%)** e.g. glisten → 'glistening'; happen → 'happening'	**7 (4.67%)** e.g. grow → 'growing'; recover → 'recovered'	**6 (8%)** e.g cower → 'cowering'; agonize → 'agonizing'	**1 (1.3%)** bewilder → 'bewildered'
Phonological errors	**0**	**2 (1.3%)** crumple → 'crumble' x2	**0**	**0**
Visual errors	**4 (5.3%)** e.g. vanish → 'vanquish'; wilt → 'welt'	**1 (0.67%)** blend → 'bleed'	**7 (9.3%)** e.g. proceed → 'recede'; meditate → 'mediate'	**17 (22.67%)** e.g. appease → 'appeal'; attain → 'attend'
Semantic errors	**1 (1.3%)** glisten → 'glitters'	**0**	**0**	**1 (1.3%)** bewilder → 'bewitch'
Unrelated / no response	**2 (2.6%)**	**3 (2%)**	**1 (1.3%)**	**5 (6.67%)**

Table 2: % of total responses falling into each error type on verb reading task

It should be noted that the error types designated 'word class changes' and 'affixation errors' in table 2 are closely related; the decision as to whether an affixation error should be counted as a word class change was somewhat arbitrary, and relied to a certain extent on intuition. Some were obvious: for example, MC produced *dine* as *'dinner'*, *resolve* as *'resolute'*, *thrive* as *'thrift'*; all such errors are classed as word class changes. Some were less obviously word class changes (though they could have counted as gerunds, gerundives, or adjectivisations), and these have been counted as

affixation errors. These include, for example, *happen* → *'happening'; live* → *'living'; recover* → *'recovered'*.

There were no significant differences in MC's performance across the three trials. MC read 29 of the 50 ambiguous unaccusative / transitive verbs correctly on all three occasions of testing. He read a further 14 correctly two out of three times, and two were read correctly only once. Overall, MC was correct on 80.67% of the ambiguous class, across all three testing occasions. In this class, MC made a total of 12 (8%) function word errors, and he changed the word class of the target 4 times, plus 7 affixation errors (see table 2 for some examples).

Of the unambiguous unaccusatives, 9 of the 25 were read correctly all three times (*blush, exist, die, arise, persist, emerge, perish, depart* and *prevail*). MC read 7 correctly on two out of three occasions, and 6 were read correctly only once. This meant that he was correct on 62.67% of all unaccusatives across all three testing occasions. He made 9 (12%) function word errors, and changed the word class of the target 5 times, with 7 affixation errors in addition. Other errors were visual (e.g. *vanish* → *'vanquish'*) and unrelated / no response.

MC made no function word errors on the intransitive verbs or on the low imageability / low frequency transitive verbs (n=25 of each, tested three times). Errors on the intransitive verbs were mainly word class changes (e.g. *convalesce* → *'convalescent', agree* → *'agreement'*), and on the low imageability class he made mainly visual errors (e.g. *confute* → *'confuse', attain* → *'attend'*). He correctly read 66.67% of the intransitives, and 68% of the transitive verbs.

3.2 Discussion of MC's verb reading

A chi-square statistical analysis was carried out to compare the numbers of correct responses, general errors and function word errors made by MC when reading the unaccusative verb classes and the other verb classes (transitive and intransitive). The differences were significant (χ^2 = 22.88, df = 2, $p < 0.001$). In order to ascertain whether there was a significant difference between the number of function word errors made on the unaccusatives and on other verbs, the data were partitioned and a further chi-square was carried out. This result too is significant (χ^2 = 19.41, df = 1; $p< 0.001$). This suggests that MC can, at some level, identify and react to unaccusativity, but generating the structure associated with the syntactic reflex of unaccusativity is problematic for him, and sometimes leads to his misidentification of an unaccusative verb as a functional category.

We have seen that MC makes this kind of error (function word substitutions) only on other function words; he never substitutes a function word for a substantive. His anomalous, and statistically significant, production of function word errors on unaccusative verbs suggests, in accordance with our theory of his access deficit, that unaccusative syntax involves the immediate requirement for some projection of a functional category (recall that MC's substitution errors are hypothesised to be due to

his access deficit, which prevents him from retrieving any item with a positive F specification from the lexicon; the best he can do is produce *any* 'categoryless' item in its place). Some speculations regarding the functional characteristics of unaccusatives, their differences from other verb classes which MC can read, and possible reasons for MC's ability to read some unaccusative verbs correctly, are discussed below.

4 Unaccusativity

4.1 Background considerations: the nature of unaccusativity

Unaccusatives are nonagentive verbs whose subject is assumed to be the underlying object, by the Uniform Theta Assignment Hypothesis (Baker 1988). Unaccusativity tends to be defined across semantic classes: as Levin and Rappaport Hovav (1995) put it, '*unaccusativity is syntactically represented but semantically determined*' (p.30). I would like to suggest, in the light of the data from MC, that unaccusativity must be *syntactically* determined; in this way, we can maintain a syntactic account of MC's deficits, which is a desirable outcome since his meaning representations of words he is unable to read appear to be relatively intact.

It has been suggested that unaccusatives involve some kind of lexical derivation (e.g. Reinhart 1997; Pesetsky 1995). On this view, unaccusatives are underlyingly related to transitive verbs, and many of them have a transitive alternation:

(1) a. The boy bounced the ball
    b. The ball bounced

(2) a. The sunlight faded the photographs
    b. The photographs faded

(3) a. Several difficulties diminished the impact of the theory
    b. The impact of the theory diminished

(4) a. The British consulate returned the tourists
    b. The tourists returned

Here I will consider the view, taken by Reinhart (1997) and Pesetsky (1995), that unaccusativity results from a process in the lexicon which suppresses one of the arguments of the transitive counterpart (the agent). This process may be a semantic 'reduction' as envisaged by Reinhart, or abstract affixation of the CAUS morpheme in the lexicon, as proposed by Pesetsky to capture the intuition of Levin and Rappaport Hovav that unaccusatives generally have some kind of causative meaning.

Reinhart (1997), seeking to capture some observed similarities between reflexives

and unaccusatives, considers two operations that can apply to the argument structure of verbs as represented in the lexicon. The first of these, saturation, is comparable to Grimshaw's (1990) notion of 'suppression', and is the process whereby one theta role undergoes existential binding. This is the process applied to the external argument of a passivised verb, so that passives have a semantic structure like that in (5) (Chierchia 1989: based on Reinhart's (8)):

(5) $\exists x$ (<u>wash</u> (x, θ_2)) Max was washed
(= x washed Max)

The second operation discussed by Reinhart is reduction, which she states to be equivalent to Grimshaw's (1990) lexical binding. This is the process seen in reflexivization; essentially, one argument of a two-place predicate is 'bound' to the other, yielding a semantics as in (6):

(6) R (<u>wash</u>) (θ_1) Max washed
(= Max washed Max)

Reflexivization results from reduction of the internal argument of the predicate. Reinhart suggests that reduction can also apply to the external argument, and this is what results in unaccusative syntax. Semantically, reduction of the external role must apply to a more complex abstract verb, which involves a causal relationship. The example that Reinhart uses to illustrate this point is *roll* (7 a, b, c; based on Reinhart's (16) and (17)):

(7) a. <u>roll</u> < θ_1, θ_2> Lucie rolled the stone
b. Reduction of internal argument:
R (<u>roll</u>) (θ_1) Lucie rolled (in order to impress us)
c. Reduction of external argument:
R_i (<u>roll</u>) (θ_2) The stone rolled (= a property of the stone caused the stone to roll)

Reinhart does not specify the nature of the underlying 'complex' abstract verb to which reduction of the external argument must apply. A possibility, however, comes from Pesetsky's work on Cascade syntax (Pesetsky 1995).

To simplify, Pesetsky suggests that there is an abstract morpheme, CAUS, which is affixed onto certain classes of verb in the lexicon. In common with some other kinds of affixation (such as, under certain circumstances, nominalisation and adjectivisation), Pesetsky claims that the attachment of the CAUS affix to a transitive serves the function of suppressing the external argument of the verb. This accounts for the often observed fact that unaccusatives cannot generally be passivised (see (8) - (11)):

(8) a. The train disappeared over the horizon
b. *The horizon was disappeared over (by the train)

(9) a. The shrub wilted in the poor soil
b. *The poor soil was wilted in (by the shrub)

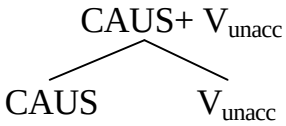
(10) a. The students arrived in the examination hall
b. *The examination hall was arrived in (by the students)

(11) a. John trembled under the stern gaze of the magistrate
b. *The stern gaze of the magistrate was trembled under (by John)

The external argument of an unaccusative has already been absorbed by affixation of some abstract morpheme, leaving no Agent role to be assigned to the passive morphology. According to Pesetsky, this would lead to a violation of the theta criterion, because effectively the passive morpheme *is* an argument, so must receive a theta role.

Pesetsky assumes that the features of the CAUS morpheme can be strong or weak, which implies that CAUS is a functional category. This suggests that an abstractly CAUS-affixed verb would be represented as a kind of functional head[7]:

(12)



Underlyingly, then, it could be assumed that an unaccusative has a structural representation which is the same as that for a transitive verb, with positions for internal and external arguments. But V_{unacc} has some 'diacritic' associated with its lexical entry, which means it must be affixed to CAUS[8] before entering the syntactic derivation.

The nature of the 'diacritic' for triggering affixation of an abstract functional morpheme is not clear, and I will not discuss it much here. However, to speculate,

[7] Pesetsky assumes that there are two varieties of CAUS, one which is affixal in nature and one which is prepositional. I am concerned with the former here, since that is the one assumed to be affixed to the verb in the lexicon. Although Pesetsky implies that $CAUS_{affix}$ is functional in nature, he does not specify exactly what kind of functional head it is. However, I do not think that this unclarity causes any problems for the present discussion.

[8] It should be clear that little rests on the assumption that it really is the CAUS morpheme which is affixed to the unaccusative verb in the lexicon. The suggestion is that *some* abstract functional head undergoes this lexical attachment, and that this is what triggers an unaccusative syntactic representation. CAUS is simply the best candidate (at present).

perhaps the ‘diacritic’ is the source of the semantic similarities often observed between the various classes of unaccusative verbs (e.g. predicates of existing and happening, non-voluntary emission of stimuli that impinge on the senses, etc - Perlmutter 1978). It may be that the trigger for unaccusativity via affixation of a functional morpheme to suppress the external argument is in fact some semantic feature. It is possible that the precise semantic feature responsible could vary crosslinguistically; for instance, Sorace (1995:160) suggests that unaccusative syntax could be triggered by stativity in Italian, telicity in Dutch, change leading to a new location in French, change leading to a new condition in English, and so on. In a way, this is similar to the Levin and Rappaport Hovav view, that unaccusativity is ultimately semantically determined; perhaps it turns out that this is necessarily the case after all. But it seems clear that unaccusativity *is* syntactically realised, and is the result of some syntactic process which occurs at a pre-Selection level. Whether some semantic feature triggers unaccusative syntax, or whether certain kinds of interpretation are made possible by the structural interaction between semantics and unaccusativity, a coherent syntactic account of unaccusatives is still required.

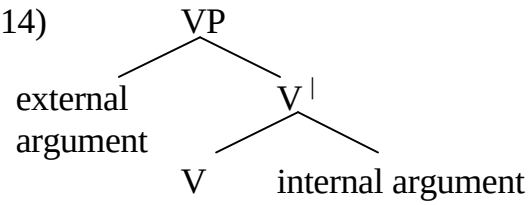
5 Accounting for MC’s unaccusative verb reading deficit

Given my earlier comments about MC’s (in)ability to carry out abstract affixation, I would like to pursue the notion that unaccusative syntax is the result of a lexical process of abstract affixation of a functional morpheme to a transitive verb.

Lexical affixation of CAUS absorbs the external theta role; this is the process which leads MC to make function word errors when reading unaccusatives, because affixation of V with CAUS is like adjunction of a lexical to a functional head (as illustrated in 13-16):

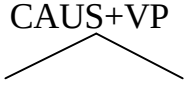
(13) V_{unacc} (underlying lexical representation)
Argument structure: [1, 2] (external and internal arguments selected for)

(14)



(15) CAUS + V_{unacc} (following lexical affixation of CAUS)
Argument structure: [2] (internal argument only is selected for; external θ-role has been absorbed by affixation of CAUS)

(16)



CAUS+V internal argument (external θ-role absorbed)

I assume that, when it enters the derivation, CAUS + VP has no specifier position because neither Case nor a theta role are to be assigned in spec,VP. The derived subject (if there is one; recall that we are considering the syntax of single words here) would be Merged as the complement of CAUS+V, and would then move to Spec,IP to check (nominative) Case.

As suggested above, MC is not able to carry out abstract affixation in the syntactic computation. This inability would appear to dissociate, given current assumptions, from a retained ability to carry out such affixation in the lexicon, prior to Select. This is consistent with the notion that MC's lexical representations and processes are intact. So MC is able to attach the CAUS morpheme to a transitive verb in the lexicon, permitting him to identify unaccusativity. The problem is that, when such affixation is carried out in MC's lexicon, the category he is trying to access is now marked as functional because of the presence of the CAUS morpheme. This is what leads to his function word errors on unaccusatives: successful application of abstract affixation of a functional morpheme in the lexicon.

Some problems remain: notably, the fact that MC is very often able to read unaccusative verbs correctly. This is straightforwardly accounted for in the case of unaccusatives with a transitive alternation; the lexical affixation process does not have to happen when the verbs are read in isolation, so that the structure projected can either be the functional one which incorporates the CAUS morpheme (the unaccusative alternate) or a straightforward extended projection with a lexical head (the transitive alternate). If affixation is applied, MC makes a function word error; if not (as happens about 80% of the time), he reads the verb correctly. If no transitive alternation is available, however, it is not clear how MC is able to read any of the verbs correctly; yet he did so, on this test, approximately two thirds of the time. Sometimes MC is able to substitute a related nominal or adjectival form for the target word, which would get him around the problem (he did this on the unambiguous unaccusatives 14.6% of the time).

The fact that MC is correct on any unaccusatives at all seems to work against Reinhart's suggestion that unaccusatives with no transitive alternation are lexically generated as 'frozen' in the unaccusative state (for Reinhart, this is with a reduction operation already applied to the external argument). I would suggest that unaccusatives, at least for MC and perhaps for everyone, are in fact stored as transitives in the lexicon, even when no transitive alternation is available in a language. Unaccusative syntax is triggered by lexical affixation of some functional morpheme, perhaps analogous to Pesetsky's CAUS, which absorbs the external theta role of the transitive. MC is able to read correctly only those instances of unaccusative verbs to which lexical affixation of the functional morpheme has not been applied[9].

[9] This leaves open the question as to what determines the (un)availability of a transitive /

6 Concluding Comments

My goal in this paper was to account for the observed verb reading deficit of an aphasic patient within the context of what we already understand of his disorder. I have discussed how his difficulties in reading function words led to a syntactic account of the deficit, and the similarity in errors on function word reading and unaccusative verb reading tasks suggested that a unitary approach to both effects was called for. By making use of various assumptions about the nature of unaccusativity, all of which are independently motivated, I have attempted to show that MC's disorder can be best accounted for by assuming the syntactic determination of unaccusativity. In this way, syntactic theory has provided an account of a hitherto unexplained deficit, and our patient has provided some evidence in favour of the view that unaccusatives are underlyingly represented as transitives and are subject to certain affixation operations prior to Selection from the lexicon. I hope I have also shown that neuropsychological accounts of acquired language disorders can benefit from the adoption of a well-articulated and independently motivated syntactic theory.

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unaccusative alternation for a particular verb. I have no solution to this at present: to speculate, it may be that the presence or absence of a transitive alternation in a language may depend on the relative strength or weakness of the semantic trigger for unaccusativity: for example, it may be that unaccusativity is a graded phenomenon, and the presence of more than one of the semantic features thought to trigger unaccusative syntax makes it more difficult to override the requirement for the CAUS (or similar) morpheme to be lexically attached and syntactically realised. This would predict that MC should make more function word errors on those verbs which are strongly unaccusative (i.e. have more than one of the relevant semantic features which trigger CAUS attachment), a possibility which has not yet been systematically considered. For MC, in any case, it could be argued that the situation is slightly different: overriding the trigger for unaccusative syntax actually saves the derivation, and makes it possible (some of the time) for him to project a structure and read the verb.

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Appendix
Verb reading list

Unaccusatives (25)	**ambiguous unaccusative / transitives (50)**		**intransitives (25)**	**low imageability / low frequency transitives (25)**
tremble	return	scatter	kneel	entail
depart	enter	shatter	pray	bewilder
perish	recover	burst	pretend	confute
exist	know	advance	hesitate	commit
happen	go	explode	meditate	appease
transpire	come	crumple	agree	daunt
occur	cease	improve	confabulate	verify
vanish	evaporate	rupture	genuflect	exalt
ensue	begin	roll	pant	censure
arise	soar	bounce	agonize	pledge
glisten	alter	continue	cringe	derive
remain	expand	increase	breathe	contemplate
arrive	hang	freeze	cower	hallow
wilt	fade	accumulate	dine	extenuate
thrive	dangle	gather	complain	enhance
emerge	grow	develop	decide	justify
live	shake	resolve	loiter	symbolise
linger	melt	settle	convalesce	alleviate
prevail	heal	spread	commiserate	declare
persist	vaporise	bend	concur	adjudicate
rise	choke	blend	excel	worship
reverberate	split	drown	forage	represent
deteriorate	stretch	boil	proceed	attain
die	suffocate	collapse	wallow	beguile
blush	survive	diminish	congregate	engross